Report on National Greenhouse Gas Inventory System in the Republic of Moldova – 2021

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Contents

Introduction

The "Report on National Inventory System in the Republic of Moldova - 2021" was developed within the Project "Republic of Moldova: Enabling Activities for the Preparation of the Third Biennial Update Report under the United Nations Framework Convention on Climate Change" implemented by the Public Institution "Environmental Projects Implementation Unit" and United Nations Environment Programme, with financial support of the Global Environment Facility, drawing on six templates worked out by the Environmental Protection Agency of the United States of America (US EPA)[1].

The Report provides complete documentation of every major component related to the inventory management process in the Republic of Moldova on anthropogenic emissions of greenhouse gases by sources and removals by sinks, which are not regulated by the Montreal Protocol.

The advantages of using the predefined templates (adapted to national conditions of the Republic of Moldova) are as follows:

- They focus on documenting essential information in a concise format and avoid unnecessary waste of time in lengthy report writing;
- They ensure understanding of roles and responsibilities;
- They are adapted to different levels of national capacity; They standardize the tasks to be achieved, which allows a comparative analysis of national inventory systems and a comparison and review of data from different countries;
- They provide an objective and effective system for identifying priorities for future improvements;
- They serve as guideline and starting point for the national inventory team in the development of future national GHG inventories;
- They help the national team to apply the 2006 IPCC Guidelines for National Emission Inventories of GHG emissions (IPCC, 2006) and other guidance of the UNFCCC on development of national GHG inventories;
- They ensure transparency in matters relating to the operation of the National Inventory System in the Republic of Moldova; and
- They facilitate the improvement of the inventory over time.

The six predefined templates for the development of the National Inventory System are as follows:

1. **Institutional Arrangements for the National Inventory System (IA)** – assist the national inventory team to assess and document strengths and weaknesses of existing institutional arrangements in developing the national inventory of anthropogenic emissions of greenhouse gas by sources and removals by sinks, ensure its continuity and integrity and promote the inventory institutionalization process.
2. **Methods and Data Documentation (MDD)** – aassist national inventory team in documentation and communication of the origin of the methodology used, of activity data sets and emission factors used to estimate future GHG emissions or removals; the future national teams inventory will be able to refer to the template completed for each source and sink category to determine what information was collected, how the data were obtained and what calculation methods were used, and to reproduce estimates of GHG emissions.

[1] <www.epa.gov/climatechange/emissions/ghginventorycapacitybuilding>.

3. **Description of Quality Assurance / Quality Control (QA/QC)** – guides the national entity responsible for managing the national inventory system in creating a Plan for quality assurance and quality control in a cost-effective manner to improve transparency, consistency, comparability, completeness and accuracy of the national inventory of anthropogenic emissions of greenhouse gases from sources and sinks not controlled by the Montreal Protocol; the template includes checklists with recommended QA / QC procedures that are suitable for staff with management responsibility, such as the Inventory Coordinator, QA/QC Coordinator, as well as sectorial coordinators.
4. **Description of the Archiving System (AS)** – an archiving system is a relatively inexpensive component, but particularly important for a sustainable national inventory system; the archiving system allows for easy reproduction of estimates, ensures avoiding loss of data and information and facilitates further development of inventories by staff involved in the inventory process.
5. **Key Category Analysis (KCA)** – identifies sources or sinks that contributing the most to the total national emissions and therefore it constitutes a priority objective for improvement efforts. KCA tools and template are consistent with 2006 IPCC Guidelines for National Emission Inventories of GHG emissions (IPCC, 2006).
6. **National Inventory Improvement Plan (NIIP)** – is a summary of conclusions on capacity building needs and it describe specific priorities for future activities based on the capacity needs identified following completion of the first five templates; the plan facilitates continual inventory improvements.

Chapter 1: Institutional Arrangements

1: Institutional Arrangements

2: Methods and Data Documentation

3: Description of QA/QC Procedures

4: Description of Archiving System

5: Key Category Analysis

6: National Inventory Improvement Plan

Contact data of the Coordinator of the National Greenhous Gas Inventory Working Group

Country	Republic of Moldova	**Postal address:**	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova
Name:	Taranu Marius	**Telephone/Fax:**	+373 22 23 22 47
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Organization:	Public Institution "Environmental Projects Implementation Unit"	**URL:**	http://www.clima.md

1. Institutional Arrangements

1.1. Overview of Current Inventory Management Team

Table 1.1: Designated Inventory Agency

Designated Inventory Agency, as of September 2021	UNFCCC focal point	Describe the arrangements or relationship between Inventory Agency and UNFCCC Focal Point Agency
Environment Agency	The Ministry of Environment of the Republic of Moldova is the state authority vested with the power to develop and promote policies and strategies addressing environment protection and climate change, as well as natural resources. On behalf of the Government of the Republic of Moldova, the Ministry of Environment is responsible for implementing international environmental treaties to which the Republic of Moldova is a party (including the United Nations Framework Convention on Climate Change). The Head of Air and Climate Change Policies Department of the Ministry of Environment holds the position of the UNFCCC focal point.	The Environmental Agency, established in accordance with the Governmental Decision No. 549 as of 13.06.2018, was designated as the Competent Authority responsible for ensuring the functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change, established by Governmental Decision No. 1277 as of 26.12.2018. The Public Institution "Environmental Projects Implementation Unit" (PI "EPIU"), established by Governmental Decision No. 1249 as of 19.12.2018, has the mission to provide support to Ministry of Environment and the organizational structures in its area of competence (including Environment Agency), in order to effectively implement financial and technical assistance projects, external and internal in the field of environmental protection and use of natural resources. The Steering Committee (SC) of the PI "EPIU" facilitates the project activities coordination, providing transparency and guidance, ensuring high-level support and sustainability of the project results and having decision-making power over all aspects of the project implementation. The SC meet on regular basis to evaluate progress of work, advise project execution, and where necessary provide overall direction and oversight to the project. The State Secretary in the field of Environment Protection and Natural Resources acts as Chairman of the SC and ensure effective communications between all key actors and relevant partners. The GHG Inventory Working Group established within the PI "EPIU" holds responsibility for the activities associated with the preparation of national communications, updated biennial reports, national inventory reports and national GHG inventories, following the delegation of these responsibilities by the Environment Agency to PI "EPIU", by Letter No. 3471 as of 25.09.2019.

Table 1.2: National GHG Inventory Working Group

Role	Name	Organization	Contact data
Coordinator of GHG Inventory Working Group	Marius Taranu, MSc in Biology	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: marius.taranu@uipm.gov.md
Energy Sector Lead	Elena Bicova, PhD in Power Engineering	Institute of Power Engineering	St. Academiei 5, room 443, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94, E-mail: bicovaelena279@gmail.com
Industrial Processes and Product Use Sector Lead	Anatolie Tarita, PhD in Biology	Institute of Ecology and Geography	St. Academiei 3, room 437, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-71-89-38, +373-22-72-17-74, E-mail: ozonmd@mail.ru
Agriculture Sector Lead	Sergiu Cosman, PhD in Agriculture	Scientific-Practical Institute for Biotechnology in Animal Breeding and Veterinary Medicine	Maximovca village, Anenii-Noi district, MD-6525, Republic of Moldova Tel.: +373-22-35-93-57; +373-22-35-92-95, E-mail: sergiu_cosman@mail.ru
Land Use, Land-Use Change and Forestry Sector Lead	Ion Talmaci, MSc in Biology	Forestry Research and Management Institute	St. Calea Iesilor 69, MD-2069, Chisinau, Republic of Moldova Tel.: +373-22-92-89-59, E-mail: iontalmaci@mail.ru
Waste Sector Lead	Tatiana Tugui, PhD in Chemistry	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel./Fax: +373-22-22-25-42, E-mail: tuguitatiana@ymail.com
Archive Manager	Marius Taranu, MSc in Biology	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: marius.taranu@uipm.gov.md

Role	Name	Organization	Contact data
QA/QC Coordinator	Marius Taranu, MSc in Biology	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: marius.taranu@uipm.gov.md
Uncertainties Analysis Coordinator	Marius Taranu, MSc in Biology	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: marius.taranu@uipm.gov.md

1.2. Sectoral Roles and Arrangements

Table 1.3: Energy Sector Institutional Arrangements

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Energy Sector Lead, responsible also for categories: 1A3 Transport and International aviation	Institute of Power Engineering	Elena Bicova, PhD in Power Engineering	St. Academiei 5, room 443, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94 E-mail: bicovaelena279@gmail.com	Yes	Personal contract for provision of consultancy services
Consultant compiling estimates from categories 1A1 Energy Industries, 1A5 Other and 1B2 Fugitive emissions from oil and natural gas	Institute of Power Engineering	Irina Vasiliev, MSc in Power Engineering	St. Academiei 5, room 443, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94 E-mail: vasiliev_irina@yahoo.com	Yes	Personal contract for provision of consultancy services
Consultant compiling estimates from category 1A2 Manufacturing industries and constructions	Institute of Power Engineering	Larisa Moraru	St. Academiei 5, room 421, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-72-80-62 E-mail: moraru-larisa@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant compiling estimates from category 1A4 Other sectors and CO_2 emissions from biomass	Institute of Power Engineering	Tatiana Kirillova	St. Academiei 5, room 439, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94 E-mail: kirillova_tanea@mail.ru	Yes	Personal contract for provision of consultancy services
Data provider (Energy Balance of the Republic of Moldova)	National Bureau for Statistics, Division for statistics of industry and energy	Galina Ermurachi, Head of division	St. Grenoble 106, MD-2019, Chisinau, Republic of Moldova Tel.: +373-22-40-30-58, E-mail: galina.ermurachi@statistica.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 93 as of 26.05.2017 on official statistics and Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel use and amount of produced power and heat)	Termoelectrica" JSC	Alexander Rudenco, Engineer	St. Mesterul Manole 3, MD-2023, Chisinau, Republic of Moldova Tel.: +373-22-82-93-66 E-mail: anticamera@termoelectrica.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Data provider (fuel use, amount of produced power and heat and the CHP-1 technical specifications)	"Termoelectrica" JSC ("CHP-1" unit)	Tatiana Comarova, Engineer	St. Vadul lui Voda 5, MD-2023, Chisinau, Republic of Moldova Tel.: +373-22-40-33-19 E-mail: anticamera@termoelectrica.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel use, amount of produced power and heat and the CHP-2 technical specifications)	"Termoelectrica" JSC ("CHP-2" unit)	Oxana Contedailova, Engineer	St. Mesterul Manole 3, MD-2023, MD-2023, Chisinau, Republic of Moldova Tel.: +373-22-38-53-54 E-mail: lpm@termoelectrica.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel use, amount of heat produced and technical specifications of HPs)	"Termoelectrica" JSC ("Termoservice" unit)	Oleg Sarateanu, Engineer	St. Tudor Vladimirescu 6, MD-2024, Chisinau, Republic of Moldova Tel.: +373-22-83-93-12 E-mail: anticamera@termoelectrica.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel use, amount of produced power and heat)	"CHP-North" JSC	Ecaterina Mașcenco, Engineer	St. Stefan cel Mare 168, MD-3100, Balți, Republic of Moldova Tel.: +373-231-53-366 E-mail: ecaterina.mascenco@cet-nord.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (information included in the State Registry of Vehicles, including number of vehicles by type of classes, age, fuel use)	Public Service Agency	Olesea Savcenco	St. Puskin 42, MD-2012, Chisinau, Republic of Moldova Tel.: +373-22-25-70-70 / +373-22-26-95-94 E-mail: olesea.savcenco@asp.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (diesel oil consumption for international maritime transportation)	Public Institution Harbor Master Giurgiulesti	Victor Andrusca, Master of Giurgiulesti Harbor	Hincesti Highway 53A, MD-2028, Chisinau, Republic of Moldova, Tel./Fax: +373-22-73-13-96 E-mail: info@maradmoldova.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (diesel oil consumption for naval transportation)	Fluvial Harbor Ungheni (on Prut River)	Vladimir Medvedev, Interim Administrator	St. Lacului 1, MD-3600, Ungheni, Republic of Moldova, Tel.: +373-236-3-32-70; +373-236-3-32-75 Fax: +373-236-3-38-56 E-mail: portungheni@gmail.com	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Data provider (diesel oil consumption for naval transportation)	State Enterprise "Bacul Molovata" (on Dniester River)	V. Carpov, Administrator	St. Alexandri 1, Molovata Noua village, Dubasari district, MD-4576, Republic of Moldova, Tel.: +373-248-51-330	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel use and number of engines, wagons and trains)	State Company "Railways of Moldova"	Alexei Chitoroaga	St. Vlaicu Parcalab 48, MD-2012, Chisinau, Republic of Moldova Tel.: 373-22-83-49-00 Fax: +373-22-83-43-90 E-mail: cfm@railway.md, alexei.chitoroaga@railway.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (use of fuels and lubricants in the National Army of the Republic of Moldova)	Ministry of Defense	Lucia Brunchi	Hancesti Highway 84, MD-2021, Chisinau, Republic of Moldova, Tel.: +373-22-25-24-07 E-mail: lucia.brunchi@army.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel use for domestic and international aviation, number of airplanes used and number of flights)	Civil Aeronautical Authority of the Republic of Moldova	Veronica Onesciuc	Bd. Dacia 80/2, MD-2026, Chisinau, Republic of Moldova, Tel.: +373-22-82-35-00 / +373-22-82-35-93 Fax: +373-22-52-91-18 E-mail: veronica.onesciuc@caa.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import, use, transit and technology loss of natural gas, specifications of natural gas distribution networks and main pipelines)	"Moldovagaz" JSC	Vitalie Gheorghita / Valeriu Taraburca	St. Puskin 64, MD-2005, Chisinau, Republic of Moldova, Tel.: +373-22-57-87-07 / 373-22-57-81-16 Fax: +373-22-57-81-40 E-mail: vitalie.gheorghita@moldovagaz.md valeriu.taraburca@moldovagaz.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (fuel import and export)	Customs Service of the Republic of Moldova	Cristina Fetescu / Tatiana Balan	St. Nicolae Starostenco 30, MD-2065, Chisinau, Republic of Moldova, Tel./Fax: +373-22-273-061 Tel.: +373-22-574-224 E-mail: cristina.fetescu@customs.gov.md, tatiana.balan@customs.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Consultant responsible for verification and quality control (QC)	Institute of Power Engineering	Irina Vasiliev, MSc in Power Engineering	St. Academiei 5, room 443, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94 E-mail: vasiliev_irina@yahoo.com	Yes	Personal contract for provision of consultancy services

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Consultant responsible for quality assurance (QA)	Institute of Power Engineering	Mihai Tirsu, PhD in Power Engineering	St. Academiei 5, room 400, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-53-84, Fax: +373-22-73-53-82 E-mail: tirsu.mihai@gmail.com	No	Personal contract for provision of consultancy services
Consultant responsible for uncertainty analysis	Institute of Power Engineering	Elena Bicova, PhD in Power Engineering	St. Academiei 5, room 443, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94 E-mail: bicovaelena279@gmail.com	Yes	Personal contract for provision of consultancy services

Table 1.4: Industrial Processes and Product Use Sector Institutional Arrangements

Role	Organization	Contact [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Industrial Processes and Product Use Sector Lead, responsible also for compiling estimates from categories 2F Product Use as Substitutes for ODS and 2G Other Product Manufacture and Use	Institute for Ecology and Geography	Anatol Tarita, PhD in Biology	St. Academiei 3, room 437, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-71-89-38 / +373-22-72-17-74 E-mail: ozonmd@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant responsible for categories: 2A Mineral Industry, 2B Chemical Industry, 2C Metal Industry, 2D Non-Energy Products from Fuels and Product Use and 2H Other	Institute for Ecology and Geography	Vladimir Brega, PhD in Chemistry	St. Academiei 1, room 405, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-71-94-48 / +373-22-73-19-18 E-mail: bregaradu@rocketmail.com	Yes	Personal contract for provision of consultancy services
Data provider (Statistical Reports PRODMOLD – A "Production in natural expression in the industry of the Republic of Moldova)"	National Bureau for Statistics, Division for statistics of industry and energy	Galina Ermurachi, Head of Division	St. Grenoble 106, MD-2019, Chisinau, Republic of Moldova Tel.: +373-22-40-30-58, E-mail: galina.ermurachi@statistica.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 93 as of 26.05.2017 on official statistics and Law No. 982 of 11.05.2000 on access to information.
Data provider (data on annual production of cement and clinker, use of raw materials and additional material resources)	Lafarge Cement (Moldova) JSC	Olga Ignatenco	St. Viitorului 1, MD-5400, Rezina, Republic of Moldova, Tel.: +373-254-55-500 / +373 69 888 289 Fax: +373-254-55-549 E-mail: olga.ignatenco@lafargeholcim.com	No	The information is requested through an official letter of the Director of Environment Agency addressed to General Director of Lafarge Ciment JSC (Moldova). The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on annual production of bricks and expanded clay and use of raw materials)	Building Materials Company "MACON" JSC	Maxim Vasiliev, Head of Production Development and New Technologies Department	St. Uzinelor 104, MD-2023, Chisinau, Republic of Moldova, Tel.: +373-22-40-58-88, +373-22-40-58-60 Fax: +373-22-47-43-21, +373-22-47-43-63 E-mail: c.macon@yandex.ru	No	The information is requested through an official letter of the Director of Environment Agency addressed to General Director of the Building Materials Company "MACON" JSC. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.

Role	Organization	Contact [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Data provider (data on annual production of glass and raw material use)	State Enterprise "Chisinau Glass Factory"	V. Zubovici, Engineer	St. Transnistria 20, MD-2023, Chisinau, Republic of Moldova, Tel.: +373-22-47-39-26, +373-22-47-39-34 Fax: +373-22-47-38-70, +373-22-47-34-30 E-mail: moldova@glassf.mldnet.com, kazuca@rambler.ru, elizfsc@rambler.ru	No	The information is requested through an official letter of the Director of Environment Agency addressed to General Director of the State Enterprise "Chisinau Glass Factory". The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on annual production of glass and raw material use)	IM „Glass Container Company" S.A.	Ion Tibuh, Engineer	St. Uzinelor 201, MD-2023, Chisinau, Republic of Moldova, Tel.: +373-22-47-24-18, +373-22-47-24-45 Fax: +373-22-47-24-32, +373-22-47-54-57 E-mail: gcc@gcc.md, iontibuh@rambler.ru	No	The information is requested through an official letter of the Director of Environment Agency addressed to General Director of the Joint Venture „Glass Container Company" JSC. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on annual production of sugar and specific consumption of limestone per tone of sugar beet processed, as well as data on fuels consumption for sugar production)	S.R.L. Sudzucker-Moldova (Sugar Factory)	Diana Gherța	St. 27 August 1, or. Drochia, Republic of Moldova, Tel.: +373-252-2-80-10 Fax: +373-252-2-80-30 Email: Diana.Gerta@szm.md	No	The information is requested through an official letter of the Director of Environment Agency addressed to General Director of the S.R.L. Sudzucker-Moldova (Sugar Factory). The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on extracted non-metal calcareous minerals to be used as raw materials in industrial processes which involve limestone oven combustion)	Agency for Geology and Mineral Resources, Geology Division	Adriana Curcubet, Senior Specialist	St. Mitropolit Dosoftei 156, MD-2004, Chisinau, Republic of Moldova Tel.: +373-22-75-06-56; +373-22-75-14-38 Fax: +373-22-75-08-63, E-mail: agrm@agrm.gov.md, adriana.curcubet@agrm.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on production of bitumen-based asphalt mixtures (asphalt concrete) for works on roads and bridges)	State Enterprise "State Road Administration"	Petru Triboi	St. Bucuriei 12A, MD-2004, Chisinau, Republic of Moldova, Tel.: +373-22-74-05-70; +373-22-74-12-05 Fax: +373-22-22-22-80 E-mail: serviciu@asd.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information Law No. 982 of 11.05.2000 on access to information.
Data provider (import and export of industrial products, including cooling equipment and refrigerants)	Customs Service of the Republic of Moldova	Cristina Fetescu / Tatiana Balan	St. Nicolae Starostenco 30, MD-2065, Chisinau, Republic of Moldova, Tel./Fax: +373-22-273-061 Tel.: +373-22-574-224 E-mail: cristina.fetescu@customs.gov.md, tatiana.balan@customs.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on share of different refrigeration agents incorporated in refrigeration equipment and air conditioning devices imported in Moldova)	Non-governmental association of refrigeration technicians of the Republic of Moldova	Vasile Cartofeanu, Director	St Studentilor 9/6, room 204, MD-2045, Chisinau, Republic of Moldova, Tel.: +373-22-32-17-16, +373-22-50-99-30 Fax: +373-22-50-99-40 E-mail: vasile.cartofeanu@fimit.utm.md	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of Non-governmental association of refrigeration technicians. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.

Role	Organization	Contact [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Data provider (import of refrigeration equipment and refrigerants)	Trade Company ECOLUX Ltd (S.C. Ecolux S.R.L.)	Lilia Gudi	St. Sfintul Gheorghe 3, MD-2001, Chisinau, Republic of Moldova, Tel.: +373-22-50-09-63 Fax: +373-22-50-09-64 Mobile: +373-69-44-54-55 E-mail: office@ecolux.md Web: http://www.ecolux.md	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of Trade Company ECOLUX Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import of refrigeration equipment and refrigerants)	Trade Company MASFRIGCOM Ltd (S.R.L. MASFRIGCOM)	Stepan Marinov, Director / Stela Buzi, Chief Accountant	St. V. Crasescu 1, MD-3700, or. Straseni, Republic of Moldova, Tel.: +373-237-2-24-28, Fax: +373-237-2-30-13, Mobile: +373-69-12-50-83, E-mail: marinov@mtc-st.md, stelab93@mail.ru	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of the Trade Company MASFRIGCOM Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import of refrigeration equipment and refrigerants)	Trade Company FRIGOMAS Ltd (FRIGOMAS S.A.)	Petru Bonta, Director	St. Chișinăului 12/10, MD-3702, or. Straseni, Republic of Moldova, Tel.: +373-237-2-31-30, +373-237-2-43-36 Mobile: +373-79-54-90-41 E-mail: frigomas@rambler.ru	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of the Trade Company FRIGOMAS Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import of refrigeration equipment and refrigerants)	Trade Company FRIO-DINS Ltd (FRIO-DINS SRL)	Arcadie Cojocari, Director	St. Florilor 1, MD-2068, Chisinau, Republic of Moldova, Tel./Fax: +373-22-49-01-32, Mobile: +373-69-15-63-22, E-mail: arcadie.cojocari@gmail.com, arcadie.cojocari@mail.ru	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of Trade Company FRIO-DINS Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import of refrigeration equipment and refrigerants)	Trade Company FRIG INDUSTRIAL Ltd (FRIG INDUSTRIAL SRL)	Valerii Colesnicov, Director / Natalia Stamboliu, Chief Accountant	St. Acad. Sergiu Rădăuțanu 7, Ap. 86, Chisinau, Republic of Moldova, Tel.: +373-22-473-716, GSM: +373-68-091-341 / +373 69 381 668 E-mail: colesnicov@frigoind.com, contabilsef999@gmail.com	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of the Trade Company FRIGOIND Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import of refrigeration equipment and refrigerants)	Trade Company DINA COCIUG Ltd (Dina Cociug SRL)	Cociug Mihail, General Director / Vasile Postolachi, Deputy General Director	38/7, Dacia Av., MD-2060, Chisinau, Republic of Moldova Tel/Fax: +373-22-56-88-30 / 56-88-75 Mobile: +373-79-70-37-05 E-mail: cociug@dina.md, dina@dina.md, ofice.dina@gmail.com	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of Trade Company DINA COCIUG Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (import of refrigeration equipment and refrigerants)	Trade Company YORK REFRIGERENT Ltd (SRL York Refrigerent)	Sergiu Baltaga, General Director / Olga Gorodetcaia, Import Manager	St. Mihail Kogalniceanu 22, of. 9 MD-2001, Chisinau, Republic of Moldova Tel/Fax: +373-22-226-016; +373-22-273-943; E-mail: yorkrefrigerent@gmail.com	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of Trade Company YORK REFRIGERENT Ltd. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.

Role	Organization	Contact [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on GHG inventory development? [Yes/No]	Comments [Institutional arrangements]
Data provider (data on number and capacity of electrical equipment – high voltage powered installations, using sulphur hexafluoride and perfluorocarbons as insulating gas)	Foreign Capital Company "Premier Energy" JSC (ICS "Premier Energy" S.A.)	Lilian Cernolevckii, Quality and Environment Department	St. Andrei Doga 4, MD-2024, Chisinau, Republic of Moldova Tel.: +373-22-43-13-60 / +373-22-43-16-75 Mobile: +373-62-16-13-60 E-mail: LCernolevckii@premierenergy.md	No	The information is requested through an official letter of the Director of Environment Agency addressed to the Director of Foreign Capital Company GAS NATURAL FENOSA JSC. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on number and capacity of electrical equipment – high voltage powered installations, using sulphur hexafluoride and perfluorocarbons as insulating gas)	State Company "Moldelectrica" (IS "Moldelectrica")	N. Melnicenco	St. Vasile Alexandri 78, MD-2012, Chisinau, Republic of Moldova Tel. +373-22-22-22-70, +373-22-25-33-96 Fax: +373-22-25-31-42 E-mail: cancelar@moldelectrica.md, melnicenco@moldelectrica.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on number and capacity of electrical equipment – high voltage powered installations, using sulphur hexafluoride and perfluorocarbons as insulating gas)	S.A. "Furnizarea Energiei Electrice Nord" Bălți (FEE-Nord)	Octavian Blaj / Plesca Vorel	St. Strii 17A, MD 3100, mun. Balti, Republic of Moldova Tel. +373-231-164-307 Mob.: +373-62-163-411 E-mail: anticamera@fee-nord.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (data on import of pressurized aerosols with inhalation dosing, propulsion substance based on HFCs)	Medicines and Medical Devices Agency (Agentia Medicamentului si Dispozitivelor medicale)	Eremei Prisneajniuc / Anastasia Babileva	St. Korolenco 2/1, MD-2028, Chisinau, Republic of Moldova Tel. +373-22-884-301, +373-22-88-43-08 E-mail: office@amdm.gov.md, anastasia.babileva@amdm.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (information on number of vehicles registered in the Republic of Moldova, according to data of the State Registry of Vehicles)	Public Service Agency	Olesea Savcenco	St. Puskin 42, MD-2012, Chisinau, Republic of Moldova Tel.: +373-22-25-70-70 / +373-22-26-95-94 E-mail: anticamera@asp.gov.md, olesea.savcenco@asp.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Consultant responsible for verification and quality control (QC)	Institute for Ecology and Geography	Anatol Tarita, PhD in Biology	St. Academiei 3, room 437, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-71-89-38 / +373-22-72-17-74 E-mail: ozonmd@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant responsible for quality assurance (QA)	Technical University of Moldova, Faculty of Urbanism and Architecture, "Engineering of Heat, Gas and Climate Control Systems in Buildings and Environment Protection" Program	Natalia Beglet, PhD in Power Engineering	St. 31 August 1989 78/2, MD-2004, Chisinau, Republic of Moldova, Tel: +373-68-16-88-22 E-mail: natalia.beglet@gmail.com	No	Personal contract for provision of consultancy services
Consultant responsible for uncertainty analysis	Institute for Ecology and Geography	Vladimir Brega, PhD in Chemistry	St. Academiei 1, room 405, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-71-94-48 / +373-22-73-19-18 E-mail: bregaradu@rocketmail.com	Yes	Personal contract for provision of consultancy services

Table 1.5: Agriculture Sector Institutional Arrangements

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on development of GHG inventory? [Yes/No]	Comments [Institutional arrangements]
Agriculture Sector Lead, responsible also for categories: 3A Enteric Fermentation and 3B Manure Management	Scientific-Practical Institute for Biotechnology in Animal Breeding and Veterinary Medicine	Sergiu Cosman, PhD Hab. in Agriculture	Maximovca village, Anenii-Noi district, MD-6525, Republic of Moldova Tel.: +373-22-35-93-57; +373-22-35-92-95, E-mail: sergiu_cosman@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant responsible for compiling estimates for categories 3D Agricultural Soils and 3H Urea Application	Public Institution "Environmental Projects Implementation Unit	Lilia Taranu, PhD in Biology	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: l.taranu@yahoo.com	Yes	Personal contract for provision of consultancy services
Data provider (Statistical Reports No. 9-AGR „Use of plant protection products and introduction of artificial and natural fertilizer", No. 29-AGR „Production obtained from crops harvested from all seeded area")	National Bureau for Statistics, Statistics in Agriculture and Environment Division, Section for Agricultural Statistics	Maria Chiperi, Senior Consultant	St. Grenoble 106, MD-2019, Chisinau, Republic of Moldova Tel.: +373-22-21-08-80 E-mail: maria.chiperi@statistica.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 93 as of 26.05.2017 on official statistics and Law No. 982 of 11.05.2000 on access to information.
Data provider (Statistical Reports No. 6 "Number of cattle and poultry in households", No. 15-AGR "Livestock number", No. 24-AGR „Condition of the livestock sector")	National Bureau for Statistics, Division for Statistics in Agriculture and Environment, Section of Agricultural Censuses	Elena Cojocaru, Senior Consultant	106, Grenoble Str., MD-2019, Chisinau, Republic of Moldova Tel.: +373-67-770-625 E-mail: elena.cojocaru@statistica.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 93 as of 26.05.2017 on official statistics and Law No. 982 of 11.05.2000 on access to information.
Data provider (meteorological information: air temperature, precipitations, relative humidity, saturation deficit, solar radiation, direction and speed of wind)	State Hydrometeorological Service	Lidia Trescilo, Head of Meteorology Department	St. Grenoble 134, MD-2072, Chisinau, Republic of Moldova Tel: +373-22-773-644 Fax: +373-22-773-636 E-mail: lidia.trescilo@meteo.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Consultant responsible for verification and quality control (QC)	Scientific-Practical Institute for Biotechnology in Animal Breeding and Veterinary Medicine	Sergiu Cosman, PhD Hab. in Agriculture	Maximovca village, Anenii-Noi district, MD-6525, Republic of Moldova Tel.: +373-22-35-93-57; +373-22-35-92-95, E-mail: sergiu_cosman@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant responsible for quality assurance (QA)	Institute for Pedology, Agrochemistry and Soil Protection "Nicolae Dimo"	Tamara Leah, Prof., PhD in Biology	St. Ialoveni 100, MD-2070, Chisinau, Republic of Moldova Tel: +373-22-28-48-43 / 28-48-62, Fax: +373-22-28-48-55 E-mail: tamaraleah09@gmail.com	No	Personal contract for provision of consultancy services
Consultant responsible for uncertainty analysis	Public Institution "Environmental Projects Implementation Unit	Lilia Taranu, PhD in Biology	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: l.taranu@yahoo.com	Yes	Personal contract for provision of consultancy services

Table 1.6: Land Use, Land-Use Change and Forestry Sector Institutional Arrangements

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on development of GHG inventory? [Yes/No]	Comments [Institutional arrangements]
LULUCF Sector Lead, consultant responsible also for categories: 4A Forest Land and 4G Harvested Wood Products	Forestry Research and Management Institute	Ion Talmaci, Technical Deputy Director	St. Calea Iesilor 69, MD-2069, Chisinau, Republic of Moldova Tel: +373-22-92-89-59 Fax: +373-22-59-33-51 E-mail: iontalmaci@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant responsible for compiling estimates for categories 4B Cropland, 4E Settlements and 4F Other Land	Service for Prognoses, Monitoring, Programs and Strategies, Forestry Research and Management Institute, "Moldsilva" Agency	Liliana Spitoc, Head of Service	St. Calea Iesilor 69, MD-2069, Chisinau, Republic of Moldova Tel.: +373-22-92-89-56 E-mail: liliana.spitoc@yahoo.com	Yes	Personal contract for provision of consultancy services
Consultant responsible for compiling estimates for categories 4C Grassland and 4D Wetlands	National Botanical Garden (Institute) "Alexandru Ciubotaru"	Aliona Miron, PhD in Biology, Scientific Deputy Director	St. Padurii 18, MD-2002, Chisinau, Republic of Moldova Tel.: +373-22-55-61-45; Fax: +373-22-55-04-43 E-mail: aliona_miron@yahoo.com	Yes	Personal contract for provision of consultancy services
Data provider (Statistical Report No. 2-LIV-VII "Establishing and deforestation of multiannual plantations, production of seeding material")	National Bureau for Statistics, Division for Statistics in Agriculture and Environment, Environment Statistics Service	Ludmila Lungu, Head of Service	St. Grenoble 106, MD-2019, Chisinau, Republic of Moldova Tel.: +373-22-73-75-42 E-mail: ludmila.lungu@statistica.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 93 as of 26.05.2017 on official statistics and Law No. 982 of 11.05.2000 on access to information.
Data provider (Statistical Report on Forest Cultivation; Statistical Report on Condition of Forests; Statistical Report on Release of Wood mass, forest care works and associated uses; Statistical Report on Cases of Forestry Fires; Forest Balance of Land Managed by "Moldsilva" Agency Report on deforested areas and transferred to another land use category; Report on forest guarding; State accounting of forestry fund; Forestry improvement; Report on forest areas and other forest land categories in which N based fertilizer was applied; Report on forest areas and other forest land categories which were improved by application of limestone and dolomite)	Division for Forestry Fund, Protected Areas, Guarding and Protection, "Moldsilva" Agency	Petru Rotaru, Head of Division	Ave. Stefan cel Mare 124, Chisinau, Republic of Moldova Tel: +373-22-27-23-06, +373-22-272-425, Fax: +373-22-27-73-45 E-mail: petru.rotaru@moldsilva.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings on development of GHG inventory? [Yes/No]	Comments [Institutional arrangements]
Data provider (Land Cadaster, as of 1st January of the reporting year)	Agency for Land Relations and Cadaster, Division Cadaster of Real Estate	Octavian Mocreac, Leading Consultant	St. Serghei Lazo 48, MD-2004, Chisinau, Republic of Moldova Tel: +373-22-88-12-55; +373-22-88-12-63 Fax: +373-22-22-63-73 E-mail: octavian.mocreac@arfc.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (Report on area of forests and other categories of forest vegetation affected by fires (for land which is not managed by "Moldsilva" Agency); Report on illegal deforestation in forests and other types of forest vegetation; Report on wood mass approved for harvesting)	Environment Protection Inspectorate, Direction for Flora and Fauna	Valentina Moisei, Deputy Head of Direction	St. Constantin Tanase 9, MD-2005, Chisinau, Republic of Moldova Tel.: +373-22-24-23-26 E-mail: moisei.valentina@ies.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Data provider (Report on wood mass approved for harvesting)	Environmental Agency, Directorate for Regulation and Permissive Environmental Acts	Gavrilaș Veaceslav, Head of Direction	MD-2005, 38 Albișoara str., Chisinau, Republic of Moldova; Tel: +373-22-820-791; +373-22-820-770; E-mail: v_gavrilas@mediu.gov.md, am@mediu.gov.md;	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 982 of 11.05.2000 on access to information.
Consultant responsible for verification and quality control (QC)	Forestry Research and Management Institute	Ion Talmaci, Technical Deputy Director	St. Calea Iesilor 69, MD-2069, Chisinau, Republic of Moldova Tel: +373-22-92-89-59 Fax: +373-22-59-33-51 E-mail: iontalmaci@mail.ru	Yes	Personal contract for provision of consultancy services
Consultant responsible for quality assurance (QA)	State Agricultural University of Moldova, Faculty of Horticulture, Department of Forestry and Public Gardens	Victor Sfecla, Senior Lecturer	St. Mircesti 44, MD-2049, Chisinau, Republic of Moldova Tel: +373-22-43-22-05 / 43-28-09 E-mail: v.sfecla@gmail.com	No	Personal contract for provision of consultancy services
Consultant responsible for uncertainty analysis	Forestry Research and Management Institute	Ion Talmaci, Technical Deputy Director	St. Calea Iesilor 69, MD-2069, Chisinau, Republic of Moldova Tel: +373-22-92-89-59 Fax: +373-22-59-33-51 E-mail: iontalmaci@mail.ru	Yes	Personal contract for provision of consultancy services

Table 1.7: Waste Sector Institutional Arrangements

Role	Organization	Contact person [Name]	Contact data [E-mail, telephone, etc.]	Participation in meetings related to GHG Inventory development? [Yes/No]	Comments [Institutional arrangements]
Waste Sector Lead, consultant responsible for compiling estimates for categories 5A Solid Waste Disposal and 5B Biological Treatment of Solid Waste	Public Institution "Environmental Projects Implementation Unit"	Tatiana Tugui, PhD in Chemistry	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel/Fax: +373-22-22-25-42 E-mail: tuguitatiana@ymail.com	Yes	Personal contract for provision of consultancy services
Consultant responsible for compiling estimates for categories 5C Incineration and Open Burning of Waste and 5D Wastewater Treatment and Discharge	Public Institution "Environmental Projects Implementation Unit"	Natalia Efros	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel/Fax: +373-22-22-25-42 E-mail: n.efros@yahoo.com	Yes	Personal contract for provision of consultancy services
Data provider (Statistical Report No. 1 – "Toxic waste: generation, use and neutralization of toxic waste", Statistical Report No.2 „Generation, use of waste")	National Bureau for Statistics, Division for Statistics in Agriculture and Environment, Environment Statistics Service	Ludmila Lungu, Head of Service	St. Grenoble 106, MD-2019, Chisinau, Republic of Moldova Tel.: +373-22-73-75-42 E-mail: ludmila.lungu@statistica.gov.md	No	The information is provided to the Environment Agency in accordance with stipulations of the GD No. 1277 as of 26.12.2018 on establishing and functioning of the National Monitoring and Reporting System of greenhouse gas emissions and other information relevant to climate change. The legal basis for such request and provision of information is Law No. 93 as of 26.05.2017 on official statistics and Law No. 982 of 11.05.2000 on access to information.
Consultant responsible for verification and quality control (QC)	Public Institution "Environmental Projects Implementation Unit"	Tatiana Tugui, PhD in Chemistry	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel/Fax: +373-22-22-25-42 E-mail: tuguitatiana@ymail.com	Yes	Personal contract for provision of consultancy services
Consultant responsible for quality assurance (QA)	Independent Consultant	Tamara Guvir	Tel: +373-68-022-203 E-mail: guvir.tamara@gmail.com	No	Personal contract for provision of consultancy services
Consultant responsible for uncertainty analysis	Public Institution "Environmental Projects Implementation Unit"	Natalia Efros	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel/Fax: +373-22-22-25-42 E-mail: n.efros@yahoo.com	Yes	Personal contract for provision of consultancy services

1.3. Potential Improvements

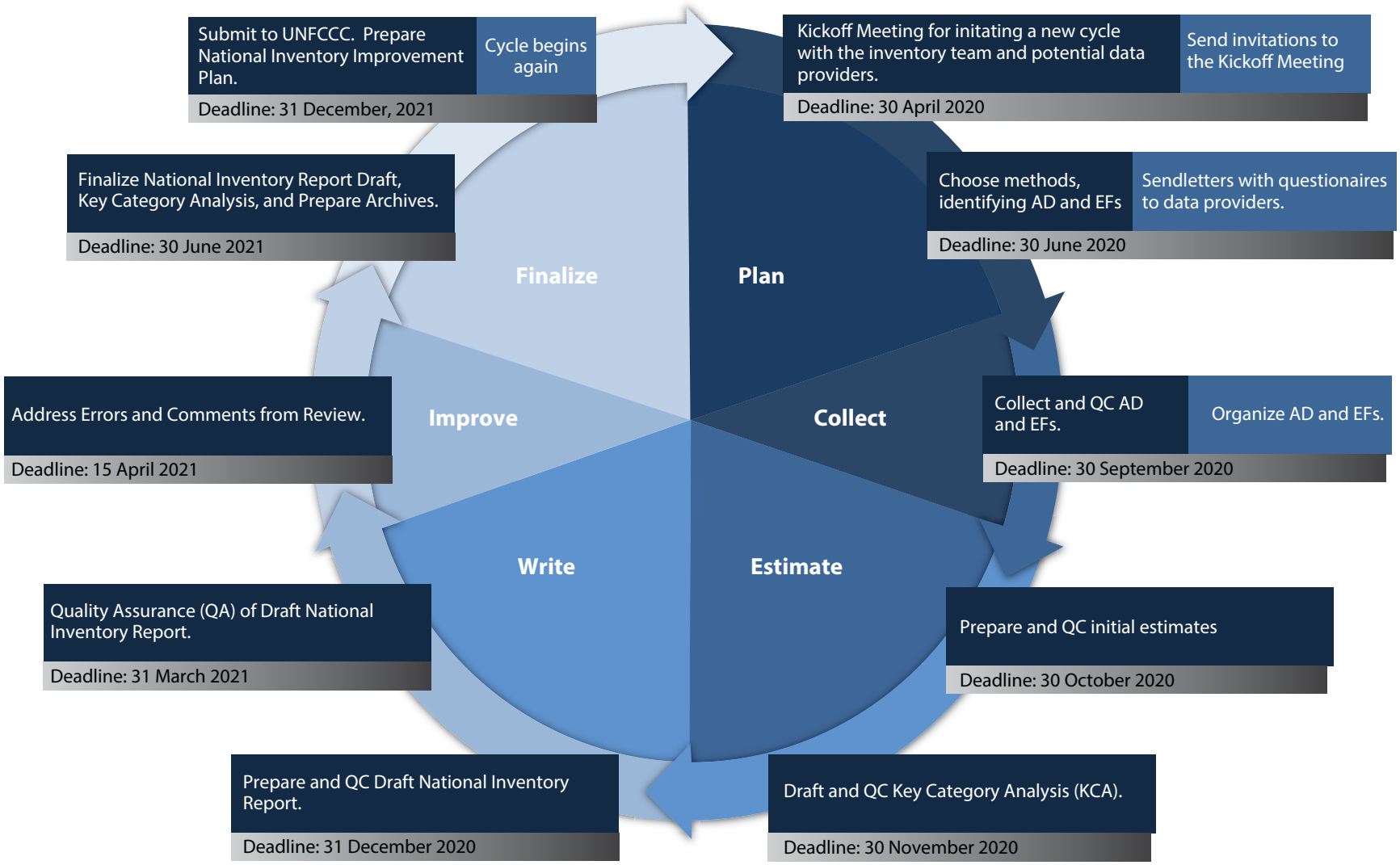
Table 1.8: Potential Improvements in the Management Structure

Strengths in management structure of National Inventory System	Potential improvements in management structure of the National Inventory System
The key strengths in the management structure of the National Inventory System (NIS) are as follows: • The existence of regulatory provisions (Government Decision No. 1277 as of 26 December 2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change) that establish the obligation to submit data related to the inventory process of GHG emissions towards specific deadlines to the competent authority designated with responsibility for national inventory preparation; • Existence of a group of qualified experts specializing in areas related to the process of GHG emissions inventory with rich experience gained over the years 1998-2020, starting from the first cycle of GHG emissions inventory conducted during preparation of the First National Communication of the Republic of Moldova to the UNFCCC (1997-2000) and ending with the latest inventory cycles conducted during preparation of the Second Biennial Update Report of the Republic of Moldova under the UNFCCC (2017-2019) and of the Third Biennial Update Report of the Republic of Moldova under the UNFCCC (2020-2021); • Possibilities for elucidation of quantitative and qualitative aspects related to the inventory process from sectorial, national and international statistical reports and publications; • The existence of national studies in various sectorial areas, which allowed for the possibility in the near future to start using calculation methodologies of higher tiers within the national inventory; • The existence of a database of activity data related to the inventory process of GHG emissions, which is updated within each inventory cycle and is maintained institutionally starting from the first cycle of GHG emissions inventory. • Experience gained in implementing quality verification, quality control and quality assurance measures for the national inventory of GHG emissions.	The estimations process of anthropogenic GHG emissions and removals could be also enhanced through the following potential improvements: • Enhancing the level of knowledge of national experts and institutions involved in developing the national GHG emission inventory by organizing a series of thematic trainings; • Enhancing the professional skills of national experts and institutions involved in developing the inventory process, with the purpose of realizing the gradual transition from default EFs and Tier 1 methodologies to country specific EFs and Tier 2 and 3 methodologies, particularly in the case of key categories; • Strengthening the data management system used in each inventory cycle, as well as the periodic archiving of the inventory and the documentation on which inventory was drawn up, in order to comply with the principle of transparency.

1.4. National Greenhouse Gas Emissions Inventory Cycle

The duration of the inventory cycle depends on national circumstances and reporting requirements. The diagram of the GHG inventory cycle is shown in Figure 1.1. In the Republic of Moldova, a biannual reporting cycle is applied. The side boxes show the calendar periods for completion of each stage of the last inventory cycle under the Third Biennial Update Report of the Republic of Moldova under the UNFCCC. The GHG inventory cycle presents important information that is believed to reflect the institutional arrangements in the scheme of development of the national inventory. Within the process, the cycle allows communicating where and when institutional coordination is needed. Data providers may have different deadlines for submission of relevant information, depending on the complexity and the time of publication of different statistical reports. Thus, for sector-specific data, collection periods are scheduled as adjusted to deadlines for generating information and inventory team needs.

Figure 1.1: The most recent inventory cycle in the Republic of Moldova



Chapter 2: Methods and Data Documentation

Contact data of the Coordinator of the National Greenhous Gas Inventory Working Group

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2. Methods and Data Documentation

2.1. Energy Sector

Relevant information on categories comprised within the inventory, including description of each category allocated to Sector 1 'Energy' is provided below.

2.1.1. Category 1A1 'Energy Industries'

Tables 2.1.1.1 – 2.1.1.18 below comprise relevant information on source categories comprised within the inventory, including description of each source by type of fuel allocated to category 1A1 'Energy Industries'.

Table 2.1.1.1: Information on source category 1A1a Main activity electricity and heat production, solid fuels / CO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, solid fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (T); Tier 2: Yes: 1990 (L), 2019 (T) (1A1 Energy Industries – aggregated for all sources)
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2,520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1,200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of solid fuels (coal) from total fuel consumption within category 1A1a decreased from 22.9 percent to 0.03 percent. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because the CS EFs are not available.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks of the ATULBD (Administrative Territorial Units on the Left Bank of Dniester), NCV for Other Bituminous Coal (25.44 TJ/kt). Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.
Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Fuel type	CO_2 Emission Factor	Unit
Other Bituminous Coal	94.600	t CO_2/TJ
Anthracite	98.300	t CO_2/TJ

Table 2.1.1.2: Information on source category 1A1a Main activity electricity and heat production, solid fuels / CH_4, N_2O

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, solid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2,520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1,200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of solid fuels (coal) from total fuel consumption within category 1A1a decreased from 22.9 percent to 0.03 percent. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks of the ATULBD and press releases from MTPP (available on http://moldgres.com for 2012-2019). NCV for Other Bituminous Coal (25.44 TJ/kt). Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Other Bituminous Coal	1.0	1.5
Anthracite	1.0	1.5

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.3: Information on source category 1A1a Main activity electricity and heat production, solid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, solid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of solid fuels (coal) from total fuel consumption within category 1A1a decreased from 22.9 percent to 0.03 percent. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel,\ consumption} \cdot EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ – Annual emission of pollutant; $AR_{fuel,\ consumption}$ – Activity rate by fuel consumption; $EF_{pollutant}$ – Emission factor of pollutant. Methodology: Tier 1
Reference	EEA (2019), EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-1-energy-industries/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks of the ATULBD and press releases from MTPP (available on http://moldgres.com for 2012-2019). NCV for Other Bituminous Coal (25.44 TJ/kt). Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, page 15, Table 3-2.

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/TJ			
Hard Coal	209 (200-350)	8.7 (6.15-15)	1.0 (0.6-2.4)	820 (330-5000)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.4: Information on source category 1A1a Main activity electricity and heat production, liquid fuels / CO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, liquid fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (T); Tier 2: Yes: 1990 (L), 2019 (T) (1A1 Energy Industries – aggregated for all sources)
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of liquid fuels (petroleum products) from total fuel consumption within category 1A1a decreased from 32.5 percent to 0.04 percent. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because the CS EFs are not available.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks of the ATULBD and press releases from MTPP (available at http://moldgres.com for 2012-2019), NCV for Residual Fuel Oil (40.2 TJ/kt). Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.**

Fuel type	CO_2 Emission Factor	Unit
Gas/Diesel Oil	74.100	t CO_2/TJ
Residual Fuel Oil	77.400	t CO_2/TJ
Other Petroleum Products	73.300	t CO_2/TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.5: Information on source category 1A1a Main activity electricity and heat production, liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of liquid fuels (petroleum products) from total fuel consumption within category 1A1a decreased from 32.5 percent to 0.04 percent. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks of the ATULBD and press releases from MTPP (available on http://moldgres.com for 2012-2019), NCV for Residual Fuel Oil (40.2 TJ/kt). Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.**

Fuel type	CH_4 Emission Factor	N_2O Emission factor
	kg/TJ	
Gas/Diesel Oil	3.0	0.6
Residual Fuel Oil	3.0	0.6
Other Petroleum Products	3.0	0.6

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.6: Information on source category 1A1a Main activity electricity and heat production, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of liquid fuels (petroleum products) from total fuel consumption within category 1A1a decreased from 32.5 percent to 0.04 percent. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel,\ consumption} \cdot EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ – Annual emission of pollutant; $AR_{fuel,\ consumption}$ – Activity rate by fuel consumption; $EF_{pollutant}$ – Emission factor of pollutant. Methodology: Tier 1
Reference	EEA (2019), EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-1-energy-industries/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks of the ATULBD and press releases from MTPP (available on http://moldgres.com for 2012-2019), NCV for Residual Fuel Oil (40.2 TJ/kt). Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook 2019. 1A1 Energy industries, page 18-19, Table 3-5, 3-6.**

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/TJ			
Heavy Fuel Oil	142 (70-300)	15.1 (9.06-21.1)	2.3 (1.4-3.2)	495 (146-1700)
Gas oil	65 (22-195)	16.2 (4-65)	0.8 (0.48-1.28)	46.5 (4.65-465)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.7: Information on source category 1A1a Main activity electricity and heat production, gaseous fuels / CO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, gaseous fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (1A1 Energy Industries – aggregated for all sources)
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of gaseous fuels (natural gas) from total fuel consumption within category 1A1a increased from 44.6 percent to 99.7 percent. In 2019 was made the transition from an annual average NCV to an average NCV for natural gases. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because the CS EFs are not available.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances and Quantity of fuel (m^3) – activity data from J.S.C. "Moldovagaz", NCV of natural gas – 33.86 TJ/mln.m^3. Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Type of fuel	CO_2 Emission Factor	Unit
Natural Gas	56.100	t CO_2/TJ
Gas Biomass	54.600	t CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the ATULBD are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.8: Information on source category 1A1a Main activity electricity and heat production, gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of gaseous fuels (natural gas) from total fuel consumption within category 1A1a increased from 44.6 percent to 99.7 percent. In 2019 was made the transition from an annual average NCV to an average NCV for natural gases. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances and Quantity of fuel (m^3) – activity data from J.S.C. "Moldovagaz", NCV of natural gas – 33.86 TJ/mln.m^3. Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2**

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Natural Gas	1.0	0.1
Gas Biomass	1.0	0.1

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.9: Information on source category 1A1a Main activity electricity and heat production, gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of gaseous fuels (natural gas) from total fuel consumption within category 1A1a increased from 44.6 percent to 99.7 percent. In 2019 was made the transition from an annual average NCV to an average NCV for natural gases. Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel,\ consumption} \cdot EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ – Annual emission of pollutant; $AR_{fuel,\ consumption}$ – Activity rate by fuel consumption; $EF_{pollutant}$ – Emission factor of pollutant. Methodology: Tier 1
Reference	EEA (2019), EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-1-energy-industries/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances and Quantity of fuel (m^3) – activity data from J.S.C. "Moldovagaz", NCV of natural gas – 33.86 TJ/mln.m^3. Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, page 17, Table 3-4.**

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/TJ			
Gaseous fuels	89 (15—185)	39 (20-60)	2.6 (0.65-10.4)	0.281 (0.169-0.393)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available (filling the gaps for certain years). Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.10: Information on source category 1A1a Main activity electricity and heat production, biomass / CO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, biomass / CO_2
Key Category?	No
Category Description / Definition	CO_2 emissions from biomass under source category 1A1a 'Main activity electricity and heat production' has to be reported under the Memo Items (CO_2 emissions from biomass). Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of biofuels from total fuel consumption within category 1A1a increased from 0.02 per cent to 0.24 per cent of the total (biofuels consumption recorded a significant growth, in particular between 2000 and 2014, from circa 59 TJ to 472 TJ). Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because the CS EFs are not available.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2**

Fuel type	CO_2 Emission Factor	Unit
Wood / Wood Waste	112 000	kg CO_2/TJ
Other Primary Solid Biomass	100 000	kg CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available. Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.11: Information on source category 1A1a Main activity electricity and heat production, biomass / CH_4, N_2O

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, biomass / CH_4, N_2O
Key Category?	No
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of biofuels from total fuel consumption within category 1A1a increased from 0.02 per cent to 0.24 per cent of the total (biofuels consumption recorded a significant growth, in particular between 2000 and 2014, from circa 59 TJ to 472 TJ). Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Wood / Wood Waste, Other Primary Solid Biomass	30	4

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available. Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.12: Information on source category 1A1a Main activity electricity and heat production, biomass / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1a Main activity electricity and heat production, biomass / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Sum of emissions from main activity producers of electricity generation, combined heat and power generation, and heat plants. Main activity producers (formerly known as public utilities) are defined as those undertakings whose primary activity is to supply the public. They may be in public or private ownership. Emissions from own on-site use of fuel should be included. Emissions from autoproducers should be assigned to the sector where they were generated and not under 1A1a.
Country Detail	In the Republic of Moldova electricity generation capacity include: Moldavian Thermal Power Plant (MTPP) in Dnestrovsk (on the left bank of the Dniester River) with an installed capacity of 2520 MW; CHP-2 Chisinau, with an installed capacity of 240 MW and 1200 Gcal/h heat capacity; CHP-1 Chisinau, with an installed capacity of 66 MW and 239 Gcal/h heat capacity; CHP-North Balti, with an installed capacity of 37 MW and 350 Gcal/h heat capacity; other power plants, including CHP owned by sugar plants operating on natural gas and residual fuel oil, built during 1956-1981. In recent years, renewable energy sources of small power are being developed. Their total capacity in 2019 represented 41.8 MW. In the RM, within 1990-2019, the share of biofuels from total fuel consumption within category 1A1a increased from 0.02 per cent to 0.24 per cent of the total (biofuels consumption recorded a significant growth, in particular between 2000 and 2014, from circa 59 TJ to 472 TJ). Within the current inventory cycle, GHG emission under the Sector 1 'Energy' were estimated separately for the RBDR (Right Bank of Dniester River) and LBDR (Left Bank of Dniester River).
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel,\ consumption} \cdot EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ – Annual emission of pollutant; $AR_{fuel,\ consumption}$ – Activity rate by fuel consumption; $EF_{pollutant}$ – Emission factor of pollutant. Methodology: Tier 1
Reference	EEA (2019), EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-1-energy-industries/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-30 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, page 20, Table 3-7.**

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/TJ			
Biomass	81 (40 -160)	90 (45 -180)	7.31 (2.44-21.9)	10.8 (6.45-15.1)

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A1 'Energy Industries' category could be possible once new AD regarding the fuel consumption for electricity and heat generation on the territory of the LBDR are available. Also, another potential improvement could be identifying additional AD sources or updating AD from official statistical publications.

Table 2.1.1.13: Information on source category 1A1b Petroleum refining / Liquid / CO_2

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1b Petroleum refining / CO_2
Key Category?	No
Category Description / Definition	All combustion activities supporting the refining of petroleum products including on-site combustion for the generation of electricity and heat for own use.
Country Detail	GHG emissions from source category 1A1b 'Petroleum Refining' were recalculated within the Sector 1 'Energy' in the current inventory cycle, considering that the amount of fuel consumed for energy purposes in oil refineries constitute only 8 % of total fuel used. The AD for 2003-2019 time series are available in the EBs of the RM in energy units (TJ) for 5 types of fuel: petroleum, gasoline, diesel, residual fuel oil, other petroleum products and other hydrocarbons. In the Republic of Moldova there are two operational companies in this sector: the first ("Valiexchimp" LTD) is involved in oil extraction on the oil fields near Valeni village, Cahul district, and the second one (Arnaut Petrol J.S.C.) owns an oil refinery with a small capacity in the city of Comrat (ATU Gagauzia).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used
Type and source of activity data	The needed information is available within Chapter "Transformation", categories "Petroleum installations" and "Petrol Refineries" from Energy Balances of the RM. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova, Tables 3-40.
Type and source of EF and OF	**2006 IPCC Guidelines, Table 2.2. IPCC default emission factors for stationary combustion in the energy industries**

Fuel type	CO_2 Emission Factor	Unit
Petroleum	73 300	kg CO_2 /TJ
Diesel oil	74 100	kg CO_2 /TJ
Residual fuel oil	77 400	kg CO_2 /TJ
Other petroleum products	73 300	kg CO_2 /TJ
Other hydrocarbons	73 300	kg CO_2 /TJ
Lubricants	73 300	kg CO_2 /TJ
Gasoline	69 300	kg CO_2 /TJ
Fuel for oven	74 100	kg CO_2 /TJ
Engine fuels	74 100	kg CO_2 /TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	Within the current inventory cycle, Category 1A1b was improved by using another methodology for calculation emissions. Improvements are possible when using additional data sources.

Table 2.1.1.14: Information on source category 1A1b Petroleum refining / Liquid / CH_4, N_2O

Sector	Energy
Category	1A1 Energy Industries
Source / Fuel / Gas	1A1b Petroleum refining / CH_4, N_2O
Key Category?	No
Category Description / Definition	All combustion activities supporting the refining of petroleum products including on-site combustion for the generation of electricity and heat for own use.
Country Detail	GHG emissions from source category 1A1b 'Petroleum Refining' were recalculated within the Sector 1 'Energy' in the current inventory cycle, considering that the amount of fuel consumed for energy purposes in oil refineries constitute only 8 % of total fuel used. The AD for 2003-2019 time series is available in the EBs of the RM in energy units (TJ) for 5 types of fuel: petroleum, gasoline, diesel, residual fuel oil, other petroleum products and other hydrocarbons In the Republic of Moldova there are two operational companies in this sector: the first ("Valiexchimp" LTD) is involved in oil extraction on the oil fields near Valeni village, Cahul district, and the second one (Arnaut Petrol J.S.C.) owns an oil refinery with a small capacity in the city of Comrat (ATU Gagauzia).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	The needed information is available within Chapter "Transformation", categories "Petroleum installations" and "Petrol Refineries" from Energy Balances of the RM. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova, Tables 3-40.
Type and source of EF and OF	**2006 IPCC Guidelines, Table 2.2. IPCC default emission factors for stationary combustion in the energy industries.**

Fuels	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Petroleum, Residual Fuel Oil, Other Petroleum Products	3	0.6
Diesel Oil, Gasoline, Engine Fuels, Fuel for Oven	3	0.6
Lubricants, Other Hydrocarbons	3	0.6

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement (see also 2006 IPCC Guidelines, Stationary Combustion, Table 2.14, p. 2.40).
Potential Improvements	Within the current inventory cycle, Category 1A1b was improved by using another methodology for calculation emissions. Improvements are possible when using additional data sources.

Table 2.1.1.15: Information on source category 1A1b Petroleum refining / Liquid / NO_x, CO, NMVOC and SO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A1 Energy Industries</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A1b Petroleum refining / NO_x, CO, NMVOC and SO_2</td></tr>
<tr><td>Key Category?</td><td>Not applicable for pollutant emissions</td></tr>
<tr><td>Category Description / Definition</td><td>All combustion activities supporting the refining of petroleum products including on-site combustion for the generation of electricity and heat for own use.</td></tr>
<tr><td>Country Detail</td><td>GHG emissions from source category 1A1b ‘Petroleum Refining’ were recalculated within the Sector 1 ‘Energy’ in the current inventory cycle, considering that the amount of fuel consumed for energy purposes in oil refineries constitute only 8 % of total fuel used. The AD for 2003-2019 time series is available in the EBs of the RM in energy units (TJ) for 5 types of fuel: petroleum, gasoline, diesel, residual fuel oil, other petroleum products and other hydrocarbons
In the Republic of Moldova there are two operational companies in this sector: the first (“Valiexchimp” LTD) is involved in oil extraction on the oil fields near Valeni village, Cahul district, and the second one (Arnaut Petrol J.S.C.) owns an oil refinery with a small capacity in the city of Comrat (ATU Gagauzia).</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{pollutant} = AR_{fuel,\ consumption} \bullet EF_{pollutant}$ (Equation 1)
Where:
$E_{pollutant}$ – Annual emission of pollutant;
$AR_{fuel,\ consumption}$ – Activity rate by fuel consumption;
$EF_{pollutant}$ – Emission factor of pollutant.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EEA (2019), EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries, (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-1-energy-industries/view).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>The needed information is available within Chapter “Transformation”, categories “Petroleum installations” and “Petrol Refineries” from Energy Balances of the RM.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova, Tables 3-40.</td></tr>
<tr><td>Type and source of EF and OF</td><td>The values of direct GHG emissions were taken from EMEP/EEA air pollutant emission inventory guidebook 2019.1.A.1 Energy industries. Table 3-5, page 18, Tier 1 emission factors for source category 1.A.1.a using heavy fuel oil – for petroleum and residual fuel oil. Table 3-6, page 19, Tier 1 EFs for source category 1.A.1.a using gas oil – for other fuels (there are no special tables of EFs for gasoline and other liquid fuels, therefore the coefficients for diesel fuel are used for them).
<table>
<tr><th rowspan="2">Fuels</th><th>NO_x</th><th>CO</th><th>NMVOC</th><th>SO_2</th></tr>
<tr><th colspan="4">g / GJ</th></tr>
<tr><td>Petroleum, Residual Fuel Oil</td><td>142 (70-300)</td><td>15.1 (9.06-21.1)</td><td>2.3(1.4-3.2)</td><td>495 (146-1700)</td></tr>
<tr><td>Diesel Oil, Gasoline, Engine Fuels, Fuel for Oven</td><td>65 (22-195)</td><td>16.2 (4-65)</td><td>0.8 (0.48-1.28)</td><td>46.5 (4.65-465)</td></tr>
<tr><td>Lubricants, Other Hydrocarbons, Other Petroleum Products</td><td>65 (22-195)</td><td>16.2 (4-65)</td><td>0.8 (0.48-1.28)</td><td>46.5 (4.65-465)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5% expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>Within the current inventory cycle, Category 1A1b was improved by using another methodology for calculation emissions. Improvements are possible when using additional data sources.</td></tr>
</table>

2.1.2. Category 1A2 'Manufacturing Industries and Constructions'

Tables 2.1.2.1 – 2.1.2.12 below comprise relevant information on source categories comprised within the inventory, including description of each source by type of fuel allocated to category 1A2 'Manufacturing Industries and Construction'.

Table 2.1.2.1: Information on source category 1A2 Manufacturing industries and construction, solid fuels / CO_2

Sector	Energy
Category / Fuel / Gas	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, solid fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L) (1A2 Manufacturing industries and construction – aggregated for all sources)
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries (autoproducers). Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported not here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[2] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37) As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG) Fuel Consumption fuel – amount of fuel consumed (TJ) $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), NCV Other Bituminous Coal (25.44 TJ/kt) – Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

[2] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>)

Type and source of EF and OF	**2006 IPCC GL, page 2.18, Table 2.3. IPCC Default Emission Factors for Stationary Combustion in Manufacturing Industries and Construction.**

Fuels	CO_2 Emission Factor	Unit
Other Bituminous Coal	94 600 (89 500 – 99 700)	kg CO_2 / TJ
Anthracite	98 300 (94 600 – 101 000)	kg CO_2 / TJ
Lignite	101 000 (90 900 – 115 000)	kg CO_2 / TJ
Brown Coal Briquettes	97 500 (87 300 – 109 000)	kg CO_2 / TJ
Coke Oven Coke and Lignite Coke	107 000 (95 700 – 119 000)	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.2: Information on source category 1A2 Manufacturing industries and construction, solid fuels / CH_4, N_2O

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, solid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[3] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37). As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).
Equation (Describe variables for method used)	$$Emissions_{GHG,\,fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\,fuel}$$ (Equation 2.1) Where: $Emissions_{GHG,\,fuel}$ – emission of the greenhouse gases by type of fuel (kg GHG) $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ) $Emission\ factor_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.

[3] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), NCV Other Bituminous Coal (25.44 TJ/kt) – Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	2006 IPCC GL, page 2.18, Table 2.3. IPCC Default Emission Factors for Stationary Combustion in Manufacturing Industries and Construction.

Solid Fuels	CH_4 Emission Factor	N_2O Emission Factor
	kg / TJ	
Other Bituminous Coal, Anthracite, Lignite, Brown Coal Briquettes, Coke Oven Coke and Lignite Coke	1.0 (0.3 – 3.0)	1.5 (0.5 – 5.0)

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - CH_4, ±50% - N_2O - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.3: Information on source category 1A2 Manufacturing industries and construction, solid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, solid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[4] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37). As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 - LBDR).
Equation (Describe variables for method used)	$E_{pollutant} = \sum_{fuel} AR_{fuel\ consumption} \cdot EF_{fuel\ pollutant}$ (Equation 1), Where: $E_{pollutant}$ – emissions of pollutant (kg), $AR_{fuel\ consumption}$ – fuel used in the industrial combustion (TJ) for each fuel, $EF_{fuel\ pollutant}$ – an average emission factor (EF) for each pollutant for each unit of fuel type used (kg/TJ). Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 15. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.

[4] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>)..

Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), NCV Other Bituminous Coal (25.44 TJ/kt) – Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 15, Tables 3-1 and 3-2.** https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view

Fuels	NO_x	CO	SO_2	NMVOC
	g / Gg			
Solid fuels: (Associated Fuel Types – Other Bituminous Coal, Anthracite, Lignite, Brown Coal Briquettes, Coke Oven Coke and Lignite Coke)	173 (150 – 200)	931 (150 – 2000)	900 (450 – 1000)	88.8 (10 – 300)

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above.
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.4: Information on source category 1A2 Manufacturing industries and construction, liquid fuels / CO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, liquid fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L) (1A2 Manufacturing industries and construction – aggregated for all sources)
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[5] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37). Aviation gasoline fuel was transferred to category 1A3a(ii) Domestic aviation, gasoline and diesel fuel was transferred to category 1A3b Road transport. As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).
Equation (Describe variables for method used)	$$\text{Emissions}_{GHG,\,fuel} = \text{Fuel Consumption}_{fuel} \bullet \text{Emission factor}_{GHG,\,fuel} \quad \text{(Equation 2.1)}$$ Where: Emissions $_{GHG,\,fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG) Fuel Consumption $_{fuel}$ - amount of fuel consumed (TJ) Emission factor $_{GHG,\,fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11.

[5] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197); Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC GL, page 2.18, Table 2.3, IPCC default EFs.**

Fuels	CO_2 Emission Factor	Unit
Aviation Gasoline	70 000 (67 500 – 73 000)	kg CO_2 / TJ
Motor Gasoline	69 300 (67 500 – 73 000)	kg CO_2 / TJ
Jet Kerosene	71 500 (69 700 – 74 400)	kg CO_2 / TJ
Other Kerosene	71 900 (70 800 – 73 700)	kg CO_2 / TJ
LPG	63 100 (61 600 – 65 600)	kg CO_2 / TJ
Diesel Oil	74 100 (72 600 – 74 800)	kg CO_2 / TJ
Residual Fuel Oil	77 400 (75 500 – 78 800)	kg CO_2 / TJ
Other Petroleum Products	73 300 (72 200 – 74 400)	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.5: Information on source category 1A2 Manufacturing industries and construction, liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[6] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37). Aviation gasoline fuel was transferred to category 1A3a(ii) Domestic aviation, gasoline and diesel fuel was transferred to category 1A3b Road transport. As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, 3-61- LBDR).

[6] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

Equation (Describe variables for method used)	Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ (Equation 2.1) Where: Emissions $_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG) Fuel Consumption $_{fuel}$ - amount of fuel consumed (TJ) Emission factor $_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC GL, page 2.18, Table 2.3, IPCC default EFs.**

Fuels	CH_4	N_2O
	kg / TJ	
Aviation Gasoline, Motor Gasoline, Jet Kerosene, Other Kerosene, Diesel Oil, Residual Fuel Oil, Other Petroleum Products	3.0 (1.0 – 10.0)	0.6 (0.2 – 2.0)
LPG	1.0 (0.3 – 3.0)	0.1 (0.03 – 0.3)

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - CH_4, ±50% - N_2O - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.6: Information on source category 1A2 Manufacturing industries and construction, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[7] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37). Aviation gasoline fuel was transferred to category 1A3a(ii) Domestic aviation, gasoline and diesel fuel was transferred to category 1A3b Road transport. As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).

[7] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{pollutant} = \sum_{fuel} AR_{fuel\ consumption} \bullet EF_{fuel\ pollutant}$ (Equation 1),
where:
$E_{pollutant}$ - emissions of pollutant (kg),
$AR_{fuel\ consumption}$ - fuel used in the industrial combustion (TJ) for each fuel,
$EF_{fuel\ pollutant}$ - an average emission factor (EF) for each pollutant for each unit of fuel type used (kg/TJ).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 14. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 17, Table 3.4. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view
<table>
<tr><th rowspan="2">Fuels</th><th>NO_x</th><th>CO</th><th>SO_2</th><th>NMVOC</th></tr>
<tr><th colspan="4">g / Gg</th></tr>
<tr><td>Liquid fuels: (Associated Fuel Types - Residual Fuel Oil, Other Petroleum Products, Diesel Oil, LPG, Other Kerosene, Jet Kerosene, Motor Gasoline, Aviation Gasoline)</td><td>513
(308 – 718)</td><td>66
(40 – 93)</td><td>47
(28 – 66)</td><td>25
(15 – 35)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A2 ‘Manufacturing Industries and Construction’ category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.</td></tr>
</table>

Table 2.1.2.7: Information on source category 1A2 Manufacturing industries and construction, gaseous fuels / CO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, gaseous fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L) (1A2 Manufacturing industries and construction – aggregated for all sources)
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 ‘Manufacturing Industries and Construction’ are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 ‘IPPU’). Direct GHG emissions from 1A2 “Manufacturing industries and construction’ are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[8] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a ‘Iron and Steel’ (ISIC Group 271, Class 2731); 1A2b ‘Non-Ferrous Metals’ (ISIC Group 272, Class 2732); 1A2c ‘Chemicals’ (ISIC Division 24); 1A2d ‘Pulp, Paper and Print’ (ISIC Divisions 21 and 22); 1A2e ‘Food Processing, Beverages and Tobacco’ (ISIC Divisions 15 and 16); 1A2f ‘Non-Metallic Minerals’ (glass, ceramic, cement) (ISIC Division 26); 1A2g ‘Transport Equipment’ (ISIC Divisions 34 and 35); 1A2h ‘Machinery’ (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i ‘Mining (excluding fuels) and Quarrying’ (ISIC Divisions 13 and 14); 1A2j ‘Wood and Wood Products’ (ISIC Division 20); 1A2k ‘Construction’ (ISIC Division 45); 1A2l ‘Textile and Leather’ (ISIC Divisions 17, 18 and 19); 1A2m ‘Non-specified Industry’ (not included above) (ISIC Divisions 25, 33, 36 and 37). As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).

[8] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

Equation (Describe variables for method used)	Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ (Equation 2.1) Where: Emissions $_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG) Fuel Consumption $_{fuel}$ - amount of fuel consumed (TJ) Emission factor $_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC GL, page 2.19, Table 2.3, default EF.**

Fuel	CO_2 Emission Factor	Unit
Natural Gas	56 100 (54 300 – 58 300)	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.8: Information on source category 1A2 Manufacturing industries and construction, gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m / gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[9] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37) As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).

[9] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1)
Where:
Emissions $_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG)
Fuel Consumption $_{fuel}$ - amount of fuel consumed (TJ)
Emission factor $_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197
Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC GL, page 2.19, Table 2.3, default EFs.
<table>
<tr><td rowspan="2">Fuel</td><td>CH_4</td><td>N_2O</td></tr>
<tr><td colspan="2">kg / TJ</td></tr>
<tr><td>Natural Gas</td><td>1.0 (0.3 – 3.0)</td><td>0.1 (0.03 – 0.3)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±3% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>±50% - CH_4, ±50% - N_2O - expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A2 ‘Manufacturing Industries and Construction’ category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.</td></tr>
</table>

Table 2.1.2.9: Information on source category 1A2 Manufacturing industries and construction, gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m / gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 ‘Manufacturing Industries and Construction’ are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 ‘IPPU’). Direct GHG emissions from 1A2 “Manufacturing industries and construction’ are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[10] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a ‘Iron and Steel’ (ISIC Group 271, Class 2731); 1A2b ‘Non-Ferrous Metals’ (ISIC Group 272, Class 2732); 1A2c ‘Chemicals’ (ISIC Division 24); 1A2d ‘Pulp, Paper and Print’ (ISIC Divisions 21 and 22); 1A2e ‘Food Processing, Beverages and Tobacco’ (ISIC Divisions 15 and 16); 1A2f ‘Non-Metallic Minerals’ (glass, ceramic, cement) (ISIC Division 26); 1A2g ‘Transport Equipment’ (ISIC Divisions 34 and 35); 1A2h ‘Machinery’ (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i ‘Mining (excluding fuels) and Quarrying’ (ISIC Divisions 13 and 14); 1A2j ‘Wood and Wood Products’ (ISIC Division 20); 1A2k ‘Construction’ (ISIC Division 45); 1A2l ‘Textile and Leather’ (ISIC Divisions 17, 18 and 19); 1A2m ‘Non-specified Industry’ (not included above) (ISIC Divisions 25, 33, 36 and 37) As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 - LBDR).

[10] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{pollutant} = \sum_{fuel} AR_{fuel\ consumption} \bullet EF_{fuel\ pollutant}$ (Equation 1),
where:
$E_{pollutant}$ - emissions of pollutant (kg),
$AR_{fuel\ consumption}$ - fuel used in the industrial combustion (TJ) for each fuel,
$EF_{fuel\ pollutant}$ - an average emission factor (EF) for each pollutant for each unit of fuel type used (kg/TJ).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 14. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 16, Tables 3-1 and 3-3. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view
<table>
<tr><th rowspan="2">Fuel</th><th>NO_x</th><th>CO</th><th>SO_2</th><th>NMVOC</th></tr>
<tr><th colspan="4">g / Gg</th></tr>
<tr><td>Natural Gas</td><td>74 (46 – 103)</td><td>29 (21 –48)</td><td>0.67 (0.40 – 0.94)</td><td>23 (14 – 33)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A2 ‘Manufacturing Industries and Construction’ category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.</td></tr>
</table>

Table 2.1.2.10: Information on source category 1A2 Manufacturing industries and construction, biomass / CO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, biomass / CO_2
Key Category?	No
Category Description / Definition	CO_2 emissions from biomass under the source category 1A2 ‘Manufacturing industries and construction’ have to be reported under the Memo Items (CO_2 emissions from biomass). Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 ‘Manufacturing Industries and Construction’ are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 ‘IPPU’). Direct GHG emissions from 1A2 “Manufacturing industries and construction’ are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[11] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a ‘Iron and Steel’ (ISIC Group 271, Class 2731); 1A2b ‘Non-Ferrous Metals’ (ISIC Group 272, Class 2732); 1A2c ‘Chemicals’ (ISIC Division 24); 1A2d ‘Pulp, Paper and Print’ (ISIC Divisions 21 and 22); 1A2e ‘Food Processing, Beverages and Tobacco’ (ISIC Divisions 15 and 16); 1A2f ‘Non-Metallic Minerals’ (glass, ceramic, cement) (ISIC Division 26); 1A2g ‘Transport Equipment’ (ISIC Divisions 34 and 35); 1A2h ‘Machinery’ (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i ‘Mining (excluding fuels) and Quarrying’ (ISIC Divisions 13 and 14); 1A2j ‘Wood and Wood Products’ (ISIC Division 20); 1A2k ‘Construction’ (ISIC Division 45); 1A2l ‘Textile and Leather’ (ISIC Divisions 17, 18 and 19); 1A2m ‘Non-specified Industry’ (not included above) (ISIC Divisions 25, 33, 36 and 37) As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).

[11] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

Equation (Describe variables for method used)	Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ (Equation 2.1) Where: Emissions GHG, fuel - emission of the greenhouse gases by type of fuel (kg GHG) Fuel Consumption fuel - amount of fuel consumed (TJ) Emission factor GHG, fuel - default EF of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC GL, page 2.19, Table 2.3, IPCC default EFs.**
Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Fuels	CO_2 Emission Factor	Unit
Fuel Wood, Wood Waste, Charcoal	112 000 (95 000 – 132 000)	kg CO_2 / TJ
Other Types of Solid Biomass	100 000 (84 700 – 117 000)	kg CO_2 / TJ

Table 2.1.2.11: Information on source category 1A2 Manufacturing industries and construction, biomass / CH_4, N_2O

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m, biomass / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[12] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37) As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).

[12] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

Equation (Describe variables for method used)	Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ (Equation 2.1) Where: Emissions $_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG) Fuel Consumption $_{fuel}$ - amount of fuel consumed (TJ) Emission factor $_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 2, Chapter 2, p. 2.11.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines, page 2.19, Table 2.3, IPCC default EFs.**

Fuels	CH_4 Emission Factor	N_2O Emission Factor
	kg / TJ	
Fuel Wood, Wood Waste, Charcoal, Other Types of Solid Biomass	30.0 (10.0 – 100.0)	4.0 (1.5– 15.0)

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - CH_4, ±50% - N_2O - expert judgement
Potential Improvements	Potential improvements within the 1A2 'Manufacturing Industries and Construction' category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.

Table 2.1.2.12: Information on source category 1A2 Manufacturing industries and construction, biomass / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A2 Manufacturing industries and construction
Source / Fuel / Gas	1A2 a-m / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from combustion of fuels in industry. Also includes combustion for the generation of electricity and heat for own use in these industries. Emissions from fuel combustion in coke ovens within the iron and steel industry should be reported under 1A1c and not within manufacturing industry. Emissions from the industry sector should be specified by sub-categories that correspond to the International Standard Industrial Classification of all Economic Activities (ISIC). Energy used for transport by industry should not be reported here but under Transport (1A3). Emissions arising from off road and other mobile machinery in industry should, if possible, be broken out as a separate subcategory. For each country, the emissions from the largest fuel-consuming industrial categories ISIC should be reported, as well as those from significant emitters of pollutants.
Country Detail	GHG emissions from 1A2 'Manufacturing Industries and Construction' are a result of fuel combustion within the manufacturing industries of the Republic of Moldova (except for emissions from technological processes taken into account under the Sector 2 'IPPU'). Direct GHG emissions from 1A2 "Manufacturing industries and construction' are being monitored within the following source categories (which, correspond to the ISIC Rev. 3.1[13] Registry - International Standard Industrial Classification of all Economic Activities): 1A2a 'Iron and Steel' (ISIC Group 271, Class 2731); 1A2b 'Non-Ferrous Metals' (ISIC Group 272, Class 2732); 1A2c 'Chemicals' (ISIC Division 24); 1A2d 'Pulp, Paper and Print' (ISIC Divisions 21 and 22); 1A2e 'Food Processing, Beverages and Tobacco' (ISIC Divisions 15 and 16); 1A2f 'Non-Metallic Minerals' (glass, ceramic, cement) (ISIC Division 26); 1A2g 'Transport Equipment' (ISIC Divisions 34 and 35); 1A2h 'Machinery' (ISIC Divisions 28, 29, 30, 31 and 32); 1A2i 'Mining (excluding fuels) and Quarrying' (ISIC Divisions 13 and 14); 1A2j 'Wood and Wood Products' (ISIC Division 20); 1A2k 'Construction' (ISIC Division 45); 1A2l 'Textile and Leather' (ISIC Divisions 17, 18 and 19); 1A2m 'Non-specified Industry' (not included above) (ISIC Divisions 25, 33, 36 and 37) As the AD are incomplete of the LBDR, in order to fill the existing gaps associated with fuel consumption, these were generated indirectly by considering the industrial production on the territory of the LBDR, respectively, the share of each sector in the total structure of industrial production. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (Table 3-60 – RBDR, Table 3-61 – LBDR).

[13] ISIC Rev.3.1 (International Standard Industrial Classification of All Economic Activities, Rev.3.1) (<https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=17>).

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{pollutant} = \sum_{fuel} AR_{fuel\ consumption} \bullet EF_{fuel\ pollutant}$ (Equation 1),
where:
$E_{pollutant}$ - emissions of pollutant (kg),
$AR_{fuel\ consumption}$ - fuel used in the industrial combustion (TJ) for each fuel,
$EF_{fuel,\ pollutant}$ - an average emission factor (EF) for each pollutant for each unit of fuel type used (kg/TJ).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 14. (https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197), Statistical Yearbooks of the ATULBD (http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/ezhegodnik-gosudarstvennoj-sluzhby-statistiki.html).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.2 Manufacturing industries and construction (combustion), page 17, Tables 3-1 and 3-5.
(https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-2-manufacturing-industries/view)
<table>
<tr><th rowspan="2">Fuels</th><th>NO_x</th><th>CO</th><th>SO_2</th><th>NMVOC</th></tr>
<tr><th colspan="4">g / Gg</th></tr>
<tr><td>Biomass: (Associated Fuel Types – Fuel Wood and Wood Waste, Other Solid Biomass, Charcoal)</td><td>91
(20 – 120)</td><td>570
(50 – 4000)</td><td>11.0
(8.0 – 40.0)</td><td>300
(5 – 500)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A2 ‘Manufacturing Industries and Construction’ category could be possible once the updated AD regarding the fuel consumption with energy purposes for the territory on the LBDR are available, thus filling the gaps for certain years.</td></tr>
</table>

2.1.3. Category 1A3 ‘Transport’

Tables 2.1.3.1 – 2.1.3.21 below comprise relevant information on source categories comprised within the inventory, including description of each source by type of fuel allocated to category 1A3 ‘Transport’.

Table 2.1.3.1: Information on source category 1A3ai ‘International Aviation’, liquid fuels / CO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3ai ‘International Aviation’, liquid fuels / CO_2
Key Category?	No
Category Description / Definition	CO_2 emissions from source category 1A3ai ‘International Aviation’ are reported under ‘Memo Items’ (International Bunkers) and include emissions from flights that depart in one country and arrive in a different country. Include take-offs and landings for these flight stages. Emissions from international military aviation can be included as a separate subcategory of international aviation provided that the same definitional distinction is applied and data are available to support the definition.

Country Detail	GHG emissions from source category 1A3ai 'International Aviation' comes from the combustion of jet fuel used in the international air transport (in case of aircrafts which operate international flights, emissions are allocated to the country in which the aircraft was fueled). In the Republic of Moldova, international aviation includes jet propelled aircrafts using jet kerosene. The aviation fleet in the RM includes different types of aircrafts produced in foreign countries and CIS countries: large commercial jet aircrafts: A-319, 320, 321, 300-600; Boeing-707, 737, 739, 747, 757; EMB-120, 135, 145, 170, 190; Fokker 70, 100; MD-81, 82, 83; RJ-85, 100; CRJ, Rombac-561 Rc; turbo-propelled aircrafts for short and medium distances: Saab-340, 2000; L410, DHC8, ATR-42; light turbo-propelled aircrafts: X-32 Becas; small jet aircrafts: Falcon-2000EX, Learjet-35. The aircrafts produced in the CIS countries include: TU-134,154; AN-2, 12, 24, 26, 28, 32, 72, 74; IL-18, 76; YAK-18, 40, 42; and helicopters Mi-8, 17, 26; Ka-26, 32. Operation of aircrafts is divided into two phases: (i) Landing/Take-Off (LTO) occurring at altitudes lower than 914 meters and (ii) Cruise (C), occurring at altitudes higher than 914 meters. The largest share in the total GHG emissions from international aviation is covered by CO_2 (circa 70 per cent).
Equation (Describe variables for method used)	The basic equations used to estimate emissions are as follows: Total Emissions = LTO Emissions + Cruise Emissions LTO Emissions = Number of LTOs • Emission Factor LTO LTO Fuel Consumption = Number of LTOs • Fuel Consumption per LTO Cruise Emissions = (Total Fuel Consumption – LTO Fuel Consumption) • Emission Factor Cruise Tier 2b method
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 3: Mobile Combustion, Equations 3.6.2.-3.6.5, p. 3.59. Revised 1996 IPCC Guidelines, Vol. 3, Table 1-52, Pag. 1.98. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the availability of specific data for this source, the Tier 2 methodology has been used. The number of aircraft departures are available for the period 1995-2019. The results for 1990-1994 were restored using the partial overlapping method, while for 1995-2019 – by using a Tier 2b approach available in the 2006 IPCC Guidelines.
Type and source of activity data	The number of aircraft departures (units) and Amount of fuel consumption (thousand tons): Civil Aeronautical Authority of the RM through Official Letters No. 3978 dated 02.10.2006 and No. 1328 dated 13.09.2011; No. 474 dated 13.02.2014 and No. 366 dated 02.03.2015 and No.1156 dated 27.05.2016 and No. 4040 dated 28.12.2017. No. 1871 dated 18.07.2020. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), tables 3-190, 3-191 and 3-192.
Type and source of EF and OF	CO_2 Emission Factors for representative aircrafts according to the 2006 IPCC Guidelines, Vol. 2, Ch. 3, Tab. 3.6.3, 3.6.9. p. 2.63 and p. 3.70. New and old aircraft types: LTO (kg/LTO); all aircraft types: cruise phase of flight (kg/t): Revised 1996 IPCC Guidelines, Vol. 3, Table 1-52, Page 1.98. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-167 and 3-168.
Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Within the 1A3ai 'International Aviation' source category (reported under the memo Items (International Bunkers), potential improvements could be achieved once a higher methodology is used (for example, a Tier 3 approach available in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), which considers the real values of emissions for each type of aircraft depending on the flight distance. Also, it could be used the emission calculator available in the updated version of the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019). This category is not a key, and the use of method 3 will not create a significant change in emissions.

Table 2.1.3.2: Information on source category 1A3ai 'International Aviation', liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3ai 'International Aviation', liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	CH_4 and N_2O emissions from source category 1A3ai 'International Aviation' are reported under 'Memo Items' (International Bunkers) and include emissions from flights that depart in one country and arrive in a different country. Include take-offs and landings for these flight stages. Emissions from international military aviation can be included as a separate subcategory of international aviation provided that the same definitional distinction is applied and data are available to support the definition.

Country Detail	GHG emissions from 1A3ai 'International Aviation' comes from the combustion of jet fuel used in the international air transport (in case of aircrafts which operate international flights, emissions are allocated to the country in which the aircraft was fueled). In the Republic of Moldova, international aviation includes jet propelled aircrafts using jet kerosene. The aviation fleet in the RM includes different types of aircrafts produced in foreign countries and CIS countries: large commercial jet aircrafts: A-319, 320, 321, 300-600; Boeing-707, 737, 739, 747, 757; EMB-120, 135, 145, 170, 190; Fokker 70, 100; MD-81, 82, 83; RJ-85, 100; CRJ, Rombac-561 Rc; turbo-propelled aircrafts for short and medium distances: Saab-340, 2000; L410, DHC8, ATR-42; light turbo-propelled aircrafts: X-32 Becas; small jet aircrafts: Falcon-2000EX, Learjet-35. The aircrafts produced in the CIS countries include: TU-134, 154; AN-2, 12, 24, 26, 28, 32, 72, 74; IL-18, 76; YAK-18, 40, 42; and heli-copters Mi-8, 17, 26; Ka-26, 32. Operation of aircrafts is divided into two phases: (i) Landing/Take-Off (LTO) occurring at altitudes lower than 914 meters and (ii) Cruise (C), occurring at altitudes higher than 914 meters. The share of methane and nitrous oxide emissions is insignificant (it is considered that modern engines emit little or no CH4, in particular, during the cruise cycle).
Equation (Describe variables for method used)	The basic equations used to estimate emissions are as follows: Total Emissions = LTO Emissions + Cruise Emissions LTO Emissions = Number of LTOs • Emission Factor LTO LTO Fuel Consumption = Number of LTOs • Fuel Consumption per LTO Cruise Emissions = (Total Fuel Consumption – LTO Fuel Consumption) • Emission Factor Cruise Tier 2b method
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 3: Mobile Combustion, Equations 3.6.2.-3.6.5, p. 3.59. Revised 1996 IPCC Guidelines, Vol. 3, Table 1-52, Pag. 1.98. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the availability of specific data for this source, the Tier 2 methodology has been used. The number of aircraft departures are available for the period 1995-2019. The results for 1990-1994 were restored using the partial overlapping method, while for 1995-2019 – by using a Tier 2b approach available in the 2006 IPCC Guidelines.
Type and source of activity data	The number of aircraft departures (units) and Amount of fuel consumption (thousand tons): Civil Aeronautical Authority of the RM through Official Letters No. 3978 dated 02.10.2006 and No. 1328 dated 13.09.2011; No. 474 dated 13.02.2014; No. 366 dated 02.03.2015; No.1156 dated 27.05.2016; No. 4040 dated 28.12.2017; and No.1871 dated 18.07.2020. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), tables 3-190, 3-191 and 3-192.
Type and source of EF and OF	CO_2 Emission Factors for representative aircrafts according to the 2006 IPCC Guidelines, Vol. 2, Ch. 3, Tab. 3.6.3, 3.6.9. p. 2.63 and p. 3.70. New and old aircraft types: LTO (kg/LTO); all aircraft types: cruise phase of flight (kg/t): Revised 1996 IPCC Guidelines, Vol. 3, Table 1-52, Page 1.98. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-167 and 3-168.
Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±10% for CH_4, expert judgement ±100% for N_2O, expert judgement
Potential Improvements	Within the 1A3ai 'International Aviation' source category (reported under the memo Items (International Bunkers), potential improvements could be achieved once a higher methodology is used (for example, a Tier 3 approach available in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), which considers the real values of emissions for each type of aircraft depending on the flight distance. Also, it could be used the emission calculator available in the updated version of the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019). This category is not a key, and the use of method 3 will not create a significant change in emissions.

Table 2.1.3.3: Information on source category 1A3ai 'International Aviation', liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3ai 'International Aviation', liquid fuels / NO_x, CO, NMVOC and SO_x
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	NO_x, CO, NMVOC and SO_2 emissions from source category 1A3ai 'International Aviation' are reported under 'Memo Items' (International Bunkers) and include emissions from flights that depart in one country and arrive in a different country. Include take-offs and landings for these flight stages. Emissions from international military aviation can be included as a separate subcategory of international aviation provided that the same definitional distinction is applied and data are available to support the definition.

Country Detail	GHG emissions from 1A3ai 'International Aviation' comes from the combustion of jet fuel used in the international air transport (in case of aircrafts which operate international flights, emissions are allocated to the country in which the aircraft was fueled). In the Republic of Moldova, international aviation includes jet propelled aircrafts using jet kerosene. The aviation fleet in the RM includes different types of aircrafts produced in foreign countries and CIS countries: large commercial jet aircrafts: A-319, 320, 321, 300-600; Boeing-707, 737, 739, 747, 757; EMB-120, 135, 145, 170, 190; Fokker 70, 100; MD-81, 82, 83; RJ-85, 100; CRJ, Rombac-561 Rc; turbo-propelled aircrafts for short and medium distances: Saab-340, 2000; L410, DHC8, ATR-42; light turbo-propelled aircrafts: X-32 Becas; small jet aircrafts: Falcon-2000EX, Learjet-35. The aircrafts produced in the CIS countries include: TU-134, 154; AN-2, 12, 24, 26, 28, 32, 72, 74; IL-18, 76; YAK-18, 40, 42; and heli-copters Mi-8, 17, 26; Ka-26, 32. Operation of aircrafts is divided into two phases: (i) Landing/Take-Off (LTO) occurring at altitudes lower than 914 meters and (ii) Cruise (C), occurring at altitudes higher than 914 meters, less than 30 per cent of the total emissions are covered by water vapors and as little as circa 1 per cent by other gases (NO_x, CO, NMVOC, SO_2).
Equation (Describe variables for method used)	The basic equations used to estimate emissions are as follows: Total Emissions = LTO Emissions + Cruise Emissions LTO Emissions = Number of LTOs • Emission Factor LTO LTO Fuel Consumption = Number of LTOs • Fuel Consumption per LTO Cruise Emissions = (Total Fuel Consumption – LTO Fuel Consumption) • Emission Factor Cruise Tier 2b method
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 3: Mobile Combustion, Equations 3.6.2.-3.6.5, p. 3.59. Revised 1996 IPCC Guidelines, Vol. 3, Table 1-52, Pag. 1.98. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the availability of specific data for this source, the Tier 2 methodology has been used. The number of aircraft departures are available for the period 1995-2019. The results for 1990-1994 were restored using the partial overlapping method, while for 1995-2019 – by using a Tier 2b approach available in the 2006 IPCC Guidelines.
Type and source of activity data	The number of aircraft departures (units) and Amount of fuel consumption (thousand tons): Civil Aeronautical Authority of the RM through Official Letters No. 3978 dated 02.10.2006 and No. 1328 dated 13.09.2011; No. 474 dated 13.02.2014; No. 366 dated 02.03.2015; No.1156 dated 27.05.2016; No. 4040 dated 28.12.2017; and No.1871 dated 18.07.2020. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), tables 3-190, 3-191 and 3-192.
Type and source of EF and OF	Emission Factors for representative aircrafts according to the 2006 IPCC Guidelines, Vol. 2, Ch. 3, Tab. 3.6.3, 3.6.9. p. 2.63 and p. 3.70. New and old aircraft types: LTO (kg/LTO); all aircraft types: cruise phase of flight (kg/t): Revised 1996 IPCC Guidelines, Vol. 3, Table 1-52, Page 1.98. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-167 and 3-168.
Uncertainty of AD and source	±5%, expert judgement (see also 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 3: Mobile Combustion, Section 3.6.1.7 'Uncertainty Assessment').
Uncertainty of EF and source	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1.A.3.a, Aviation, p. 34, Section 4.4 'Uncertainty Assessment'. The uncertainties related to the estimated aircraft emissions are closely associated with the emission factors assigned to the estimations. The CO_2 emissions (and fuel use) are generally determined with a higher accuracy than the other pollutants. According to Section 4.4.1 'Tier 1 approach', the accuracy of the distribution of fuel between domestic and international will depend on the national conditions. The use of 'representative' emission factors may contribute significantly to the uncertainty. In terms of the factors relating to the LTO activities, the accuracy is better than for CCD (because of the origin of the factors from which the average values are derived). It would be hard to calculate a quantitative uncertainty estimate. The uncertainty may however lie between 20 and 30% for LTO factors and 20 and 45% for the CCD factors. According to Section 4.4.2 'Tier 2 approach' the accuracy of the distribution of fuel between domestic and international will depend on the national conditions. The uncertainties lie mainly in the origin of the emission factors. There is a high uncertainty associated with the CCD emission factors.
Potential Improvements	Within the 1A3ai 'International Aviation' source category (reported under the memo Items (International Bunkers), potential improvements could be achieved once a higher methodology is used (for example, a Tier 3 approach available in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), which considers the real values of emissions for each type of aircraft depending on the flight distance. Also, it could be used the emission calculator available in the updated version of the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019). This category is not a key, and the use of method 3 will not create a significant change in emissions.

Table 2.1.3.4: Information on source category 1A3aii 'Domestic aviation', liquid fuels / CO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3aii 'Domestic aviation', liquid fuels / CO_2
Key Category?	No

Category Description / Definition	Emissions from domestic civil aviation, including take-offs and landings. Comprises civil commercial use of airplanes, including: scheduled and charter traffic for passengers and freight, air taxiing, and general aviation. The international/domestic split should be determined on the basis of departure and landing locations for each flight stage and not by the nationality of the airline. Exclude use of fuel at airports for ground transport which is reported under 1A3e Other Transportation. Also exclude fuel for stationary combustion at airports; report this information under the appropriate stationary combustion category.
Country Detail	Domestic aviation in the Republic of Moldova performs annually a small number of flights, with an increasing trend in activity, between 2011 to 2019 (from 8 flights in 2001 to 4,244 in 2019). Fuel consumption in domestic aviation is rather insignificant. Primary data on the use of fuel in domestic aviation were provided by the Civil Aviation Administration of the RM (subsequently renamed the Civil Aeronautical Authority of the RM). The time series of values has become more improved due to the transfer of a number of values for aviation gasoline from 1A2 and 1A3b from Energy Balances. Between 1990 and 2019, the GHG emissions from 1A3aii 'Domestic Aviation' decreased by circa 99.6 per cent.
Equation (Describe variables for method used)	Emissions = Fuel Consumption • Emission factor (Equation 3.6.1) Where: Emissions - emission of the greenhouse gases by type of fuel (kg GHG); Fuel Consumption - quantity of fuel (AD) • Net calorific value (NCV); Emission factor - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.59 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (t), activity data were provided by the Civil Aeronautical Authority of the RM. NCV of Aviation Gasoline (43.66 TJ/kt). State Administration of Civil Aviation, through Letter No. 1328 dated 13.09.2011, answer to Letter No. 03-07/175 dated 02.02.2011; Civil Aeronautical Authority of the RM through Letter No. 474 dated 13.03.2014, answer to Letter No. 320/2014-01-01 dated 03.01.2014 from the Climate Change Office of the MoEN; Letter No. 366 dated 02.03.2015, answer to Letter No. 407/2015-01-09 dated 29.01.2015 from the Climate Change Office of the MoEN; Letter No. 1156 dated 27.05.2016, answer to Letter No. 512/2016-05-01 dated 10.05.2016 from the Climate Change Office of the MoEN; Letter No. 4040 dated 28.12.2017 answer to Letter No. 601/2017-12-03 dated 14.12.2017 from the Climate Change Office of the MoEN; Letter No. №1871 dated 18.07.2020 answer to Letter No. 08-310/1 dated 11.02.2020. Quantity of fuel consumed is reported in the Table 3-73, 3-74, 3-75 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.64, Table 3.6.4.**

Fuel type	CO_2 Emission Factor	Unit
Aviation Gasoline	69.300	t CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For 1A3aii 'Domestic Aviation', it would be possible to use higher-tier methods (Tier 2b, respectively Tier 2), but since these sources are not key categories, this activity is not cost-efficient and cost-effective for the national inventory team.

Table 2.1.3.5: Information on source category 1A3aii 'Domestic aviation', liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3aii 'Domestic aviation', liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from domestic civil aviation, including take-offs and landings. Comprises civil commercial use of airplanes, including: scheduled and charter traffic for passengers and freight, air taxiing, and general aviation. The international/domestic split should be determined on the basis of departure and landing locations for each flight stage and not by the nationality of the airline. Exclude use of fuel at airports for ground transport which is reported under 1A3e Other Transportation. Also exclude fuel for stationary combustion at airports; report this information under the appropriate stationary combustion category.

Country Detail	Domestic aviation in the Republic of Moldova performs annually a small number of flights, with an increasing trend in activity, between 2011 to 2019 (from 8 flights in 2001 to 4,244 in 2019). Fuel consumption in domestic aviation is rather insignificant. Primary data on the use of fuel in domestic aviation were provided by the Civil Aviation Administration of the RM (subsequently renamed the Civil Aeronautical Authority of the RM). The time series of values has become more improved due to the transfer of a number of values for aviation gasoline from 1A2 and 1A3b from Energy Balances. Between 1990 and 2019, the GHG emissions from 1A3aii 'Domestic Aviation' decreased by circa 99.6 per cent.
Equation (Describe variables for method used)	Emissions = Fuel Consumption • Emission factor (Equation 3.6.1) Where: Emissions - emission of the greenhouse gases by type of fuel (kg GHG); Fuel Consumption - quantity of fuel (AD) • Net calorific value (NCV); Emission factor - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.59 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (t), activity data were provided by the Civil Aeronautical Authority of the RM. NCV of Aviation Gasoline (43.66 TJ/kt). State Administration of Civil Aviation, through Letter No. 1328 dated 13.09.2011, answer to Letter No. 03-07/175 dated 02.02.2011; Civil Aeronautical Authority of the RM through Letter No. 474 dated 13.03.2014, answer to Letter No. 320/2014-01-01 dated 03.01.2014 from the Climate Change Office of the MoEN; Letter No. 366 dated 02.03.2015, answer to Letter No. 407/2015-01-09 dated 29.01.2015 from the Climate Change Office of the MoEN; Letter No. 1156 dated 27.05.2016, answer to Letter No. 512/2016-05-01 dated 10.05.2016 from the Climate Change Office of the MoEN; Letter No. 4040 dated 28.12.2017 answer to Letter No. 601/2017-12-03 dated 14.12.2017 from the Climate Change Office of the MoEN; Letter No. 1871 dated 18.07.2020 answer to Letter No. 08-310/1 dated 11.02.2020. Quantity of fuel consumed is reported in the Table 3-73, 3-74, 3-75 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.64, Table 3.6.5.**

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Aviation Gasoline	0.5	2.0

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement
Potential Improvements	For 1A3aii 'Domestic Aviation', it would be possible to use higher-tier methods (Tier 2b, respectively Tier 2), but since these sources are not key categories, this activity is not cost-efficient and cost-effective for the national inventory team.

Table 2.1.3.6: Information on source category 1A3aii 'Domestic aviation', liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3aii 'Domestic aviation', liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Emissions from domestic civil aviation, including take-offs and landings. Comprises civil commercial use of airplanes, including: scheduled and charter traffic for passengers and freight, air taxiing, and general aviation. The international/domestic split should be determined on the basis of departure and landing locations for each flight stage and not by the nationality of the airline. Exclude use of fuel at airports for ground transport which is reported under 1A3e Other Transportation. Also exclude fuel for stationary combustion at airports; report this information under the appropriate stationary combustion category.

Country Detail	Domestic aviation in the Republic of Moldova performs annually a small number of flights, with an increasing trend in activity, between 2011 to 2019 (from 8 flights in 2001 to 4,244 in 2019). Fuel consumption in domestic aviation is rather insignificant. Primary data on the use of fuel in domestic aviation were provided by the Civil Aviation Administration of the RM (subsequently renamed the Civil Aeronautical Authority of the RM). The time series of values has become more improved due to the transfer of a number of values for aviation gasoline from 1A2 and 1A3b from Energy Balances Between 1990 and 2019, the GHG emissions from 1A3aii 'Domestic Aviation' decreased by circa 99.6 per cent.
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel\ consumption} \bullet EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ - the annual emission of pollutant; $AR_{fuel\ consumption}$ - the activity rate by fuel consumption; $EF_{pollutant}$ - the emission factor of pollutant. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.3.a. Aviation, page 20 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (t), activity data were provided by the Civil Aeronautical Authority of the RM. NCV of Aviation Gasoline (43.66 TJ/kt). State Administration of Civil Aviation, through Letter No. 1328 dated 13.09.2011, answer to Letter No. 03-07/175 dated 02.02.2011; Civil Aeronautical Authority of the RM through Letter No. 474 dated 13.03.2014, answer to Letter No. 320/2014-01-01 dated 03.01.2014 from the Climate Change Office of the MoEN; Letter No. 366 dated 02.03.2015, answer to Letter No. 407/2015-01-09 dated 29.01.2015 from the Climate Change Office of the MoEN; Letter No. 1156 dated 27.05.2016, answer to Letter No. 512/2016-05-01 dated 10.05.2016 from the Climate Change Office of the MoEN; Letter No. 4040 dated 28.12.2017 answer to Letter No. 601/2017-12-03 dated 14.12.2017 from the Climate Change Office of the MoEN; Letter No. 1871 dated 18.07.2020 answer to Letter No. 08-310/1 dated 11.02.2020. Quantity of fuel consumed is reported in the Table 3-73, 3-74, 3-75 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019. 1. A.3.a Aviation, page 20, Table 3.3.**

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/ton fuel			
Aviation Gasoline	4 (2-8)	1200 (600-2400)	19 (9.5-38)	1 (0.5-2)

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	For 1A3aii 'Domestic Aviation', it would be possible to use higher-tier methods (Tier 2b, respectively Tier 2), but since these sources are not key categories, this activity is not cost-efficient and cost-effective for the national inventory team.

Table 2.1.3.7: Information on source category 1A3b Road Transportation, liquid fuels / CO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3b Road transportation, liquid fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (1A3b Road transportation – aggregated for all types of fuels)
Category Description / Definition	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on paved roads.
Country Detail	The park of road transport units in the RM is growing. The largest share in the total structure is represented by cars. For the RBDR, the AD associated with diesel oil and gasoline consumption within 1A3b 'Road Transportation' was collected from the Energy Balances of the RM (see Chapter S.2.1. 'Consumed directly as fuel or energy', in columns: 'for transport operation', 'for agriculture' and 'sold to the population' for 1990,1993-2014; The rows "Road Transport" from the Energy Balances of the RM Excel format for period 2015-2019 available on http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). The recovered data for 1991-1992 were determined by interpolation. As the AD are incomplete, in order to fill the existing gaps associated with fuel consumption on the LBDR, information regarding diesel oil consumption were generated indirectly by considering the specific consumption per capita (it was determined fuel consumption per capita for the population on the RBDR between 1993 and 2019 and further this was extended to the population on the LBDR). During the current inventory cycle, GHG emissions from 1A3b 'Road Transportation' were estimated applying a Tier 3 approach (the COPERT 4.9 model program was tested), but this change was possible only for 1995-2019 time series. Between 1990 and 2019, the GHG emissions from 1A3b 'Road Transportation' decreased in the RM by circa 37.7 per cent.

Equation (Describe variables for method used)	Emissions = $\sum_a$ ($Fuel_a$ • EF_a) (Equation 3.2.1) Where: Emissions - emission of CO_2 (kg); $Fuel_a$ - fuel sold (TJ); EF_a - emission factor (kg gas/TJ). This is equal to the carbon content of the fuel multiplied by 44/12; a - type of fuel (e.g. petrol, diesel, natural gas, LPG, etc.). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.12 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of detailed data, the Tier 3 methodology has been tested.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Tables 3-82, 3-83, 3-86 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.16, Table 3.2.1.**
Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For 1A3b Road Transport, potential improvements can be obtained using the COPERT 4.9 model program. Test calculations were carried out for 1995-2019.

Fuel type	CO_2 Emission Factor	Unit
Gasoline	69.300	t CO_2/TJ
Gas/Diesel Oil	74.100	t CO_2/TJ

Table 2.1.3.8: Information on source category 1A3b Road transportation, liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3b Road transportation, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on paved roads.
Country Detail	The park of road transport units in the RM is growing. The largest share in the total structure is represented by cars. For the RBDR, the AD associated with diesel oil and gasoline consumption within 1A3b 'Road Transportation' was collected from the Energy Balances of the RM (see Chapter S.2.1. 'Consumed directly as fuel or energy', in columns: 'for transport operation', 'for agriculture' and 'sold to the population' for 1990,1993-2014; The rows "Road Transport" from the Energy Balances of the RM Excel format for period 2015-2019 available on http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). The recovered data for 1991-1992 were determined by interpolation. As the AD are incomplete, in order to fill the existing gaps associated with fuel consumption on the LBDR, information regarding diesel oil consumption were generated indirectly by considering the specific consumption per capita (it was determined fuel consumption per capita for the population on the RBDR between 1993 and 2019 and further this was extended to the population on the LBDR). During the current inventory cycle, GHG emissions from 1A3b 'Road Transportation' were estimated applying a Tier 3 approach (the COPERT 4.9 model program was tested), but this change was possible only for 1995-2019 time series. Between 1990 and 2019, the GHG emissions from 1A3b 'Road Transportation' decreased in the RM by circa 37.7 per cent.
Equation (Describe variables for method used)	Emission = $\sum_a$($Fuel_a$ • EF_a) (Equation 3.2.3) Where: Emissions - emission in kg; $Fuel_a$ - fuel consumed, (TJ) (as represented by fuel sold); EF_a - emission factor (kg gas/TJ); a - type of fuel (e.g. petrol, diesel, natural gas, LPG). Methodology: Tier 1

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.12 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of detailed data, the Tier 3 methodology has been tested.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Tables 3-82, 3-83, 3-86 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.21, Table 3.2.2.**

Fuel type	CH_4	N_2O
	kg/TJ	
Gasoline	33.0	3.2
Gas/Diesel Oil	3.9	3.9

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement
Potential Improvements	For 1A3b Road Transport, potential improvements can be obtained using the COPERT 4.9 model program. Test calculations were carried out for 1995-2019.

Table 2.1.3.9: Information on source category 1A3b Road transportation, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3b Road transportation, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on paved roads.
Country Detail	The park of road transport units in the RM is growing. The largest share in the total structure is represented by cars. For the RBDR, the AD associated with diesel oil and gasoline consumption within 1A3b 'Road Transportation' was collected from the Energy Balances of the RM (see Chapter S.2.1. 'Consumed directly as fuel or energy', in columns: 'for transport operation', 'for agriculture' and 'sold to the population' for 1990,1993-2014; The rows "Road Transport" from the Energy Balances of the RM Excel format for period 2015-2019 available on http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). The recovered data for 1991-1992 were determined by interpolation. As the AD are incomplete, in order to fill the existing gaps associated with fuel consumption on the LBDR, information regarding diesel oil consumption were generated indirectly by considering the specific consumption per capita (it was determined fuel consumption per capita for the population on the RBDR between 1993 and 2019 and further this was extended to the population on the LBDR). During the current inventory cycle, GHG emissions from 1A3b 'Road Transportation' were estimated applying a Tier 3 approach (the COPERT 4.9 model program was tested), but this change was possible only for 1995-2019 time series. Between 1990 and 2019, the GHG emissions from 1A3b 'Road Transportation' decreased in the RM by circa 37.7 per cent.
Equation (Describe variables for method used)	$$E_i = \sum_j (\sum_m (FC_{j,m} \bullet EF_{i,j,m}))$$ (Equation 1) Where: E_i - emission of pollutant *i* (g); $FC_{j,m}$ - fuel consumption of vehicle category *j* using fuel *m* (kg); $EF_{i,j,m}$ - fuel consumption - specific emission factor of pollutant *i* for vehicle category *j* and fuel *m*(g/kg). Methodology: Tier 1 SO_2 emissions calculated on the special formula by EMEP/EEA 2019, 1.A.3.b.i-iv Road transport, page 21 (equation 2): $$E(SO_{2,m}) = 2 \bullet \sum \bullet K_{s,m} \bullet FC_m$$ Where: $E(SO_{2,m})$- emissions of SO2 per fuel *m* [g]; $K_{s,m}$ -weight related sulphur content in fuel of type *m* [g/g fuel]; (K_s values are available in EMEP/EEA 2019, 1.A.3.b.i-iv Road transport, Table 3-13, page 24); FC_m -fuel consumption of fuel *m* [g].

<table>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019. 1.A.3.b.i-iv Road transport, page 18-19. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-b-i/view.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the importance of this source and availability of detailed data, the Tier 3 methodology has been tested.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) and (t) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197).
Quantity of fuel consumed is reported in the Tables 3-86 and 3-87 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019. 1A3.b.i-iv Road transport, pages 22-23, Tables 3.5 and 3.6.
<table>
<tr><th rowspan="2">Fuel type</th><th>NO_x</th><th>CO</th><th>NMVOC</th></tr>
<tr><th colspan="3">g/kg fuel</th></tr>
<tr><td>Gasoline</td><td>8.73
(4.48-29.89)</td><td>84.70
(49.0-269.5)</td><td>10.05
(5.55-34.42)</td></tr>
<tr><td>Gas/Diesel Oil</td><td>12.96
(11.20-13.88)</td><td>3.33
(2.05-8.19)</td><td>0.70
(0.41-1.88)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>For 1A3b Road Transport, potential improvements can be obtained using the COPERT 4.9 model program. Test calculations were carried out for 1995-2019.</td></tr>
</table>

Table 2.1.3.10: Information on source category 1A3b Road Transportation, gaseous fuels / CO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3b Road transportation, gaseous fuels / CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (1A3b Road transportation – aggregated for all types of fuels)
Category Description / Definition	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on paved roads.
Country Detail	The park of road transport units in the RM is growing. The largest share in the total structure is represented by cars. For the RBDR, the AD associated with diesel oil and gasoline consumption within 1A3b 'Road Transportation' was collected from the Energy Balances of the RM (see Chapter S.2.1. 'Consumed directly as fuel or energy', in columns: 'for transport operation', 'for agriculture' and 'sold to the population' for 1990, 1993-2014. The rows "Road Transport" from the Energy Balances of the RM Excel format for period 2015-2019 available on http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). The recovered data for 1991-1992 were determined by interpolation. As the AD are incomplete, in order to fill the existing gaps associated with fuel consumption on the LBDR, information regarding diesel oil consumption were generated indirectly by considering the specific consumption per capita (it was determined fuel consumption per capita for the population on the RBDR between 1993 and 2019 and further this was extended to the population on the LBDR). During the current inventory cycle, GHG emissions from 1A3b 'Road Transportation' were estimated applying a Tier 3 approach (the COPERT 4.9 model program was tested), but this was possible only for 1995-2019 time series. Between 1990 and 2019, the GHG emissions from 1A3b 'Road Transportation' decreased in the RM by circa 37.7 per cent.
Equation (Describe variables for method used)	$$Emissions = \sum_a (Fuel_a \bullet EF_a) \text{ (Equation 3.2.1)}$$ Where: Emissions - emission of CO_2 (kg); $Fuel_a$ - fuel sold (TJ); EF_a - emission factor (kg gas/TJ). This is equal to the carbon content of the fuel multiplied by 44/12; a - type of fuel (e.g., petrol, diesel, natural gas, LPG, etc.). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.12 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of detailed data, the Tier 3 methodology has been tested.

Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197) of the Republic of Moldova and Quantity of fuel (m^3) – NCV of natural gas country specific data pertaining to annual average net caloric, which are provided by J.S.C. "Moldovagaz", through Letter No. 604 dated 01.04.1999 (for 1990-1998), No. 02-541 dated 28.05.2001 (for 1999-2000), No. 02-156 dated 06.02.2004 (for 2001-2002), No. 06-1253 dated 27.09.2006 (for 2003-2005); No. 02/1-476 dated 23.02.2011 (for 2006-2010); No. 02/1-288 dated 22.01.2014 (for 2011-2012); No. 02/1-507 dated 10.02.2015 (for 2013-2014), No. 02/1-2183 dated 03.06.2016 (for 2015), No. 03/2-74 dated 12.01.2018 (for 2016), No. 03/4-676 dated 03.03.2020 (for 2017-2019). Quantity of fuel consumed is reported in the Table 3-84, 3-85, 3-86 and 3-87 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.16, Table 3.2.1.**

Fuel type	CO_2 Emission Factor	Unit
Natural Gas	56.100	t CO_2/TJ
Liquefied Petroleum Gases	63.100	t CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For 1A3b Road Transport, potential improvements can be obtained using the COPERT 4.9 model program. Test calculations were carried out for 1995-2019.

Table 2.1.3.11: Information on source category 1A3b Road transportation, gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3b Road transportation, gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on paved roads.
Country Detail	The park of road transport units in the RM is growing. The largest share in the total structure is represented by cars. For the RBDR, the AD associated with diesel oil and gasoline consumption within 1A3b 'Road Transportation' was collected from the Energy Balances of the RM (see Chapter S.2.1. 'Consumed directly as fuel or energy', in columns: 'for transport operation', 'for agriculture' and 'sold to the population' for 1990, 1993-2014. The rows "Road Transport" from the Energy Balances of the RM Excel format for period 2015-2019 available on http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). The recovered data for 1991-1992 were determined by interpolation. As the AD are incomplete, in order to fill the existing gaps associated with fuel consumption on the LBDR, information regarding diesel oil consumption were generated indirectly by considering the specific consumption per capita (it was determined fuel consumption per capita for the population on the RBDR between 1993 and 2019 and further this was extended to the population on the LBDR). During the current inventory cycle, GHG emissions from 1A3b 'Road Transportation' were estimated applying a Tier 3 approach (the COPERT 4.9 model program was tested), but this change was possible only for 1995-2019 time series. Between 1990 and 2019, the GHG emissions from 1A3b 'Road Transportation' decreased in the RM by circa 37.7 per cent.
Equation (Describe variables for method used)	$$Emission = \sum_a (Fuel_a \bullet EF_a) \text{ (Equation 3.2.3)}$$ Where: Emissions - emission in kg; $Fuel_a$ - fuel consumed, (TJ) (as represented by fuel sold); EF_a - emission factor (kg gas/TJ); a - type of fuel (e.g. petrol, diesel, natural gas, LPG). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.12 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of detailed data, the Tier 3 methodology has been tested.

<table>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197) of the Republic of Moldova and Quantity of fuel (m^3) – NCV of natural gas country specific data pertaining to annual average net caloric, which are provided by J.S.C. “Moldovagaz”, through Letter No. 604 dated 01.04.1999 (for 1990-1998), No. 02-541 dated 28.05.2001 (for 1999-2000), No. 02-156 dated 06.02.2004 (for 2001-2002), No. 06-1253 dated 27.09.2006 (for 2003-2005); No. 02/1-476 dated 23.02.2011 (for 2006-2010); No. 02/1-288 dated 22.01.2014 (for 2011-2012); No. 02/1-507 dated 10.02.2015 (for 2013-2014), No. 02/1-2183 dated 03.06.2016 (for 2015), No. 03/2-74 dated 12.01.2018 (for 2016), No. 03/4-676 dated 03.03.2020 (for 2017-2019).
Quantity of fuel consumed is reported in the Table 3-84, 3-85, 3-86 and 3-87 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.21, Table 3.2.2.
<table>
<tr><th rowspan="2">Fuel type</th><th>CH_4</th><th>N_2O</th></tr>
<tr><th colspan="2">kg/TJ</th></tr>
<tr><td>Natural Gas</td><td>90.0</td><td>3.0</td></tr>
<tr><td>Liquefied Petroleum Gases</td><td>62.0</td><td>0.2</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 50%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>For 1A3b Road Transport, potential improvements can be obtained using the COPERT 4.9 model program. Test calculations were carried out for 1995-2019.</td></tr>
</table>

Table 2.1.3.12: Information on source category 1A3b Road transportation, gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3b Road transportation, gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	All combustion and evaporative emissions arising from fuel use in road vehicles, including the use of agricultural vehicles on paved roads.
Country Detail	The park of road transport units in the RM is growing. The largest share in the total structure is represented by cars. For the RBDR, the AD associated with diesel oil and gasoline consumption within 1A3b ‘Road Transportation’ was collected from the Energy Balances of the RM (see Chapter S.2.1. ‘Consumed directly as fuel or energy’, in columns: ‘for transport operation’, ‘for agriculture’ and ‘sold to the population’ for 1990, 1993-2014. The rows “Road Transport” from the Energy Balances of the RM Excel format for period 2015-2019 available on http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). The recovered data for 1991-1992 were determined by interpolation. As the AD are incomplete, in order to fill the existing gaps associated with fuel consumption on the LBDR, information regarding diesel oil consumption were generated indirectly by considering the specific consumption per capita (it was determined fuel consumption per capita for the population on the RBDR between 1993 and 2019 and further this was extended to the population on the LBDR). During the current inventory cycle, GHG emissions from 1A3b ‘Road Transportation’ were estimated applying a Tier 3 approach (the COPERT 4.9 model program was tested), but this change was possible only for 1995-2019 time series. Between 1990 and 2019, the GHG emissions from 1A3b ‘Road Transportation’ decreased in the RM by circa 37.7 per cent.
Equation (Describe variables for method used)	$$E_i = \sum_j (\sum_m (FC_{j,m} \bullet EF_{i,j,m}))$$ (Equation 1) Where: E_i - emission of pollutant *i* (g); $FC_{j,m}$ - fuel consumption of vehicle category *j* using fuel *m* (kg); $EF_{i,j,m}$ - fuel consumption - specific emission factor of pollutant *i* for vehicle category *j* and fuel *m*(g/kg). Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019 1.A.3.b.i-iv Road transport, page 18-19. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-b-i/view. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of detailed data, the Tier 3 methodology has been tested.

<table>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197) of the Republic of Moldova and Quantity of fuel (m^3) – NCV of natural gas country specific data pertaining to annual average net caloric, which are provided by J.S.C. “Moldovagaz”, through Letter No. 604 dated 01.04.1999 (for 1990-1998), No. 02-541 dated 28.05.2001 (for 1999-2000), No. 02-156 dated 06.02.2004 (for 2001-2002), No. 06-1253 dated 27.09.2006 (for 2003-2005); No. 02/1-476 dated 23.02.2011 (for 2006-2010); No. 02/1-288 dated 22.01.2014 (for 2011-2012); No. 02/1-507 dated 10.02.2015 (for 2013-2014), No. 02/1-2183 dated 03.06.2016 (for 2015), No. 03/2-74 dated 12.01.2018 (for 2016), No. 03/4-676 dated 03.03.2020 (for 2017-2019). Quantity of fuel consumed is reported in the Table 3-84, 3-85, 3-86 and 3-87 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.3.b.i-iv Road transport, page 18-19, Tables 3.5 and 3.6.
<table>
<tr><th rowspan="2">Fuel type</th><th>NO_x</th><th>CO</th><th>NMVOC</th></tr>
<tr><th colspan="3">g/kg fuel</th></tr>
<tr><td>Natural Gas</td><td>13.00
(5.5 - 30)</td><td>5.70
(2.2-15)</td><td>0.26
(0.1-0.67)</td></tr>
<tr><td>Liquefied Petroleum Gases</td><td>15.20
(4.18-34.3)</td><td>84.70
(38.7-117)</td><td>13.64
(6.1-25.66)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>For 1A3b Road Transport, potential improvements can be obtained using the COPERT 4.9 model program. Test calculations were carried out for 1995-2019.</td></tr>
</table>

Table 2.1.3.13: Information on source category 1A3c Railways, liquid fuels / CO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A3 Transport</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A3c Railways, liquid fuels / CO_2</td></tr>
<tr><td>Key Category?</td><td>Tier 1: Yes: 1990 (L), 2019 (T)</td></tr>
<tr><td>Category Description / Definition</td><td>Emissions from railway transport for both freight and passenger traffic routes.</td></tr>
<tr><td>Country Detail</td><td>The railway transport in the RM includes railways, locomotives, passenger and cargo trains, buildings and edifices. At the end of 2019 operated: diesel locomotives (sections) – 20, maneuvering locomotives – 20, diesel trains (sections) – 12, cargo wagons – 2975, passenger coaches – 150. Fuel consumption (diesel oil) within railways transport decreases by every year due to reduced cargo and passenger transport activity, poor rail and main rolling stock conditions (for the RBDR). For the LBDR, the AD associated with diesel oil consumption between 1993 and 2019 were calculated indirectly, based on specific consumption per capita (it was determined the diesel oil consumption average per capita for the population on the RBDR, and this was extended to the population on the LBDR). Between 1990 and 2019, the GHG emissions from 1A3c ‘Railways’ decreased in the RM by circa 93.9 per cent.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$$Emissions = \sum_j(\sum_m(FC_{j,m} \bullet EF_{i,j,m})) \text{ (Equation 3.4.1)}$$
Where:
Emissions - emission (kg);
$Fuel_j$ - fuel type j consumed in (TJ);
EF_j - emission factor for fuel type j, (kg/TJ);
j - fuel type.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.41 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>The Tier 1 method has been chosen because the CS EFs are not available.</td></tr>
</table>

Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). "Moldavian Railways" SOE through Letter dated 26 March 1999, No. 94/T; Letter dated 17 December 2003 No. H-4/993; Letter dated 19.09.2006 No. Nteh/338; Letter dated 28 February 2011 No. 54/Nteh; Letter dated 17.01.2014 No. H-4/147; Letter dated 02.03.2015 No.H-4/458; Letter dated 02.06.2016 No. H-4/1186; Letter dated 02.01.2018 No. H-4/02; Letter dated 02.03.2020 No. H-4/474. Quantity of fuel consumed is reported in the Table 3-95, from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**IPCC Default EF from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.43, Table 3.4.1.**

Fuel type	CO_2 Emission Factor	Unit
Diesel Oil	74.100	t CO_2 / TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A3c 'Railways' could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.

Table 2.1.3.14: Information on source category 1A3c Railways, liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3c Railways, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from railway transport for both freight and passenger traffic routes.
Country Detail	The railway transport in the RM includes railways, locomotives, passenger and cargo trains, buildings and edifices. At the end of 2019 operated: diesel locomotives (sections) – 20, maneuvering locomotives – 20, diesel trains (sections) – 12, cargo wagons – 2975, passenger coaches – 150. Fuel consumption (diesel oil) within railways transport decreases by every year due to reduced cargo and passenger transport activity, poor rail and main rolling stock conditions (for the RBDR). For the LBDR, the AD associated with diesel oil consumption between 1993 and 2019 were calculated indirectly, based on specific consumption per capita (it was determined the diesel oil consumption average per capita for the population on the RBDR, and this was extended to the population on the LBDR). Between 1990 and 2019, the GHG emissions from 1A3c 'Railways' decreased in the RM by circa 93.9 per cent.
Equation (Describe variables for method used)	$$Emissions = \sum_j (Fuel_j \bullet EF_j) \text{ (Equation 3.4.1)}$$ Where: Emissions - emission (kg); $Fuel_j$ - fuel type *j* consumed in (TJ); EF_j - emission factor for fuel type *j*, (kg/TJ); j - fuel type. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.41 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because this category is not a key source category and also because not all enhanced characterization data are available.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). "Moldavian Railways" SOE through Letter dated 26 March 1999, No. 94/T; Letter dated 17 December 2003 No. H-4/993; Letter dated 19.09.2006 No. Nteh/338; Letter dated 28 February 2011 No. 54/Nteh; Letter dated 17.01.2014 No. H-4/147; Letter dated 02.03.2015 No.H-4/458; Letter dated 02.06.2016 No. H-4/1186; Letter dated 02.01.2018 No. H-4/02; Letter dated 02.03.2020 No. H-4/474. Quantity of fuel consumed is reported in the Table 3-95, from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.43, Table 3.4.1.**

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Diesel Oil	4.15	28.6

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A3c 'Railways' could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.

Table 2.1.3.15: Information on source category 1A3c Railways, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3c Railways, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from railway transport for both freight and passenger traffic routes.
Country Detail	The railway transport in the RM includes railways, locomotives, passenger and cargo trains, buildings and edifices. At the end of 2019 operated: diesel locomotives (sections) – 20, maneuvering locomotives – 20, diesel trains (sections) – 12, cargo wagons – 2975, passenger coaches – 150. Fuel consumption (diesel oil) within railways transport decreases by every year due to reduced cargo and passenger transport activity, poor rail and main rolling stock conditions (for the RBDR). For the LBDR, the AD associated with diesel oil consumption between 1993 and 2019 were calculated indirectly, based on specific consumption per capita (it was determined the diesel oil consumption average per capita for the population on the RBDR, and this was extended to the population on the LBDR). Between 1990 and 2019, the GHG emissions from 1A3c 'Railways' decreased in the RM by circa 93.9 per cent.
Equation (Describe variables for method used)	$$E_i = \sum_m FC_m \cdot EF_{i,m} \text{ (Equation 1)}$$ Where: E_i - emission of pollutant *i* for the period concerned in the inventory (kg or g); FC_m - fuel consumption of fuel type *m* for the period and area considered (tons); EF_i - emission factor of pollutant *i* for each unit of fuel type *m* used, (kg/tons); m - fuel type (diesel, gas oil). Methodology: Tier 1 SO_2 emissions calculated on the special formula by EMEP/EEA 2019, 1.A.3.c Railways, page 7: $$E(SO_2) = 2 \cdot \sum \cdot K_S \cdot FC \text{ (Equation 2)}$$ Where: $E(SO_2)$- emissions of SO_2 from diesel gas oil [kg], K_S -weight related sulphur content in diesel gas oil [% by mass} (or g/g fuel). (K_S values are available in EMEP/EEA 2019, 1.A.3.b.i, 1.A.3.b.ii, 1.A.3.b.iii, 1.A.3.b.iv Passenger cars, light commercial trucks, heavy-duty vehicles including buses and motor cycles, Table 3-13, page 24), *FC* -diesel gas oil consumption (tons).
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.3.c Railways, page 8 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-c-railways/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because this category is not a key source category and also because not all enhanced characterization data are available.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). "Moldavian Railways" SOE through Letter dated 26 March 1999, No. 94/T; Letter dated 17 December 2003 No. H-4/993; Letter dated 19.09.2006 No. Nteh/338; Letter dated 28 February 2011 No. 54/Nteh; Letter dated 17.01.2014 No. H-4/147; Letter dated 02.03.2015 No.H-4/458; Letter dated 02.06.2016 No. H-4/1186; Letter dated 02.01.2018 No. H-4/02; Letter dated 02.03.2020 No. H-4/474. Quantity of fuel consumed is reported in the Table 3-95, from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

<table>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019. 1. A.3.c Railways, page 8, Table 3.1.
<table>
<tr><th rowspan="2">Fuel type</th><th>NO_x</th><th>CO</th><th>NMVOC</th><th>SO_2</th></tr>
<tr><th colspan="3">kg/ton fuel</th><th>kg/TJ</th></tr>
<tr><td>Diesel Gas Oil</td><td>52.4
(25-93)</td><td>10.7
(6-19)</td><td>4.65
(2-8)</td><td>Special Formula
(depend on Sulphur content in fuel)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A3c ‘Railways’ could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.</td></tr>
</table>

Table 2.1.3.16: Information on source category 1A3d Water-borne navigation, liquid fuels / CO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A3 Transport</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A3d Water-borne navigation, liquid fuels / CO_2</td></tr>
<tr><td>Key Category?</td><td>No</td></tr>
<tr><td>Category Description / Definition</td><td>Emissions from fuels used to propel water-borne vessels, including hovercraft and hydrofoils, but excluding fishing vessels. The international/domestic split should be determined on the basis of port of departure and port of arrival, and not by the flag or nationality of the ship.</td></tr>
<tr><td>Country Detail</td><td>Water-borne navigation in the RM includes a small number of ships, the fuel consumption being equally insignificant (for a great number of years, for example for: 1993-2003, 2005 and 2009, in the Energy Balances (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197) of the RM, fuel consumption for water-borne navigation was indicated as zero). Under these circumstances, the main source of information on diesel oil consumption for water-borne navigation was the Ministry of Transport and Road Infrastructure until 2016. Information was obtained directly from the port enterprises starting from 2017. The data for the Left Bank of the Dniester River region were restored for all years, based on the specific consumption per person in the Right Bank. Between 1990 and 2019, the GHG emissions from 1A3d ‘Water-borne Navigation’ decreased in the RM by circa 90.3 per cent.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$$\text{Emissions} = \sum(\textit{Fuel Consumed}_{ad} \bullet \textit{Emission Factor}_{ab}) \quad \text{(Equation 3.5.1)}$$
Where:
a - Fuel type (diesel, gasoline, LPG, bunker, etc.);
b - Water-borne navigation type (i.e., ship or boat, and possibly engine type) (only at Tier 2 is the fuel used differentiated by type of vessel so b can be ignored at Tier 1).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.47 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (t), activity data were provided by the Ministry of Transport and Road Infrastructure. NCV of Diesel Oil (42.54 TJ/kt). Official Letters from the Ministry of Transport and Communications dated 31.03.1999 No. 03-5-2/2-32; Ministry of Transport and Road Infrastructure dated 02.10.2006 No. 04-01-3/754; Ministry of Transport and Road Infrastructure dated 12.03.2011 No. 04/2-2-05; dated 21.01.2014 No. 03-02-5/52; dated 20.02.2015 No. 03-02-5/102; and dated 07.06.2016, No. 03-02-5/424; Enterprise “Molovata Ferry”) letter No. 03 dated10.01.2018 (for the period 2010-2017); Enterprise “Ungheni River Port” letter No. 07 dated 10.01.2018 (for 2010-2017) and No. 74 dated 19.02.2020 (for 2017-2019). Energy Balances of the RM for 1990 and 1993-2019. For the territory on the Left Bank of the Dniester River, the consumption of diesel for naval transport in the period 1993-2019 was restored by indirect methods (based on the specific per capita consumption for the territory on the Right Bank of the Dniester River).
Quantity of fuel consumed is reported in the Table 3-101 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.50, Table 3.5.2.
<table>
<tr><th>Fuel type</th><th>CO_2 Emission Factor</th><th>Unit</th></tr>
<tr><td>Diesel Oil</td><td>74.100</td><td>t CO_2/TJ</td></tr>
</table></td></tr>
</table>

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A3d 'Water-borne Navigation" category could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.

Table 2.1.3.17: Information on source category 1A3d Water-borne navigation, liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3d Water-borne navigation, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels used to propel water-borne vessels, including hovercraft and hydrofoils, but excluding fishing vessels. The international/domestic split should be determined on the basis of port of departure and port of arrival, and not by the flag or nationality of the ship.
Country Detail	Water-borne navigation in the RM includes a small number of ships, the fuel consumption being equally insignificant (for a great number of years, for example for: 1993-2003, 2005 and 2009, in the Energy Balances (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 of the RM, fuel consumption for water-borne navigation was indicated as zero). Under these circumstances, the main source of information on diesel oil consumption for water-borne navigation was the Ministry of Transport and Road Infrastructure until 2016. Information was obtained directly from the port enterprises starting in 2017. The data for the Left Bank of the Dniester River region were restored for all years, based on the specific consumption per person in the Right Bank. Between 1990 and 2019, the GHG emissions from 1A3d 'Water-borne Navigation' decreased in the RM by circa 90.3 per cent.
Equation (Describe variables for method used)	$$Emissions = \sum(Fuel\ Consumed_{ad} \bullet Emission\ Factor_{ab})$$ (Equation 3.5.1) Where: a - Fuel type (diesel, gasoline, LPG, bunker, etc.); b - Water-borne navigation type (i.e., ship or boat, and possibly engine type) (only at Tier 2 is the fuel used differentiated by type of vessel so *b* can be ignored at Tier 1). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.47 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (t), activity data were provided by the Ministry of Transport and Road Infrastructure. NCV of Diesel Oil (42.54 TJ/kt). Official Letters from the Ministry of Transport and Communications dated 31.03.1999 No. 03-5-2/2-32; Ministry of Transport and Road Infrastructure dated 02.10.2006 No. 04-01-3/754; Ministry of Transport and Road Infrastructure dated 12.03.2011 No. 04/2-2-05; dated 21.01.2014 No. 03-02-5/52; dated 20.02.2015 No. 03-02-5/102; and dated 07.06.2016, No. 03-02-5/424; Enterprise "Molovata Ferry") letter No. 03 dated10.01.2018 (for the period 2010-2017); Enterprise "Ungheni River Port" letter No. 07 dated 10.01.2018 (for 2010-2017) and No. 74 dated 19.02.2020 (for 2017-2019). Energy Balances of the RM for 1990 and 1993-2019. For the territory on the Left Bank of the Dniester River, the consumption of diesel for naval transport in the period 1993-2019 was restored by indirect methods (based on the specific per capita consumption for the territory on the Right Bank of the Dniester River). Quantity of fuel consumed is reported in the Table 3-101 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, Mobile Combustion, page 3.50, Table 3.5.3.**

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Diesel Oil	7	2

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A3d 'Water-borne Navigation" category could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.

Table 2.1.3.18: Information on source category 1A3d Water-borne navigation, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3d Water-borne navigation, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuels used to propel water-borne vessels, including hovercraft and hydrofoils, but excluding fishing vessels. The international/domestic split should be determined on the basis of port of departure and port of arrival, and not by the flag or nationality of the ship.
Country Detail	Water-borne navigation in the RM includes a small number of ships, the fuel consumption being equally insignificant (for a great number of years, for example for: 1993-2003, 2005 and 2009, in the Energy Balances (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197) of the RM, fuel consumption for water-borne navigation was indicated as zero). Under these circumstances, the main source of information on diesel oil consumption for water-borne navigation was the Ministry of Transport and Road Infrastructure until 2016. Information was obtained directly from the port enterprises starting from 2017. The data for the Left Bank of the Dniester River region were restored for all years, based on the specific consumption per person in the Right Bank. Between 1990 and 2019, the GHG emissions from 1A3d 'Water-borne Navigation' decreased in the RM by circa 90.3 per cent.
Equation (Describe variables for method used)	$E_i = \sum_m (FC_m \bullet EF_{i,m})$ (Equation 1) Where: E_i - emission of pollutant *i* in kilograms FC_m - mass of fuel type *m* sold in the country for navigation (tons); EF_i - fuel consumption - specific emission factor of pollutant *i and* fuel type *m*, (kg/ton); m - fuel type (bunker fuel oil, marine diesel oil, marine gas oil, gasoline). Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.3.d.i, 1.A.3.d.ii, 1.A.4.c.iii International maritime and inland navigation, national navigation, national fishing, recreational boats International maritime navigation, international inland navigation, national navigation (shipping), national fishing, page 14 (available on: https://www.eea.europa.eu/publications/emep-eea-guide-book-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-d-navigation/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (t), activity data were provided by the Ministry of Transport and Road Infrastructure. NCV of Diesel Oil (42.54 TJ/kt). Official Letters from the Ministry of Transport and Communications dated 31.03.1999 No. 03-5-2/2-32; Ministry of Transport and Road Infrastructure dated 02.10.2006 No. 04-01-3/754; Ministry of Transport and Road Infrastructure dated 12.03.2011 No. 04/2-2-05; dated 21.01.2014 No. 03-02-5/52; dated 20.02.2015 No. 03-02-5/102; and dated 07.06.2016, No. 03-02-5/424; Enterprise "Molovata Ferry") letter No. 03 dated10.01.2018 (for the period 2010-2017); Enterprise "Ungheni River Port" letter No. 07 dated 10.01.2018 (for 2010-2017) and No. 74 dated 19.02.2020 (for 2017-2019). Energy Balances of the RM for 1990 and 1993-2019. http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197. For the territory on the Left Bank of the Dniester River, the consumption of diesel for naval transport in the period 1993-2019 was restored by indirect methods (based on the specific per capita consumption for the territory on the Right Bank of the Dniester River). Quantity of fuel consumed is reported in the Table 3-101 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.3.d.i, 1.A.3.d.ii, 1.A.4.c.iii International maritime and inland navigation, national navigation, national fishing, recreational boats International maritime navigation, international inland navigation, national navigation (shipping), national fishing, page 14, Table 3.1.
Uncertainty of AD and source	± 5%, expert judgement

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/ton fuel			
Diesel Oil	79.3	7.4	2.7	20.0

Uncertainty of EF and source	EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.3.d.i, 1.A.3.d.ii, 1.A.4.c.iii International maritime and inland navigation, national navigation, national fishing, recreational boats International maritime navigation, international inland navigation, national navigation (shipping), national fishing. 4.3.1 Uncertainties, Table 4-1: Estimated uncertainties given as percentage related to the emission factors, p.34.

Parameter	At sea	Maneuvering	In port
NO_x	±20%	±40%	±30%
SO_2	±10%	±30%	±20%
NMVOC	±25%	±50%	±40%

Potential Improvements	Potential improvements within the 1A3d 'Water-borne navigation" category could be possible once updating the available AD on real fuel consumption of the Left Bank of the Dniester River.

Table 2.1.3.19: Information on source category 1A3e 'Other Transportation', gaseous fuels / CO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3e Other transportation, gaseous fuels / CO_2
Key Category?	No
Category Description / Definition	Combustion related emissions from the operation of pump stations and maintenance of pipelines. Transport via pipelines includes transport of gases, liquids, slurry and other commodities via pipelines. Distribution of natural or manufactured gas, water or steam from the distributor to final users is excluded.
Country Detail	The RM has a developed natural gas transportation and distribution network. AD associated with fuel consumption for pipeline transport are available in the Energy Balances of the RM (Chapter S.2.3. "Consumed directly as fuel or energy for transportation", column "Pipeline Transportation" (1990-2014); row "Pipeline Transportation" (2015-2019), http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197. For the LBDR, the AD associated with Natural Gas consumption between 1993 and 2019 were calculated indirectly, based on specific consumption per capita (it was determined the diesel oil consumption average per capita for the population on the RBDR, and this was extended to the population on the LBDR. Between 1990 and 2019, the GHG emissions from 1A3e 'Other Transportation' (Pipeline Transport) decreased in the RM by circa 81.2 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG,\ fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\ fuel}$ (Equation 2.1) Where: $Emissions_{GHG,\ fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG,\ fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197. Quantity of fuel consumed is reported in the Table 3-107 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Fuel type	CO_2 Emission Factor	Unit
Natural Gas	56.100	t CO_2 / TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	Potential improvements within the 1A3e 'Other transportation' category could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.

Table 2.1.3.20: Information on source category 1A3e 'Other transportation', gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3e Other transportation, gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Combustion related emissions from the operation of pump stations and maintenance of pipelines. Transport via pipelines includes transport of gases, liquids, slurry and other commodities via pipelines. Distribution of natural or manufactured gas, water or steam from the distributor to final users is excluded.
Country Detail	The RM has a developed natural gas transportation and distribution network. AD associated with fuel consumption for pipeline transport are available in the Energy Balances of the RM (Chapter S.2.3. "Consumed directly as fuel or energy for transportation", column "Pipeline Transportation" (1990-2014); row "Pipeline Transportation" (2015-2019), http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197. For the LBDR, the AD associated with Natural Gas consumption between 1993 and 2019 were calculated indirectly, based on specific consumption per capita (it was determined the diesel oil consumption average per capita for the population on the RBDR, and this was extended to the population on the LBDR. Between 1990 and 2019, the GHG emissions from 1A3e 'Other Transportation' (Pipeline Transport) decreased in the RM by circa 81.2 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197). Quantity of fuel consumed is reported in the Table 3-107 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Fuel type	CH_4 Emission Factor	N_2O Emission Factor
	kg/TJ	
Natural Gas	1.0	0.1

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement
Potential Improvements	Potential improvements within the 1A3e 'Other transportation' category could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions.

Table 2.1.3.21: Information on source category 1A3e 'Other transportation', gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A3 Transport
Source / Fuel / Gas	1A3e Other transportation, gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Combustion related emissions from the operation of pump stations and maintenance of pipelines. Transport via pipelines includes transport of gases, liquids, slurry and other commodities via pipelines. Distribution of natural or manufactured gas, water or steam from the distributor to final users is excluded.

<table>
<tr><td>Country Detail</td><td>The RM has a developed natural gas transportation and distribution network. AD associated with fuel consumption for pipeline transport are available in the Energy Balances of the RM (Chapter S.2.3. “Consumed directly as fuel or energy for transportation”, column “Pipeline Transportation” (1990-2014); line “Pipeline Transportation” (2015-2019). http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197. For the LBDR, the AD associated with Natural Gas consumption between 1993 and 2019 were calculated indirectly, based on specific consumption per capita (it was determined the diesel oil consumption average per capita for the population on the RBDR, and this was extended to the population on the LBDR. Between 1990 and 2019, the GHG emissions from 1A3e ‘Other Transportation’ (Pipeline Transport) decreased in the RM by circa 81.2 per cent.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{pollutant} = AR_{fuel\ consumption} \cdot EF_{pollutant}$ (Equation 1)
Where:
$E_{pollutant}$ - the emission of the specified pollutant;
$AR_{fuel\ consumption}$ - the activity rate for fuel consumption;
$EF_{pollutant}$ - the emission factor for this pollutant.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.4.a.i, 1.A.4.b.i., 1.A.4.c.i, 1.A.5.a Small combustion, page 37 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view)
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova (http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197).
Quantity of fuel consumed is reported in the Table 3-107 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019, 1.A.4.a.i, 1.A.4.b.i, 1.A.4.c.i, 1.A.5.a Small combustion, page 37, Table 3.8.
<table>
<tr><td rowspan="2">Fuel type</td><td>NO_x</td><td>CO</td><td>NMVOC</td><td>SO_2</td></tr>
<tr><td colspan="4">kg/TJ</td></tr>
<tr><td>Natural Gas</td><td>74 (46-103)</td><td>29 (21-48)</td><td>23 (14-33)</td><td>0.67 (0.40-0.94)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A3e Other transportation category could be possible once updating the available AD on real fuel consumption in the ATULBD for each source of emissions</td></tr>
</table>

2.1.4. Category 1A4 ‘Other sectors’

Tables 2.1.4.1 – 2.1.4.39 below comprise relevant information on source categories comprised within the inventory, including description of each source by type of fuel allocated to category 1A4 ‘Other sectors’.

Table 2.1.4.1: Information on source category 1A4a Commercial/Institutional, solid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, solid fuels / CO_2
Key Category?	Tier 1: 1990 (L), 2019 (L, T); Tier 2: 1990 (L) (1A4a Commercial/Institutional – aggregated for all types of fuels)
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications “Socio-economic development of the ATULBD”, http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$
Where:
$Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
$Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ),
$Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-122 and 3-123.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.20.
<table>
<tr><th>Fuels</th><th>CO_2 Emission Factor</th><th>Unit</th></tr>
<tr><td>Anthracite</td><td>98 300</td><td>kg CO_2 / TJ</td></tr>
<tr><td>Other Bituminous Coal</td><td>94 600</td><td>kg CO_2 / TJ</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>±5% - expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A4 ‘Other Sectors’ category could be possible by updating the available AD on fuel consumption on the territory of the LBDR and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.</td></tr>
</table>

Table 2.1.4.2: Information on source category 1A4a Commercial/Institutional, solid fuels / CH_4, N_2O

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A4 Other sectors</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A4a Commercial/Institutional, solid fuels / CH_4, N_2O</td></tr>
<tr><td>Key Category?</td><td>No</td></tr>
<tr><td>Category Description / Definition</td><td>Emissions from fuel combustion in commercial and institutional buildings</td></tr>
<tr><td>Country Detail</td><td>AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications “Socio-economic development of the ATULBD”, http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$
Where:
$Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
$Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ),
$Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-122 and 3-123.</td></tr>
</table>

Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.20.**

Fuels	CH_4, kg/ TJ	N_2O, kg / TJ
Anthracite, Bituminous Coal	10	1.5

Uncertainty of AD and source	±5 - expert judgement
Uncertainty of EF and source	±50% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the LBDR and filling the existing gaps for certain years. GHG emissions will be reported by fuel type in the next inventory cycle.

Table 2.1.4.3: Information on source category 1A4a Commercial/Institutional, solid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, solid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.7, page 36, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-122 and 3-123.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.7, page 36. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Hard and Brown Coal**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Solid fuels	173 (150-200)	931 (150-2000)	88.8 (10-300)	840 (450-1000)

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.4: Information on source category 1A4a Commercial/Institutional, liquid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors

Source / Fuel / Gas	1A4a Commercial/Institutional, liquid fuels / CO_2
Key Category?	Tier 1: 1990 (L); 2019 (L, T); Tier 2: 1990 (L) (1A4a Commercial/Institutional – aggregated for all types of fuels)
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-123.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.20.**

Fuels	**CO_2 Emission Factor**	Unit
Motor Gasoline	69 300	kg CO_2 / TJ
Gas/Diesel Oil	74 100	kg CO_2 / TJ
Residual Fuel Oil	77 400	kg CO_2 / TJ
Other Petroleum Products	73 300	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.5: Information on source category 1A4a Commercial/Institutional, liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the EB of the RM, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.

Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-123.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.20.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Liquid Fuels	10	0.6

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.6: Information on source category 1A4a Commercial/Institutional, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the EB of the RM, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.9, page 38, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-123.

<table>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.9, page 38. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Using Liquid Fuels
<table>
<tr><th>Fuels</th><th>NO_x, kg / TJ</th><th>CO, kg / TJ</th><th>NMVOC, kg / TJ</th><th>SO_2, kg / TJ</th></tr>
<tr><td>Liquid fuels</td><td>306 (50-1319)</td><td>93 (2-200)</td><td>20 (0.018-70)</td><td>94 (28-140)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A4 ‘Other Sectors’ category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.</td></tr>
</table>

Table 2.1.4.7: Information on source category 1A4a Commercial/Institutional, gaseous fuels / CO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A4 Other Sectors</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A4a Commercial/Institutional, gaseous fuels / CO_2</td></tr>
<tr><td>Key Category?</td><td>Tier 1: 2019 (L, T); Tier 2: 1990 (L) (1A4a Commercial/Institutional – aggregated for all types of fuels)</td></tr>
<tr><td>Category Description / Definition</td><td>Emissions from fuel combustion in commercial and institutional buildings</td></tr>
<tr><td>Country Detail</td><td>AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications “Socio-economic development of the ATULBD”, http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. “Moldovagaz”.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$$\text{Emissions}_{GHG,\,fuel} = \text{Fuel Consumption}_{fuel} \bullet \text{Emission factor}_{GHG,\,fuel} \bullet 10^{-6}$$
Where:
$\text{Emissions}_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
$\text{Fuel Consumption}_{fuel}$ – amount of fuel consumed (TJ),
$\text{Emission factor}_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-120,3-121 and 3-123.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.
<table>
<tr><th>Fuel</th><th>CO_2 Emission Factor</th><th>Unit</th></tr>
<tr><td>Natural Gas</td><td>56 100</td><td>kg CO_2/TJ</td></tr>
<tr><td>LPG</td><td>63 100</td><td>kg CO_2 / TJ</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5% expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>±5%- expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A4 ‘Other Sectors’ category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.</td></tr>
</table>

Table 2.1.4.8: Information on source category 1A4a Commercial/Institutional, gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. "Moldovagaz".
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-120, 3-121 and 3-123.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.**

Fuel	CH_4, kg / TJ	N_2O, kg / TJ
Natural Gas, LPG	5	0.1

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.9: Information on source category 1A4a Commercial/Institutional, gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD" http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. "Moldovagaz".

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6}
Where:
Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
Fuel Consumption $_{fuel}$ – amount of fuel consumed (TJ),
Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.8, page 37,
https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuels in TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-120, 3-121 and 3-123.</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.8, page 37. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Using Gaseous Fuels
<table>
<tr><th>Fuels</th><th>NO_x, kg / TJ</th><th>CO, kg / TJ</th><th>NMVOC, kg / TJ</th><th>SO_2, kg / TJ</th></tr>
<tr><td>Natural Gas, LPG</td><td>74 (46-103)</td><td>29 (21-48)</td><td>23 (14-33)</td><td>0.67 (0.4-0.94)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5%</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A4 ‘Other Sectors’ category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.</td></tr>
</table>

Table 2.1.4.10: Information on source category 1A4a Commercial/Institutional, biomass / CO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A4 Other Sectors</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A4a Commercial/Institutional, biomass / CO_2</td></tr>
<tr><td>Key Category?</td><td>No</td></tr>
<tr><td>Category Description / Definition</td><td>CO_2 emissions from biomass under the source category 1A4a Commercial/Institutional, has to be reported under the Memo Items (CO_2 emissions from biomass). Emissions from fuel combustion in commercial and institutional buildings.</td></tr>
<tr><td>Country Detail</td><td>AD on fuel consumption are available in the EB of the RM.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6}
Where:
Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
Fuel Consumption $_{fuel}$ – amount of fuel consumed (TJ),
Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-123.</td></tr>
</table>

Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.**

Fuels	CO_2 Emission Factor	Unit
Wood/ Wood Waste, Charcoal	112 000	kg CO_2 / TJ
Other Primary Solid Biomass	100 000	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years.

Table 2.1.4.11: Information on source category 1A4a Commercial/Institutional, biomass / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4a Commercial/Institutional, biomass / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the EB of the RM.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-123.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Wood / Wood Waste, Other Primary Solid Biomass	300	4
Charcoal	200	1

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.12: Information on source category 1A4a Commercial/Institutional, biomass / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other Sectors

Source / Fuel / Gas	1A4a Commercial/Institutional, biomass / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuel combustion in commercial and institutional buildings
Country Detail	AD on fuel consumption are available in the EB of the RM.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.10, page 39, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-121, 3-123.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.10, page 39. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Solid biomass.**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Solid Biomass	91 (20-120)	570 (50-4000)	300 (5-500)	11 (8-40)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years.

Table 2.1.4.13: Information on source category 1A4b Residential, solid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, solid fuels / CO_2
Key Category?	Tier 1:1990 (L), 2019 (L, T); Tier 2: 1990 (L), 2019 (L, T)
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the EB of the RM, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.

Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-126 and 3-127.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.**

Fuels	CO_2 Emission Factor	Unit
Anthracite	98 300	kg CO_2 / TJ
Other Bituminous Coal	94 600	kg CO_2 / TJ
Lignite	101 000	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years.

Table 2.1.4.14: Information on source category 1A4b Residential, solid fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, solid fuels / CH_4, N_2O
Key Category?	For CH_4 – Tier 1: 1990 (L), 2019 (T); Tier 2: 1990 (L), 2019 (L, T)
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$$Emissions_{GHG,\,fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\,fuel} \bullet 10^{-6}$$ Where: $Emissions_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-126 and 3-127.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.23.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Solid fuels	300	1.5

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±50% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.15: Information on source category 1A4b Residential, solid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, solid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.3, page 32, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-126 and 3-127.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.3, page 32. Tier 1 emission factors for NFR source category 1.A.4.b, Hard Coal and Brown Coal.**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Hard Coal and Brown Coal	110 (36-200)	4600 (3000-7000)	484 (250-840)	900 (300-1000)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.16: Information on source category 1A4b Residential, liquid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, liquid fuels / CO_2
Key Category?	No
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD" http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. A part of the information used was provided by the J.S.C. "Moldovagaz".

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6}
Where:
Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
Fuel Consumption $_{fuel}$ – amount of fuel consumed (TJ),
Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel TJ, from Energy Balances of the Republic of Moldova.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-126 and 3-127.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.
<table>
<tr><th>Fuels</th><th>CO_2 Emission Factor</th><th>Unit</th></tr>
<tr><td>Residual Fuel Oil</td><td>77 400</td><td>kg CO_2 / TJ</td></tr>
<tr><td>Other Kerosene</td><td>71 900</td><td>kg CO_2 / TJ</td></tr>
<tr><td>Diesel Oil</td><td>74 100</td><td>kg CO_2 / TJ</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>±5%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A4 ‘Other Sectors’ category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.</td></tr>
</table>

Table 2.1.4.17: Information on source category 1A4b Residential, liquid fuels / CH_4, N_2O

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A4 Other sectors</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A4b Residential, liquid fuels / CH_4, N_2O</td></tr>
<tr><td>Key Category?</td><td>No</td></tr>
<tr><td>Category Description / Definition</td><td>All emissions from fuel combustion in households.</td></tr>
<tr><td>Country Detail</td><td>AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications “Socio-economic development of the ATULBD”, http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. “Moldovagaz”.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6}
Where:
Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
Fuel Consumption $_{fuel}$ – amount of fuel consumed (TJ),
Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
</table>

Type and source of activity data	Quantity of fuel TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-126 and 3-127.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.**

Fuel	CH_4, kg / TJ	N_2O, kg / TJ
Residual Fuel Oil, Other Kerosene, Diesel Oil	10	0.6

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.18: Information on source category 1A4b Residential, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. "Moldovagaz".
Equation (Describe variables for method used)	$$Emissions_{GHG,\,fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\,fuel} \bullet 10^{-6}$$ Where: $Emissions_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 35, page 34. https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.5, page 34. Tier 1 emission factors for NFR source category 1.A.4.b, Liquid fuels**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Liquid fuels	51 (31-72)	57 (34-80)	0.69 (0.4-1.0)	70 (42-97)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.19: Information on source category 1A4b Residential, gaseous fuels / CO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4b Residential, gaseous fuels / CO_2
Key Category?	Tier 1:1990 (L), 2019 (L, T); Tier 2: 1990 (L), 2019 (L, T) (1A4b Residential - aggregated for all types of fuels)
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and in the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. "Moldovagaz".
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in TJ, from Energy Balances of the Republic of Moldova, and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-125 and 3-126.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.23.**

Fuel	CO_2 Emission Factor	Unit
Natural Gas	56 100	kg / TJ
LPG	63 100	kg / TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. Greenhouse gas emissions will be presented by fuel type in the next inventory cycle.

Table 2.1.4.20: Information on source category 1A4b Residential, gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. "Moldovagaz".

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6}
Where:
Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
Fuel Consumption $_{fuel}$ – amount of fuel consumed (TJ),
Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel in TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-125 and 3-126.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.
<table>
<tr><th>Fuel</th><th>CH_4, kg / TJ</th><th>N_2O, kg / TJ</th></tr>
<tr><td>Natural Gas, LPG</td><td>5</td><td>0.1</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>±5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>±50%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1A4 ‘Other Sectors’ category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.</td></tr>
</table>

Table 2.1.4.21: Information on source category 1A4b Residential, gaseous fuels / NO_x, CO, NMVOC and SO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A4 Other sectors</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A4b Residential, gaseous fuels / NO_x, CO, NMVOC and SO_2</td></tr>
<tr><td>Key Category?</td><td>Not applicable for pollutant emissions.</td></tr>
<tr><td>Category Description / Definition</td><td>All emissions from fuel combustion in households.</td></tr>
<tr><td>Country Detail</td><td>AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications “Socio-economic development of the ATULBD”, http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html. Part of the information used was provided by the J.S.C. “Moldovagaz”.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6}
Where:
Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG),
Fuel Consumption $_{fuel}$ – amount of fuel consumed (TJ),
Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ),
10^{-6} – conversion factor from kg to kt.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 34, page 33,
https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel in TJ, from Energy Balances of the Republic of Moldova, and Statistical Yearbooks of the ATULBD.
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-125 and 3-126.</td></tr>
</table>

Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Tables 3.4, page 33. Tier 1 emission factors for NFR source category 1.A.4.b, Using Gaseous Fuels**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Gaseous Fuels	51 (31-71)	26 (18-42)	1.9 (1.1-2.6)	0.3 (0.2-0.4)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.22: Information on source category 1A4b Residential, biomass / CO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4b Residential, biomass / CO_2
Key Category?	No
Category Description / Definition	CO_2 emissions from biomass under the source category 1A4b 'Residential' have to be reported under the memo Items (CO_2 emissions from biomass). All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$$\text{Emissions}_{GHG,\,fuel} = \text{Fuel Consumption}_{fuel} \bullet \text{Emission factor}_{GHG,\,fuel} \bullet 10^{-6}$$ Where: $\text{Emissions}_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $\text{Fuel Consumption}_{fuel}$ – amount of fuel consumed (TJ), $\text{Emission factor}_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-125, 3-126 and 3-127.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.23.**

Fuels	CO_2 Emission Factor	Unit
Wood / Wood Waste, Charcoal	112 000	kg CO_2 / TJ
Other Primary Solid Biomass	100 000	kg CO_2 / TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. Greenhouse gas emissions will be presented by fuel type in the next inventory cycle.

Table 2.1.4.23: Information on source category 1A4b Residential, biomass / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4b Residential, biomass / CH_4, N_2O
Key Category?	For CH_4 - Tier 1: 2019 (L, T); Tier 2: 1990 (L), 2019 (L, T) (aggregated)
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-125, 3-126 and 3-127.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.23.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Wood / Wood Waste, Other Primary Solid Biomass	300	4
Charcoal	200	1

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.24: Information on source category 1A4b Residential, biomass / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4b Residential, biomass / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	All emissions from fuel combustion in households.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.

Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 36, page 35, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in TJ, from Energy Balances of the Republic of Moldova and Statistical Yearbooks of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-125, 3-126 and 3-127.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.6, page 35. Tier 1 emission factors for NFR source category 1.A.4.b, Using Biomass.**

Fuels	kg NO_x / TJ	kg CO / TJ	kg NMVOC / TJ	kg SO_2 / TJ
Biomass fuels	50 (30-150)	4000 (1000-10000)	600 (20-3000)	11 (8-40)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.25: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', solid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', solid fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.

Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.**

Fuels	CO_2 Emission Factor	Unit
Anthracite	98 300	kg CO_2 / TJ
Other Bituminous Coal	94 600	kg CO_2 / TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. Greenhouse gas emissions will be presented by fuel type in the next inventory cycle.

Table 2.1.4.26: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', solid fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', solid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$$Emissions_{GHG,\,fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\,fuel} \bullet 10^{-6}$$ Where: $Emissions_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Anthracite, Other Bituminous Coal	300	1.5

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.27: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', solid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors

Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', solid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.7, page 36, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.7, page 36. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Hard and Brown Coal**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Solid Fuels	173 (150-200)	931 (150-2000)	88.8 (10-300)	840 (450-1000)

Uncertainty of AD and source	±5%
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.28: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', liquid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', liquid fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the EB of the RM, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1

Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.**

Fuels	CO_2 Emission Factor	Unit
Diesel Oil	74 100	kg CO_2 / TJ
Residual Fuel Oil	77 400	kg CO_2 / TJ
Other Kerosene	71 900	kg CO_2 / TJ
Other Petroleum Products	73 300	kg CO_2 / TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.29: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4cii 'Mobile', liquid fuels / CO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4cii 'Mobile' ('Off-Road Vehicles and Other Machinery'), liquid fuels / CO_2
Key Category?	Tier 1:1990 (L), 2019 (L, T); Tier 2: 1990 (L) (1A4c Agriculture/Forestry/Fishing - aggregated for all types of fuels)
Category Description / Definition	Emissions from fuels combusted in traction vehicles on farmland and in forests.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and Press Release "The State of Housing and Communal Services of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/sostoyanie-zhkx.html.
Equation (Describe variables for method used)	$$Emissions_{GHG,\,fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\,fuel} \bullet 10^{-6}$$ Where: $Emissions_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 3, Mobile Combustion, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-131, 3-132 and 3-133.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 3, Table 3.2.1, page 3.16.**

Fuels	CO_2 Emission Factor	Unit
Motor Gasoline	69 300	kg CO_2 / TJ
Gas/Diesel Oil	74 100	kg CO_2 / TJ

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±5%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.30: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$$Emissions_{GHG,\,fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG,\,fuel} \bullet 10^{-6}$$ Where: $Emissions_{GHG,\,fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG,\,fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.22.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Diesel Oil, Residual Fuel Oil, Other Kerosene, Other Petroleum Products	10	0.6

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.31: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4cii 'Mobile', liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4cii 'Mobile' ('Off-Road Vehicles and Other Machinery'), liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in traction vehicles on farmland and in forests.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and Press Release "The State of Housing and Communal Services of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/sostoyanie-zhkx.html.

Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 3, Mobile Combustion, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-131, 3-132 and 3-133.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 3, Tables 3.3.1 and 3.2.2.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Motor Gasoline	80	2
Gas/Diesel Oil	4.15	28.6

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.32: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.9, page 38, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.

Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small Combustion. Tables 3.9, page 38. Tier 1 Emission Factors for NFR Source Category 1.A.4.a/c, 1.A.5.a, Using Liquid Fuels**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Liquid Fuels	306 (50-1319)	93 (2-200)	20 (0.018-70)	94 (28-140)

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.33: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4cii 'Mobile', liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4cii 'Mobile' ('Off-Road Vehicles and Other Machinery'), liquid fuels / NO_x, CO and NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Emissions from fuels combusted in traction vehicles on farmland and in forests.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and Press Release "The State of Housing and Communal Services of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/sostoyanie-zhkx.html.
Equation (Describe variables for method used)	For NO_x, CO, NMVOC Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ •10^{-6} Where: Emissions $_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), Fuel Consumption $_{fuel}$ – amount of fuel consumed (kt), Emission factor $_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /kt), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1 For SO_2 Emissions = $2\Sigma k_{s,m} \bullet b_{j,m}\ 10^{-6}$ Where: $k_{S,m}$ = weight of sulphur content in fuel of type m [kg/kt], $b_{j,m}$ = total annual consumption of fuel of type m [kt] by source category j. 10^{-6} – conversion factor from kg to kt
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Non-road mobile machinery. Table 3-1, page 22-23, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-non-road-1/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-131, 3-132 and 3-133
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1.A.4 Non-road mobile machinery, Table 3-1, pages 22-23.**

Fuels	NO_x kg / kt	CO, kg / kt	NMVOC, kg / kt
Motor Gasoline	7 117	770 368	18 893
Gas/Diesel Oil	34 457	11 469	3 542

Uncertainty of AD and source	±5%
Uncertainty of EF and source	Uncertainty detailing is available for this sector. EMEP/EEA air pollutant emission inventory guidebook, 2019, 1.A.4 Non road mobile machinery, 1.A.2.f ii; 1.A.4.a.ii, 1.A.4.b ii; 1.A.4.c ii; 1.A.4.c iii; 1.A.5.b, Table 4-1 'Uncertainty estimates for input data required to apply the proposed methodologies'.

Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.34: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', gaseous fuels / CO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4c i 'Stationary', gaseous fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the EB of the RM, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.**

Fuels	CO_2 Emission Factor	Unit
Natural Gas	56 100	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.34-1: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4cii 'Mobile', gaseous fuels / CO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4c ii 'Mobile', gaseous fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.

Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 3, Mobile Combustion, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-132 and 3-133.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 3, Table 3.2.1.**

Fuels	CO_2 Emission Factor	Unit
LPG	63 100	kg CO_2 / TJ

Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.35: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.

Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.4, page 2.21.** Fuels | CH_4, kg / TJ | N_2O, kg / TJ Natural Gas | 5 | 0.1
Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.35-1: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4cii 'Mobile', gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4cii 'Mobile', gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 3, Mobile Combustion, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-132 and 3-133.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 3, Table 3.2.2, page 3.21.** Fuels | CH_4, kg / TJ | N_2O, kg / TJ LPG | 62 | 0.2
Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.36: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions

Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197 and the statistical publications "Socio-economic development of the ATULBD", http://mer.gospmr.org/gosudarstvennaya-sluzhba-statistiki/informacziya/o-soczialno-ekonomicheskom-polozhenii-pmr.html.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.8, page 37, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-128, 3-129 and 3-130.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.8, page 37. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Using Gaseous Fuels**

Fuels	NO_x, kg / TJ	CO, kg / TJ	NMVOC, kg / TJ	SO_2, kg / TJ
Gaseous fuels	74 (46-103)	29 (21-48)	23 (14-33)	0.67 (0.4-0.94)

Uncertainty of AD and source	±5%
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.36-1: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4cii 'Mobile', gaseous fuels / NO_x, CO, NMVOC

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4cii 'Mobile', gaseous fuels / NO_x, CO, NMVOC
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (kt), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /kt), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Non-road mobile machinery. Table 3-1, page 22-23, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-non-road-1/view

Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-129 and 3-130.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Non-road mobile machinery. Table 3-1, page 22-237.**
Uncertainty of AD and source	±5%
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Fuels	NO_x, kg /kt	CO, kg / kt	NMVOC, kg / kt
LPG	28 571	4 823	6 720

Table 2.1.4.37: Information on source category 1A4c 'Agriculture/Forestry/Fishing', 1A4ci 'Stationary', biomass / CO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', biomass / CO_2
Key Category?	No
Category Description / Definition	CO_2 emissions from biomass under the source category 1A4c 'Agriculture/Forestry/Fishing' have to be reported under the Memo Items (CO_2 emissions from biomass). Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel} \cdot 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-129 and 3-130.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.23.**
Uncertainty of AD and source	±5% - expert judgement
Uncertainty of EF and source	±5% - expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Fuels	CO_2 Emission Factor	Unit
Wood / Wood Waste, Charcoal	112 000	kg CO_2 / TJ
Other Primary Solid Biomass	100 000	kg CO_2 / TJ

Table 2.1.4.38: Information on source category 1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', biomass / CH_4, N_2O

Sector	Energy
Category	1A4 Other sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4c i 'Stationary', biomass / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 2, Chapter 2, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf.
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-129 and 3-130.
Type and source of EF and OF	**2006 IPCC Guidelines, Volume 2, Chapter 2, Table 2.5, page 2.23.**

Fuels	CH_4, kg / TJ	N_2O, kg / TJ
Wood / Wood Waste, Other Primary Solid Biomass	300	4

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	±50%, expert judgement
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

Table 2.1.4.39: Information on source category 1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', biomass / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A4 Other Sectors
Source / Fuel / Gas	1A4c Agriculture/Forestry/Fishing, 1A4ci 'Stationary', biomass / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuels combusted in pumps, grain drying, horticultural greenhouses and other agriculture, forestry or stationary combustion in the fishing industry.
Country Detail	AD on fuel consumption are available in the Energy Balances of the Republic of Moldova, http://www.statistica.md/pageview.php?l=ro&idc=263&id=2197.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel} \bullet 10^{-6}$ Where: $Emissions_{GHG, fuel}$ – emissions of the greenhouse gases by type of fuel (kt GHG), $Fuel\ Consumption_{fuel}$ – amount of fuel consumed (TJ), $Emission\ factor_{GHG, fuel}$ – default emission factor of a given greenhouse gases by type of fuel (kg /TJ), 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1

Reference	EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.10, page 39, https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel in kt and TJ, from Energy Balances of the Republic of Moldova. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-129 and 3-130.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook, 2019, 1A4 Small combustion. Table 3.10, page 39. Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, Using Solid Biomass**

Fuels	kg NO_x / TJ	kg CO / TJ	kg NMVOC / TJ	kg SO_2 / TJ
Solid biomass	91 (20-120)	570 (50-4000)	300 (5-500)	11 (8-40)

Uncertainty of AD and source	±5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper)
Potential Improvements	Potential improvements within the 1A4 'Other Sectors' category could be possible by updating the available AD on fuel consumption on the territory of the ATULBD and filling the existing gaps for certain years. GHG emissions will be reported by fuel types in the next inventory cycle.

2.1.5. Category 1A5 'Other'

Tables 2.1.5.1 – 2.1.5.15 below comprise relevant information on source categories comprised within the inventory, including description of each source by type of fuel allocated to category 1A5 'Other'.

Table 2.1.5.1: Information on source category 1A5 'Other', 1A5a 'Stationary', solid fuels / CO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, solid fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks and "Use of energy resources" of the ATULBD, NCV of Other Bituminous Coal (25.44 TJ/kt). Quantity of fuel consumed is reported in the Table 3-145, 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.**

Fuel type	CO_2 Emission Factor	Unit
Other Bituminous Coal	94.600	t CO_2 / TJ
Anthracite	98.300	t CO_2 / TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.2: Information on source category 1A5 'Other', 1A5a 'Stationary', solid fuels / CH_4, N_2O

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, solid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks and "Use of energy resources" of the ATULBD, NCV of Other Bituminous Coal (25.44 TJ/kt). Quantity of fuel consumed is reported in the Table 3-145, 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.

<table>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.
<table>
<tr><td rowspan="2">Fuel type</td><td>CH_4</td><td>N_2O</td></tr>
<tr><td colspan="2">kg/TJ</td></tr>
<tr><td>Other Bituminous Coal, Anthracite</td><td>1.0</td><td>1.5</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 50%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

Table 2.1.5.3: Information on source category 1A5 ‘Other’, 1A5a ‘Stationary’, solid fuels / NO_x, CO, NMVOC and SO_2

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1A5 Other</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1A5a Stationary, solid fuels / NO_x, CO, NMVOC and SO_2</td></tr>
<tr><td>Key Category?</td><td>Not applicable for pollutant emissions</td></tr>
<tr><td>Category Description / Definition</td><td>Emissions from fuel combustion in stationary sources that are not specified elsewhere.</td></tr>
<tr><td>Country Detail</td><td>The Energy Balances of the RM (Chapter S.2.1 “Consumed as Fuel or Energy” and columns: “For Other Works and Needs” and “Used for other purposes”) represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD “Use of energy resources” (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 ‘Other’ category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$$E_{pollutant} = AR_{fuel\ consumption} \bullet EF_{pollutant} \text{ (Equation 1)}$$
Where:
$E_{pollutant}$ - the emission of the specified pollutant;
$AR_{fuel\ consumption}$ - the activity rate for fuel consumption;
$EF_{pollutant}$ - the emission factor for this pollutant.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.4.a.i, 1.A.4.b.i, 1.A.4.c.i, 1.A.5.a Small combustion, page 36 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova and Quantity of fuel (t) – Statistical Yearbooks and “Use of energy resources” of the ATULBD, NCV of Other Bituminous Coal (25.44 TJ/kt). Quantity of fuel consumed is reported in the Table 3-145, 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook, 2019. 1A4 Small combustion, page 36, Table 3.7.
<table>
<tr><td rowspan="2">Fuel type</td><td>NO_x</td><td>CO</td><td>NMVOC</td><td>SO_2</td></tr>
<tr><td colspan="4">kg/TJ</td></tr>
<tr><td>Hard Coal and Brown Coal</td><td>173 (150-200)</td><td>931 (150-2000)</td><td>88.8 (10-300)</td><td>840 (450-1000)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

Table 2.1.5.4: Information on source category 1A5 'Other', 1A5a 'Stationary', liquid fuels / CO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, liquid fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.**

Fuel type	CO_2 Emission Factor	Unit
Residual Fuel Oil	77.400	t CO_2/TJ
Other Kerosene	71.900	t CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.5: Information on source category 1A5 'Other', 1A5a 'Stationary', liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.

<table>
<tr><td>Country Detail</td><td>The Energy Balances of the RM (Chapter S.2.1 “Consumed as Fuel or Energy” and columns: “For Other Works and Needs” and “Used for other purposes”) represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD “Use of energy resources” (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 ‘Other’ category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1)
Where:
$Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG);
$Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ);
$Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.16, Table 2.2.
<table>
<tr><th rowspan="2">Fuel type</th><th>CH_4</th><th>N_2O</th></tr>
<tr><th colspan="2">kg/TJ</th></tr>
<tr><td>Residual Fuel Oil, Other Kerosene</td><td>3.0</td><td>0.6</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 50%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

Table 2.1.5.6: Information on source category 1A5 ‘Other’, 1A5a ‘Stationary’, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 “Consumed as Fuel or Energy” and columns: “For Other Works and Needs” and “Used for other purposes”) represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD “Use of energy resources” (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 ‘Other’ category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{pollutant} = AR_{fuel\ consumption} \bullet EF_{pollutant}$ (Equation 1)
Where:
$E_{pollutant}$ - the emission of the specified pollutant;
$AR_{fuel\ consumption}$ - the activity rate for fuel consumption;
$EF_{pollutant}$ - the emission factor for this pollutant.
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.4.a.i, 1.A.4.b.i, 1.A.4.c.i, 1.A.5.a Small combustion, page 36 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.</td></tr>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019. 1A4 small combustion, page 38, Table 3.9.
<table>
<tr><th rowspan="2">Fuel type</th><th>NO_x</th><th>CO</th><th>NMVOC</th><th>SO_2</th></tr>
<tr><th colspan="4">kg/TJ</th></tr>
<tr><td>Liquid Fuels</td><td>306 (50-1319)</td><td>93 (2-200)</td><td>20 (0.018-70)</td><td>94 (28-140)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

Table 2.1.5.7: Information on source category 1A5 ‘Other’, 1A5a ‘Stationary’, gaseous fuels / CO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, gaseous fuels / CO_2
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 “Consumed as Fuel or Energy” and columns: “For Other Works and Needs” and “Used for other purposes”) represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD “Use of energy resources” (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 ‘Other’ category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Fuel type	CO_2 Emission Factor	Unit
Natural Gas	56.100	t CO_2/TJ
Liquefied Petroleum Gases	63.100	t CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.8: Information on source category 1A5 'Other', 1A5a 'Stationary', gaseous fuels / CH_4, N_2O

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, gaseous fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \cdot Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Fuel type	CH_4	N_2O
	kg/TJ	
Natural Gas, Liquefied Petroleum Gases	1.0	0.1

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 50%, expert judgement
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.9: Information on source category 1A5 'Other', 1A5a 'Stationary', gaseous fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, gaseous fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel\ consumption} \bullet EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ - the emission of the specified pollutant; $AR_{fuel\ consumption}$ - the activity rate for fuel consumption; $EF_{pollutant}$ - the emission factor for this pollutant. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.4.a.i, 1.A.4.b.i, 1.A.4.c.i, 1.A.5.a Small combustion, page 36 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook 2019. 1A4 small combustion, page 37, Table 3.8.**

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/TJ			
Gaseous Fuels	74 (46-103)	29 (21-48)	23 (14-33)	0.67 (0.40-0.94)

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.10: Information on source category 1A5 'Other', 1A5a 'Stationary', biomass / CO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, biomass / CO_2

Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$Emissions_{GHG, fuel} = Fuel\ Consumption_{fuel} \bullet Emission\ factor_{GHG, fuel}$ (Equation 2.1) Where: $Emissions_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG); $Fuel\ Consumption_{fuel}$ - amount of fuel consumed (TJ); $Emission\ factor_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ). For CO_2, it includes the carbon oxidation factor, assumed to be 1. Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.**

Fuel type	CO_2 Emission Factor	Unit
Wood / Wood Waste	112	t CO_2/TJ
Other Primary Solid Biomass	100	t CO_2/TJ

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.11: Information on source category 1A5 'Other', 1A5a 'Stationary', biomass / CH_4, N_2O

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, biomass / CH_4, N_2O
Key Category?	No
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD "Use of energy resources" (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>Emissions $_{GHG, fuel}$ = Fuel Consumption $_{fuel}$ • Emission factor $_{GHG, fuel}$ (Equation 2.1)
Where:
Emissions $_{GHG, fuel}$ - emission of the greenhouse gases by type of fuel (kg GHG);
Fuel Consumption $_{fuel}$ - amount of fuel consumed (TJ);
Emission factor $_{GHG, fuel}$ - default emission factor of a given greenhouse gases by type of fuel (kg gas/TJ).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, p. 2.11 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 2: Stationary Combustion, page 2.17, Table 2.2.
<table>
<tr><th rowspan="2">Fuel type</th><th>CH_4</th><th>N_2O</th></tr>
<tr><th colspan="2">kg/TJ</th></tr>
<tr><td>Wood / Wood Waste, Other Primary Solid Biomass</td><td>30</td><td>4</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 50%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

Table 2.1.5.12: Information on source category 1A5 ‘Other’, 1A5a ‘Stationary’, biomass / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5a Stationary, biomass / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions
Category Description / Definition	Emissions from fuel combustion in stationary sources that are not specified elsewhere.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 “Consumed as Fuel or Energy” and columns: “For Other Works and Needs” and “Used for other purposes”) represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR were collected from the Statistical Publications of the ATULBD “Use of energy resources” (these are available for only one type of fuel (coal) only for 2014-2019 time series). Between 1990 and 2019, the GHG emissions from 1A5 ‘Other’ category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from stationary combustion increased up to 100 per cent.
Equation (Describe variables for method used)	$E_{pollutant} = AR_{fuel\ consumption} \bullet EF_{pollutant}$ (Equation 1) Where: $E_{pollutant}$ - the emission of the specified pollutant; $AR_{fuel\ consumption}$ - the activity rate for fuel consumption; $EF_{pollutant}$ - the emission factor for this pollutant. Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.4.a.i, 1.A.4.b.i, 1.A.4.c.i, 1.A.5.a Small combustion, page 36 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-4-small-combustion/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) – activity data from Energy Balances of the Republic of Moldova. Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**EMEP/EEA air pollutant emission inventory guidebook 2019. 1A4 Small combustion, page 39, Table 3.10.**

Fuel type	NO_x	CO	NMVOC	SO_2
	kg/TJ			
Solid biomass	91 (20-120)	570 (50-4000)	300 (5-500)	11 (8-40)

Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.13: Information on source category 1A5 'Other', 1A5b 'Mobile', liquid fuels / CO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5b Mobile, liquid fuels / CO_2
Key Category?	No
Category Description / Definition	All remaining emissions from fuel combustion from vehicles and other machinery, marine and aviation that are not specified elsewhere. Include emissions from fuel delivered to the country's military as well as fuel delivered within that country but used by the militaries of other countries that are not engaged in multilateral operations.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR are not available). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from mobile combustion decreased to 0 per cent.
Equation (Describe variables for method used)	$$\text{Emissions} = \sum_a (\text{Fuel}_a \cdot \text{EF}_a) \quad \text{(Equation 3.2.1)}$$ Where: Emissions - emission of CO_2 (kg); Fuel_a - fuel sold (TJ); EF_a - emission factor (kg gas/TJ). This is equal to the carbon content of the fuel multiplied by 44/12; a - type of fuel (e.g. petrol, diesel, natural gas, LPG). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3: Mobile Combustion, page 3.12 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) and (t), NCV Gasoline (43.72 TJ/kt), NCV Diesel Oil (42.54 TJ/kt), NCV Aviation Gasoline (43.66 TJ/kt), NCV Jet Kerosene (43.13 TJ/kt). Quantity of fuel consumed is reported in the Table 3-147, 3-148 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.

Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, page 3.16, Table 3.2.1; page 3.64, Table 3.6.4.** Type of fuel / CO_2 Emission Factor / Unit Gasoline / 69.300 / t CO_2/TJ Aviation Gasoline / 69.300 / t CO_2/TJ Jet Kerosene / 71.500 / t CO_2/TJ Gas/Diesel Oil / 74.100 / t CO_2/TJ
Uncertainty of AD and source	± 5%, expert judgement
Uncertainty of EF and source	± 5%, expert judgement
Potential Improvements	For the next inventory cycle, potential improvements in 1A5 'Other' category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.

Table 2.1.5.14: Information on source category 1A5 'Other', 1A5b 'Mobile', liquid fuels / CH_4, N_2O

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5b Mobile, liquid fuels / CH_4, N_2O
Key Category?	No
Category Description / Definition	All remaining emissions from fuel combustion from vehicles and other machinery, marine and aviation that are not specified elsewhere. Include emissions from fuel delivered to the country's military as well as fuel delivered within that country but used by the militaries of other countries that are not engaged in multilateral operations.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 "Consumed as Fuel or Energy" and columns: "For Other Works and Needs" and "Used for other purposes") represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR are not available). Between 1990 and 2019, the GHG emissions from 1A5 'Other' category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from mobile combustion decreased to 0 per cent.
Equation (Describe variables for method used)	$$Emission = \sum_a (Fuel_a \bullet EF_a) \quad \text{(Equation 3.2.3)}$$ Where: Emissions - emission in kg; $Fuel_a$ - fuel consumed, (TJ) (as represented by fuel sold); EF_a - emission factor (kg gas/TJ); a - type of fuel (e.g. petrol, diesel, natural gas, LPG). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3: Mobile Combustion, page 3.13 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) and (t), NCV Gasoline (43.72 TJ/kt), NCV Diesel Oil (42.54 TJ/kt), NCV Aviation Gasoline (43.66 TJ/kt), NCV Jet Kerosene (43.13 TJ/kt). Quantity of fuel consumed is reported in the Table 3-147, 3-148 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.

<table>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Chapter 3, page 3.21, Table 3.2.2, page 3.64, Table 3.6.5.
<table>
<tr><td rowspan="2">Fuel type</td><td>CH_4</td><td>N_2O</td></tr>
<tr><td colspan="2">kg/TJ</td></tr>
<tr><td>Gasoline</td><td>33.0</td><td>3.2</td></tr>
<tr><td>Gas/Diesel Oil</td><td>3.9</td><td>3.9</td></tr>
<tr><td>Aviation Gasoline, Jet Kerosene</td><td>0.5</td><td>2.0</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 50%, expert judgement</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

Table 2.1.5.15: Information on source category 1A5 ‘Other’, 1A5b ‘Mobile’, liquid fuels / NO_x, CO, NMVOC and SO_2

Sector	Energy
Category	1A5 Other
Source / Fuel / Gas	1A5b Mobile, liquid fuels / NO_x, CO, NMVOC and SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	All remaining emissions from fuel combustion from vehicles and other machinery, marine and aviation that are not specified elsewhere. Include emissions from fuel delivered to the country’s military as well as fuel delivered within that country but used by the militaries of other countries that are not engaged in multilateral operations.
Country Detail	The Energy Balances of the RM (Chapter S.2.1 “Consumed as Fuel or Energy” and columns: “For Other Works and Needs” and “Used for other purposes”) represented the main source of reference for AD associated to fuel consumption on the territory of the RBDR. Another relevant source of reference was the Ministry of Defense of the RM, which provides information on fuel combustion for military transport (for the 2017-2019 the data are not available). The activity data pertaining to the fuel consumption on the territory of the LBDR are not available). Between 1990 and 2019, the GHG emissions from 1A5 ‘Other’ category decreased in the RM by circa 80.1 per cent. By 2019 the share of emissions from mobile combustion decreased to 0 per cent.
Equation (Describe variables for method used)	$E_i = \sum_j (\sum_m (FC_{j,m} \cdot EF_{i,j,m}))$ (Equation 1) Where: E_i - emission of pollutant *i* (g); $FC_{j,m}$ - fuel consumption of vehicle category *j* using fuel *m* (kg); $EF_{i,j,m}$ - fuel consumption- specific emission factor of pollutant *i* for vehicle category *j* and fuel *m* (g/kg). Methodology: Tier 1
Reference	EMEP/EEA air pollutant emission inventory guidebook 2019. 1A3.b.i-iv Road transport, page 19 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-b-i/view). EMEP/EEA air pollutant emission inventory guidebook 2019. 1.A.3.a, 1.A.5.b Aviation, page 20 (available on: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-a-aviation/view). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Quantity of fuel (TJ) and (t), NCV Gasoline (43.72 TJ/kt), NCV Diesel Oil (42.54 TJ/kt), NCV Aviation Gasoline (43.66 TJ/kt), NCV Jet Kerosene (43.13 TJ/kt). Quantity of fuel consumed is reported in the Table 3-146 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.

<table>
<tr><td>Type and source of EF and OF</td><td>EMEP/EEA air pollutant emission inventory guidebook 2019, 1A3.b.i-iv Road transport, page 19-20, Tables 3.5 and 3.6.
<table>
<tr><td rowspan="2">Fuel type</td><td>NO_x</td><td>CO</td><td>NMVOC</td><td>SO_2</td></tr>
<tr><td colspan="3">g/kg fuel</td><td>kg/TJ</td></tr>
<tr><td>Gasoline</td><td>8.73 (4.48-29.89)</td><td>84.7 (49.0-269.5)</td><td>10.05 (5.55-34.42)</td><td>(depend on sulphur content on fuel)*</td></tr>
<tr><td>Gas/Diesel Oil</td><td>33.37 (28.34-38.29)</td><td>7.58 (5.73-10.57)</td><td>1.92 (1.33-3.77)</td><td>(depend on sulphur content on fuel)*</td></tr>
</table>
*Note: SO_2 emissions by fuel type are calculated for each year individually according to the formula 2 page 22. (EMEP/EEA air pollutant emission inventory guidebook 2019. 1A3.b.i-iv Road transport)
EMEP/EEA air pollutant emission inventory guidebook 2019, 1.A.3.a, 1.A.5.b Aviation, page 20, Table 3.3.
<table>
<tr><td rowspan="2">Fuel type</td><td>NO_x</td><td>CO</td><td>NMVOC</td><td>SO_2</td></tr>
<tr><td colspan="3">kg/tone fuel</td></tr>
<tr><td>Jet Gasoline and Aviation Gasoline</td><td>4.0 (2-8)</td><td>1200 (600-2400)</td><td>19 (9.5-38)</td><td>1 (0.5-2)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 5%, expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
<tr><td>Potential Improvements</td><td>For the next inventory cycle, potential improvements in 1A5 ‘Other’ category could be performed if new AD on fuel consumption would be available for the territory on the LBDR and filling the existing gaps for certain years.</td></tr>
</table>

2.1.6. Category 1B2 ‘Fugitive Emissions from Oil and Natural Gas’

Tables 2.1.6.1 – 2.1.6.10 below comprise relevant information on source categories comprised within the inventory, including description of each source by type of fuel allocated to category 1B2 ‘Fugitive Emissions from Oil and Natural Gas’.

Table 2.1.6.1: Information on source category 1B2 ‘Fugitive Emissions from Oil and Natural Gas’, 1B2a.iii.1 ‘Exploration’, 1B2a.iii.2 ‘Production and Upgrading’, liquid fuels / CO_2, CH_4, N_2O, NMVOC

Sector	Energy
Category	1B2 Fugitive Emissions from Oil and Natural Gas
Source / Fuel / Gas	1B2.a.iii.1 ‘Exploration’, 1B2.a.iii.2 ‘Production and Upgrading’, liquid fuels / CO_2, CH_4, N_2O, NMVOC
Key Category?	no
Category Description / Definition	1B2.a.iii.1 ‘Exploration’: Fugitive emissions (excluding venting and flaring) from oil well drilling, drill stem testing, and well completions 1B2.a.iii.2 ‘Production and Upgrading’: Fugitive emissions from oil production (excluding venting and flaring) occur at the oil wellhead or at the oil sands or shale oil mine through to the start of the oil transmission system. This includes fugitive emissions related to well servicing, oil sands or shale oil mining, transport of untreated production (i.e., well effluent, emulsion, oil shale and oilsands) to treating or extraction facilities, activities at extraction and upgrading facilities, associated gas re-injection systems and produced water disposal systems.
Country Detail	Oil extraction is performed nearby Valeni village, Cahul district, on the territory of national reservation “Prutul de Jos”. The estimated amount of oil reserves in oil fields of Valeni is circa 2-3 million tons, of which about 0.5-1.0 million tons are available reserves. After removing the water, oil is pumped through pipelines into storage tanks, from where it is transported in tanks to the refinery owned by Arnaut Petrol J.S.C. (Comrat, ATU Gagauzia), with a processing capacity of about 35 kt annually. The following types of secondary fuels are produced at the respective refinery: gasoline, diesel oil, residual fuel oil and other petroleum products. About 30 wells were drilled in the oil fields of Valeni. Extraction takes place only on some of them, the rest being preserved. Between 2003 and 2005, 8 wells were operational, 5 being in service. In 2006-2012 time series, 10 wells were servicing, while starting with 2013 – circa 15 wells. During the period under review, the amount of extracted oil varied between 1 and 17 kt annually or between 1 and 18 thousand m^3 annually.

Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \bullet EF_{gas,\ industry\ segment}$ $E\ gas = \Sigma\ E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (kt); $A_{industry\ segment}$: Oil Wells Oil Wells (Drilling, Testing, Servicing) (well units) $EF_{gas,\ industry\ segment}$ – emission factor (kt/activity unit). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1. (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	It is not a key source; data for determination of CS EF are not available.
Type and source of activity data	Activity data from Energy Balances of the Republic of Moldova for 2003-2019, Report by State Ecological Inspectorate. Quantity of oil extraction is reported in the Table 3-151 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average**

	CO_2, kg / per well	CH_4 kg / per well	N_2O, kg / per well	NMVOC, kg / per well
Drilling	900 (-12.5 +800%)	296.5 (-12.5 +800%)	-	7.935 (-12.5 +800%)
Testing	79500 (-12.5 +800%)	450.5 (-12.5 +800%)	0.584 (-10 +1000%)	106 (-12.5 +800%)
Servicing	17 (-12.5 +800%)	955 (-12.5 +800%)	-	148.5 (-12.5 +800%)

Uncertainty of AD and source	± 25%, expert judgement (see also as reference 2006 IPCC, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25%, expert judgement (see also as reference IPCC, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). See the confidence intervals in the table above.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.2: Information on source category 1B2 'Fugitive Emissions from Oil and Natural Gas', 1B2.a i 'Oil Production', liquid fuels / CO_2, CH_4, N_2O, NMVOC

Sector	Energy
Category	1B2 Fugitive Emissions from Oil and Natural Gas
Source / Fuel / Gas	1B2.a i 'Oil Production', liquid fuels / CO_2, CH_4, N_2O, NMVOC
Key Category?	No
Category Description / Definition	1B2.a i 'Oil Production': fugitive emissions from oil production (excluding venting and flaring) occur at the oil wellhead or at the oil sands or shale oil mine through to the start of the oil transmission system. This includes fugitive emissions related to well servicing, oil sands or shale oil mining, transport of untreated production (i.e., well effluent, emulsion, oil shale and oilsands) to treating or extraction facilities, activities at extraction and upgrading facilities, associated gas re-injection systems and produced water disposal systems.
Country Detail	Oil extraction is performed nearby Valeni village, Cahul district, on the territory of national reservation "Prutul de Jos". The estimated amount of oil reserves in oil fields of Valeni is circa 2-3 million tons, of which about 0.5-1.0 million tons are available reserves. After removing the water, oil is pumped through pipelines into storage tanks, from where it is transported in tanks to the refinery owned by Arnaut Petrol J.S.C. (Comrat, ATU Gagauzia), with a processing capacity of about 35 kt annually. The following types of secondary fuels are produced at the respective refinery: gasoline, diesel oil, residual fuel oil and other petroleum products. About 30 wells were drilled in the oil fields of Valeni. Extraction takes place only on some of them, the rest being preserved. Between 2003 and 2005, 8 wells were operational, 5 being in service. In 2006-2012 time series, 10 wells were servicing, while starting with 2013 – circa 15 wells. During the period under review, the amount of extracted oil varied between 1 and 17 kt annually or between 1 and 18 thousand m^3 annually.

Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \cdot EF_{gas,\ industry\ segment}$ $E_{gas} = \Sigma E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (kt); $A_{industry\ segment}$: Oil Production (10^3 m^3) $EF_{gas,\ industry\ segment}$ – emission factor (kt/10^3 m^3). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this emission source and unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	Oil Production, in kt, is available in the Energy Balances of the RM for the period 2003-2019 and is reported in the Table 3-151 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The value of oil density (circa 0.941t/m^3) is available in the Report produced by the State Ecological Inspectorate.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average**

	CO_2	CH_4	NMVOC
	Emission Factors, kg / 10^3 m^3		
Oil Production	2 150 (-12.5 to +800%)	30 000.8 (-12.5 to +800%)	37 500.9 (-12.5 to +800%)

Uncertainty of AD and source	± 25% expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25% expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). The confidence interval is available in the table above.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.3: Information on source category 1B2 Fugitive Emissions from Oil and Natural Gas, 1B2.a i 'Oil Venting', liquid fuels / CO_2, CH_4, N_2O, NMVOC

Sector	Energy
Category	1B2 Fugitive Emissions from Oil and Natural Gas
Source / Fuel / Gas	1B2.a i 'Oil Venting', liquid fuels / CO_2, CH_4, N_2O, NMVOC
Key Category?	No
Category Description / Definition	Emissions from venting of associated gas and waste gas/vapor streams at oil facilities.
Country Detail	Oil extraction is performed nearby Valeni village, Cahul district, on the territory of national reservation "Prutul de Jos". The estimated amount of oil reserves in oil fields of Valeni is circa 2-3 million tons, of which about 0.5-1.0 million tons are available reserves. After removing the water, oil is pumped through pipelines into storage tanks, from where it is transported in tanks to the refinery owned by Arnaut Petrol J.S.C. (Comrat, ATU Gagauzia), with a processing capacity of about 35 kt annually. The following types of secondary fuels are produced at the respective refinery: gasoline, diesel oil, residual fuel oil and other petroleum products. About 30 wells were drilled in the oil fields of Valeni. Extraction takes place only on some of them, the rest being preserved. Between 2003 and 2005, 8 wells were operational, 5 being in service. In 2006-2012 time series, 10 wells were servicing, while starting with 2013 – circa 15 wells. During the period under review, the amount of extracted oil varied between 1 and 17 kt annually or between 1 and 18 thousand m^3 annually.

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{gas,\ industry\ segment} = A_{industry\ segment} \cdot EF_{gas,\ industry\ segment}$t
$E_{gas} = \Sigma E_{gas,\ industry\ segment}$
Where:
$E_{gas,\ industry\ segment}$ – annual emissions (kt);
$A_{industry\ segment}$: Oil Production (10^3 m^3)
$EF_{gas,\ industry\ segment}$ – emission factor (kt/10^3 m^3).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>It is not a key source; data for determination of CS EF are not available</td></tr>
<tr><td>Type and source of activity data</td><td>Oil Production, in kt, is available in the Energy Balances of the RM for the period 2003-2019 and is reported in the Table 3-151 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The value of oil density (circa 0.941t/m^3) is available in the Report produced by the State Ecological Inspectorate.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average
<table>
<tr><th></th><th>CO_2</th><th>CH_4</th><th>NMVOC</th></tr>
<tr><th></th><th colspan="3">Emission Factors, kg / 10^3 m^3</th></tr>
<tr><td>Oil Production</td><td>112.5 (±75%)</td><td>855 (±75%)</td><td>510 (±75%)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 25% expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 25% expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55).</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.</td></tr>
</table>

Table 2.1.6.4: Information on source category 1B2 Fugitive Emissions from Oil and Natural Gas, 1B2.a i 'Oil Transport' (Tanker, Trucks), liquid fuels / CO_2, CH_4, N_2O, NMVOC

<table>
<tr><td>Sector</td><td>Energy</td></tr>
<tr><td>Category</td><td>1B2 Fugitive Emissions from Oil and Natural Gas</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1B2.a i 'Oil Transport' (Tanker, Trucks), liquid fuels / CO_2, CH_4, N_2O, NMVOC -</td></tr>
<tr><td>Key Category?</td><td>No</td></tr>
<tr><td>Category Description / Definition</td><td>Fugitive emissions (excluding venting and flaring) related to the transport of marketable crude oil (including conventional, heavy and synthetic crude oil and bitumen) to upgraders and refineries. The transportation systems may comprise pipelines, marine tankers, tank trucks and rail cars.</td></tr>
<tr><td>Country Detail</td><td>The transportation systems comprise pipelines, tank trucks and rail cars.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>$E_{gas,\ industry\ segment} = A_{industry\ segment} \cdot EF_{gas,\ industry\ segment}$
$E_{gas} = \Sigma E_{gas,\ industry\ segment}$
Where:
$E_{gas,\ industry\ segment}$ – annual emissions (kt);
$A_{industry\ segment}$: Oil Production (10^3 m^3)
$EF_{gas,\ industry\ segment}$ – emission factor (kt/10^3 m^3).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
</table>

Describe How and Why this Method Was Chosen	It is not a key source; data for determination of CS EF are not available.
Type and source of activity data	Oil Production, in kt, is available in the Energy Balances of the RM for the period 2003-2019 and is reported in the Table 3-151 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The value of oil density (circa 0.941t/m^3) is available in the Report produced by the State Ecological Inspectorate
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55.**

	CO_2	CH_4	NMVOC
	Emission Factors, kg / 10^3 m^3		
Oil Production	2.3 (-50 to +200%)	25 (-50 to +200%)	250 (-50 to +200%)

Uncertainty of AD and source	± 25% expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25% expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). The confidence interval is available in the table above.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.5: Information on source category 1B2 'Fugitive Emissions from Oil and Natural Gas', 1B2b.ii.2 'Natural Gas – Production', Gaseous fuels / CO_2, CH_4, NMVOC

Sector	1 Energy
Category	1B2 Fugitive emissions
Source / Fuel / Gas	1B2b.iii.2 'Natural Gas – Production' / CO_2 CH_4, NMVOC
Key Category?	CH_4: Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L, T) (1B2 'Fugitive Emissions from Oil and Natural Gas' – aggregated for all sources)
Category Description / Definition	Fugitive emissions (excluding venting and flaring) from the gas wellhead through to the inlet of gas processing plants, or, where processing is not required, to the tie-in points on gas transmission systems. This includes fugitive emissions related to well servicing, gas gathering, processing and associated waste water and acid gas disposal activities.
Country Detail	The methane content reaches circa 86-92 per cent. The natural gas explored at Victorovca field is supplied to the following nearby settlements: Ciobaclia, Suhata, Baimaclia, Flocoasa and Victorovca. The supply is made both from the natural gas fields in Victorovca, in particular during the warm period of the year, when the natural gas consumption in the respective localities is reduced, as well as through the national gas distribution and transportation network, especially during the cold season of the year, when natural gas consumption is increased (during this time of the year, the capacities of the Victorovca reservoir cannot meet the needs of the population in these localities). The net caloric value of natural gas is assumed to be 33.86 TJ/mln. m^3.
Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \cdot EF_{gas,\ industry\ segment}$ $E_{gas} = \Sigma E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (kt); $A_{industry\ segment}$: Gas Production (10^6 m^3) $EF_{gas,\ industry\ segment}$ – emission factor (kg10^6 m^3). Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1. (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf) National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because not all enhanced characterization data are available.

<table>
<tr><td>Type and source of activity data</td><td>Natural gas production (TJ): Energy Balance. Natural gas consumption (10^6 m^3): J.S.C. “Moldovagaz”. through Official Letters No. 604 dated 01.04.1999, answer to Letter No. 02-541 dated 28.05.2001; No. 02-156 dated 06.02.2004, answer to Letter No. 257-01-07 dated 26.01.2004; No. 06-1253 dated 27.09.2006, answer to Letter No.01-07/1400 dated 25.08.2006; No. 07-730 dated 6.6.2007, answer to Letter No. 47/21-103 dated 31.05.2007; No. 02/1-476 dated 23.02.2011, answer to Letter No. 03-07/175 dated 02.02.2011; No. 02/1-288 dated 22.01.2014, answer to Letter No. 320/2014-01-01 dated 03.01.2014; No. 02/1-507 dated 10.02.2015, answer to Letter No. 407/2015-01-09 dated 29.01.2015; No. 02/1-2183 dated 03.06.2016, answer to Letter No. 512/2016-05-01 dated 10.05.2016; No. 03/2-74 dated 12.01.2018, answer to Letter No. 601/2017-12-03 dated 14.12.2017; No. 03/4-676 dated 03.03.2020, answer to Letter No. 08-310/1/ dated 11.02.2020. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Tables 3-152 and 3-160.</td></tr>
<tr><td>Type and source of EF and OF</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average.
<table>
<tr><th></th><th>CO_2</th><th>CH_4</th><th>NMVOC</th></tr>
<tr><th></th><th colspan="3">Emission Factors, kg / 10^6 m^3</th></tr>
<tr><td>Gas Production</td><td>97
(-10 +1000%)</td><td>12 190
(-10 +1000%)</td><td>645.5
(-10 +1000%)</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).</td></tr>
<tr><td>Uncertainty of EF and source</td><td>± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). The confidence interval is available in the table above.</td></tr>
<tr><td>Potential Improvements</td><td>Potential improvements within the 1B2 ‘Fugitive Emissions from Oil and Natural Gas’ source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functi-oning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.</td></tr>
</table>

Table 2.1.6.6: Information on source category 1B2 Fugitive Emissions from Oil and Natural Gas, 1B2b.ii.2 ‘Natural Gas - Wells Servicing’, gaseous fuels / CO_2, CH_4, NMVOC

<table>
<tr><td>Sector</td><td>1 Energy</td></tr>
<tr><td>Category</td><td>1B2 Fugitive emissions</td></tr>
<tr><td>Source / Fuel / Gas</td><td>1B2b.ii ‘Natural Gas - Wells Servicing’ / CO_2, CH_4, NMVOC</td></tr>
<tr><td>Key Category?</td><td>CH_4: Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L, T) (1B2 ‘Fugitive Emissions from Oil and Natural Gas’ – aggregated for all sources)</td></tr>
<tr><td>Category Description / Definition</td><td>Fugitive emissions from oil production (excluding venting and flaring) occur at the oil wellhead or at the oil sands or shale oil mine through to the start of the oil transmission system. This includes fugitive emissions related to well servicing, oil sands or shale oil mining, transport of untreated production (i.e., well effluent, emulsion, oil shale and oilsands) to treating or extraction facilities, activities at extraction and upgrading facilities, associated gas re-injection systems and produced water disposal systems.</td></tr>
<tr><td>Country Detail</td><td>The natural gas explored at Victorovca field is supplied to the following nearby settlements: Ciobaclia, Suhata, Baimaclia, Flocoasa and Victorovca. The supply is made both from the natural gas fields in Victorovca, in particular during the warm period of the year, when the natural gas consumption in the respective localities is reduced, as well as through the national gas distribution and transportation network, especially during the cold season of the year, when natural gas consumption is increased (during this time of the year, the capacities of the Victorovca reservoir cannot meet the needs of the population in these localities). The net caloric value of natural gas is assumed to be 33.86 TJ/mln. m^3.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1.
$E_{gas,\ industry\ segment} = A_{industry\ segment} \bullet EF_{gas,\ industry\ segment}$
$E_{gas} = \Sigma E_{gas,\ industry\ segment}$
Where:
$E_{gas,\ industry\ segment}$ – annual emissions (kt);
$A_{industry\ segment}$: Gas Wells Servicing (well units)
$EF_{gas,\ industry\ segment}$ – emission factor (kg / per well).
Methodology: Tier 1</td></tr>
<tr><td>Reference</td><td>2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1. (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
</table>

Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because not all enhanced characterization data are available.
Type and source of activity data	Number of Gas Wells Servicing – J.S.C. "Valiexchimp".
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average.**

	CO_2	CH_4	NMVOC
	Emission Factors, kg / per well		
Gas Production	17 (-10 +1000%)	955 (-10 +1000%)	148.5 (-10 +1000%)

Uncertainty of AD and source	± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). The confidence interval is available in the table above.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.7: Information on source category 1B2 'Fugitive Emissions from Oil and Natural Gas', 1B2b.iii.4 'Gas Transmission and Storage', gaseous fuels / CO_2, CH_4, NMVOC

Sector	1 Energy
Category	1B2 Fugitive emissions
Source / Fuel / Gas	1B2b.iii.4 'Gas Transmission and Storage' / CO_2, CH_4, NMVOC
Key Category?	CH_4: Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L, T) (1B2 'Fugitive Emissions from Oil and Natural Gas' – aggregated for all sources)
Category Description / Definition	Fugitive emissions from systems used to transport processed natural gas to market (i.e., to industrial consumers and natural gas distribution systems). Fugitive emissions from natural gas storage systems should also be included in this category.
Country Detail	The natural gas transport system in the RM currently includes: high, medium and low-pressure main gas pipelines. Natural gas supply is operated by the J.S.C. "Moldovagaz", which distributes natural gas to consumers in the country and performs the transit of Russian natural gas to South-Eastern European countries. Information on natural gas consumption is available separately for RBDR and LBDR. The net caloric value of natural gas is assumed to be 33.86 TJ/mln. m^3.
Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \bullet EF_{gas,\ industry\ segment}$ $E_{gas} = \Sigma E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (kt); $A_{industry\ segment}$: Gas Transmission (10^6 m^3) $EF_{gas,\ industry\ segment}$ – emission factor (kg/10^3 m^3) Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because not all enhanced characterization data are available.

Type and source of activity data	Amount of transit gas (10^6 m^3) and length of the transmission pipelines: J.S.C. "Moldovagaz" through Official Letters No. 604 dated 01.04.1999, answer to Letter No. 02-541 dated 28.05.2001; No. 02-156 dated 06.02.2004, answer to Letter No. 257-01-07 dated 26.01.2004; No. 06-1253 dated 27.09.2006, answer to Letter No.01-07/1400 dated 25.08.2006; No. 07-730 dated 6.6.2007, answer to Letter No. 47/21-103 dated 31.05.2007; No. 02/1-476 dated 23.02.2011, answer to Letter No. 03-07/175 dated 02.02.2011; No. 02/1-288 dated 22.01.2014, answer to Letter No. 320/2014-01-01 dated 03.01.2014; No. 02/1-507 dated 10.02.2015, answer to Letter No. 407/2015-01-09 dated 29.01.2015; No. 02/1-2183 dated 03.06.2016, answer to Letter No. 512/2016-05-01 dated 10.05.2016; No. 03/2-74 dated 12.01.2018, answer to Letter No. 601/2017-12-03 dated 14.12.2017; No. 03/4-676 dated 03.03.2020, answer to Letter No. 08-310/1/ dated 11.02.2020. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Table 3-160. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Table 3-160.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average.**

	CO_2	CH_4	NMVOC
	Emission Factors, kg / 10^6 m^3		
Gas Transmission	1.44 (-10 +1000%)	633 (-10 +1000%)	11.5 (-10 +1000%)

Uncertainty of AD and source	± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25%, expert judgement (2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). The confidence interval is available in the table above.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.8: Information on source category 1B2 'Fugitive Emissions from Oil and Natural Gas', 1B2b.ii.5 'Gas Distribution', gaseous fuels / CO_2, CH_4, NMVOC

Sector	1 Energy
Category	1B2 Fugitive emissions
Source / Fuel / Gas	1B2b.iii.5 'Gas Distribution' / CO_2 CH_4, NMVOC
Key Category?	CH_4: Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L, T) (1B2 'Fugitive Emissions from Oil and Natural Gas' – aggregated for all sources)
Category Description / Definition	Fugitive emissions (excluding venting and flaring) from the distribution of natural gas to end users.
Country Detail	The natural gas transport system in the RM currently includes: high, medium and low-pressure main gas pipelines. Natural gas supply is operated by the J.S.C. "Moldovagaz", which distributes natural gas to consumers in the country. Information on natural gas consumption is available separately for RBDR and LBDR. The net caloric value of natural gas is assumed to be 33.86 TJ/mln. m^3.
Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \bullet EF_{gas,\ industry\ segment}$ $E_{gas} = \Sigma\ E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (kt); $A_{industry\ segment}$: Gas Distribution (10^6 m^3) $EF_{gas,\ industry\ segment}$ – emission factor (kg/10^3 m^3) Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1. (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because not all enhanced characterization data are available.

Type and source of activity data	Amount of transit gas (10^6 m^3) and length of the transmission pipelines: J.S.C. "Moldovagaz" through Official Letters No. 604 dated 01.04.1999, answer to Letter No. 02-541 dated 28.05.2001; No. 02-156 dated 06.02.2004, answer to Letter No. 257-01-07 dated 26.01.2004; No. 06-1253 dated 27.09.2006, answer to Letter No.01-07/1400 dated 25.08.2006; No. 07-730 dated 6.6.2007, answer to Letter No. 47/21-103 dated 31.05.2007; No. 02/1-476 dated 23.02.2011, answer to Letter No. 03-07/175 dated 02.02.2011; No. 02/1-288 dated 22.01.2014, answer to Letter No. 320/2014-01-01 dated 03.01.2014; No. 02/1-507 dated 10.02.2015, answer to Letter No. 407/2015-01-09 dated 29.01.2015; No. 02/1-2183 dated 03.06.2016, answer to Letter No. 512/2016-05-01 dated 10.05.2016; No. 03/2-74 dated 12.01.2018, answer to Letter No. 601/2017-12-03 dated 14.12.2017; No. 03/4-676 dated 03.03.2020, answer to Letter No. 08-310/1/ dated 11.02.2020. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Table 3-160. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Table 3-160.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average.**

	CO_2	CH_4	NMVOC
	Emission Factors, kg / 10^6 m^3		
Gas Distribution	95.5 (-10 +1000%)	1800 (-10 +1000%)	26 (-10 +1000%)

Uncertainty of AD and source	± 25%, expert judgement, 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72.
Uncertainty of EF and source	± 25%, expert judgement (2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55). The confidence interval is available in the table above.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.9: Information on source category 1B2 'Fugitive Emissions from Oil and Natural Gas', 1B2b.i 'Natural Gas – Venting', gaseous fuels / CO_2, CH_4, NMVOC

Sector	1 Energy
Category	1B2 Fugitive emissions
Source / Fuel / Gas	1B2b.i 'Natural Gas – Venting' / CO_2 CH_4 NMVOC
Key Category?	CH_4: Tier 1: Yes: 1990 (L), 2019 (L, T), Tier 2: Yes: 1990 (L), 2019 (L, T), (1B2 'Fugitive Emissions from Oil and Natural Gas' – aggregated for all sources)
Category Description / Definition	Emissions from venting of natural gas and waste gas/vapor streams at gas facilities.
Country Detail	The natural gas transport system in the RM currently includes: high, medium and low-pressure main gas pipelines. Natural gas supply is operated by the J.S.C. "Moldovagaz", which distributes natural gas to consumers in the country and performs the transit of Russian natural gas to South-Eastern European countries. Information on natural gas consumption is available separately for RBDR and LBDR. The net caloric value of natural gas is assumed to be 33.86 TJ/mln. m^3.
Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \bullet EF_{gas,\ industry\ segment}$ $E_{gas} = \Sigma E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (Gg); $A_{industry\ segment}$: Gas Transmission (10^6 m^3) $EF_{gas,\ industry\ segment}$ – emission factor (kg/10^3 m^3) Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because not all enhanced characterization data are available.
Type and source of activity data	Amount of Gas Distributed (10^6 m^3) – J.S.C. "Moldovagaz". National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Table 3-160.

Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55, average.**

	CO_2 kg / 10^6 m^3	CH_4, kg / 10^6 m^3	NMVOC, kg / 10^6 m^3
Gas Transmission	5.2	392	7.8

Uncertainty of AD and source	± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25%, expert judgement (2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, p. 4.55).
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

Table 2.1.6.10: Information on source category 1B2 'Fugitive Emissions from Oil and Natural Gas', 1B2a.iii.3 'Natural Gas and Liquefied Natural Gas Transport', gaseous fuels / CO_2, N_2O

Sector	1 Energy
Category	1B2 Fugitive emissions
Source / Fuel / Gas	1B2a.iii.3 'Natural Gas and LPG Transport' / CO_2 N_2O
Key Category?	No
Category Description / Definition	Fugitive emissions related to the transport of LPG with tank and trucks. This includes fugitive emissions related to storage, filling and unloading LPG and evaporation from equipment.
Country Detail	Emissions from LPG transport. Information on LPG amounts are available for the territory on the RBDR for the entire period under review, while for the LBDR, only for 2011-2019 time series.
Equation (Describe variables for method used)	$E_{gas,\ industry\ segment} = A_{industry\ segment} \bullet EF_{gas,\ industry\ segment}$ $E_{gas} = \Sigma\ E_{gas,\ industry\ segment}$ Where: $E_{gas,\ industry\ segment}$ – annual emissions (kt); $A_{industry\ segment}$: LPG consumption (10^3 m^3) $EF_{gas,\ industry\ segment}$ – emission factor (kg/10^3 m^3) Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.2, page 4.41, equation 4.2.1 (available on: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_4_Ch4_Fugitive_Emissions.pdf). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	It is not a key source; data for determination of CS EF are not available.
Type and source of activity data	LPG consumption (kt) - Energy Balances of the RM, for the LBDR- Statistical publications of the ATULBD. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), Section 3.7.1, Table 3-154.
Type and source of EF and OF	**2006 IPCC Guidelines for National Greenhouse Gas Inventories, V2_4_Ch4_Fugitive_Emissions, Table 4.2.5, page 4.55.**

	CO_2 kg / 10^3 m^3	N_2O, kg / 10^3 m^3
Liquefied Petroleum Gas	430	0.0022

Uncertainty of AD and source	± 25%, expert judgement (see also 2006 IPCC GL, V2_4_Ch4_Fugitive_Emissions, Section 4.2.2.7.2, page 4.72).
Uncertainty of EF and source	± 25%, expert judgement.
Potential Improvements	Potential improvements within the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category could be possible regarding the availability of new data related to fugitive leaks from oil and natural gas distribution networks (from the infrastructure needed to produce, collect, process, refine and distribute oil products and natural gases for the final consumers; from equipment functioning, evaporation and flashing losses, flaring, accidental releases from pipeline dig-ins, etc.), respectively in the case of adopting a higher-ranking assessment methodology. Improvements are also possible when presenting each category separately and for each region.

2.2. Industrial Processes and Product Use Sector

Relevant information on categories comprised within the inventory, including description of each category allocated to Sector 2 'Industrial Processes and Product Use' is provided below.

2.2.1. Category 2A 'Mineral Industry'

Tables 2.2.1.1 – 2.2.1.9 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2A 'Mineral Industry'.

Table 2.2.1.1: Information on Source Category 2A1 'Cement Production' – CO_2

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A1 Cement Production / CO_2
Key Category?	Tier 1: Yes: 1990 (L, T), 2019 (L, T)
Category Description / Definition	Emissions of CO_2 occur during the production of clinker that is an intermediate component in the cement manufacturing process. During the production of clinker, limestone, which is mainly (95%) calcium carbonate ($CaCO_3$), is heated (calcined) to produce lime (CaO) and CO_2 as a by-product. The limestone, which is a source of CaO, normally has an admixture of dolomite, which introduces MgO into the system.
Country Detail	There have been two cement factories in the Republic of Moldova in the period 1990-2019, one on the right bank of Dniester river (Lafarge Cement (Moldova) J.S.C. in Rezina) and another one on the left bank of Dniester river (Cement and Slate Combined Works in Ribnita). Emissions of CO_2 have been calculated from the amount of clinker produced and content of CaO and MgO in clinker. Composition of clinker comprises about 65% CaO and 2% MgO. Cement kiln dust (CKD) is also accounted in emission calculation. To be noted that default CKD correction factor is 1.02, and in the Republic of Moldova its value varied during 1990-2016 from a maximum of 1.013 to a minimum of 1.0002.
Equation (Describe variables for method used)	Tier 2 methodology is applied. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions, Equation 2.2, pages 2.9-2.10. CO_2 emissions = $EF_{clinker}$ • Clinker Production • CKD Correction Factor $EF_{clinker}$ = Content CaO • stoichiometric ratio CO_2/CaO + Content MgO • stoichiometric ratio CO_2/MgO EF = 0.785 • CaO content +1.092 • MgO content
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of the plant specific data, the Tier 2 methodology has been used.
Type and source of activity data	Quantity of cement and clinker produced is reported in the Table 4-12 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. CS values of the CaO and MgO content (weight fraction) in clinker are reported in the Table 4-10 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. In case of Lafarge Cement (Moldova) J.S.C. in Rezina, the source of information is as following: Official Letter No. 114 dated 02.03.2020, as a response to the request of the Environment Agency No. 08-310/1 dated 11.02.2020; Official Letter No. 780 dated 22.12.2017, as a response to the request of the Climate Change Office, the Ministry of Agriculture, Regional Development and Environment No. 601/2017-12-03 dated 14.12.2017; Official Letter No. 395 dated 24.05.2016, as a response to the request of the Climate Change Office, the Ministry of Environment No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 82 dated 18.02.2015, as a response to the request of the Climate Change Office, the Ministry of Environment No. 407/2015-01-09 dated 29.01.2015; Official Letter No. 67 dated 06.02.2014, as a response to the request of the Climate Change Office, the Ministry of Environment No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 74 dated 02.03.2011, as a response to the request of the Ministry of Environment No. 03-07/175 dated 02.02.2011; as well as Official Letter No. 186 dated 18.04.2007, as a response to the request of the Institute of Ecology and Geography No. 84 dated 26.03.2007. In the case of Cement and Slate Combined Works in Ribnita the source of information is as following: Statistical Yearbooks of the ATULBD for 1998 (page 176), 2000 (page 99), 2002 (page 103), 2005 (page 94), 2006 (page 93), 2007 (page 92), 2009 (page 92), 2010 (page 93), 2011 (page 94), 2012 (page 98), 2013 (page 99), 2014 (page 88), 2015 (page 88), 2016 (page 98), 2017 (page 101), 2019 (page 99), 2020 (page 102).

Type and source of EF and OF	CS values of $EF_{clinker}$ is provided in Table 4-10 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Uncertainty of AD and source	2% - expert judgement
Uncertainty of EF and source	3% - expert judgement
Potential Improvements	Potential improvements under the 2A1 Cement Production source category aim at collecting plant specific activity data from Cement Plant in Ribnita, on the left bank of Dniester river for the whole reporting period.

Table 2.2.1.2: Information on Source Category 2A1 'Cement Production' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A1 Cement Production / Pollutant emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Cement manufacture is a major mineral commodity industry. During the manufacturing process, natural raw materials are finely ground and then transformed into cement clinker in a kiln system at high temperatures. The clinkers are cooled and ground together with additions into a fine powder known as cement. Cement is a hydraulic binder, i.e. it hardens when mixed with water. Cement is used to bind sand and gravel together in concrete. Releases from the cement kiln system come from the physical and chemical reactions of the raw materials and the fuels. The main constituents of the exit gases are nitrogen and excess oxygen from the combustion air, and carbon dioxide and water from the raw materials and the combustion process. The exit gases also contain small quantities of dust, sulphur dioxide, nitrogen oxides, carbon monoxide, chlorides, fluorides, ammonia, and still smaller quantities of organic compounds and heavy metals.
Country Detail	There have been two cement factories in the Republic of Moldova in the period 1990-2019, one on the right bank of Dniester river (Lafarge Cement (Moldova) J.S.C. in Rezina) and another one on the left bank of Dniester river (Cement and Slate Combined Works in Ribnita).
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from cement uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.A.1 Cement production, page 11, section 3.3 'Tier 2 technology-specific approach': $E_{technology,\ pollutant} = AR_{production,\ technology} \bullet EF_{technology,\ pollutant}$ Where: $E_{technology,\ pollutant}$ is the emission of a pollutant (kg); $AR_{production,\ technology}$ is the annual production of cement (tons); $EF_{technology,\ pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton cement).
Reference	EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). European Commission (2013), Joint Research Centre – Institute for Institute for Prospective Technological Studies, 2013. Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques (BREF) for the Production of Cement, Lime and Magnesium Oxide. Industrial Emissions Directive 2010/75/EU Integrated Pollution Prevention and Control. Available at http://eippcb.jrc.ec.europa.eu/reference/BREF/CLM_Published_def.pdf. European Commission (2010), Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques (BREF) in the Cement and Lime Manufacturing Industries. May, 2010. Available at http://eippcb.jrc.es.
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	In case of Lafarge Cement (Moldova) J.S.C. in Rezina, the source of information is as following: Official Letter No. 114 dated 02.03.2020, as a response to the request of the Environment Agency No. 08-310/1 dated 11.02.2020; Official Letter No. 780 dated 22.12.2017, as a response to the request of the Climate Change Office, the Ministry of Agriculture, Regional Development and Environment No. 601/2017-12-03 dated 14.12.2017; Official Letter No. 395 dated 24.05.2016, as a response to the request of the Climate Change Office, the Ministry of Environment No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 82 dated 18.02.2015, as a response to the request of the Climate Change Office, the Ministry of Environment No. 407/2015-01-09 dated 29.01.2015; Official Letter No. 67 dated 06.02.2014, as a response to the request of the Climate Change Office, the Ministry of Environment No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 74 dated 02.03.2011, as a response to the request of the Ministry of Environment No. 03-07/175 dated 02.02.2011; as well as Official Letter No. 186 dated 18.04.2007, as a response to the request of the Institute of Ecology and Geography No. 84 dated 26.03.2007. In the case of Cement and Slate Combined Works in Ribnita the source of information is as following: Statistical Yearbooks of the ATULBD for 1998 (page 176), 2000 (page 99), 2002 (page 103), 2005 (page 94), 2006 (page 93), 2007 (page 92), 2009 (page 92), 2010 (page 93), 2011 (page 94), 2012 (page 98), 2013 (page 99), 2014 (page 88), 2015 (page 88), 2016 (page 98), 2017 (page 101), 2019 (page 99), 2020 (page 102).

<table>
<tr><td>Type and source of EF and OF</td><td>
Default Emission Factors for ‘Cement Production’ Source Category (‘Installation for the production of cement clinker in rotary kilns’)
<table>
<tr><td></td><td>Code</td><td colspan="4">Name</td></tr>
<tr><td>NFR source category</td><td>2.A.1
1.A.2.f.i</td><td colspan="4">Cement production
Stationary combustion in manufacturing industry and construction: other</td></tr>
<tr><td>SNAP</td><td>040612
030311</td><td colspan="4">Cement
Cement</td></tr>
<tr><td>Fuel</td><td colspan="5">Coal /Pet. Coke / Gas / Oil / Recovery waste</td></tr>
<tr><td rowspan="2">Pollutant</td><td rowspan="2">Value</td><td rowspan="2">Unit</td><td colspan="2">95% confidence interval</td><td rowspan="2">Reference</td></tr>
<tr><td>Lower</td><td>Upper</td></tr>
<tr><td></td><td colspan="5">Tier 2 default emission factors from combustion emissions</td></tr>
<tr><td>NO_x</td><td>1.241</td><td>kg/t clinker</td><td>0.330</td><td>4.670</td><td>European Commission (2010)</td></tr>
<tr><td>CO</td><td>1.455</td><td>kg/t clinker</td><td>0.460</td><td>4.600</td><td>European Commission (2010)</td></tr>
<tr><td>NMVOC</td><td>0.018</td><td>kg/t clinker</td><td>0.023</td><td>0.138</td><td>European Commission (2010)</td></tr>
<tr><td>SO_2</td><td>0.374</td><td>kg/t clinker</td><td>0.020</td><td>11.12</td><td>European Commission (2010)</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 030311 Cement, Category 1.A.2.f.i, Table 3-24, Page 31; and Code SNAP 040612 Cement, Category 2.A.1, Table 3-1, page 10.
</td></tr>
<tr><td>Uncertainty of AD and source</td><td>2% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
</table>

Table 2.2.1.3: Information on Source Category 2A2 ‘Lime Production’ – CO_2

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A2 Lime Production / CO_2
Key Category?	No.
Category Description / Definition	Lime (CaO) is the high-temperature product of the calcination of limestone. The production occurs in vertical and rotary kilns fired by coal, oil or natural gas. Calcium limestone contains 97–98% calcium carbonate on a dry basis. The rest includes magnesium carbonate, aluminium oxide, iron oxide and silica. However, some limestone contains as much as 35–45% magnesium carbonate and is classified as dolomite. Lime production emits CO_2 through the thermal decomposition (calcination) of the calcium carbonate ($CaCO_3$) in limestone to produce quicklime (CaO), or through the decomposition of dolomite ($CaCO_3 \cdot MgCO_3$) to produce dolomitic ‘quick’ lime (CaO·MgO).
Country Detail	The only lime producing plant on the right bank of Dniester river was located in Vatra (“Var-Nest” JSC), currently is not operating. On the left bank of Dniester river, lime is produced at Cement and Slate Combined Works in Ribnita. Lime is produced also at sugar mills, it used to activate earlier in '90s of 20th century 9 sugar plants in the Republic of Moldova, from which only 5 sugar plants are currently activating (Drochia, Floresti, Donduseni, Cupcini and Glodeni). According to the information provided by the National Bureau of Statistics, the lime production has decreased on the right bank of Dniester river from 114.3 kt in 1990 to 0.04 kt in 2019, while according to the Statistical Yearbooks of the Administrative-Territorial Units on the Left bank of Dniester River, the production of lime has decreased on the left bank of Dniester river from 90.0 kt in 1990 to 27.90 kt in 2019. A certain amount of lime needed for domestic consumption is imported. According to the data provided by the Custom Service of the Republic of Moldova during 1995-2019 period the lime imports increased by circa 117 times, from 0.063 kt in 1995 to 7.390 kt in 2019. Concomitantly, lime is produced and used also by at Sugar Mills. Since 1990 to 2019 the amount of lime produced and used at sugar mills decreased from 151.81 kt to 9.23 kt.
Equation (Describe variables for method used)	Tier 2 methodology is applied. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions, Equation 2.6, page 2.21. $Total_i = P_i \cdot FE_{lime,i} \cdot$ correction factor (LKD) Where: $Total_i$ – CO_2 emissions from type i lime production (kt/yr); P_i – production of lime of type i (kt/yr); $EF_{lime,i}$ – emission factor for lime of type i (0.7456 t CO_2/t high-calcium lime and 0.7763 t CO_2/t dolomitic lime); LKD – correction factor, the default value used is 1.02, the country specific value is unknown.

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source, the Tier 2 methodology has been used.
Type and source of activity data	Quantity of lime produced is reported in the Table 4-15 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks for 1994 (page 286), 1999 (page 302), 2003 (page 392), 2006 (page 312); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 176), 2000 (page 99), 2002 (page 103), 2005 (page94), 2006 (page 93), 2007 (page 92), 2009 (page 92), 2011 (page 94), 2012 (page 98), 2013 (page 99), 2014 (page 88), 2015 (page 88), 2016 (page 98), 2017 (page 101), 2020 (page 102). Activity data on lime production at sugar mills have been provided by largest sugar producers (Sudzucker-Moldova SRL and Moldova-Zahar SRL) (in 2013-2019 these two enterprises hold between 92.6 and 99.9% of the sugar market in the Republic of Moldova). Activity data on sugar production on the right bank of Dniester river are based on the information available in the Statistical Yearbooks of the Republic of Moldova for 1994 (page 289), 1999 (page 304), 2003 (page 393), 2006 (page 310), as well as in the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic, by product type, for 2005-2019'. Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 177), 2000 (page 100), 2002 (page 104), 2005 (page 94).
Type and source of EF and OF	**Basic Parameters for Estimating EFs from 2A2 'Lime Production'**

Type of lime	Stoichiometric Ratio (1)	Range of CaO Content (%)	Range of MgO Content (%)	Default Values for CaO/CaO·MgO Content (2)	Default EF, t CO_2/t lime (1) · (2)
High-calcium lime	0.7848	93-98	0.3-2.5	0.95	0.7456
Dolomitic lime	0.9132	55-57	38-41	0.85	0.7763
Hydraulic lime	0.7848	65-92		0.75	0.5886

	Source: 2006 IPCC Guidance, Chapter 2.3 'Lime Production', Table 2.4, page 2.22.
Uncertainty of AD and source	10% - expert judgement
Uncertainty of EF and source	2% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2A2 'Lime production'.

Table 2.2.1.4: Information on Source Category 2A2 'Lime Production' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A2 Lime Production / Pollutant emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Lime (CaO) is the high-temperature product of the calcination of limestone. The production occurs in vertical and rotary kilns fired by coal, oil or natural gas. Calcium limestone contains 97–98% calcium carbonate on a dry basis. The rest includes magnesium carbonate, aluminum oxide, iron oxide and silica. However, some limestone contains as much as 35–45% magnesium carbonate and is classified as dolomite. Atmospheric emissions in the lime manufacturing industry include particulate emissions from the mining, handling, crushing, screening and calcining of the limestone and emissions of air pollutants generated during fuel combustion in kilns. These emissions are not very significant on a global or even regional scale. However, lime works can be an important emission source of air pollutants on a local scale. The production of lime causes emissions from both processes and combustion. The main pollutants released are: sulphur oxides (SO_x), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC) and particulate matter.
Country Detail	The only lime producing plant on the right bank of Dniester river was located in Vatra ("Var-Nest" JSC), currently is not operating. On the left bank of Dniester river, lime is produced at Cement and Slate Combined Works in Ribnita. Lime is produced also at sugar mills, it used to activate earlier in '90s of 20th century 9 sugar plants in the Republic of Moldova, from which only 5 sugar plants are currently activating (Drochia, Floresti, Donduseni, Cupcini and Glodeni).

<table>
<tr><td>Equation
(Describe variables for method used)</td><td>The Tier 2 approach for pollutant emissions from lime production uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.A.2 Lime production, page 9, section 3.3 ‘Tier 2 technology-specific approach’:
$E_{technology,\ pollutant} = AR_{production,\ technology} \bullet EF_{technology,\ pollutant}$
Where:
$E_{technology,\ pollutant}$ is the emission of a pollutant (kg);
$AR_{production,\ technology}$ is the annual production of lime (tons);
$EF_{technology,\ pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton lime).</td></tr>
<tr><td>Reference</td><td>EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark, (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019).
European Commission (2013), Joint Research Centre – Institute for Institute for Prospective Technological Studies, 2013. Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques (BREF) for the Production of Cement, Lime and Magnesium Oxide. Industrial Emissions Directive 2010/75/EU Integrated Pollution Prevention and Control. Available at http://eippcb.jrc.ec.europa.eu/reference/BREF/CLM_Published_def.pdf.
European Commission (2010), Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques (BREF) in the Cement and Lime Manufacturing Industries. May, 2010. Available at http://eippcb.jrc.es.</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>A Tier 2 methodology has been used due to availability of technology-specific emission factors.</td></tr>
<tr><td>Type and source of activity data</td><td>Quantity of lime produced is reported in the Table 4-15 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks for 1994 (page 286), 1999 (page 302), 2003 (page 392), 2006 (page 312); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019” (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 176), 2000 (page 99), 2002 (page 103), 2005 (page94), 2006 (page 93), 2007 (page 92), 2009 (page 92), 2011 (page 94), 2012 (page 98), 2013 (page 99), 2014 (page 88), 2015 (page 88), 2016 (page 98), 2017 (page 101), 2020 (page 102). Activity data on lime production at sugar mills have been provided by largest sugar producers (Sudzucker-Moldova SRL and Moldova-Zahar SRL) (in 2013-2019 these two enterprises hold between 92.6 and 99.9% of the sugar market in the Republic of Moldova). Activity data on sugar production on the right bank of Dniester river are based on the information available in the Statistical Yearbooks of the Republic of Moldova for 1994 (page 289), 1999 (page 304), 2003 (page 393), 2006 (page 310), as well as in the Statistical Reports PRODMOLD-A ‘Total production, as a natural expression, in the Republic, by product type, for 2005-2019’. Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 177), 2000 (page 100), 2002 (page 104), 2005 (page 94).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Default emission factors for source category ‘Lime production’ (installation for the production of lime in rotary kilns) – Uncontrolled Abatement Technologies
<table>
<tr><td></td><td>Code</td><td colspan="4">Name</td></tr>
<tr><td>NFR source category</td><td>2.A.2
1.A.2.f.i</td><td colspan="4">Lime production
Stationary combustion in manufacturing industry and construction: other</td></tr>
<tr><td>SNAP</td><td>040614
030312</td><td colspan="4">Lime (decarbonizing)
Lime</td></tr>
<tr><td>Technologies/Practices</td><td colspan="5">Typical emissions from some types of lime kiln</td></tr>
<tr><td>Abatement technologies</td><td colspan="5">Uncontrolled</td></tr>
<tr><td>Fuel</td><td colspan="5">Coal / Gas / Oil</td></tr>
<tr><td rowspan="2">Pollutant</td><td rowspan="2">Value</td><td rowspan="2">Unit</td><td colspan="2">95 % confidence interval</td><td rowspan="2">Reference</td></tr>
<tr><td>Lower</td><td>Upper</td></tr>
<tr><td></td><td colspan="5">Tier 2 default emission factors from combustion emissions</td></tr>
<tr><td>NOx</td><td>1.369</td><td>kg/t lime</td><td>0.15</td><td>12.5</td><td>European Commission (2010)</td></tr>
<tr><td>CO</td><td>1.940</td><td>kg/t lime</td><td>0.30</td><td>12.5</td><td>European Commission (2010)</td></tr>
<tr><td>SO_2</td><td>0.316</td><td>kg/t lime</td><td>0.01</td><td>10.0</td><td>European Commission (2010)</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 030312 Lime, Category 1.A.2.f.i, Table 3-23, Page 30; and Code SNAP 040614 Lime, Category 2.A.2, Table 3-1, page 8.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>10% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the tables above.</td></tr>
</table>

Table 2.2.1.5: Information on Source Category 2A3 'Glass Production' – CO_2

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A3 Glass Production / CO_2
Key Category?	No
Category Description / Definition	Under this source category are covered GHG emissions originated from the production of different types of glass (flat window glass, multi-layer insulating glass, glassware, glass for recipients (containers), glass for tableware, specialty glass etc.). Glass is produced from a raw material mix containing silica (SiO_2), sodium (Na_2O), lime (CaO) or other carbonates ($CaCO_3$, $CaMg(CO_3)_2$, Na_2CO_3, $BaCO_3$, K_2CO_3, $SrCO_3$ etc.), with small admixture of aluminum (Al_2O_3) and alkaline substances, plus other minor ingredients. Glass production process allows for a small quantity of recycled glass (cullet) to be used (its share can vary between 10-80 per cent of the total raw material used). The melting process for glass of different types is similar. Glass production process implies the following phases: selection and preparation of the raw material; melting, moulding, hardening, quenching and finishing.
Country Detail	Four glass plants used to produce glass in the RM: the SOE 'Chisinau Glass Factory' and 'Glass Container Company' (since 1997) in Chisinau, 'Cristal-Flor' Glass Factory in Floresti and the Glass Factory in Tiraspol (ATULBD), but the last two plants ceased their activity.
Equation (Describe variables for method used)	Tier 2 methodology is applied. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions, Equation 2.11, page 2.28. $$\text{Total } CO_2 = \Sigma [M_{g,i} \bullet FE_{g,i} \bullet (1 - CR_i)]$$ Where: Total – CO_2 emissions from glass production (kt/yr); $M_{g,i}$ – mass of melted glass of type i (kt/yr); FE_i – emission factor for manufacturing of glass of type i (t CO_2/t glass melted); CR_i – cullet ratio for manufacturing of glass of type i, fraction.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions. National Inventory Report: 1990-2016. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2018).
Describe How and Why this Method Was Chosen	Due to the importance of this source, the Tier 2 methodology has been used.
Type and source of activity data	The amount of glass produced is reported in the Table 4-21 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1988 (page 228), 1994 (page 287), 1999 (page 303), 2003 (page 393), 2004 (page 443), 2005 (pages 321-322), 2006 (page 312); as well as through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 180), 2000 (page 100), 2002 (page 104), 2005 (page 94), 2007 (page 93), 2010 (page 93). Plant specific information has been provided by SOE 'Chisinau Glass Factory' through Official Letter No. 31 dated 21.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011; Official Letter No. 9/01-01 dated 16.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 16 dated 12.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015; Official Letter No. 86 dated 19.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016; Official Letter from 20.02.2018, as a response to request No. 601/2017-12-03 as of 14.12.2017; Official Letter from 28.02.2020, as a response to the request No. 08-310/1 din 11.02.2020; and by 'Glass Container Company Chisinau' though Official Letter dated 28.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011; Official Letter No. 01-1C-78 dated 19.02.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 01-3C-63 dated 30.03.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015; Official Letter dated 23.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 23.02.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017; Official Letter from 23.02.2018, as a response to request No. 601/2017-12-03 as of 14.12.2017; Official Letter from 02.06.2020, as a response to request No. 08-310/1 as of 11.02.2020.
Type and source of EF and OF	Default EF Used to Estimate CO_2 Emissions from Glass Production are available in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2.4, Table 2.6, Page 2.30. The Country Specific Emission Factors Used to Estimate CO_2 Emissions from Glass Production (glass jars, glass containers and bottles) in the RM within the 1990-2019 periods are reported in the Table 4-22 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Uncertainty of AD and source	15% - expert judgement
Uncertainty of EF and source	10% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2A3 'Glass production'.

Table 2.2.1.6: Information on Source Category 2A3 'Glass Production' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A3 Glass Production / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Under this source category are covered pollutant emissions originated from the production of different types of glass (flat window glass, multi-layer insulating glass, glassware, glass for recipients (containers), glass for tableware, specialty glass etc.). Glass is produced from a raw material mix containing silica (SiO_2), sodium (Na_2O), lime (CaO) or other carbonates ($CaCO_3$, $CaMg(CO_3)_2$, Na_2CO_3, $BaCO_3$, K_2CO_3, $SrCO_3$ etc.), with small admixture of aluminum (Al_2O_3) and alkaline substances, plus other minor ingredients. Glass production process allows for a small quantity of recycled glass (cullet) to be used (its share can vary between 10-80 per cent of the total raw material used). The melting process for glass of different types is similar. Glass production process implies the following phases: selection and preparation of the raw material; melting, moulding, hardening, quenching and finishing. The main emission from the production of glass is carbon dioxide, originating mainly from the carbonization process. Other emitted pollutants include micro pollutants, heavy metals, black carbon and dust. Emission factors are given for process and combustion emissions together, since it is not straightforward to separate the two. However, large variations may apply depending on the glass composition, fuel type and furnace type and care should be taken in applying these factors.
Country Detail	Four glass plants used to produce glass in the RM: the SOE 'Chisinau Glass Factory' and 'Glass Container Company' (since 1997) in Chisinau, 'Cristal-Flor' Glass Factory in Floresti and the Glass Factory in Tiraspol (ATULBD), but the last two plants ceased their activity.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from glass production uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.A.3 Glass production, page 15, section 3.3 'Tier 2 technology-specific approach': $E_{technology,\ pollutant} = AR_{production,\ technology} \bullet EF_{technology,\ pollutant}$ Where: $E_{technology,\ pollutant}$ is the emission of a pollutant (kg); $AR_{production,\ technology}$ is the annual production of glass (tons); $EF_{technology,\ pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton glass).
Reference	EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark, (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). European Commission (2008), Integrated Pollution Prevention and Control (IPPC), Revised reference Document on Best Available Technologies (BREF) in the Glass Manufacturing Industry. European Commission. February, 2008. European Commission (2013), Joint Research Centre – Institute for Institute for Prospective Technological Studies, 2013. Integrated Pollution Prevention and Control (IPPC), Authors: SCALET Bianca Maria, GARCIA MUÑOZ Marcos, SISSA Aivi Querol, ROUDIER Serge, DELGADO SANCHO Luis. Reference Document on Best Available Techniques (BREF) for the Manufacture of Glass. Industrial Emissions Directive 2010/75/EU Integrated Pollution Prevention and Control (available on: http://eippcb.jrc.ec.europa.eu/reference/BREF/GLS_Adopted_03_2012.pdf).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	The amount of glass produced is reported in the Table 4-21 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1988 (page 228), 1994 (page 287), 1999 (page 303), 2003 (page 393), 2004 (page 443), 2005 (pages 321-322), 2006 (page 312); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 180), 2000 (page 100), 2002 (page 104), 2005 (page 94), 2007 (page 93), 2010 (page 93). Plant specific information has been provided by SOE 'Chisinau Glass Factory' through Official Letter No. 31 dated 21.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011; Official Letter No. 9/01-01 dated 16.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 16 dated 12.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015; Official Letter No. 86 dated 19.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016; Official Letter from 20.02.2018, as a response to request No. 601/2017-12-03 as of 14.12.2017; Official Letter from 28.02.2020, as a response to the request No. 08-310/1 din 11.02.2020; and by 'Glass Container Company Chisinau' though Official Letter dated 28.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011; Official Letter No. 01-1C-78 dated 19.02.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 01-3C-63 dated 30.03.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015; Official Letter dated 23.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 23.02.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017; Official Letter from 23.02.2018, as a response to request No. 601/2017-12-03 as of 14.12.2017; Official Letter from 02.06.2020, as a response to request No. 08-310/1 as of 11.02.2020.

<table>
<tr><td>Type and source of EF and OF</td><td>Default emission factors for source category ‘Glass production’ (installation for the manufacture of glass, including glass fiber)
<table>
<tr><td></td><td>Code</td><td colspan="4">Name</td></tr>
<tr><td>NFR source category</td><td>2.A.3
1.A.2.f.i</td><td colspan="4">Glass production
Stationary combustion in manufacturing industry and construction: other</td></tr>
<tr><td>SNAP (if applicable)</td><td>040613
0303</td><td colspan="4">Glass
Processes with contact (glass: flat, container, domestic, special, cont. filament glass fiber)</td></tr>
<tr><td>Fuel</td><td colspan="5">Gas / Oil</td></tr>
<tr><td rowspan="2">Pollutant</td><td rowspan="2">Value</td><td rowspan="2">Unit</td><td colspan="2">95 % confidence interval</td><td rowspan="2">Reference</td></tr>
<tr><td>Lower</td><td>Upper</td></tr>
<tr><td></td><td colspan="5">Tier 2 default emission factors from combustion emissions</td></tr>
<tr><td>NO_x</td><td>2.93</td><td>kg/t glass</td><td>0.22</td><td>14.7</td><td>European Commission (2008)</td></tr>
<tr><td>CO</td><td>0.00613</td><td>kg/t glass</td><td>0.00307</td><td>0.258</td><td>European Commission (2008)</td></tr>
<tr><td>SO_2</td><td>1.96</td><td>kg/t glass</td><td>0.118</td><td>15.1</td><td>European Commission (2008)</td></tr>
<tr><td colspan="6">Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 030314-030317 Glass, Category 1.A.2.f.i, Table 3-26 Page 32; Code SNAP 040613 Glass, Category 1.A.3, Table 3.1, page 14.</td></tr>
</table></td></tr>
<tr><td>Uncertainty of AD and source</td><td>15% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
</table>

Table 2.2.1.7: Information on Source Category 2A4a ‘Ceramics’ – CO_2

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A4a Ceramics / CO_2
Key Category?	No
Category Description / Definition	Within the process of ceramics production, CO_2 emissions result from the calcination of the raw material used. Similar to the cement and lime production processes, carbonates are heated to high temperatures in a kiln, producing CO_2 emissions, which can be estimated by multiplying the annual data on the amounts of carbonates used with a specific emission factor that takes into account the CaO and MgO content.
Country Detail	Three large bricks plants used to produce ceramics in the RM: the Macon JSC in Chisinau, ‘ANCHIR’ JSC in Chirca village, Anenii Noi district and the Bricks Factory in Tiraspol (ATULBD). There is also a number of smaller size bricks plants which periodically seize their activity. The Macon JSC in Chisinau is producing also expendable clay since 2001.
Equation (Describe variables for method used)	Tier 2 methodology is applied. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions, Equation 2.15, page 2.34. CO_2 Emissions = $M_c \bullet EF_c$ Where: M_c – mass of carbonate consumed for bricks and ceramics production (tons); EF_c – emission factor for carbonates calcination (t CO_2 / t). During the calcination of the carbonates in the clay, each mole of CaO and respectively, MgO forms one mole of CO_2. This principle was used for developing countries specific values of emission factors. EF = Stoichiometric Ratio (CO_2/CaO) • Content of CaO in Clay + Stoichiometric Ratio (CO_2/MgO) • Content of MgO in Clay In the RM the content of CaO in clay varies between 6-9 per cent, while the content of MgO, respectively between 2-4 per cent. In conformity with the information provided by ‘MACON’ J.S.C., the average content of CaO in clay extracted in Purcel quarry is circa 8.44 per cent, in Pruncul quarry – 8.22 per cent, in Micauti – 6.70 per cent, in Haruza Mica – 6.66 per cent; while the average content of MgO in clay extracted in Purcel quarry is 3.03 per cent, in Pruncul – 3.57 per cent, in Micautil – 2.93 per cent, and in Haruza Mica – 2.60 per cent.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to availability of the plant specific data, the Tier 2 methodology has been used.

Type and source of activity data	The information on bricks production (in million conventional units) is reported in the Table 4-27 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1988 (page 228), 1994 (page 287), 1999 (page 303), 2005 (page 322), 2010 (page 305); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 177), 2000 (page 99), 2002 (page 103), 2005 (page 94), 2006 (page 93), 2007 (page 92), 2009 (page 92), 2010 (page 93), 2011 (page 94), 2012 (page 98), 2013 (page 99), 2014 (page 88), 2015 (page 88), 2016 (page 98), 2017 (page 101), 2020 (page 102). Plant specific information has been provided periodically by 'Macon' J.S.C. through Official Letters as response to the requests from Climate Change Office and Environment Agency. To convert the activity data in metric mass units (kilotons), conversion coefficients were used based on the data available on the web pages of national and foreign construction companies. According to those, one conventional brick piece represents: 250 x 120 x 65 mm, with a specific density variation between 1500 and 1900 kg/m^3 (in the RM - between 1020 and 1869 kg/m^3). Under these circumstances, the volume of a conventional brick is - 0.25 • 0.12 • 0.065 = 0.00195 m^3; the minimum weight – 1020 • 0.00195/1 = 1.989 kg; the maximum weight – 1869 • 0.00195/1 = 3.644 kg; the average weight – 1444.5 • 0.00195/1 = 2.817 kg; this particular value was used in order to calculate the weight in tons of the national bricks production. At the same time, for estimating the mass of carbonates used for brick production, it was used the method recommended by the 2006 IPCC Guidelines; the mass of clay used for brick production is determined by multiplying total brick production (in kilotons) by the default factor – 1.1 (Volume 3, Chapter 2.5, Page 2.36). The activity data on the amount of clay used in brick production in the Republic of Moldova within 1990-2019 is reported in Table 4-28 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The activity data on the amount of clay used in expanded clay production in the Republic of Moldova within 2001-2019 periods as provided by 'Macon' JSC the only producer in the Republic of Moldova, is reported in Table 4-29 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). While the activity data regarding the production of ceramics in the 2005-2019 periods as provided by the National Bureau of Statistics through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic, by product type", is reported in the Table 4-30 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	Default EF used to estimate CO_2 emissions from ceramic production are available in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2.1, Table 2.1, Page 2.7. The country specific emission factors used to estimate CO_2 emissions from ceramic production in the RM within the 1990-2019 periods are reported in the Table 4-26 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). As the Table 4-26 reveals, the annual values of the EF varied between 1990 and 2019 from a minimum of 72.9 kg CO_2 per ton of clay used (in 2007) and a maximum of 103.5 kg CO_2 per ton of clay used (between 1997-2000). According to the 2006 IPCC Guidelines (Volume 3, Chapter 2.5, Page 2.34), the default EF represents 100 kg CO_2 per ton of clay used or 10 per cent of carbonate content used as raw material.
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	5% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2A4a 'Ceramics'.

Table 2.2.1.8: Information on Source Category 2A4a 'Ceramics' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A4a Ceramics / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	The main emission from the other process uses of carbonates is carbon dioxide, originating mainly from the carbonization process. Particulate matter is another main substance emitted from clay and brick product manufacturing. Substances such as oxides of nitrogen, sulphur dioxide, carbon monoxide, hydrogen fluoride, and calcium fluoride, are likely to be emitted from the combustion processes. Smaller quantities of volatile organic compounds (VOCs), ammonia, chlorine, and hydrochloric acid may also be emitted. Other emissions might include NPI listed metals and organic compounds generated from the fuel and raw materials used, or as products of incomplete combustion. Emission factors are given for process and combustion emissions together, since it is not straightforward to separate the two. However, large variations may apply depending on the carbonates composition, fuel type and furnace type and care should be taken in applying these factors.
Country Detail	Three large bricks plants used to produce ceramics in the RM: the Macon JSC in Chisinau, 'ANCHIR' JSC in Chirca village, Anenii Noi district and the Bricks Factory in Tiraspol (ATULBD). There is also a number of smaller size bricks plants which periodically seize their activity. The Macon JSC in Chisinau is producing also expendable clay since 2001.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from ceramic production uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.A.4 Other process uses of carbonates, section 3.3 'Tier 2 technology-specific approach': $E_{technology,\ pollutant} = AR_{production,\ technology} \bullet EF_{technology,\ pollutant}$ Where: $E_{technology,\ pollutant}$ is the emission of a pollutant (kg); $AR_{production,\ technology}$ is the annual production of ceramics (tons); $EF_{technology,\ pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton ceramic).

<table>
<tr><td>Reference</td><td>European Commission (2007), Reference Document on Best Available Technologies (BAT) in the Ceramic Manufacturing Industry. European Integrated Pollution Prevention and Control (IPPC) Bureau at the Institute for Prospective Technological Studies. August 2007 (Available on: http://eippcb.jrc.ec.europa.eu/reference/BREF/cer_bref_0807.pdf).
EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (Available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>A Tier 2 methodology has been used due to availability of technology-specific emission factors.</td></tr>
<tr><td>Type and source of activity data</td><td>The information on bricks production (in million conventional units) is reported in the Table 4-27 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1988 (page 228), 1994 (page 287), 1999 (page 303), 2005 (page 322), 2010 (page 305); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 177), 2000 (page 99), 2002 (page 103), 2005 (page 94), 2006 (page 93), 2007 (page 92), 2009 (page 92), 2010 (page 93), 2011 (page 94), 2012 (page 98), 2013 (page 99), 2014 (page 88), 2015 (page 88), 2016 (page 98), 2017 (page 101) 2020 (page 102). Plant specific information has been provided periodically by 'Macon' J.S.C. through Official Letters as response to the requests from Climate Change Office and Environment Agency.
To convert the activity data in metric mass units (kilotons), conversion coefficients were used based on the data available on the web pages of national and foreign construction companies. According to those, one conventional brick piece represents: 250 x 120 x 65 mm, with a specific density variation between 1500 and 1900 kg/m^3 (in the RM - between 1020 and 1869 kg/m^3). Under these circumstances, the volume of a conventional brick is - 0.25 • 0.12 • 0.065 = 0.00195 m^3; the minimum weight – 1020 • 0.00195/1 = 1.989 kg; the maximum weight – 1869 • 0.00195/1 = 3.644 kg; the average weight – 1444.5 • 0.00195/1 = 2.817 kg; this particular value was used in order to calculate the weight in tons of the national bricks production. At the same time, for estimating the mass of carbonates used for brick production, it was used the method recommended by the 2006 IPCC Guidelines; the mass of clay used for brick production is determined by multiplying total brick production (in kilotons) by the default factor – 1.1 (Volume 3, Chapter 2.5, Page 2.36).
The activity data on the amount of clay used in brick production in the Republic of Moldova within 1990-2019 is reported in Table 4-28 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The activity data on the amount of clay used in expanded clay production in the Republic of Moldova within 2001-2019 periods as provided by 'Macon' JSC the only producer in the Republic of Moldova, is reported in Table 4-29 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). While the activity data regarding the production of ceramics in the 2005-2019 periods as provided by the National Bureau of Statistics through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic, by product type", is reported in the Table 4-30 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Default emission factors for source category 'Ceramic production' (installation for the manufacture of ceramic product by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware of porcelain (with a production capacity of 75 ton/day or with a kiln capacity of 4m^3 and with a setting density per kiln of 300 kg/m^3)
<table>
<tr><td></td><td>Code</td><td colspan="4">Name</td></tr>
<tr><td>NFR source category</td><td>2.A.4
1.A.2.f.i</td><td colspan="4">Other processes use of carbonates
Stationary combustion in manufacturing industry and construction: other</td></tr>
<tr><td>SNAP</td><td>030319</td><td colspan="4">Bricks and tiles production</td></tr>
<tr><td>Fuel</td><td colspan="5">Gas / Oil / Coal</td></tr>
<tr><td rowspan="2">Pollutant</td><td rowspan="2">Value</td><td rowspan="2">Unit</td><td colspan="2">95 % confidence interval</td><td rowspan="2">Reference</td></tr>
<tr><td>Lower</td><td>Upper</td></tr>
<tr><td></td><td colspan="5">Tier 2 default emission factors from combustion emissions</td></tr>
<tr><td>NO_x</td><td>0.184</td><td>kg/t</td><td>0.049</td><td>0.255</td><td>European Commission (2007)</td></tr>
<tr><td>SO_x</td><td>0.0396</td><td>kg/t</td><td>0.0245</td><td>2.55</td><td>European Commission (2007)</td></tr>
<tr><td>CO</td><td>0.189</td><td>kg/t</td><td>0.155</td><td>0.800</td><td>European Commission (2007)</td></tr>
</table>
Sources: European Commission (2007), Reference Document on Best Available Techniques in the Ceramic Manufacturing Industry. August 2007. The document is available on: http://eippcb.jrc.ec.europa.eu/reference/BREF/cer_bref_0807.pdf. See Table 3.5, Page 99; EEA (2016), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark. The document is available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). See category 1.A.2 Manufacturing industries and construction (combustion), Table 3-28, Page 33.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>20% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
</table>

Table 2.2.1.9: Information on Source Category 2A4b 'Other Uses of Soda Ash' – CO_2

Sector	Industrial Processes and Product Use
Category	2A Mineral Industry
Source / Gas	2A4b Other Uses of Soda Ash / CO_2
Key Category?	No
Category Description / Definition	Soda ash (Na_2CO_3) is used as a raw material in a variety of industrial processes. It is applied in glass production, soaps and detergents, flue gas desulphurisation, chemicals, pulp and paper and other common consumer products. CO_2 process-related emissions in this sector result only from the calcination of soda ash use that are not included elsewhere. Soda ash used for glass is reported in 2A3.
Country Detail	CO_2 emissions from use of soda ash have been calculated from consumption of soda ash and default emission factor for soda ash. Amount of soda ash consumed has been estimated from data on import and export as provided by the Custom Service of the Republic of Moldova. Consumption of soda ash in glass production is subtracted.
Equation (Describe variables for method used)	Tier 1 methodology was applied. Methodological issues regarding estimation of CO_2 emissions from soda ash production and use are addressed in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions, specifically in Chapter 2.1, Table 2.1, Page 2.7, respectively in Chapter 2.5, Pages 2.32-2.40 (equation 2.14 on page 2.34): $Total_{sa} = A_{sa} \cdot EF_{sa}$ Where: $Total_{sa}$ – CO_2 emissions from soda ash use (kt); A_{sa} – soda ash consumption (kt); EF_{sa} – default EF for CO_2 emissions from soda ash use (t CO_2/t of soda ash).
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this emission source and unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	The information on soda ash import is reported in the Table 4-33, while the activity data on soda ash consumption is reported in Table 4-34 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information of soda ash import and export was provided by the Custom Service of the Republic of Moldova, through the Official Letter No. 28/07-3025 as of 28.02.2020, as a response to the request of the Environment Agency No. 08-310/1 as of 11.02.2020; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request of the CCO of the MARDE No. 601/2017-12-03 dated 14.12.2017; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request of the CCO of the MoEN No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request of the CCO of the MoEN No. 407/2015-01-09 dated 29.01.2015; Official Letter No.15-03-05 dated 24.01.2014, as a response to the request of the CCO of the MoEN No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request of the MoEN No. 03-07/175 dated 02.02.2011.
Type and source of EF and OF	Methodological issues regarding estimation of CO_2 emissions from soda ash production and use are addressed in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 2: Mineral Industry Emissions, specifically in Chapter 2.1, Table 2.1, Page 2.7. The emission factor used to calculate CO_2 emissions from soda ash use was estimated using the stoichiometry of the chemical processes and the following equation: EF_{sa} = 44.0099 g/mole CO_2 / 106.0685 g/mole Na_2CO_3 = 0.41492 t CO_2 / t Na_2CO_3.
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	5% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2A4b 'Other Uses of Soda Ash'.

2.2.2. Category 2B 'Chemical Industry'

Tables 2.2.2.1 – 2.2.2.3 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2B 'Chemical Industry'.

Table 2.2.2.1: Information on Source Category 2B10 'Other' (Polyethylene Production) – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2B Chemical Industry

Source / Gas	2B10 Other / Polyethylene Production / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Three types of polyethylene are produced: low density polyethylene (LDPE), linear low-density polyethylene (LLDPE) and high-density polyethylene (HDPE). Polyethylene is a polymer of ethylene and has the general empirical formula $(-CH_2CH_2-)n$. The manufacturing process used depends upon the type of polymer produced. LDPE is a tough waxy polymer, with approximately 2 per cent branching between polymer chains and has a density of about 0.92 t/m^3. LDPE is generally produced by high pressure and high temperature catalytic polymerization of ethylene in a tubular or autoclave reactor. LLDPE is a crystalline polymer with no chain branching and a density comparable to that of LDPE. A low-pressure method is generally used in which ethylene and a co-monomer such as butane or hexane is catalytically polymerized. HDPE is a crystalline polymer with no chain branching and a density of about 0.96t/m^3. HDPE is produced by low pressure polymerization of ethylene in a reactor containing a liquid hydrocarbon diluent and in the presence of Ziegler catalysts. The polymer produces slurry as it forms and is filtered from the solvent. NMVOCs are emitted primarily through leakages, and may be production time dependent rather than production dependent. Control techniques are primarily through replacement of leaking valves etc., and regular maintenance.
Country Detail	Polyethylene is produced on both banks of Dniester river. No plant specific data are available so far.
Equation (Describe variables for method used)	The Tier 1 approach for process emissions from polyethylene production uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.B.5.a Other chemical industry, section 3.2 'Tier 1 default approach': $E_{pollutant} = AR_{production} \bullet EF_{pollutant}$ Where: $E_{pollutant}$ is the emission of a pollutant (kg); $AR_{production}$ is the annual production of polyethylene (tons); $EF_{pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton polyethylene).
Reference	EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2016. Copenhagen, Denmark (Available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this emission source and unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	The information on polyethylene production is reported in the Table 4-47 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1994 (page 284), 1999 (page 302), 2005 (page 391), 2011 (page 305); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 176), 2002 (page 103), 2005 (page 94), 2007 (page 92), 2010 (page 95), 2012 (page 100), 2014 (page 90), 2017 (page 103), 2019 (page 101), 2020 (page 104).
Type and source of EF and OF	**Default EF Used to Estimate NMVOC Emissions from Polyethylene Production**

Source	SNAP	Description	NMVOC Emissions, kg / t	95% confidence interval	
				Lower	Upper
Other Chemical Products	040506	LDPE Production	2.4	1.0	4.5
	040507	HDPE Production	2.3	1.9	5.8

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 040506 LDPE Production, Category 2.B.5.a, Table 3.39, page 37. Code SNAP 040507 HDPE Production, Category 2.B.5.a, Table 3.40, page 37.

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above.

Table 2.2.2.2: Information on Source Category 2B10 'Other' (Acrylonitrile Butadiene Styrene Resins Production) – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2B Chemical Industry
Source / Gas	2B10 Other / Acrylonitrile Butadiene Styrene Resins (ABS) Production / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.

Category Description / Definition	Acrylonitrile Butadiene Styrene (ABS) is a combination of a graft copolymer and a polymer mixture (graft copolymer – a polymer with a 'backbone' of one type of monomer and with 'ribs' of co-polymers of two other monomers). ABS can be produced in three ways: (1) emulsion polymerization: it is a two-step process; in the first step a rubber latex is made, usually in a batch process; in the second step, which can be operated as batch and continuous, styrene and acrylonitrile are polymerized in the rubber latex solution to form an ABS latex; the ABS polymer is recovered through coagulation of the ABS latex by adding a destabilizing agent; the resulting slurry is filtered or centrifuged to recover the ABS resin; the ABS resin is then dried; (2) mass polymerization: two or more continuous flow reactors are used in this process; rubber is dissolved in the monomers, being styrene and acrylonitrile; during the reaction the dissolved rubber is replaced by the Styrene Acrylo-nitrile Copolymer (SAN) and forms discrete rubber particles; part of the SAN is grafted on the rubber particles, while another part is occluded in the particles; the reaction mixture contains several additives, these are needed in the polymerization; the product is devolatilized to remove unreacted monomer, which are recycled to the reactor, and then pelletized; (3) mass suspension: this batch process starts with a mass polymerization which is stopped at a monomer conversion of 15-30 per cent; then a suspension reaction completes the polymerization; for this reaction the mixture of polymer and monomer is suspended in water using a suspending agent and then the polymerization is continued; unreacted monomers are stripped, then the product is centrifuged and dried. NMVOC emissions of acrylonitrile butadiene styrene resins plants can be subdivided as follows: leakage losses from appendages, pumps, and other leakage. The losses due to leakage can be limited by use of certain types of seals and application of double seals near pumps.
Country Detail	Acrylonitrile Butadiene Styrene (ABS) used to be produced on both banks of Dniester River until 1994, since 1995 it is produced only on the left bank of Dniester river.
Equation (Describe variables for method used)	The Tier 1 approach for process emissions from ABS resin production uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.B.5.a Other chemical industry, section 3.2 'Tier 1 default approach': $E_{pollutant} = AR_{production} \bullet EF_{pollutant}$ Where: $E_{pollutant}$ is the emission of a pollutant (kg); $AR_{production}$ is the annual production of ABS resin (tons); $EF_{pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton ABS resin).
Reference	EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this emission source and unavailability of country specific emission factors, the Tier 1 methodology has been used.
Type and source of activity data	The information on ABS resin production is reported in the Table 4-49 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbook of the RM for 1994 (page 284). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 176), 2002 (page 103), 2005 (page 94), 2007 (page 92), 2010 (page 95), 2012 (page 100), 2014 (page 90), 2017 (page 101), 2019 (page 99), 2020 (page 102).
Type and source of EF and OF	Default EF Used to Estimate NMVOC Emissions from Acrylonitrile Butadiene Styrene Production

Source	SNAP	Description	NMVOC Emissions, kg / t	95% confidence interval	
				Lower	Upper
Other Chemical Products	040515	Production of ABS Resins	3.0	1.0	25

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 040515 Production of ABS resins, Category 2.B.5.a, Table 3.51, page 45.

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above.

Table 2.2.2.3: Information on Source Category 2B10 'Other' (Polystyrene Production) – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2B Chemical Industry
Source / Gas	2B10 Other / Polystyrene Production / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.

<table>
<tr><td>Category Description / Definition</td><td>Polystyrene is made by polymerising styrene monomer and is rigid plastic material, transparent or opaque, having a high refractive index (1.59) and a specific low weight (1.054). It is a polymer in which the high molecular weight hydrocarbon $(C_8H_8)n$ is predominant, with the value of n between 500 and 2000. The polymer also contains small amounts of styrene, ethyl-benzene, traces of catalysts and low molecular weight polymers, in shares that vary according to the polymerization process used. The styrene homopolymer, the copolymers and their components are thermoplastic materials with a predominantly amorphous structure. The molecular weight distribution influences polystyrene properties and in particular the tensile strength, shock resistance, viscosity and the so important flow during moulding through injection or extrusion. The low molecular weight component of the polymer also influences the flow, light stability, electrical properties, chemical stability etc. Low molecular weight components can be: unpolymerized styrene, saturated or non-polymerizable substances such as aldehydes, ethyl-benzene and di-, tri-, tetramers etc. Styrene polymerization at the industrial scale is carried out on the basis of the radical mechanism. The conjugated double vinyl bond and benzene nucleus give the styrene a particular reactivity as a monomer in the radical polymerization and, at the same time, a low activity of the respective radical. The initiation of radical styrene polymerization can be done thermally, photochemically, radiochemically or with initiators. Thermal polymerization is a consequence of the high reactivity of this monomer. Styrene polymerization can also be initiated by a large number of substances capable of decomposing into radicals under the action of heat. Peroxides, hydroperoxides or nitrocombinations are commonly used. Styrene polymerization can be carried out in block, solution, emulsion and suspension. Bulk polymerization is more widespread and can be conducted in the presence of initiators or under the influence of temperature. The use of initiators can lead to an uncontrolled process or to oxidation reactions, which lead to yellowing of the polymer. For this reason, on industrial scale it is applied thermal initiation, at 150-260°C. Such high temperatures are due to the fact that at 100°C, the reaction rate is low (conversions of 2 per cent per hour), and at the end (at conversions higher than 90 per cent) the polymerization rate drops greatly and only when temperature rises at 220-260°C it can lead to a polymer with a monomer content of less than 1 per cent. On industrial scale, bulk polymerization can take place in discontinuous or continuous installations, the latter being the most used. The main difficulty in this process is to increase the viscosity of the environment, making it difficult to remove the reaction heat. Discontinuous mass polymerization consists in introducing previously purified styrene in glass forms, which, under heat, in the presence or absence of initiators, in an air or inert gas environment is transformed into a hard mass taking the shape of the glass form. The continuous mass polymerization allows the production of a polymer free of monomer traces, characterized by a high molecular mass. This is carried out in polymerization towers or vacuum drying chambers. In order to overcome certain drawbacks, different types of reactors were used, with the following bulk polymerization installations being known: with a tubular displacement reactor, with shaking tubular reactors, rolling mill and horizontal reactors.</td></tr>
<tr><td>Country Detail</td><td>Polystyrene is produced in the Republic of Moldova since 2005. No plant specific information is available so far.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>The Tier 1 approach for process emissions from polystyrene production uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.B.5.a Other chemical industry, section 3.2 ‘Tier 1 default approach’:
$$E_{pollutant} = AR_{production} \bullet EF_{pollutant}$$
Where:
$E_{pollutant}$ is the emission of a pollutant (kg);
$AR_{production}$ is the annual production of polystyrene (tons);
$EF_{pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton polystyrene).</td></tr>
<tr><td>Reference</td><td>EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019 Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>Due to the lower importance of this emission source and unavailability of country specific emission factors, the Tier 1 methodology has been used.</td></tr>
<tr><td>Type and source of activity data</td><td>The information on polyethylene production is reported in the Table 4-51 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019” (are produced from 2005 year).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Default EF Used to Estimate NMVOC Emissions from Polystyrene Production
<table>
<tr><th rowspan="2">Source</th><th rowspan="2">SNAP</th><th rowspan="2">Description</th><th rowspan="2">NMVOC Emissions, g / t</th><th colspan="2">95% confidence interval</th></tr>
<tr><th>Lower</th><th>Upper</th></tr>
<tr><td rowspan="3">Other Chemical Products</td><td rowspan="3">040511</td><td>Production of general-purpose polystyrene (GPPS)</td><td>120</td><td>50</td><td>300</td></tr>
<tr><td>Production of high impact polystyrene (HIPS)</td><td>120</td><td>50</td><td>1000</td></tr>
<tr><td>Production of expandable polystyrene (EPS)</td><td>3.2</td><td>1.6</td><td>11.5</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 040511 Polystyrene, Category 2.B.5.a, Tables 3.45-3.47, page 42.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above.</td></tr>
</table>

2.2.3. Category 2C 'Metal Industry'

Tables 2.2.3.1 – 2.2.3.2 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2C 'Metal Industry'.

Table 2.2.3.1: Information on Source Category 2C1 'Iron and Steel Production' – CO_2

Sector	Industrial Processes and Product Use
Category	2C Metal Industry
Source / Gas	2C1 Iron and Steel Production / CO_2
Key Category?	No
Category Description / Definition	Iron and steel production can occur at primary integrated facilities, by reducing the iron ore with metallurgical coke; and at secondary facilities, in particular, by melting the recycled steel scrap using electrical energy imparted to the charge through carbon electrodes. Primary facilities are: open hearth furnaces (OHFs) accounting for circa 4 per cent of the world iron and steel production, and basic oxygen steelmaking furnaces (BOFs), accounting for circa 63 per cent of the world iron and steel production. The metallurgical coke used in furnaces and ovens is oxidized to CO_2 and then emitted into the atmosphere (a certain amount of carbon is retained in iron). Secondary steelmaking most often occurs in electric arc furnaces (EAFs) accounting for circa 33 per cent of the world iron and steel production. Electric arc furnaces are equipped with carbon electrodes (usually made from graphite with a carbon content of circa 97 per cent). Through carbon electrodes electricity is added to the scrap in the furnace, thus raising the temperature to 1700ºC. Lime, anthracite and pig-iron are also added. Depending on the desired quality of the steel, chromium, magnesium, molybdenum or vanadium compounds can be added as well. CO_2 emissions from steel production in electric arc furnaces are determined by carbon losses in electrodes, as well as from carbonates use. When electrodes are placed above the melted metal, the electric arc oxidizes the carbon to CO or CO_2. Sometimes, electrodes are immersed in the melted metal to increase carbon concentration in steel, thus contributing to additional CO_2 emissions.
Country Detail	Metal Integrated Works in Ribnita on the left bank of Dniester river is one of the two mini-metallurgical works (the second is located in Jlobino, Belarus) bought by the USSR in the early 80's of the twentieth century on „dollar for oil" account. These plants were, at the time, at the level of Western European plants, well provided with advanced equipment and efficient technologies. Production capacity at the launch in 1985 year represented about 684 kt of steel and 500 kt of rolling mills. By 2004/2005, steel production reached 1 million tons of steel and 800 thousand tons of rolling mills. The Metal Integrated Works in Ribnita uses scrap metal collected mainly in the Republic of Moldova, but also from the neighboring countries, especially from Ukraine. At the same time, there are a number of enterprises on the right bank of Dniester River (such as: "Incomaș" J.S.C., Plant "Fiting" J.S.C., Pipe Plant "Protos" J.S.C. owned by the company IM 'Orvento Metall Trading Co' Ltd., etc.) that use low-capacity electric arc furnaces (less than 50 tones). The steel production of these enterprises is insignificant compared to that of the Metal Integrated Works in Ribnita. Between 1990 and 2019 years, CO_2 emissions from the source category 2C1 'Iron and Steel Production' decreased in the Republic of Moldova by circa 32 per cent.
Equation (Describe variables for method used)	CO_2 emissions from 2C1 'Iron and Steel Production' source category was estimated using a Tier 2 methodology, based on carbon track through the production process. Total CO_2 emission from 2C1 'Iron and Steel Production' source category were estimated using equation 4.9 from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 4: Metal Industry Emissions, Chapter 4.2: Iron & Steel and metallurgical Coke production, page 4.22. Below is the simplified version of this equation, adapted to national circumstances. $E_{CO2} = [L \cdot C_L + D \cdot C_D + CE \cdot C_{CE} - S \cdot C_S] \cdot 44/12$ Where: E_{CO2} – total CO_2 emissions from steel production, tones; L – quantity of limestone consumed in steel production, tones; C_L – carbon content in limestone consumed in steel production, tC/t limestone; D – quantity of dolomite consumed in steel production, tones; C_D – carbon content in dolomite consumed in steel production, tC/t dolomite; CE – quantity of carbon electrodes consumed in EAFs, tones; C_{CE} – carbon content in electrodes consumed in EAFs, tC/t electrodes; S – quantity of steel produced, tones; C_S – carbon content in steel produced, tC/t steel; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 4: Metal Industry Emissions. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

Describe How and Why this Method Was Chosen	Due to the importance of this source, the Tier 2 methodology has been used.
Type and source of activity data	The amount of steel produced is reported in the Table 4-55, while the amount of rolling mills produced is reported in the Table 4-56 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1994 (page 224), 1999 (page 302), 2003 (page 391), 2004 (page 441), 2010 (page 305); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 178), 2000 (page 99), 2002 (page 103), 2006 (page 93), 2007 (page 92), 2010 (page 93), 2013 (page 99), 2017 (page 101), 2019 (page 99), 2020 (page 102).
Type and source of EF and OF	In the Republic of Moldova, the content of carbon in crude steel represents circa 0.25 per cent (according to the information provided by producer, the content of carbon in crude steel varies between 0.17 and 0.33 per cent) (Metal Integrated Works from Ribnita, <http://www.aommz.com/pls/webus/webus.main.show>). According to the 2006 IPCC Guidelines, depending of steel type and quality, the content of carbon in crude steel varies between 0.5 and 2 per cent, the default value used is 1 per cent (Volume 3, Chapter 4.2, Table 4.3, page 4.27). Other relevant coefficients used to estimate CO_2 emissions from steel production are presented in the table below. **Carbon Content of Various Materials Used in Steel Production**

Raw Material	Carbon content, default values, t C / t	Raw Material	Carbon content values used at the national level, t C / t
Limestone	0.12	Lime with high calcium content	0.2142
Dolomite	0.13	Dolomite lime	0.2492
Carbon electrodes from petroleum coke for EAF	0.82		
Carbon electrodes from coal coke for EAF	0.83	Graphite electrodes for EAF	0.97
Scrap metal	0.04		
Steel	0.01	Steel	0.0025

	In order to estimate CO_2 emissions from steel production it was also considered the specific consumption of raw materials and graphite electrodes for producing 1 ton of steel, this information being identified in the literature in the field and on the web pages of the metallurgical companies. Thus, for example, the consumption of graphite electrodes in electric arc furnaces with a capacity of 30-50 tones, specific to enterprises on the right bank of Dniester River, was agreed to be 7 kg/t of steel produced (<http://metal-archive.ru/tyazhelye-metally/1468-vyplavka-stali-v-dugovyh-pechah.html>). The specific consumption of graphite electrodes in electric furnaces with higher capacity (such as that from the Metal Integrated Works in Ribnita with a capacity of 120 tons) (<http://www.aommz.com/pls/web/web.main.show?main_id=10&m_id=11>) was agreed to be 1.3 kg/t of steel produced (<http://elar.urfu.ru/bitstream/10995/40661/1/978-5-7996-1725-7_2016.pdf>). The specific consumption of lime with high calcium content and/or dolomite lime is considered to be 55 kg/ton of steel produced (<https://rep.bntu.by/bitstream/handle/data/6984/%D0%A1.%20128-130.pdf?sequence=1>) (representing 45 kg of lime with high calcium content, respectively 10 kg of dolomite lime).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	10% - expert judgement
Potential Improvements	Potential improvements under the 2C1 'Iron and steel production' source category aim at updating the activity data regarding the consumption of raw materials per ton of production, as well as the specific consumption of electrodes per ton of steel produced by the national enterprises.

Table 2.2.3.2: Information on Source Category 2C1 'Iron and Steel Production' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2C Metal Industry
Source / Gas	2C1 Iron and Steel Production / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.

<table>
<tr><td>Category Description / Definition</td><td>Iron and steel production can occur at primary integrated facilities, by reducing the iron ore with metallurgical coke; and at secondary facilities, in particular, by melting the recycled steel scrap using electrical energy imparted to the charge through carbon electrodes. Primary facilities are: open hearth furnaces (OHFs) accounting for circa 4 per cent of the world iron and steel production, and basic oxygen steelmaking furnaces (BOFs), accounting for circa 63 per cent of the world iron and steel production. Secondary steelmaking most often occurs in electric arc furnaces (EAFs) accounting for circa 33 per cent of the world iron and steel production. Electric arc furnaces are equipped with carbon electrodes (usually made from graphite with a carbon content of circa 97 per cent). Through carbon electrodes electricity is added to the scrap in the furnace, thus raising the temperature to 1700ºC. Lime, anthracite and pig-iron are also added. Depending on the desired quality of the steel, chromium, magnesium, molybdenum or vanadium compounds can be added as well.</td></tr>
<tr><td>Country Detail</td><td>Metal Integrated Works in Ribnita on the left bank of Dniester river is one of the two mini-metallurgical works (the second is located in Jlobino, Belarus) bought by the USSR in the early 80's of the twentieth century on „dollar for oil" account. These plants were, at the time, at the level of Western European plants, well provided with advanced equipment and efficient technologies. Production capacity at the launch in 1985 year represented about 684 kt of steel and 500 kt of rolling mills. By 2004/2005, steel production reached 1 million tons of steel and 800 thousand tons of rolling mills. The Metal Integrated Works in Ribnita uses scrap metal collected mainly in the Republic of Moldova, but also from the neighboring countries, especially from Ukraine. At the same time, there are a number of enterprises on the right bank of Dniester River (such as: "Incomaş" J.S.C., Plant "Fiting" J.S.C., Pipe Plant "Protos" J.S.C. owned by the company IM 'Orvento Metall Trading Co' Ltd., etc.) that use low-capacity electric arc furnaces (less than 50 tones). The steel production of these enterprises is insignificant compared to that of the Metal Integrated Works in Ribnita.</td></tr>
<tr><td>Equation
(Describe variables for method used)</td><td>The Tier 2 approach for process emissions from iron and steel production uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.C.1 Iron and steel production, section 3.3 'Tier 2 technology-specific approach':
$E_{pollutant} = AR_{production\ technology} \bullet EF_{technology\ pollutant}$
Where:
$E_{pollutant}$ is the emission of a pollutant (kg);
$AR_{production\ technology}$ is the annual production of iron and steel (tons);
$EF_{technology\ pollutant}$ is the emission factor of the relevant pollutant (kg pollutant / ton iron and steel).</td></tr>
<tr><td>Reference</td><td>EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019 Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019).
National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).</td></tr>
<tr><td>Describe How and Why this Method Was Chosen</td><td>A Tier 2 methodology has been used due to availability of technology specific information on iron and steel production in the Republic of Moldova.</td></tr>
<tr><td>Type and source of activity data</td><td>The amount of steel produced is reported in the Table 4-55, while the amount of rolling mills produced is reported in the Table 4-56 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova. Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Statistical Yearbooks of the RM for 1994 (page 224), 1999 (page 302), 2003 (page 391), 2004 (page 441), 2010 (page 305); as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic, by product type for 2005-2019" (are produced only since 2005 year). Activity data for the left bank of Dniester river are available in the Statistical Yearbooks of the ATULBD for 1998 (page 178), 2000 (page 99), 2002 (page 103), 2006 (page 93), 2007 (page 92), 2010 (page 93), 2013 (page 99), 2017 (page 101), 2019 (page 99), 2020 (page 102).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Default EF Used to Estimate Pollutant Emissions from Steel Production in Electric Arc Furnaces (EAF)
<table>
<tr><th rowspan="2">Source</th><th rowspan="2">Description</th><th>NO_x</th><th>CO</th><th>NMVOC</th><th>SO_2</th></tr>
<tr><th colspan="4">g / t</th></tr>
<tr><td rowspan="2">Steel Production in Electric Arc Furnaces (EAF)</td><td>Steel Production[1]</td><td>130 (120-140)</td><td>1700 (740-3900)</td><td>46 (16-130)</td><td>60 (24-30)</td></tr>
<tr><td>Production of Rolling Mills [2]</td><td></td><td></td><td>7 (2-20)</td><td></td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, [1] 2.C.1 Steel Production, 040207 – Steel Production in Electric Arc Furnaces, Table 3.19, page 44; [2] 2.C.1 Steel Production, 040208 – Production of Rolling Mills, Table 3.22, page 47.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
</table>

2.2.4. Category 2D 'Non-Energy Products from Fuels and Solvents Use'

Tables 2.2.4.1 – 2.2.4.29 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2D 'Non-Energy Products from Fuels and Solvents Use'.

Table 2.2.4.1: Information on Source Category 2D1 'Lubricant Use' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D1 Lubricant Use / CO_2
Key Category?	No
Category Description / Definition	Lubricants are mostly used in industrial and transportation applications. The use of lubricants in engines is primarily for their lubricating properties and associated emissions are therefore considered as non-combustion emissions to be reported in the Sector 2 'IPPU' and not in the Sector 1 'Energy'.
Country Detail	In line with the recommendations in the 2006 IPCC Guidelines, where statistical data on lubricant consumption are aggregated without the possibility of delimiting oil and grease consumption, it is recommended to consider that 90 per cent of total lubricants are oils and 10 per cent – grease.
Equation (Describe variables for method used)	The methodology used to estimate CO_2 emissions from lubricant use is a Tier 1 methodological approach. CO_2 emissions are calculated according to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.2: Lubricant Use, Equation 5.2, Page 5.7. $CO_2 \text{ Emissions} = LC \bullet CC_{Lubricant} \bullet ODU_{Lubricant} \bullet 44/12$ Where: CO_2 emissions – emissions from lubricants, t CO_2; LC – total lubricant consumption, TJ; $CC_{Lubricant}$ – carbon content of lubricant, t C/TJ; $ODU_{Lubricant}$ – ODU factor (oxidized during use); 44/12 – mass ratio of CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The amount of lubricant (oil and grease) use (in TJ) within 1990-2019 periods is reported in the Table 4-62 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Activity data for the right bank of Dniester river are based on information provided by the National Bureau of Statistics of the Republic of Moldova through the Energy Balances of the Republic of Moldova for 1990, 1993-2019. Activity data for the left bank of Dniester river are available in the Socio-economic Development of the TMR, 2019 (final data). / State Statistical Service of the TMR - Tiraspol, 2020 – 81 p.; Socio-economic Development of the TMR, 2018 (final data). / State Statistical Service of the TMR - Tiraspol, 2019 – 81 p.; Socio-economic Development of the TMR, 2017 (final data). / State Statistical Service of the TMR - Tiraspol, 2018 – 81 p.; Socio-economic Development of the TMR, 2016 (final data). / State Statistical Service of the TMR - Tiraspol, 2017 – 81 p.; Socio-economic Development of the TMR, 2015 (final data). / State Statistical Service of the TMR - Tiraspol, 2016 – 81 p.; Socio-economic Development of the TMR, 2014 (final data). / State Statistical Service of the TMR - Tiraspol, 2015 – 81 p.; Socio-economic Development of the TMR, 2013 (final data). / State Statistical Service of the Ministry of Economic Development of the TMR - Tiraspol, 2014 – 88 p.; Socio-economic Development of the TMR, 2012. / State Statistical Service of the Ministry of Economic Development of the TMR - Tiraspol, 2013 – 85 p.; Socio-economic Development of the TMR, 2011. / State Statistical Service of the Ministry of Economic Development of the TMR - Tiraspol, 2012 – 85 p.; Socio-economic Development of the TMR, 2010. / State Statistical Service of the Ministry of Economic Development of the TMR - Tiraspol, 2011 – 79 p.; Socio-economic Development of the TMR, 2009. / State Statistical Service of the Ministry of Economic Development of the TMR - Tiraspol, 2010 – 75p.
Type and source of EF and OF	$CC_{Lubricant}$ – carbon content of lubricant, t C/TJ; the default value used represents 20 t C/TJ (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.2: Lubricant Use, page 5.9). $ODU_{Lubricant}$ – ODU factor (oxidized during use); the default value used represents 20 per cent for oil and 5 per cent for grease (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.2: Lubricant Use, Tab.5.2, page 5.9).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	50% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D1 'Lubricant Use'.

Table 2.2.4.2: Information on Source Category 2D2 'Paraffin Wax Use' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D2 Paraffin Wax Use / CO_2
Key Category?	No
Category Description / Definition	Within this category, CO_2 emissions from the use of different products are monitored: petroleum jelly, paraffin waxes and other waxes, including ozokerite. Waxes are used in a number of various applications. Paraffin waxes are used in applications such as candles, corrugated boxes, for paper coating, food production, wax polishes, surfactants (as used in detergents) and many others.
Country Detail	The AD regarding paraffin wax consumption are available in the Energy Balances of the Republic of Moldova only since 2004. For 1990-2003 time series the paraffin wax consumption was estimated indirectly based on lubricants consumption. In contrast to the previous inventory cycle, in the current cycle paraffin wax use on the left bank of Dniester River (in the ATULBD) was also estimated: it was considered that the share of paraffin was consumption on the left bank of Dniester River from the total national consumption is similar to the share of lubricants consumption in the ATULBD from the total national.
Equation (Describe variables for method used)	A Tier 1 methodological approach was used to estimate CO_2 emissions from paraffin wax use. CO_2 emissions are calculated according to 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.3: Paraffin Wax Use, Equation 5.4, Page 5.11. $CO_2 \text{ Emissions} = PW \bullet CC_{Wax} \bullet ODU_{Wax} \bullet 44/12$ Where: CO_2 Emissions – emissions from waxes, t CO_2; PW – total wax consumption, TJ; CC_{Wax} – carbon content of paraffin wax, t C/ TJ; ODU_{Wax} – ODU factor (oxidized during use) for paraffin wax, fraction; 44/12 – mass ratio of CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The amount of paraffin wax use (in TJ) within 1990-2019 periods is reported in the Table 4-63 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	CC_{Wax} – carbon content of paraffin wax, t C/ TJ; the default value used represents 20 t C / TJ (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.3: Paraffin Wax Use, Page 5.12). ODU_{Wax} – ODU factor (oxidized during use) for paraffin wax, fraction; the default value used represents 20 per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.3: Paraffin Wax Use, Page 5.12).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	100% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D2 'Paraffin Wax Use'.

Table 2.2.4.3: Information on Source Category 2D3a 'Domestic Solvent Use' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3a Domestic Solvent Use / CO_2
Key Category?	No
Category Description / Definition	This category includes indirect CO_2 emissions from domestic solvent use.

Country Detail	In the Republic of Moldova there are no recorded statistical data on domestic solvent use. AD for certain applications can be generated indirectly based on the information on production, import and export of domestic products containing solvents. To be noted, that the domestic solvent production within the country is very low. Also, activity data are not always available in tons or liters thus requesting the use of conversion factors. Customs Service of the Republic of Moldova is a primary source of information on national import operations. Though AD on the production and imports of certain household products are available, the solvents share in these products is unknown.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from household waste products are of fossil origin). CO_2 emissions from domestic solvents use were estimated using the following equation: $CO_2 \text{ emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 emissions – carbon dioxide emissions from domestic solvents use, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC, fraction; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the population of the Republic of Moldova within 1990-2019 periods is reported in the Table 4-66 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3a 'Domestic Solvent Use'.

Table 2.2.4.4: Information on Source Category 2D3a 'Domestic Solvent Use' – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3a Domestic Solvent Use / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category includes pollutant emissions from domestic solvent use.
Country Detail	In the Republic of Moldova there are no recorded statistical data on domestic solvent use. AD for certain applications can be generated indirectly based on the information on production, import and export of domestic products containing solvents. To be noted, that the domestic solvent production within the country is very low. Customs Service of the Republic of Moldova is a primary source of information on national import. Though AD on the production and imports of certain household products are available, the solvents share in these products is unknown.
Equation (Describe variables for method used)	The Tier 1 approach for NMVOC emissions from domestic solvent use uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.a Domestic solvent use including fungicides, section 3.1 'Tier 1 default approach': $E_{pollutant} = (P \bullet EF_{pollutant}) / 10^3$ Where: $E_{pollutant}$ – Pollutant gas emissions from domestic solvents use, t/yr; P – Population, thousand inhabitants/yr; $EF_{pollutant}$ – Emission Factor for this pollutant gas, kg/person/yr.

Reference	EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019 Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2016. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2018).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the population of the Republic of Moldova within 1990-2019 periods is reported in the Table 4-66 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova.
Type and source of EF and OF	**Tier 1 Default Emission factors used to Estimate NMVOC Emissions from 2D3a 'Domestic Solvents Use'** Source Category: Domestic Solvent Use; NMVOC Emission Factor (Other European Countries, excluding Western Europe): 1.2 (0.5-1.7); Unit: kg/person/yr **Source:** EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 2.D.3.a 'Domestic Solvent Use' (including fungicides), Chapter 3.1, Table 3.1, page 9.
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.5: Information on Source Category 2D3b 'Road Paving with Asphalt' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3b Road Paving with Asphalt / CO_2
Key Category?	No
Category Description / Definition	This category includes indirect CO_2 emissions from road paving with asphalt.
Country Detail	In the Republic of Moldova, the data related to asphalt production were provided by the Ministry of Transport and Roads Infrastructure for 1990-2002 periods, by the National Bureau of Statistics for 2003-2015 periods, respectively by the State Enterprise "Road State Administration" for 2016-2019 periods (see Table 4-69 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default fossil carbon content fraction of NMVOC from asphalt production and use for road paving varies between 40 to 50 percent by mass (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.4: Asphalt Production and Use, Section 5.4.4 'Uncertainty assessment', Page 5.16). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from asphalt are of fossil origin). CO_2 emissions from road paving with asphalt were estimated using the following equation: $$CO_2 \text{ emissions} = NMVOC \bullet CC \bullet 44/12$$ Where: CO_2 emissions – carbon dioxide emissions from road paving with asphalt, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC, fraction; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.4: Asphalt Production and Use, Section 5.4.4 'Uncertainty assessment', Page 5.16. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.

Type and source of activity data	The information on the amount of asphalt production for road paving in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-69 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Ministry of Transport and Roads Infrastructure through the Official Letter No. 03-5-2/2-32 dated 31.03.1999, as a response to the request of the Ministry of Environment No. 01-7/172 dated 12.03.1999; Official Letter No. 04-02-3/101 dated 18.02.2004, as a response to the request of the Ministry of Ecology No. 257-01-07 dated 26.01.2004; Official Letter No. 04-01-3/754 dated 2.10.2006, as a response to the request of the Ministry of Ecology and Natural Resources No. 01-07/1400 dated 25.08.2006; as well as based on information provided by the National Bureau of Statistics of the RM through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request of the Ministry of Environment No. 03-07/175 dated 02.02.2011; through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2015", as well as based on information provided by the State Enterprise "Road State Administration" through the Official Letter No. 09-02/43, in response to request No. 601/2017-12-03 as of 14.12.2017; and through the Official Letter No. 09-02/768 from 27.02.2020, in response to request No. 08-310/1 from 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default fossil carbon content fraction of NMVOC from asphalt production and use for road paving varies between 40 to 50 percent by mass; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.4: Asphalt Production and Use, Section 5.4.4 'Uncertainty assessment', Page 5.16).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3b 'Road paving with asphalt'.

Table 2.2.4.6: Information on Source Category 2D3b 'Road Paving with Asphalt' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3b Road Paving with Asphalt / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category includes pollutant emissions from road paving with asphalt.
Country Detail	In the Republic of Moldova, the data related to asphalt production were provided by the Ministry of Transport and Roads Infrastructure for 1990-2002 periods, by the National Bureau of Statistics for 2003-2015 periods, respectively by the State Enterprise "Road State Administration" for 2016-2019 periods (see Table 4-69 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	The Tier 1 approach for emissions from road paving with asphalt uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.b 'Road paving with asphalt', section 3.1 'Tier 1 default approach': $E_{pollutant} = (A \bullet EF_{pollutant}) / 10^6$ Where: $E_{pollutant}$ – NMVOC, CO, NO_x and SO_x emissions, kt/yr; A – Annual production of asphalt, kt/an; $EF_{pollutant}$ – Default Emission Factor, g/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the amount of asphalt production for road paving in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-69 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Ministry of Transport and Roads Infrastructure through the Official Letter No. 03-5-2/2-32 dated 31.03.1999, as a response to the request of the Ministry of Environment No. 01-7/172 dated 12.03.1999; Official Letter No. 04-02-3/101 dated 18.02.2004, as a response to the request of the Ministry of Ecology No. 257-01-07 dated 26.01.2004; Official Letter No. 04-01-3/754 dated 2.10.2006, as a response to the request of the Ministry of Ecology and Natural Resources No. 01-07/1400 dated 25.08.2006; as well as based on information provided by the National Bureau of Statistics of the RM through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request of the Ministry of Environment No. 03-07/175 dated 02.02.2011; through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2015", as well as based on information provided by the State Enterprise "Road State Administration" through the Official Letter No. 09-02/43, in response to request No. 601/2017-12-03 as of 14.12.2017; and through the Official Letter No. 09-02/768 from 27.02.2020, in response to request No. 08-310/1 from 11.02.2020.

Type and source of EF and OF	**Default Emission Factors used to estimate Pollutant Emissions from Asphalt Production and Use for Road Paving with Asphalt**

Description	NO_x	CO	SO_2	NMVOC
	g / t			kg / t
Roadstone Coating with Asphalt / Asphalt Concrete Plants[1]	35.6 (12.5-60)	200 (100-300)	17.7 (2.3-44)	-
Road Paving with Asphalt (Liquified Asphalt, Cutback Asphalt, Uncontrolled Abatement Technologies)[2]	-	-	-	30 (10-100)

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019. [1] Code SNAP 030313 Asphalt Concrete Plants, Category 1.A.2.f.i, Table 3-25, Page 32. [2] Code SNAP 040611 Road Paving with Asphalt, Category 2.D.3.b, Table 3.4, Page 12.

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.7: Information on Source Category 2D3c 'Asphalt Roofing' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3c Asphalt Roofing / CO_2
Key Category?	No
Category Description / Definition	This category includes indirect CO_2 emissions from asphalt roofing.
Country Detail	In the Republic of Moldova, the data related to asphalt roofing production were provided by the National Bureau of Statistics for 2003-2014 periods (see Table 4-71 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova). Before 2003, no domestic asphalt roofing production was recorded in the Republic of Moldova, the respective production being imported.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default fossil carbon content fraction of NMVOC from asphalt roofing is about 80 percent by mass (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.4: Asphalt Production and Use, Section 5.4.4 'Uncertainty assessment', Page 5.16). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from asphalt used for roofing are of fossil origin). CO_2 emissions from asphalt roofing were estimated using the following equation: $CO_2 \text{ emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 emissions – carbon dioxide emissions from asphalt roofing, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC, fraction; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.4: Asphalt Production and Use, Section 5.4.4 'Uncertainty assessment', Page 5.16. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the amount of asphalt roofing production in the Republic of Moldova within 2003-2014 periods is reported in the Table 4-71 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the National Bureau of Statistics of the RM through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request of the Ministry of Environment No. 03-07/175 dated 02.02.2011 and through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2015".
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default fossil carbon content fraction of NMVOC from asphalt roofing is about 80 percent by mass; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.4: Asphalt Production and Use, Section 5.4.4 'Uncertainty assessment', Page 5.16).

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3c 'Asphalt Roofing'.

Table 2.2.4.8: Information on Source Category 2D3c 'Asphalt Roofing' – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3c Asphalt Roofing / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category includes pollutant emissions from asphalt roofing.
Country Detail	In the Republic of Moldova, the data related to asphalt roofing production were provided by the National Bureau of Statistics for 2003-2014 periods (see Table 4-71 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova). Before 2003, no domestic asphalt roofing production was recorded in the Republic of Moldova, the respective production being imported.
Equation (Describe variables for method used)	The Tier 1 approach for emissions from asphalt roofing production uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.c 'Asphalt Roofing', section 3.1 'Tier 1 default approach': $E_{pollutant} = (A \bullet EF_{pollutant}) / 10^6$ Where: $E_{pollutant}$ – pollutant emissions, kt/yr; A – annual production of asphalt roofing, kt/an; $EF_{pollutant}$ – default emission factor, g/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019 Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the amount of asphalt roofing production in the Republic of Moldova within 2003-2014 periods is reported in the Table 4-71 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the National Bureau of Statistics of the RM through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request of the Ministry of Environment No. 03-07/175 dated 02.02.2011 and through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2015".
Type and source of EF and OF	**Default Emission factors used to estimate Pollutant Emissions from Asphalt Roofing** Source Category / CO / NMVOC (g / t) Asphalt Roofing / 9.5 (3-30) / 130 (40-400) **Source:** EMEP/EEA Atmospheric Emissions Inventory Guidebook, 2019, Code SNAP 040610 Asphalt Roofing, Category 2.D.3.c, Table 3.1, Page 7.
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.9: Information on Source Category 2D3d 'Paint Application' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3d Paint Application / CO_2

Key Category?	No
Category Description / Definition	Under this category there are reported emissions from decorative coating application, in particular in construction (SNAP 060103) and domestic paint application (SNAP 060104); industrial coating application, in particular from manufacture of automobiles (SNAP 060101), car repairing (SNAP 060102), coil coating (SNAP 060105), painting ships and boats (SNAP 060106), wood treatment and painting (SNAP 060107), other industrial application (painting aircrafts, carriages, steel bridges, military vehicles, engines, pumps, tanks, office equipment, plastic articles, toys etc.) (SNAP 060108); respectively, other non-industrial paint application' (paint or varnish application to protect large metal construction from corrosion, for road marking etc.) (SNAP 060109). For most activities involving paint application, no statistics is available for activity data. Under such circumstances, it was considered that the share of paints in decorative coating application represents 50 per cent of the total national consumption, the share of paints in industrial coating application – 40 per cent, while the share in other coating application – 10 per cent
Country Detail	Since the breakdown of AD on paint and varnish consumption in the RM by sectors was not possible, the respective emissions were aggregated at national level.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from paint application products are of fossil origin). CO_2 emissions from paints application were estimated using the following equation: CO_2 emissions = NMVOC • CC • 44/12 Where: CO_2 emissions – carbon dioxide emissions from paint application, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC, fraction; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the amount of varnishes and paints production in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-74 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the National Bureau of Statistics of the RM through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 06-39/38 dated 22.09.2011, as a response to the request No. 101/2011-09-01 dated 02.09.2011, from the CCO of the MoEN; Official Letter No. 15-03/05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO, the MoEN; Official Letter No. 15-03-09 dated 13.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; as well as through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019". The activity data on import of varnishes and paints in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-75 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Customs Service of the Republic of Moldova through Official Letter No. 28/07-1893 dated 23.02. 2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the Ministry of Environment; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the Ministry of Agriculture, Regional Development and Environment; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3d 'Paint Application'.

Table 2.2.4.10: Information on Source Category 2D3d 'Paint Application' – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3d Paint Application / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Under this category there are reported emissions from decorative coating application, in particular in construction (SNAP 060103) and domestic paint application (SNAP 060104); industrial coating application, in particular from manufacture of automobiles (SNAP 060101), car repairing (SNAP 060102), coil coating (SNAP 060105), painting ships and boats (SNAP 060106), wood treatment and painting (SNAP 060107), other industrial application (painting aircrafts, carriages, steel bridges, military vehicles, engines, pumps, tanks, office equipment, plastic articles, toys etc.) (SNAP 060108); respectively, other non-industrial paint application' (paint or varnish application to protect large metal construction from corrosion, for road marking etc.) (SNAP 060109). For most activities involving paint application, no statistics is available for activity data. Under such circumstances, it was considered that the share of paints in decorative coating application represents 50 per cent of the total national consumption, the share of paints in industrial coating application – 40 per cent, while the share in other coating application – 10 per cent
Country Detail	Since the breakdown of AD on paint and varnish consumption in the RM by sectors was not possible, the respective emissions were aggregated at national level.
Equation (Describe variables for method used)	The Tier 1 approach for NMVOC emissions from paint application uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.d 'Paint Application', section 3.2 'Tier 1 default approach': $E_{pollutant} = (AR_{product} \bullet EF_{pollutant}) / 10^3$ Where: $E_{pollutant}$ – the emission of the specified pollutant, t/yr; $AR_{product}$ – the activity rate for the coating application (consumption of paint), t/yr; $EF_{pollutant}$ – the emission factor for the pollutant, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019*, *Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the amount of varnishes and paints production in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-74 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the National Bureau of Statistics of the RM through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 06-39/38 dated 22.09.2011, as a response to the request No. 101/2011-09-01 dated 02.09.2011, from the CCO of the MoEN; Official Letter No. 15-03/05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO, the MoEN; Official Letter No. 15-03-09 dated 13.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; as well as through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019". The activity data on import of varnishes and paints in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-75 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Customs Service of the Republic of Moldova through Official Letter No. 28/07-1893 dated 23.02. 2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the Ministry of Environment; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	**Default Tier 1 Emission factors for the 2D3d 'Paint Application' source category**

Source	NMVOC Emission Factor	Unit
Decorative Coating Application	150 (100-400)	g/kg paint applied
Industrial Coating Application	400 (100-800)	g/kg paint applied
Other Coating Application	200 (4-1000)	g/kg paint applied

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.d 'Coating Application', Tables 3-1, 3-2 and 3-3, page 17.

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.11: Information on Source Category 2D3e 'Degreasing' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3e Degreasing / CO_2
Key Category?	No
Category Description / Definition	Within the 2D3e 'Degreasing' source category there are monitored the indirect CO_2 emissions from solvent use in industry, especially for metal degreasing – SNAP 060201; electronic components manufacturing – SNAP 060203, as well as other industrial cleaning – SNAP 060204. Typically, the solvents used for degreasing are obtained by distillation of fossil fuels. For example, chlorinated solvents, including trichloroethylene (TRI) (code 2903 22 000), tetrachloroethylene (PER) (code 2903 23 000) and dichloromethane (MC) (code 2903 12 000) are widely used in the industrial sector for cleaning metal articles, electronic products and other industrial products (in closed type cleaning equipment). Previously, 1,1,1-trichloroethane (TCA) (2903 19 100) was particularly used until recently when it was replaced by trichloroethylene (TRI). As for the open type cleaning equipment, the most commonly used solvents are those obtained from white-spirit (code 2710 11 210) and alcohols, such as propylene glycol 2905 32 000).
Country Detail	To be noted that for most activities involving use of organic solvents for degreasing in the RM there are no statistical data. Under such circumstances, the total consumption of solvents used for degreasing was estimated based on information on import of solvents (internal production of solvents is insignificant, also it was assumed that such substances are not re-exported). Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from degreasing products are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: CO_2 Emissions = NMVOC • CC • 44/12 Where: CO_2 Emissions – carbon dioxide emissions from degreasing, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the consumption of solvents used in degreasing in the RM within 1990-2019 periods is reported in the Table 4-79 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Custom Service through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020. Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning (see Table 4-80 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3e 'Degreasing'.

Table 2.2.4.12: Information on Source Category 2D3e 'Degreasing' – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3e Degreasing / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Within the 2D3e 'Degreasing' source category there are monitored the NMVOC emissions from solvent use in industry, especially for metal degreasing – SNAP 060201; electronic components manufacturing – SNAP 060203, as well as other industrial cleaning – SNAP 060204. Typically, the solvents used for degreasing are obtained by distillation of fossil fuels. For example, chlorinated solvents, including trichloroethylene (TRI) (code 2903 22 000), tetrachloroethylene (PER) (code 2903 23 000) and dichloromethane (MC) (code 2903 12 000) are widely used in the industrial sector for cleaning metal articles, electronic products and other industrial products (in closed type cleaning equipment). Previously, 1,1,1-trichloroethane (TCA) (2903 19 100) was particularly used until recently when it was replaced by trichloroethylene (TRI). As for the open type cleaning equipment, the most commonly used solvents are those obtained from white-spirit (code 2710 11 210) and alcohols, such as propylene glycol 2905 32 000).
Country Detail	To be noted that for most activities involving use of organic solvents for degreasing in the RM there are no statistical data. Under such circumstances, the total consumption of solvents used for degreasing was estimated based on information on import of solvents (internal production of solvents is insignificant, also it was assumed that such substances are not re-exported). Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning.
Equation (Describe variables for method used)	The Tier 1 approach for NMVOC emissions from degreasing uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.e 'Degreasing', section 3.2 'Tier 1 default approach': $E_{pollutant} = (AR_{product} \cdot EF_{pollutant}) / 10^3$ Where: $E_{pollutant}$ – the emission of the specified pollutant, t/yr; $AR_{product}$ – the activity rate for the use of solvents for degreasing, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the consumption of solvents used in degreasing in the RM within 1990-2019 periods is reported in the Table 4-79 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Custom Service through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020. Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning (see Table 4-80 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Type and source of EF and OF	Tier 1 Default EFs for Estimating NMVOC Emissions from 2D3e 'Degreasing'

Source Category	NMVOC Emission Factor	Unit
Degreasing	460 (20-700)	g/kg of degreased products

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.e "Degreasing", Table 3-1, page 8.

Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.13: Information on Source Category 2D3f 'Dry Cleaning' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3f Dry Cleaning / CO_2
Key Category?	No
Category Description / Definition	Within the 2D3f 'Dry Cleaning' there are monitored the indirect CO_2 emissions from solvent use in dry cleaning of clothes and other textiles from animal grease, oils, wax, resin, etc. (SNAP 060202). Tetrachloroethylene (PER) (code 2903 23 000) is the most widely used solvent for dry cleaning. Previously, 1,1,1-trichloroethane (TCA) (2903 19 100) was particularly used until recently when it was replaced by trichloroethylene (TRI).
Country Detail	To be noted that for most activities involving use of organic solvents for dry cleaning in the RM there are no statistical data. Under such circumstances, the total consumption of solvents used for dry cleaning was estimated based on information on import of solvents in the RM (internal production of solvents is insignificant, also it was assumed that such substances are not re-exported). Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from dry cleaning products are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: $CO_2 \text{ Emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 Emissions – carbon dioxide emissions from dry cleaning, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the consumption of solvents used in dry cleaning in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-82 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Custom Service through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020. Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning (see Table 4-82 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3f 'Dry cleaning'.

Table 2.2.4.14: Information on Source Category 2D3f 'Dry Cleaning' – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3f Dry Cleaning / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Within the 2D3f 'Dry Cleaning' there are monitored the NMVOC emissions from solvent use in dry cleaning of clothes and other textiles from animal grease, oils, wax, resin, etc. (SNAP 060202). Tetrachloroethylene (PER) (code 2903 23 000) is the most widely used solvent for dry cleaning. Previously, 1,1,1-trichloroethane (TCA) (2903 19 100) was particularly used until recently when it was replaced by trichloroethylene (TRI).
Country Detail	To be noted that for most activities involving use of organic solvents for dry cleaning in the RM there are no statistical data. Under such circumstances, the total consumption of solvents used for dry cleaning was estimated based on information on import of solvents in the RM (internal production of solvents is insignificant, also it was assumed that such substances are not re-exported). Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning.
Equation (Describe variables for method used)	The Tier 1 approach for NMVOC emissions from dry cleaning uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.f 'Dry Cleaning', section 3.2 'Tier 1 default approach': $E_{pollutant} = (AR_{product} \bullet EF_{pollutant}) / 10^3$ Where: $E_{pollutant}$ – the emission of the specified pollutant, t/yr; $AR_{product}$ – the activity rate for the use of solvents for dry cleaning, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019 Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The information on the consumption of solvents used in dry cleaning in the Republic of Moldova within 1990-2019 periods is reported in the Table 4-82 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the Custom Service through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020. Since the same substances are widely used for both degreasing and dry cleaning, it was accepted that out of the total amount consumed, 65 per cent were used for degreasing, while 35 per cent – for dry cleaning (see Table 4-82 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Type and source of EF and OF	**Tier 1 Default EFs for Estimating NMVOC Emissions from 2D3f 'Dry Cleaning'**

Source Category	NMVOC Emission Factor	Unit
Dry Cleaning	40 (10-200)	g/kg of degreased products

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.f "Dry Cleaning", Table 3-1, page 7.

Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.15: Information on Source Category 2D3g 'Chemical Products' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3g Chemical Products / CO_2
Key Category?	No
Category Description / Definition	Under the 2D3g 'Chemical Products' there are reported indirect CO_2 emissions from polyester processing (SNAP 060301); polyurethane foam processing (SNAP 060303) and polystyrene foam processing (SNAP 060304); rubber processing (SNAP 060305); pharmaceutical products manufacturing (SNAP 060306); paints manufacturing (SNAP 060307); inks manufacturing (SNAP 060308); glues and adhesive products manufacturing (SNAP 060309); asphalt blowing (SNAP 060310); adhesive, magnetic tapes, films and photographs (SNAP 060311); textile finishing (SNAP 060312); leather tanning (SNAP 060313).
Country Detail	Statistical publications of the RM provide activity data on manufacturing different industrial commodities, including: polyurethane and polystyrene products, refurbished tires and rubber soles, paints and varnishes, glues, inks, pharmaceutical products, shoes (see Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova). Customs Service of the Republic of Moldova is a primary source of information on import-export operations regarding primary polyurethane products (code 3909 50); polyurethane products (code 3921 13); primary polystyrene products (code 3903 11), respectively styrene polymers products (code 3921 11). In order to convert AD in mass metric units (tones), the following conversion coeffi-cients were used: a car tire weights about 7.1 kg; a minibus and small tonnage truck tire – about 11.1 kg; bus and heavy truck tire – 46.0 kg; a tractor tire – about 69.9 kg).
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents from chemical products are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: CO_2 Emissions = NMVOC • CC • 44/12 Where: CO_2 Emissions – carbon dioxide emissions from chemical products, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The activity data on manufacturing industrial commodities in the RM within 1990-2019 periods are reported in the Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the NBS through the Statistical Yearbooks for 1994 (pages 284, 288, 291), 1995 (pa-ges 253, 257, 260), 1997 (pages 320, 322, 324), 1999 (pages 302, 304, 306), 2003 (pages 391, 393, 395), 2006 (page 311), 2011 (page 305), 2014 (page 302), as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019". Customs Service of the Republic of Moldova is the primary source of information on import-export operations regarding primary polyurethane products (code 3909 50); polyurethane products (code 3921 13); primary polystyrene products (code 3903 11), respectively styrene polymers products (code 3921 11), the information being provided through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 din 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3g 'Chemical Products'.

Table 2.2.4.16: Information on Source Category 2D3g 'Chemical Products' – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3g Chemical Products / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Under the 2D3g 'Chemical Products' there are reported NMVOC emissions from polyester processing (SNAP 060301); polyurethane foam processing (SNAP 060303) and polystyrene foam processing (SNAP 060304); rubber processing (SNAP 060305); pharmaceutical products manufacturing (SNAP 060306); paints manufacturing (SNAP 060307); inks manufacturing (SNAP 060308); glues and adhesive products manufacturing (SNAP 060309); asphalt blowing (SNAP 060310); adhesive, magnetic tapes, films and photographs (SNAP 060311); textile finishing (SNAP 060312); leather tanning (SNAP 060313).
Country Detail	Statistical publications of the RM provide activity data on manufacturing different industrial commodities, including: polyurethane and polystyrene products, refurbished tires and rubber soles, paints and varnishes, glues, inks, pharmaceutical products, shoes (see Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova). Customs Service of the Republic of Moldova is a primary source of information on import-export operations regarding primary polyurethane products (code 3909 50); polyurethane products (code 3921 13); primary polystyrene products (code 3903 11), respectively styrene polymers products (code 3921 11). In order to convert AD in mass metric units (tones), the following conversion coefficients were used: a car tire weights about 7.1 kg; a minibus and small tonnage truck tire – about 11.1 kg; bus and heavy truck tire – 46.0 kg; a tractor tire – about 69.9 kg).
Equation (Describe variables for method used)	The Tier 2 approach for NMVOC emissions from chemical products uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.g 'Chemical Products', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \cdot EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the use of specific chemical product, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	The activity data on manufacturing industrial commodities in the RM within 1990-2019 periods are reported in the Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the NBS through the Statistical Yearbooks for 1994 (pages 284, 288, 291), 1995 (pages 253, 257, 260), 1997 (pages 320, 322, 324), 1999 (pages 302, 304, 306), 2003 (pages 391, 393, 395), 2006 (page 311), 2011 (page 305), 2014 (page 302), as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019". Customs Service of the Republic of Moldova is the primary source of information on import-export operations regarding primary polyurethane products (code 3909 50); polyurethane products (code 3921 13); primary polystyrene products (code 3903 11), respectively styrene polymers products (code 3921 11), the information being provided through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 din 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.

Type and source of EF and OF	**Tier 2 EFs for Estimating NMVOC Emissions from 2D3g 'Chemical Products'**

Source Category	NMVOC Emission Factor	Unit
SNAP 060301, Polystyrene processing	50 (10-100)	g/kg monomer
SNAP 060303, Polyurethane processing	120 (40-400)	g/kg foam
SNAP 060304, Polystyrene foam processing	60 (30-100)	g/kg foam
SNAP 060305, Rubber processing	8 (5-21)	g/kg rubber
SNAP 060306, Pharmaceutical products manufacturing	300 (200-400)	g/kg solvent
SNAP 060307, Paints manufacturing, SNAP 060308, Inks manufacturing, SNAP 060309, Glues manufacturing	11 (7-15)	g/kg product
SNAP 060310, Asphalt blowing	27.2 (10-100)	kg/t asphalt
SNAP 060310, Saturated asphalt blowing	0.66 (0.07-7.0)	kg/t asphalt
SNAP 060310, Asphalt (in layers) blowing	1.71 (0.17-17)	kg/t asphalt
SNAP 060314, Tire production	10 (6-14)	g/kg tire
Adhesive tapes manufacturing	3 (0.0-5.5)	g/m^2
Shoes manufacture	0.045 (0.02-0.06)	kg/pair of shoes

Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.g "Chemical Products", Tables 3-2 – 3-13, pages 17-23.

Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.17: Information on Source Category 2D3h 'Printing' – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3h Printing / CO_2
Key Category?	No
Category Description / Definition	The printing industry is an important manufacturing industry in most European countries. Printing processes convert original text and pictures into an image on a carrier and the main process types are named according to how this image is carried. The main processes in the printing industry are described in the process description. In this document, the following printing categories are identified: heat set offset printing; publication packaging and rotogravure and flexography. Printing involves the use of inks which may contain a proportion of organic solvents. These inks may then be subsequently diluted before use. Different inks have different proportions of organic solvents and require dilution to different extents. Printing can also require the use of cleaning solvents and organic dampeners. Ink solvents, diluents, cleaners and dampeners may all make a significant contribution to emissions from industrial printing.
Country Detail	No statistical data on solvents and/or printing inks used are available in the RM. In such conditions, the total inks consumption (see Table 4-86 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) was estimated considering statistical data on production, import and export (according to the Statistical Reports PRODMOLD-A "Total production, as a natural expression, by product type, for 2005-2019" inks were produced only during 2011-2013; there are no information on the export of inks during the period of reference).
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: $CO_2 \text{ Emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 Emissions – carbon dioxide emissions from solvents used in printing, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The activity data on manufacturing industrial commodities in the RM within 1990-2019 periods are reported in the Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the NBS through the Statistical Yearbooks for 1994 (pages 284, 288, 291), 1995 (pages 253, 257, 260), 1997 (pages 320, 322, 324), 1999 (pages 302, 304, 306), 2003 (pages 391, 393, 395), 2006 (page 311), 2011 (page 305), 2014 (page 302), as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019". Customs Service of the Republic of Moldova is the primary source of information on import-export operations (including for 'printing, writing or drawing', as well as 'other inks' – code 3215 10-90; paints for 'artistic painting, educational use, firms painting, amusement, as well as similar paints' – code 3213 10-90), the information being provided through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 din 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D3h 'Printing'.

Table 2.2.4.18: Information on Source Category 2D3h 'Printing' – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3h Printing / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	The printing industry is an important manufacturing industry in most European countries. Printing processes convert original text and pictures into an image on a carrier and the main process types are named according to how this image is carried. The main processes in the printing industry are described in the process description. In this document, the following printing categories are identified: heat set offset printing; publication packaging and rotogravure and flexography. Printing involves the use of inks which may contain a proportion of organic solvents. These inks may then be subsequently diluted before use. Different inks have different proportions of organic solvents and require dilution to different extents. Printing can also require the use of cleaning solvents and organic dampeners. Ink solvents, diluents, cleaners and dampeners may all make a significant contribution to emissions from industrial printing.
Country Detail	No statistical data on solvents and/or printing inks used are available in the RM. In such conditions, the total inks consumption was estimated considering statistical data on production (see Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova), import and export (see Table 4-86 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) (according to the Statistical Reports PRODMOLD-A "Total production, as a natural expression, by product type, for 2005-2019" inks were produced only during 2011-2013; there are no information on the export of inks during the period of reference).
Equation (Describe variables for method used)	The Tier 1 approach for NMVOC emissions from printing uses the general equation (1) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.h 'Printing', section 3.2 'Tier 1 default approach': $E_{pollutant} = (AR_{product} \cdot EF_{pollutant}) / 10^3$ Where: $E_{pollutant}$ – the emission of the specified pollutant, t/yr; $AR_{product}$ – the activity rate for the use of solvents for printing, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.

Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The activity data on manufacturing industrial commodities in the RM within 1990-2019 periods are reported in the Table 4-84 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is based on activity data provided by the NBS through the Statistical Yearbooks for 1994 (pages 284, 288, 291), 1995 (pages 253, 257, 260), 1997 (pages 320, 322, 324), 1999 (pages 302, 304, 306), 2003 (pages 391, 393, 395), 2006 (page 311), 2011 (page 305), 2014 (page 302), as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019". Customs Service of the Republic of Moldova is the primary source of information on import-export operations (including for 'printing, writing or drawing', as well as 'other inks' – code 3215 10-90; paints for 'artistic painting, educational use, firms painting, amusement, as well as similar paints' – code 3213 10-90), the information being provided through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 din 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	**Tier 1 Default EFs for 2D3h 'Printing'** Source Category: Printing; NMVOC Emission Factor: 500 (30-2100); Unit: kg/t ink **Source:** EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.h 'Printing', Table 3-1, page 11.
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.19: Information on Source Category 2D3i 'Other Solvent and Product Use' (Seed Oil Extraction) – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Seed Oil Extraction) / CO_2
Key Category?	No
Category Description / Definition	A certain amount of solvents, hexane in particular, is used in extracting oil from seeds (mechanical extraction does not require the use of solvents). The cleaned and prepared seeds are washed several times in warm hexane solvent until all the oil is extracted, while the remaining seeds residue is treated with steam to capture the solvent and oil that remains in it. After drying, the remaining seed residue may be used as animal feed (it has a content rich in proteins and mineral salts). The oil is separated from the oil-enriched wash solvent and from the steamed-out solvent. The solvent (hexane) is recovered and re-used. Recovery efficiency is quite high, although it is dictated by some economic aspects specific to the enterprises in this branch. The oil is further refined.
Country Detail	In order to estimate emissions, statistical data on the amount of oil extracted at the Moldovan enterprises are used. At the national level, there are over 100 enterprises specialized in oil production, the largest being 'Floarea-Soarelui' J.S.C. in Balti. Current technologies used in seed oil extraction by use of solvents allow obtain around 450 kg of oil per one tone of seeds. This particular conversion factor was used to estimate the quantity of seeds consumed for oil extraction (see the Table 4-88 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: CO_2 Emissions = NMVOC • CC • 44/12 Where: CO_2 Emissions – carbon dioxide emissions from solvents used in seed oil extraction, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The activity data on oil production and quantity of seeds used for oil extraction in the Republic of Moldova within 1990-2019 periods are provided in the Table 4-88 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is provided by the National Bureau of Statistics through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011 from the MoEN; Official Letter No. 06-39/38 dated 22.09.2011, as a response to the request No. 101/2011-09-01 dated 02.09.2011 from the CCO of the MoEN; as well as through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019"; information for the territory on the left bank of Dniester river is available in the Statistical Yearbooks of the ATULBD for 1998 (page 183), 2000 (page 100), 2002 (page 104), 2003 (page 99), 2006 (page 94), 2007 (page 93), 2009 (page 93), 2011 (page 95), 2013 (page 100), 2017 (page 102), 2020 (page 103).
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2.D.3.i 'Other Solvent and Product Use' (Seed Oil Extraction).

Table 2.2.4.20: Information on Source Category 2D3i 'Other Solvent and Product Use' (Seed Oil Extraction) – Pollutant Emissions

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Seed Oil Extraction) / Pollutant Emissions
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This activity includes solvent extraction of edible oils from oilseeds and drying of leftover seeds before resale as animal feed. The extraction of oil from oil seeds is performed either mechanically or through the use of solvents, or both. Where solvent is used, it is generally recovered and cleaned for reuse. The seed may be subjected to solvent treatment many times before all the oil is extracted. The remaining seed residue is then dried and may be used as an animal feed.
Country Detail	In order to estimate emissions, statistical data on the amount of oil extracted at the Moldovan enterprises are used. At the national level, there are over 100 enterprises specialized in oil production, the largest being 'Floarea-Soarelui' J.S.C. in Balti. Current technologies used in seed oil extraction by use of solvents allow obtain around 450 kg of oil per one tone of seeds. This particular conversion factor was used to estimate the quantity of seeds consumed for oil extraction (see the Table 4-88 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from using solvents in the seed oil extraction uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use,\ technology} \cdot EF_{technology,\ pollutant}) / 10^3$ Where: $E_{technology,\ pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use,\ technology}$ – the activity rate for the use of solvents for seed oil extraction, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019 Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.

Type and source of activity data	The activity data on oil production and quantity of seeds used for oil extraction in the Republic of Moldova within 1990-2019 periods are provided in the Table 4-88 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information is provided by the National Bureau of Statistics through the Official Letter No. 06-39/08 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011 from the MoEN; Official Letter No. 06-39/38 dated 22.09.2011, as a response to the request No. 101/2011-09-01 dated 02.09.2011 from the CCO of the MoEN; as well as through the Statistical Reports PRODMOLD-A "Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019"; information for the territory on the left bank of Dniester river is available in the Statistical Yearbooks of the ATULBD for 1998 (page 183), 2000 (page 100), 2002 (page 104), 2003 (page 99), 2006 (page 94), 2007 (page 93), 2009 (page 93), 2011 (page 95), 2013 (page 100), 2017 (page 102), 2020 (page 103).
Type and source of EF and OF	**Tier 2 Default EFs for Estimating Pollutant Emissions from Seed Oil Extraction** Source Category: Seed Oil Extraction; NMVOC Emission Factor: 1.57 (0.33-2.81); Unit: g/kg seeds **Source:** EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.i 'Other Solvent and Product Use', SNAP 060404, Table 3-4, page 16.
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.21: Information on Source Category 2D3i 'Other Solvent and Product Use' (Use of Glues and Other Adhesives) – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Use of Glues and Other Adhesives) / CO_2
Key Category?	No
Category Description / Definition	Sectors using adhesives are very diverse. Production processes and application techniques are also very different. Relevant sectors are the production of adhesive tapes, composite foils, the transportation sector (passenger cars, commercial vehicles, mobile homes, rail vehicles and aircrafts), the manufacture of shoes and leather goods and the wood material and furniture industry. Adhesive tape consists of a substrate, a coupling agent, a pressure-sensitive adhesive and releasing agents. The selection of the adhesive system depends on the technical application of the adhesive tape. At a European level, packaging adhesive tapes have a proportion of 74% and coating adhesive tapes only 10%. Solvent-based adhesives (acrylate for double-sided adhesive tapes, natural rubber for packaging and cover adhesive tapes) have a proportion of 49% in the European adhesive-tape production. Hot melts (acrylate for double-sided adhesive tapes and synthetic rubber for packaging, cover and double-sided tapes) have a proportion of 33% and dispersions (acrylate for double-sided and packaging adhesive tapes), 18%.
Country Detail	For most activities related to other solvent and product use in the Republic of Moldova, there are no reliable statistical sources of reference. Under such circumstances, the total consumption of glues and other adhesives was estimated based on information on production, import and export. To be noted that production of glues and other adhesives in the Republic of Moldova was insignificant and is recorded starting only with 2003, though it increased in the recent years (see Table 4-90 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: $CO_2 \text{ Emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 Emissions – carbon dioxide emissions from solvents used in glues and other adhesives, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.

Type and source of activity data	The production of glues and other adhesives in the RM was insignificant and is recorded starting only with 2003, though it increased in the recent years (see Table 4-90 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) (information is available through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019"). Under such circumstances, the total consumption of glues and other adhesives was estimated based on information on production, import and export. Customs Service of the Republic of Moldova is the primary source of information on national import and export operations (no data on glue and other adhesives exports was recorded during the period under review), information on import operations being provided through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2.D.3.i 'Other Solvent and Product Use' (Use of Glues and Other Adhesives).

Table 2.2.4.22: Information on Source Category 2D3i 'Other Solvent and Product Use' (Use of Glues and Other Adhesives) – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Use of Glues and Other Adhesives) / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Sectors using adhesives are very diverse. Production processes and application techniques are also very different. Relevant sectors are the production of adhesive tapes, composite foils, the transportation sector (passenger cars, commercial vehicles, mobile homes, rail vehicles and aircrafts), the manufacture of shoes and leather goods and the wood material and furniture industry. Adhesive tape consists of a substrate, a coupling agent, a pressure-sensitive adhesive and releasing agents. The selection of the adhesive system depends on the technical application of the adhesive tape. At a European level, packaging adhesive tapes have a proportion of 74% and coating adhesive tapes only 10%. Solvent-based adhesives (acrylate for double-sided adhesive tapes, natural rubber for packaging and cover adhesive tapes) have a proportion of 49% in the European adhesive-tape production. Hot melts (acrylate for double-sided adhesive tapes and synthetic rubber for packaging, cover and double-sided tapes) have a proportion of 33% and dispersions (acrylate for double-sided and packaging adhesive tapes), 18%.
Country Detail	For most activities related to other solvent and product use in the Republic of Moldova, there are no reliable statistical sources of reference. Under such circumstances, the total consumption of glues and other adhesives was estimated based on information on production, import and export. To be noted that production of glues and other adhesives in the Republic of Moldova was insignificant and is recorded starting only with 2003, though it increased in the recent years (see Table 4-90 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from use of glues and other adhesives uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \cdot EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the use of glues and other adhesives, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.

<table>
<tr><td>Type and source of activity data</td><td>The production of glues and other adhesives in the RM was insignificant and is recorded starting only with 2003, though it increased in the recent years (see Table 4-90 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) (information is available through the Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019"). Under such circumstances, the total consumption of glues and other adhesives was estimated based on information on production, import and export.
Customs Service of the Republic of Moldova is the primary source of information on national import and export operations (no data on glue and other adhesives exports was recorded during the period under review), information on import operations being provided through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No.. 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.</td></tr>
<tr><td>Type and source of EF and OF</td><td>Tier 2 Default EFs for 2D3i 'Other Solvent and Product Use' ('Use of Glues and Other Adhesives')
<table>
<tr><th>Source Category</th><th>NMVOC Emission Factors</th><th>Unit</th></tr>
<tr><td>Use of Glues and Other Adhesives</td><td>522 (200-900)
562 (350-900)</td><td>g/kg glue and/or adhesives
g/kg solvent</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.i 'Other Solvent and Product Use', SNAP 060405, Table 3-11, page 20.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>20% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
</table>

Table 2.2.4.23: Information on Source Category 2D3i 'Other Solvent and Product Use' (Preservation of Wood) – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Preservation of Wood) / CO_2
Key Category?	No
Category Description / Definition	This activity considers industrial processes for the impregnation with, or immersion of timber to protect it against fungal and insect attack and also against weathering. There are three main types of preservative: creosote, organic solvent-based (often referred to as 'light organic solvent-based preservatives (LOSP)') and water-borne. Wood preservatives may be supplied for both industrial and domestic use. This activity only covers industrial use and does not include domestic use of wood preservatives, which is covered under NFR source category 'Domestic solvent use'. Most of the information currently available on emissions relates to the industrial use of wood preservatives. (1) Creosote is an oil prepared from coal tar distillation. Creosote contains a high proportion of aromatic compounds such as polycyclic aromatic hydrocarbons (PAHs). Levels of benzo[a]pyrene in some types of creosote are restricted in the EU to 500 ppm for industrial use (14th amendment to the Marketing and Use Directive — Creosote (96/60/EEC)). Creosote is the oldest form of wood preservative and is used for external applications such as telegraph poles and railway sleepers. Creosote preservatives: timber is treated in a chamber which may be pressurized with air. The chamber is flooded with hot creosote for one to three hours. After draining, a vacuum is applied to draw off excess creosote. The timber is then left to dry in the open air. Creosote is gradually being replaced by water-borne preservatives. Creosote may be mixed with petroleum fractions to produce carbolinium. This can be brushed onto the surface of the wood and is mainly for private use. (2) Water-borne preservatives consist of solutions of inorganic salts in water. Copper, chromium and arsenic (CCA) types are the most widely used. These are usually based on copper oxide, chromium trioxide and arsenic pentoxide. Water-borne preservatives are applied in the same way as creosote. (3) Organic solvent-borne preservatives consist of approximately 10% active ingredient including insecticides and fungicides such as dinitrophenol, pentachlorophenol, chloronaphthalenes, chlorobenzenes, lindane, dieldrin, organophosphorous and carbamate compounds, and copper/zinc naphthenates. The preservatives also have 90 % organic solvent, usually white spirit or other petroleum-based hydrocarbons. In the case of organic solvent-borne preservatives timber is treated in a chamber which is subsequently evacuated. The chamber is flooded with preservative and pressurized for 5 to 20 minutes. After draining the chamber, a final vacuum is applied to draw off excess preservative. The timber is left to dry in the open air. About 15–25% of the solvent remains in the wood which leaves the treatment plant. A large part of this residual solvent is likely to evaporate over the life of the product. The application efficiency of the vacuum process, dipping and brushing is close to 90%. Spraying has a much lower efficiency of around 50%
Country Detail	The literature in the field reveals that about 50 per cent of the total timber is used in construction, 15 per cent in the furniture industry and other finished wood products, 15 per cent in the packaging industry and 20 per cent in other uses. Since the share of timber treated with preservatives is unknown (it is assumed that in the RM, the preservatives are creosote based) it is admitted that this corresponds to the share of timber used in the furniture industry and other finished wood products (15 per cent of the total).

Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: CO_2 Emissions = NMVOC • CC • 44/12 Where: CO_2 Emissions – carbon dioxide emissions from solvents used in preservation of wood, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The statistical data on the total amount of timber produced at the Moldovan enterprises is reported in the Table 4-92 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), being based on information available in the Statistical Yearbooks of the Republic of Moldova for 1994 (page 273), 1999 (page 273), 2003 (page 273), 2006 (page 273); Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019"; as well as in the Statistical Yearbooks of the ATULBD for 2000 (page 99), 2003 (page 98), 2006 (page 93), 2009 (page 92), 2011 (page 95), 2012 (page 98), 2017 (page 101), 2020 (page 102). Current technologies for preservation of wood by creosote impregnation imply the use of circa 75 kg of creosote in order to treat one cubic meter of wood, while for the same volume of wood, 24 kg of organic solvents can be used (EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), source category 2.D.3.i 'Other Solvent and Product Use', SNAP 060406 'Preservation of Wood', page 16). The respective conversion factor was used to estimate the amount of creosote used in timber treatment at the Moldovan enterprises (see Table 4-92 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2.D.3.i 'Other Solvent and Product Use' (Preservation of Wood).

Table 2.2.4.24: Information on Source Category 2D3i 'Other Solvent and Product Use' (Preservation of Wood) – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Preservation of Wood) / NMVOC
Key Category?	Not applicable for pollutant emissions.

Category Description / Definition	This activity considers industrial processes for the impregnation with, or immersion of timber to protect it against fungal and insect attack and also against weathering. There are three main types of preservative: creosote, organic solvent-based (often referred to as 'light organic solvent-based preservatives (LOSP)') and water-borne. Wood preservatives may be supplied for both industrial and domestic use. This activity only covers industrial use and does not include domestic use of wood preservatives, which is covered under NFR source category 'Domestic solvent use'. Most of the information currently available on emissions relates to the industrial use of wood preservatives. (1) Creosote is an oil prepared from coal tar distillation. Creosote contains a high proportion of aromatic compounds such as polycyclic aromatic hydrocarbons (PAHs). Levels of benzo[a]pyrene in some types of creosote are restricted in the EU to 500 ppm for industrial use (14th amendment to the Marketing and Use Directive — Creosote (96/60/EEC)). Creosote is the oldest form of wood preservative and is used for external applications such as telegraph poles and railway sleepers. Creosote preservatives: timber is treated in a chamber which may be pressurized with air. The chamber is flooded with hot creosote for one to three hours. After draining, a vacuum is applied to draw off excess creosote. The timber is then left to dry in the open air. Creosote is gradually being replaced by water-borne preservatives. Creosote may be mixed with petroleum fractions to produce carbolinium. This can be brushed onto the surface of the wood and is mainly for private use. (2) Water-borne preservatives consist of solutions of inorganic salts in water. Copper, chromium and arsenic (CCA) types are the most widely used. These are usually based on copper oxide, chromium trioxide and arsenic pentoxide. Water-borne preservatives are applied in the same way as creosote. (3) Organic solvent-borne preservatives consist of approximately 10% active ingredient including insecticides and fungicides such as dinitrophenol, pentachlorophenol, chloronaphthalenes, chlorobenzenes, lindane, dieldrin, organophosphorous and carbamate compounds, and copper/zinc naphthenates. The preservatives also have 90 % organic solvent, usually white spirit or other petroleum-based hydrocarbons. In the case of organic solvent-borne preservatives timber is treated in a chamber which is subsequently evacuated. The chamber is flooded with preservative and pressurized for 5 to 20 minutes. After draining the chamber, a final vacuum is applied to draw off excess preservative. The timber is left to dry in the open air. About 15–25% of the solvent remains in the wood which leaves the treatment plant. A large part of this residual solvent is likely to evaporate over the life of the product. The application efficiency of the vacuum process, dipping and brushing is close to 90%. Spraying has a much lower efficiency of around 50%
Country Detail	The literature in the field reveals that about 50 per cent of the total timber is used in construction, 15 per cent in the furniture industry and other finished wood products, 15 per cent in the packaging industry and 20 per cent in other uses. Since the share of timber treated with preservatives is unknown (it is assumed that in the RM, the preservatives are creosote based) it is admitted that this corresponds to the share of timber used in the furniture industry and other finished wood products (15 per cent of the total).
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from preservation of wood uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \cdot EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the use of solvents in preservation of wood, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019*, *Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	The statistical data on the total amount of timber produced at the Moldovan enterprises is reported in the Table 4-92 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021), being based on information available in the Statistical Yearbooks of the Republic of Moldova for 1994 (page 273), 1999 (page 273), 2003 (page 273), 2006 (page 273); Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019"; as well as in the Statistical Yearbooks of the ATULBD for 2000 (page 99), 2003 (page 98), 2006 (page 93), 2009 (page 92), 2011 (page 95), 2012 (page 98), 2017 (page 101), 2020 (page 102). Current technologies for preservation of wood by creosote impregnation imply the use of circa 75 kg of creosote in order to treat one cubic meter of wood, while for the same volume of wood, 24 kg of organic solvents can be used (EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), source category 2.D.3.i 'Other Solvent and Product Use', SNAP 060406 'Preservation of Wood', page 16). The respective conversion factor was used to estimate the amount of creosote used in timber treatment at the Moldovan enterprises (see Table 4-92 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).

Type and source of EF and OF	**Tier 2 Default EFs for Estimating NMVOC Emissions from 'Preservation of Wood'** Source Category / NMVOC Emission Factors / Unit: 'Preservation of Wood': 105 (70-160) g/kg creosote; 945 (900-1000) g/kg preservative on base of organic solvents; 5 (0.5-7.0) g/kg waterborne preservative **Source:** EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.i 'Other Solvent and Product Use', SNAP 060406, Tables 3-5, 3-6 and 3-7, pages 17-18. If preservative consumption data is not available then it can be calculated by using the 'quantity of wood preserved' combined with the following assumptions and equation by using: • quantity of preservative used = [Volume of wood impregnated (m^3)] x [kg of wood preservative per m^3]; • 1 m^3 of wood requires 75 kg of creosote; • 1 m^3 of wood requires 24 kg of solvent borne preservative; • 1 m^3 of wood is approximately 1 Mg. The NMVOC emission factors in the table above are derived from IIASA (2008), recalculated in terms of g/kg creosote used using the above figure of 75 kg creosote/m^3 wood.
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.25: Information on Source Category 2D3i 'Other Solvent and Product Use' (Underseal Treatment and Conservation of Vehicles) – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Underseal Treatment and Conservation of Vehicles) / CO_2
Key Category?	No
Category Description / Definition	This category addresses the application of protective coatings to the undersides of cars. This is only a very small source of emissions and can nowadays be considered negligible. The following description of the processes and controls is based on discussions with the Society of Motor Manufacturers and Traders (SMMT) (SMMT, 1997), the Association of European Automobile Manufacturers (ACEA) (ACEA, 1997) and Ford Europe (Ford Europe, 1997). The application of coatings to the underside of car bodies can be divided into the original equipment manufacture (OEM) sector and the aftermarket (repair) sector. For the OEM sector a coating of PVC plastisol (1) is applied during manufacture to the underneath of car bodies at the same time as the primer. The body is then heated in an oven at 135 °C for about five minutes to cure both the primer and the PVC coating. This coating is applied for protection from stone chips and for sound deadening. The PVC coating is 97%–99% solids and is an integral part of the vehicle's coating 'package'. Any emission during manufacture will be included in any estimate of the emission from painting during vehicle manufacture (SNAP 060101 Paint application: manufacture of automobiles, included in chapter 3.A, Paint application). In the aftermarket sector, coatings are applied to the underside of cars only during repair of damaged bodywork. This coating is the same type as in the OEM sector. These emissions will be included in car repairing (chapter 3.A, Paint application). Before the early 1980s, car manufacturers did not apply any coating to the underside of their cars. If a car owner wanted to protect their car against rust and stone chip damage, they had to pay to have their car 'undersealed' at a garage or workshop. This involved the application of a bituminous coating. The market for this service is no longer very large in much of Western Europe. It may still occur in Eastern Europe, in countries having cold climatic conditions and during the restoration and maintenance of vintage cars. This market is thus considered small. Where it is carried out emissions could be reduced by: using alternative non-solvent containing materials; carrying out the coating operation in a cabin with an extract system leading to abatement plant. Atmospheric emissions from the application of transport protective coverings can be eliminated by the use of non-solvent containing products such as self-adhesive plastic film. The major European car manufacturers are already changing over to this method and within a few years it is expected that all will have done so.
Country Detail	Since the amount of underseal agent and/or solvent used for underseal treatment and conservation of vehicles is unknown, AD on the number of the population were used (see the Table 4-66 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: CO_2 Emissions = NMVOC • CC • 44/12 Where: CO_2 Emissions – carbon dioxide emissions from solvents used in underseal treatment and conservation of vehicles, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	Since the amount of underseal agent and/or solvent used for underseal treatment and conservation of vehicles is unknown, AD on the number of the population were used (see the Table 4-66 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2.D.3.i 'Other Solvent and Product Use' (Underseal Treatment and Conservation of Vehicles).

Table 2.2.4.26: Information on Source Category 2D3i 'Other Solvent and Product Use' (Underseal Treatment and Conservation of Vehicles) – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Underseal Treatment and Conservation of Vehicles) / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category addresses the application of protective coatings to the undersides of cars. This is only a very small source of emissions and can nowadays be considered negligible. The following description of the processes and controls is based on discussions with the Society of Motor Manufacturers and Traders (SMMT) (SMMT, 1997), the Association of European Automobile Manufacturers (ACEA) (ACEA, 1997) and Ford Europe (Ford Europe, 1997). The application of coatings to the underside of car bodies can be divided into the original equipment manufacture (OEM) sector and the aftermarket (repair) sector. For the OEM sector a coating of PVC plastisol (1) is applied during manufacture to the underneath of car bodies at the same time as the primer. The body is then heated in an oven at 135 °C for about five minutes to cure both the primer and the PVC coating. This coating is applied for protection from stone chips and for sound deadening. The PVC coating is 97% 99% solids and is an integral part of the vehicles coating 145package. Any emission during manufacture will be included in any estimate of the emission from painting during vehicle manufacture (SNAP 060101 Paint application: manufacture of automobiles, included in chapter 3.A, Paint application). In the aftermarket sector, coatings are applied to the underside of cars only during repair of damaged bodywork. This coating is the same type as in the OEM sector. These emissions will be included in car repairing (chapter 3.A, Paint application). Before the early 1980s, car manufacturers did not apply any coating to the underside of their cars. If a car owner wanted to protect their car against rust and stone chip damage, they had to pay to have their car 'undersealed' at a garage or workshop. This involved the application of a bituminous coating. The market for this service is no longer very large in much of Western Europe. It may still occur in Eastern Europe, in countries having cold climatic conditions and during the restoration and maintenance of vintage cars. This market is thus considered small. Where it is carried out emissions could be reduced by: using alternative non-solvent containing materials; carrying out the coating operation in a cabin with an extract system leading to abatement plant. Atmospheric emissions from the application of transport protective coverings can be eliminated by the use of non-solvent containing products such as self-adhesive plastic film. The major European car manufacturers are already changing over to this method and within a few years it is expected that all will have done so.
Country Detail	Since the amount of underseal agent and/or solvent used for underseal treatment and conservation of vehicles is unknown, AD on the number of the population were used (see the Table 4-66 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from underseal treatment and conservation of vehicles uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \cdot EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the use of solvents in underseal treatment and conservation of vehicles, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

<table>
<tr><td>Describe How and Why this Method Was Chosen</td><td>A Tier 2 methodology has been used due to availability of technology-specific emission factors.</td></tr>
<tr><td>Type and source of activity data</td><td>Since the amount of underseal agent and/or solvent used for underseal treatment and conservation of vehicles is unknown, AD on the number of the population were used (see the Table 4-66 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Tier 2 Default EFs for Estimating NMVOC Emissions from ‘Underseal Treatment and Conservation of Vehicles’
<table>
<tr><th>Source Category</th><th>NMVOC Emission Factors</th><th>Unit</th></tr>
<tr><td rowspan="3">‘Underseal Treatment and Conservation of Vehicles’</td><td>0.20 (0.01-0.20)</td><td>kg/person</td></tr>
<tr><td>636 (300-900)</td><td>g/kg underseal agent</td></tr>
<tr><td>950 (900-1000)</td><td>g/kg solvent</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.i ‘Other Solvent and Product Use’, SNAP 060407, Table 3-10, page 19-20.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
</table>

Table 2.2.4.27: Information on Source Category 2D3i ‘Other Solvent and Product Use’ (Vehicles Dewaxing) – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Vehicles Dewaxing) / CO_2
Key Category?	No
Category Description / Definition	This category considers the removal from cars of temporary coverings that are applied to protect the car’s paint work during transport. This is only a very small source of emissions and nowadays can be considered negligible. The following description of the processes and controls is based on discussions with SMMT (SMMT, 1997), ACEA (ACEA, 1997) and Ford Europe (Ford Europe, 1997). Some new cars have a protective covering applied to their bodies after painting to provide protection during transport. In the UK, this is usually done only on cars destined for export. Removal of the coating is usually done only at import centers. Cars produced for the home market are not usually given a protective covering unless there is a specific reason, for example problems at their storage location. In continental Europe, cars are transported long distances on land as well as being imported from overseas, so the driving forces affecting the use of such coatings may be different. Transport protection coverings are not applied to the whole car body, but only to regions of the body considered vulnerable to damage during transport. The pattern of application varies from one manufacturer to another. Some manufacturers do only the bumper, some do only the drivers door, some do the horizontal surfaces and some do the sides as well. There are a number of methods for applying coverings for protection during transport. Traditionally, a hydrocarbon wax was used which had to be removed using a mixture of hot water, kerosene and detergent. Recently, two alternative methods have been introduced. The first of these is a water-soluble wax which can be removed with hot water alone without the need for the kerosene. The second is a self-adhesive polyethylene film called ‘Wrap Guard’. This can be peeled off by hand and disposed of as ordinary commercial waste. Most European car manufacturers are currently either already using self-adhesive polyethylene film or are evaluating it. It is expected that within a few years all European manufacturers will be using self-adhesive polyethylene film as their only method of applying transportation protective coverings, as has been the situation in the US for a number of years already. Consequently, it is recommended that the volatile organic compounds (VOC) emission from this source is assumed to be rapidly approaching zero.
Country Detail	No vehicles are produced in the Republic of Moldova. Customs Service is a primary source of information on national import operations.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 ‘Uncertainty assessment’, Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). In order to estimate indirect CO_2 emissions, the following equation was used: $$CO_2 \text{ Emissions} = NMVOC \bullet CC \bullet 44/12$$ Where: CO_2 Emissions – carbon dioxide emissions from solvents used in vehicles dewaxing, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC; 44/12 – stoichiometric ratio CO_2/C.

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	The AD on new cars import in the Republic of Moldova within 1990-2019 periods are reported in the Table 4-96 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Information was provided by the Custom Service through the Official Letter No 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01. 2015, from the CCO of the MoEN; Official Letter No 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2.D.3.i 'Other Solvent and Product Use' (Vehicles Dewaxing).

Table 2.2.4.28: Information on Source Category 2D3i 'Other Solvent and Product Use' (Vehicles Dewaxing) – NMVOC

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D3 Solvent Use / 2D3i Other Solvent and Product Use (Vehicles Dewaxing) / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category considers the removal from cars of temporary coverings that are applied to protect the car's paint work during transport. This is only a very small source of emissions and nowadays can be considered negligible. The following description of the processes and controls is based on discussions with SMMT (SMMT, 1997), ACEA (ACEA, 1997) and Ford Europe (Ford Europe, 1997). Some new cars have a protective covering applied to their bodies after painting to provide protection during transport. In the UK, this is usually done only on cars destined for export. Removal of the coating is usually done only at import centers. Cars produced for the home market are not usually given a protective covering unless there is a specific reason, for example problems at their storage location. In continental Europe, cars are transported long distances on land as well as being imported from overseas, so the driving forces affecting the use of such coatings may be different. Transport protection coverings are not applied to the whole car body, but only to regions of the body considered vulnerable to damage during transport. The pattern of application varies from one manufacturer to another. Some manufacturers do only the bumper, some do only the drivers door, some do the horizontal surfaces and some do the sides as well. There are a number of methods for applying coverings for protection during transport. Traditionally, a hydrocarbon wax was used which had to be removed using a mixture of hot water, kerosene and detergent. Recently, two alternative methods have been introduced. The first of these is a water-soluble wax which can be removed with hot water alone without the need for the kerosene. The second is a self-adhesive polyethylene film called 'Wrap Guard'. This can be peeled off by hand and disposed of as ordinary commercial waste. Most European car manufacturers are currently either already using self-adhesive polyethylene film or are evaluating it. It is expected that within a few years all European manufacturers will be using self-adhesive polyethylene film as their only method of applying transportation protective coverings, as has been the situation in the US for a number of years already. Consequently, it is recommended that the volatile organic compounds (VOC) emission from this source is assumed to be rapidly approaching zero.
Country Detail	No vehicles are produced in the Republic of Moldova. Customs Service is a primary source of information on national import operations.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from vehicle dewaxing uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \cdot EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the use of solvents in vehicles dewaxing, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.

Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	The AD on new cars import in the Republic of Moldova within 1990-2019 periods are reported in the Table 4-96 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Information was provided by the Custom Service through the Official Letter No 28/07-1893 dated 23.02.2011, as a response to the request No. 03-07/175 dated 02.02.2011, from the MoEN; Official Letter No. 15-03-05 dated 24.01.2014, as a response to the request No. 320/2014-01-01 dated 03.01.2014, from the CCO of the MoEN; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request No. 407/2015-01-09 dated 29.01.2015, from the CCO of the MoEN; Official Letter No 28/07-8785 dated 26.05.2016, as a response to the request No. 512/2016-05-01 dated 10.05.2016, from the CCO of the MoEN; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request No. 601/2017-12-03 dated 14.12.2017, from the CCO of the MoARDE; Official Letter No. 28/07-3025 from 28.02.2020, as a response to the request of Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	**Tier 2 Default Emission Factors for 2D3i 'Vehicles Dewaxing'** Source Category: Vehicles Dewaxing; NMVOC Emission Factor: 1.0 (0.1-10); Unit: kg/vehicle **Source:** EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Category 2.D.3.i 'Other Solvent and Product Use', SNAP 060409, Table 3-9, page 19.
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.4.29: Information on Source Category 2D4 'Other' (Use of Urea-Based Catalysts) – CO_2

Sector	Industrial Processes and Product Use
Category	2D Non-Energy Products from Fuels and Solvents Use
Source / Gas	2D4 Other (Use of Urea-Based Catalysts) / CO_2
Key Category?	No
Category Description / Definition	This category includes CO_2 emissions from the use of urea-based catalysts.
Country Detail	Over the periods 1990 through 2019, the CO_2 emissions from the use of urea-based catalysts decreased in the RM by circa 37.4 per cent to the decrease of diesel oil consumption.
Equation (Describe variables for method used)	The methodology used to estimate CO_2 emissions from use of urea-based catalysts, available in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2: Energy, Chapter 3: Mobile Combustion, Chapter 3.2: Road Transportation, page 3.12), is represented by the following equation: $E = A \bullet 12/60 \bullet Purity \bullet 44/12$ Where: E – CO_2 emissions from urea-based additive in catalytic converters, kt/yr; A – Amount of urea-based additive consumed for use in catalytic converters, kt/yr; 12/60 – Stoichiometric ratio between carbon (C) and urea ($CO(NH_2)_2$); Purity – Mass fraction of urea in the urea-based additive (the default value used represents 32.5 per cent); 44/12 – stoichiometric ratio between Carbon (C) and CO_2.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 3: Mobile Combustion, Chapter 3.2: Road Transportation. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	AD on the amount of urea-based additive used in catalytic converters are determined indirectly from national diesel oil consumption (on the average, the activity level is 1 to 3 per cent of diesel oil consumption by the vehicle). Activity data on diesel oil consumption are available in the EBs of the RM for 1990 and 1993-2019 periods (in 1991 and 1992 the EBs were not elaborated, but the information for the respective years was provided by the NBS through Official Letter No. 05-96-08 dated 10.03.1999, as a response to the request of the Ministry of Environment No. 01-7/138 dated 24.02.1999. The statistical information is available for the entire territory of the country only for 1990 and 1991, while for the rest of the period, it covers only the right bank of Dniester River. In order to generate data on diesel oil consumption on ATULBD, it was used information on specific consumption of diesel oil per capita for the territory to the right of Dniester, the number of the population in the ATULBD was multiplied by the specific consumption of diesel oil per capita (for 1990 and 1991 the information was representative for the entire country). The amount of urea-based additive in catalytic converters was determined indirectly based on the total consumption of diesel oil, considering that additive consumption represents 2 per cent of the total amount of diesel oil consumed in the RM.

Type and source of EF and OF	The EF used to estimate CO_2 emissions from use of urea-based catalysts, is available in the 2006 IPCC Guidebook (Volume 2, Chapter 3.2, page 3.12), the default value for the mass fraction of urea in the urea-based additive (purity) was accepted to be 32.5 per cent.
Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	2% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2D4 Other (Use of Urea-Based Catalysts).

2.2.5. Category 2F 'Product Uses as Substitutes for ODS'

Tables 2.2.5.1 – 2.2.5.3 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2F 'Product Uses as Substitutes for ODS'.

Table 2.2.5.1: Information on Source Category 2F1 'Refrigeration and Air Conditioning' – HFCs

Sector	Industrial Processes and Product Use
Category	2F Product Use as Substitutes for ODS
Source / Gas	2F1 Refrigeration and Air Conditioning / HFCs
Key Category?	Tier 1 & 2: Yes: 1990 (L, T) and 2019 (L, T)
Category Description / Definition	Refrigeration and air-conditioning (RAC) systems may be classified in up to six sub-application domains. These categories correspond to sub-applications that may differ by location and purpose, and are listed below: (i) Domestic (i.e., household) refrigeration, (ii) Commercial refrigeration including different types of equipment, from vending machines to centralized refrigeration systems in supermarkets, (iii) Industrial processes including chillers, cold storage, and industrial heat pumps used in the food, petrochemical and other industries, (iv) Transport refrigeration including equipment and systems used in refrigerated trucks, containers, reefers, and wagons, (v) Stationary air conditioning including air-to-air systems, heat pumps, and chillers for building and residential applications, (vi) Mobile air-conditioning systems used in passenger cars, truck cabins, buses, and trains.
Country Detail	The gases have been used in the pure form and most often in the following blends: R-404a, R-406a, R-407a, R-407b, R-407c, R-407d, R-407f, R-410a, R-422d and R-507a. For the purpose of the GHG inventory all blends have been transformed to the pure F-gases using the Table 7.8 'Blends (many containing HFCs and/or PFCs)' from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 7 'Emissions of fluorinated substitutes for ozone depleting substances', Section 7.5 'Refrigeration and air conditioning', Page 7.44. As 1995 is the base year for HFC emissions no data have been collected for the years before. The emission sources, the time period and the gases included in the GHG inventory are presented below: • domestic refrigeration: - refrigerators: 2003-2015 – HFC-134a; - freezers: 2003-2016 – HFC-134a;; 2003-2019 – R-404a; • commercial refrigeration: 2003-2019 – HFC-134a, R-404a, R -407c; 2005-2019 –R-507a; since 1997-to 2004 – R-408a; 2015-2019 – R-290; • industrial refrigeration: 2003-2019 – HFC-134a, R-404a, R-507a; 2005-2019 – R-407c; 2010-2019 – R-410a; 2016-2019 – R-422d; • transport refrigeration: 2006-2019 – R-404a; • stationary air conditioning: 2003-2019 – R-410a; 2012-2019 – R-32; • mobile air conditioning: 1995-2019 – HFC-134a. The process of collecting activity data on consumption of alternative substances to chlorofluorocarbons is difficult in the Republic of Moldova. The primary difficulty is due to the fact that import, export, re-export and circulation of these substances on the market is not regulated yet at the national level (like, for example, the ODS starting with 01.01.2013). Import of substitutes for ODS in bulk, as well as products and equipment charged with halocarbons does not require a license and/or environmental authorization, being allowed to practically any legal entity or individual. Secondly, there are difficulties in monitoring the import of disaggregated HFCs by type of substance, as ODS and its alternatives are aggregated in the Nomenclature of Goods of the RM in several tariff positions (2811 2100; 2903 3921, 2903 3926, 2903 3929, 2903 3931, 2903 3939, 2903 3980, 2903 7911, 2903 7919; 3824 7100, 3824 7400, 3824 7810, 3824 7820, 3824 7830, 3824 7840, 3824 7880, 3824 7890 and 3824 7900). Another difficulty is that halocarbons may be imported both in "standard" packaging of 10-15 kg, and in small containers (300-500 g), which can be imported practically by any individual. In these circumstances, HFCs emissions from the source category 2F1 Refrigeration and Air Conditioning were estimated based on assessment methodologies available in 2006 IPCC Guidelines, considering data on import and consumption of halocarbons provided by the economic agents, including through the Annual Reports submitted by enterprises to the Ozone Office (to be noted that between 2003-2015, only a limited number of enterprises were licensed to import, export, re-export, transit and placing ODS and equipment containing ODS on the market: SC 'Ecolux' SRL, 'Frio-Dins' SRL, 'York Regrigerent' SRL, SC "Dina Cociug" SRL., SC 'Frigoind' SRL, "Frig Industrial" SRL, FM "Frigomas" SA, FPC "Masfrigcom" SRL, etc.). It should be noted that the Republic of Moldova does not produce HFCs, and before 1995 these substances had a relatively narrow use, being imported in insignificant amounts.

Equation
(Describe variables for method used)

Greenhouse gas emissions generated from consumption of halocarbons in this category were estimated using the Tier 2a approach (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 7.5, Equation 7.10, page 7.49).

$$E_{total,\,t} = E_{containers,\,t} + E_{charge,\,t} + E_{lifetime,\,t} + E_{end\text{-}of\text{-}life,\,t}$$

Where:

$E_{containers,\,t}$ – emissions related to the refrigerant container management;
$E_{charge,\,t}$ – emissions related to the charging process of refrigerant: connecting and disconnecting the refrigerant container to and from the equipment when it is initially charged;
$E_{lifetime,\,t}$ – annual leakage from the refrigerant bank during lifetime (operation and servicing);
$E_{end\text{-}of\text{-}life,\,t}$ – emissions at end-of-life, at system disposal.

The assessment process involves several steps, using the following equations.

Step 1: Management of refrigerant containers

The emissions related to the refrigerant container management comprises all the emissions related to the refrigerant transfer from bulk containers (typically 40 tones) down to small capacities where the mass varies from 0.5 kg to 1 ton. The emissions are estimated using Equation 7.11 from the IPCC 2006 Guidelines (Volume 3, Chapter 7.5, page 7.49).

$$E_{containers,\,t} = RM_t \bullet (c / 100)$$

Where:

RM_t – HFC market for new equipment and servicing of all refrigeration application in year *t*, kg;
c – EF of HFC container management of the current refrigerant market, % (varies between 2 and 10 per cent of the refrigerant market; on average, circa 6 per cent).

Step 2: Refrigerant charge emissions of new equipment

The emissions of refrigerant due to the charging process of new equipment are related to the process of connecting and disconnecting the refrigerant container to and from the equipment when it is initially charged. The respective emissions are estimated using Equation 7.12 from the 2006 IPCC Guidelines (Volume 3, Chapter 7.5, page 7.50).

$$E_{charge,\,t} = M_t \bullet (k / 100)$$

Where:

M_t – amount of HFC charged into the new equipment in year *t* per sub-application (including those that are produced for export) kg; to be noted, systems that are imported pre-charged are not been taking into consideration;
k – emission factor of assembly losses of the HFC charged into new equipment (per sub-application), % (varies from 0.1 to 3 per cent).

Step 3: Emissions during lifetime (operation and servicing)

Annual leakage from the refrigerant bank during lifetime represent fugitive emissions and are estimated using Equation 7.13 from the 2006 IPCC Guidelines (Volume 3, Chapter 7.5, page. 7.50).

$$E_{lifetime,\,t} = B_t \bullet (x / 100)$$

Where:

B_t – amount of HFC banked in existing systems in year *t* (per sub-application), kg;
x – annual emission rate (i.e., emission factor) of HFC of each sub-application bank during operation, accounting for average annual leakage and average annual emissions during servicing, %.

Step 4: Emissions at end-of-life

Emissions at system disposal are estimated using Equation 7.14 from the 2006 IPCC Guidelines (Volume 3, Chapter 7.5, page 7.51).

$$E_{end\text{-}of\text{-}life,\,t} = M_{t\text{-}d} \bullet (p / 100) \bullet (1 - \eta_{rec,d} / 100)$$

Where:

$M_{t\text{-}d}$ – amount of HFC emitted at system disposal in year *t*, kg;
p – residual charge of HFC in equipment being disposed of expressed in percentage of full charge, %;
$\eta_{rec,d}$ – recovery efficiency at disposal, which is the ratio of recovered HFC referred to the HFC contained in the system, %.

Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 7 'Emissions of fluorinated substitutes for ozone depleting substances', Section 7.5 'Refrigeration and air conditioning', Pages 7.43-7.71. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the increase use of F-gases, Tier 2a methodology have been used.
Type and source of activity data	AD used to estimate HFC emissions from consumption of hydrofluorocarbons charged into refrigeration and air conditioning equipment were provided by the Customs Service of the RM through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request from the MoEN No. 03-07/175 dated 02.02.2011; Official Letter No 15-03-05 dated 24.01.2014, as a response to the request from the CCO of the MoEN No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request from the CCO of the MoEN No. 407/2015-01-09 dated 29.01.2015; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request from the CCO of the MoEN No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request from the CCO of the MARDE No. 601/2017-12-03 dated 14.12.2017; Official Letter No. 28/07-3025 dated 28.02.2020, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020. The share of refrigerants charged into the refrigeration and air conditioning equipment in the Republic of Moldova within 1995-2019 was provided by the Republican Association of Refrigeration Technicians of the Republic of Moldova. The AD used to estimate HFC emissions from consumption of hydrofluorocarbons charged into mobile air-conditioning equipment were provided by the NBS of the RM (through the Statistical Yearbooks of the RM before 2000, respectively through the Bank for Statistical Data after 2000), as well as by the State Enterprise "State Information Resources Centre "Register" (SE "CRIS "Register") (for 1995-2013 time series), respectively by the Public Services Agency of the RM (for 2014-2019 years) based on the information included in the State Transport Register. Activity data on the total amount of refrigerants imported in the country were provided also through the annual reports submitted by the companies SC 'Ecolux' SRL, 'Frio-Dins' SRL, 'York Regrigerent' SRL, SC "Dina Cociug" SRL., SC 'Frigoind' SRL, "Frig Industrial" SRL, FM "Frigomas" SA, FPC "Masfrigcom" SRL to the National Ozone Office and Climate Change Office of the Public Institution "Environmental Projects Implementation Unit", Ministry of Agriculture, Regional Development and Environment. In addition, there were also used the Generalized Reports on the production, consumption, import/export of ozone-depleting substances regulated by the Montreal Protocol in the RM between 2001 and 2008 according to the Statistical Report No. 1-Ozone, provided by the NBS (from 2009 through 2019 the responsibility for collecting statistical information according to the Statistical Report No. 1-Ozone was kept by the Inspectorate for Environmental Protection, but due to lack of capacities, this information was not collected). It should be noted that the Republic of Moldova does not produce HFCs, and before 1995 these substances had a relatively narrow use, being imported in insignificant amounts.

Type and source of EF and OF

EFs and Parameters Used to Estimate HFC Emissions from Refrigeration and Air Conditioning Equipment Imported in the Republic of Moldova

Equipment Type (sub-application)	Charge, kg (marge and value used)	Lifetime, years (marge and value used)	EF, % of the initial charge/ year		End-of-Life Emissions (%)	
			Initial Emissions	Lifetime Emissions	Recovery efficiency	Residual charge
Factors in equations	(M)	(d)	(k)	(x)	($\eta_{rec,d}$)	(p)
Domestic refrigeration	0.05 ≤ M ≤ 0.5 **0.10**	12 ≤ d ≤ 20 **16**	0.2 ≤ k ≤ 1 **0.6**	0.1 ≤ x ≤ 0.5 **0.5**	0 < $\eta_{rec,d}$ < 70 **0**	0 < p < 80 **50**
Chest freezers	0.05 ≤ M ≤ 0.5 **0.20**	12 ≤ d ≤ 20 **16**	0.2 ≤ k ≤ 1 **0.6**	0.1 ≤ x ≤ 0.5 **0.5**	0 < $\eta_{rec,d}$ < 70 **0**	0 < p < 80 **50**
Upright freezers	0.05 ≤ M ≤ 0.5 **0.18**	12 ≤ d ≤ 20 **16**	0.2 ≤ k ≤ 1 **0.6**	0.1 ≤ x ≤ 0.5 **0.5**	0 < $\eta_{rec,d}$ < 70 **0**	0 < p < 80 **50**
Stand-alone commercial application	0.2 ≤ M ≤ 6 **0.4**	10 ≤ d ≤ 15 **12**	0.5 ≤ k ≤ 3 **1.5**	1 ≤ x ≤ 15 **16.8**	0 < $\eta_{rec,d}$ < 70 **30**	0 < p < 80 **50**
Medium commercial refrigeration	3 ≤ M ≤ 30 **6**	10 ≤ d ≤ 15 **12**	0.5 ≤ k ≤ 3 **1.5**	1 ≤ x ≤ 15 **16.8**	0 < $\eta_{rec,d}$ < 70 **30**	0 < p < 80 **50**
Large commercial refrigeration	100 ≤ M ≤ 200 **150**	10 ≤ d ≤ 15 **12**	0.5 ≤ k ≤ 3 **1.5**	1 ≤ x ≤ 15 **16.8**	0 < $\eta_{rec,d}$ < 70 **50**	0 < p < 80 **50**
Industrial refrigeration	10 ≤ M ≤ 10000 **150**	15 ≤ d ≤ 30 **20**	0.5 ≤ k ≤ 3 **1.5**	7 ≤ x ≤ 25 **16**	0 < $\eta_{rec,d}$ < 90 **50**	50 < p < 100 **75**
Residential and Commercial A/C, including Heat Pumps	0.5 ≤ M ≤ 100 **0.6**	10 ≤ d ≤ 20 **12**	0.2 ≤ k ≤ 1 **0.6**	1 ≤ x ≤ 10 **5**	0 < $\eta_{rec,d}$ < 80 **0**	0 < p < 80 **50**
Mobile A/C – personal cars	0.4 ≤ M ≤ 0.8 **0.6**	9 ≤ d ≤ 16 **16**	0.2 ≤ k ≤ 0.5 **0.5**	10 ≤ x ≤ 20 **15**	0 < $\eta_{rec,d}$ < 50 **0**	0 < p < 50 **50**
Mobile A/C – buses, trains, passenger wagons	10 ≤ M ≤ 20 **12**	9 ≤ d ≤ 16 **12**	0.2 ≤ k ≤ 0.5 **0.5**	10 ≤ x ≤ 20 **15**	0 < $\eta_{rec,d}$ < 50 **30**	0 < p < 50 **50**
Mobile A/C – minibuses	0.5 ≤ M ≤ 1.5 **1.2**	9 ≤ d ≤ 16 **12**	0.2 ≤ k ≤ 0.5 **0.5**	10 ≤ x ≤ 20 **15**	0 < $\eta_{rec,d}$ < 50 **30**	0 < p < 50 **50**
Mobile A/C – trucks	0.5 ≤ M ≤ 1.5 **1**	9 ≤ d ≤ 16 **12**	0.2 ≤ k ≤ 0.5 **0.5**	10 ≤ x ≤ 20 **15**	0 < $\eta_{rec,d}$ < 50 **30**	0 < p < 50 **50**
Refrigeration vehicles	3 ≤ M ≤ 8 **7**	6 ≤ d ≤ 9 **9**	0.2 ≤ k ≤ 1 **0.6**	15 ≤ x ≤ 50 **30**	0 < $\eta_{rec,d}$ < 70 **30**	0 < p < 50 **50**

Source: 2006 IPCC Guidelines, Volume 3, Chapter 7.5, Table 7.9, page 7.52. Republican Association of Refrigeration Technicians of the Republic of Moldova and Annual Reports submitted by companies to the National Ozone Office of the Public Institution "Environmental Projects Implementation Unit", Ministry of Environment.

Uncertainty of AD and source	20% - expert judgement
Uncertainty of EF and source	50% - expert judgement
Potential Improvements	Potential improvements could include capacity building activities by setting up an on-line information system for collecting AD from companies that import, use, dispose, recover and recycle refrigerants and refrigerant equipment. This information system will provide the National Ozone Office of the Public Institution "Environmental Projects Implementation Unit", as well as to the Environment Agency and Ministry of Environment, more accurate AD that could potentially help reduce uncertainties in estimating GHG emissions from the 2F1 'Refrigeration and Air Conditioning Equipment' source category in the Republic of Moldova.

Table 2.2.5.2: Information on Source Category 2F2 'Foam Blowing Agents'

Sector	Industrial Processes and Product Use
Category	2F Product Use as Substitutes for ODS
Source / Gas	2F2 Foam Blowing Agents / HFCs
Key Category?	Tier 1 & Tier 2 – Yes: 2019 (T)
Category Description / Definition	Increasingly, HFCs are being used as replacements for CFCs and HCFCs in foams and particularly in insulation applications. Compounds that are being used include HFC-245fa, HFC-365mfc, HFC-227ea, HFC-134a, and HFC-152a. The division of foams into open-cell or closed-cell relates to the way in which blowing agent is lost from the products. For open-cell foam, emissions of HFCs used as blowing agents are likely to occur during the manufacturing process and shortly thereafter. In closed-cell foam, only a minority of emissions occur during the manufacturing phase. Emissions therefore extend into the in-use phase, with often the majority of emission not occurring until end-of-life (de-commissioning losses). Accordingly, emissions from closed cell foams can occur over a period of 50 years or even longer from the date of manufacture. Open-celled foams are used for applications such as household furniture cushioning, mattresses, automotive seating and for molded products such as car steering wheels and office furniture. Closed-cell foams, on the other hand, are primarily used for insulating applications where the gaseous thermal conductivity of the chosen blowing agent (lower than air) is used to contribute to the insulating performance of the product throughout its lifetime.
Country Detail	In the Republic of Moldova, foams are produced since 2005. It is unknown which blowing agents are used in the production of foam blowing products, but since the production is relatively recent, also as since 2007, the use of F-gases for polyurethane OCF has been prohibited by the EU legislation, it was considered that the polystyrene in primary forms are ethanol and CO_2 based, while the polyurethane in primary forms are based on pentane (C,I,N). Foams produced as well as imported ones are mostly closed cell foams (the emissions from these last longer, for about 20 years).
Equation (Describe variables for method used)	HFC emissions from foam blowing consumption (in particular closed cell foams) used in insulation, cushioning and packaging with blowing agents such as HFC-245fa, HFC-365mfc, HFC-134a and HFC-152a, were estimated using the Tier 2a approach. The IPCC 2006 Guidelines suggests that HFC emissions from closed cell foams should be calculated separately from open-celled foams. For open-celled foams, HFCs used as blowing agents are likely to occur during the manufacturing process and shortly thereafter. Since no open-cell foams are produced in the RM, respectively no emissions are recorded from this category. Emissions from closed-cell foam occur at three distinct points: 1. First year losses from foam manufacture and installation, these emissions occur where the product is manufactured; 2. Annual losses (in situ losses from foam use); closed-cell foam will lose a fraction of their initial charge each year until decommissioning; 3. Decommissioning losses: emissions upon decommissioning also occur where the product is used. Emissions from closed cell foam were estimated following Equation 7.7 from the 2006 IPCC Guidelines (Volume 3, Chapter 7.4, page 7.33). $Emissions_t = M_t \cdot EF_{FYL} + Bank \cdot EF_{AL} + DL_t - RD_t$ Where: $Emissions_t$ – emissions from closed-cell foam in year *t*, tones; M_t – total HFC used in manufacturing new closed-cell foam in *t*, tones; EF_{FYL} – first year loss emission factor, fraction (%); $Bank_t$ – HFC charge blown into closed-cell foam manufacturing between year *t* and year *t-n*, tones; EF_{AL} – annual loss emission factor, fraction (%); DL_t – decommissioning losses in year *t* = remaining losses of chemical at the end of service life that occur when the product/equipment is scrapped, calculated from the amount of remaining chemical and the end-of-life loss factor which depends on the type of end-of-life treatment adopted, tones; RD_t – HFC emissions prevented by recovery and destruction of foams and their blowing agents in year *t*, tones; n – product lifetime of closed-cell foam; t – current year; (t-n) – the total period over which HFCs used in foams could still be present. This equation should be applied to each chemical and major foam application individually. Total emissions expressed in CO_2 equivalent are equal to the sum of CO_2 equivalent emissions of each combination of chemical type and foam application.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 7 'Emissions of fluorinated substitutes for ozone depleting substances', Section 7.4 'Foam Blowing Agents', Pages 7.32-7.42. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

Describe How and Why this Method Was Chosen	Due to the prohibited HFCs use in foam blowing only emissions from use have been estimated with the Tier 2a approach.
Type and source of activity data	The AD on imported foam blowing products in the country are provided by the Customs Service of the Republic of Moldova through the Official Letter No. 28/07-1893 dated 23.02.2011, as a response to the request from the MoEN No. 03-07/175 dated 02.02.2011; Official Letter No 15-03-05 dated 24.01.2014, as a response to the request from the CCO of the MoEN No. 320/2014-01-01 dated 03.01.2014; Official Letter No. 28/07-2231 dated 26.02.2015, as a response to the request from the CCO of the MoEN No. 407/2015-01-09 dated 29.01.2015; Official Letter No. 28/07-8785 dated 26.05.2016, as a response to the request from the CCO of the MoEN No. 512/2016-05-01 dated 10.05.2016; Official Letter No. 28/07-612 dated 12.01.2018, as a response to the request from the CCO of the MARDE No. 601/2017-12-03 dated 14.12.2017; Official Letter No. 28/07-3025 dated 28.02.2020, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020. The most frequently used blowing agents in polyurethane and polystyrene foam manufacturing can be considered HFC-134a, HFC-152a, HFC-245fa, HFC-365mfc, Pentane (C,I,N) and CO_2/ethanol. Since the share of blowing agents in foam products in total imports is unknown, it has been decided to determine it considering the expert opinions, taking into consideration, the European and international experience regarding HFC emissions inventory process within the respective category, as well as, the last years trend among the producers of foam blowing products to decrease the use of HFC as blowing agents, following the international commitments to phasing out F-gas consumption, especially when there already are competitive alternative technologies on the foam blowing market[14],[15]. The volume of blowing agents in foam products imported in the RM was identified based on the information available in the literature in the field, with the assumption that for the polyurethane products HCFC-22, HCFC-141b and HFC-134a have a volume of circa 6 per cent of the total[16], HFC-365mfc – 9 per cent, HFC-254fa – 10 per cent, and Pentane (C,I,N) – 7.5 per cent[15]; as for the polystyrene products HFC-134a has a volume of circa 13 per cent of the total, HFC-152a – 8 per cent, HCFC-22 and HFCF-142b – 12 per cent, and CO_2 + ethanol – 6 per cent of the total[17].
Type and source of EF and OF	If country specific data are not available, default emission factors can be used. **Default EFs for 2F2 'Foam Blowing Agents'** Emission Factor: Default Values Product Lifetime: n = 20 years First Year Losses: 10% of the original HFC charge/year Annual Losses: 4.5% of the original HFC charge/year **Source:** 2006 IPCC Guidelines, Volume 3, Chapter 7.4, Table 7.5, page 7.35.
Uncertainty of AD and source	30% - expert judgement
Uncertainty of EF and source	30% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2F2 'Foam Blowing Agents'.

Table 2.2.5.3: Information on Source Category 2F4 'Aerosols' (Metered Dose Aerosols) – HFCs

Sector	Industrial Processes and Product Use
Category	2F Product Use as Substitutes for ODS
Source / Gas	2F4 Aerosols (Metered Dose Aerosols) / HFCs
Key Category?	No

[14] Natural Foam Blowing Agents, Sustainable Ozone- and Climate-Friendly Alternatives to HCFCs (2012), PROKLIMA International Programme of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ) Environment and Sustainable Use of Natural Resources Division. Eschborn, September 2012. P.178.

[15] Danish Ministry of the Environment, Environment Protection Agency (2010), Greenhouse Gases HFCs, PFCs and SF6, Danish Consumption and Emissions, 2008, Environmental Project No. 1323 2010, <http://www2.mst.dk/udgiv/publications/2010/978-87-92617-66-8/pdf/978-87-92617-67-5.pdf>.

[16] EMEP/EEA Emission Inventory Guidebook 2009, Category 3.C, Chemical products', 3.3.2.2 'Polyurethane foam processing' and Chapter 3.3.2.3 'Polystyrene processing', page 17.

[17] Natural Foam Blowing Agents, Sustainable Ozone- and Climate-Friendly Alternatives to HCFCs (2012), PROKLIMA International Programme of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ) Environment and Sustainable Use of Natural Resources Division. Eschborn, September 2012. P.178.

Category Description / Definition	Most aerosol packages contain hydrocarbon (HC) as propellants but, in a small fraction of the total, HFCs and PFCs may be used as propellants or solvents. Emissions from aerosols usually occur shortly after production, on average six months after sale. However, the period between manufacture and sale could vary significantly depending on the sub application involved. During the use of aerosols, 100 percent of the chemical is emitted. The 5 main sub-applications are as follows: 1. Metered Dose Inhalers (MDIs); 2. Personal Care Products (e.g., hair care, deodorant, shaving cream); 3. Household Products (e.g., air-fresheners, oven and fabric cleaners); 4. Industrial Products (e.g., special cleaning sprays such as those for operating electrical contact, lubricants, pipe-freezers); 5. Other General Products (e.g., silly string, tire inflators, klaxons).
Country Detail	The Republic of Moldova began to use HFC-134a in the MDI in 2003 as replacement for the CFCs. No other uses of HFCs in aerosols is evidenced.
Equation (Describe variables for method used)	HFC emissions from consumption of aerosol (in particular – metered dose aerosols, where HFC-134a is used as propellant) were estimated using the Tier 2a approach. It is considered that during the use of aerosols, 100 per cent of the chemical is emitted into the atmosphere. The respective emissions occur within 1-2 years after sales and should be estimated using the Equation 7.6 from the 2006 IPCC Guidelines (Volume 3, Chapter 7.3 'Aerosols' (Propellants and Solvents), page 7.28). $Emissions_t = S_t \cdot EF + S_{t-1} \cdot (1 - EF)$ Where: $Emissions_t$ – emissions in year *t*, tones; S_t – quantity of HFC and PFC contained in aerosol products sold in year *t*, tones; EF – emission factor = fraction of chemical emitted during the first year, fraction (%); S_{t-1} – quantity of HFC and PFC contained in aerosol products sold in year *t-1*, tones.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 7 'Emissions of fluorinated substitutes for ozone depleting substances', Section 7.3 'Aerosols' (Propellants and Solvents), Pages 7.28-7.31. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to availability of sub-application level information, the Tier 2a approach have been used.
Type and source of activity data	The activity data on the amount of medical substances imported in the Republic of Moldova (metered dose inhalers used in asthma and chronicle pulmonary diseases treatment, including tuberculosis) were provided for 2003-2015 periods by the former Ministry of Health through the Official Letter No. 019/550 from 1 March 2011, as a response to the request from the MoEN No. 03-07/175 dated 02.02.2011, regarding the period 2003-2010; Official Letter No. 019/2045, dated September 14, 2011, as a response to the request from the MoEN No. 05-07/1321 dated 05.08.2011, regarding the period 2005-2010; Official Letter No. 01-9/220, dated 05.02.2014 as a response to the request from the CCO of the MoEN No. 320/2014-01-01 dated 03.01.2014, regarding the period 2011-2012; Official Letter No. 01-10/315, dated 04.03.2015, as a response to the request from the CCO of the MoEN No. 407/2015-01-09 dated 29.01.2015, regarding the period 2013-2014; Official Letter No. 01-10/483, dated 30.05.2016, as a response to the request from the CCO of the MoEN No. 512/2016-05-01 dated 10.05.2016, regarding 2015 year; as well as by the Agency for Medicines and Medical Devices through the Official Letter No. A07.PS01.Rg02-359, dated 26.01.2018, as a response to the request from the CCO of the MARDE No. 612/2018-01-02 dated 10.01.2018, regarding 2016 year; Official Letter No. Rg02-002625, dated 15.07.2020, as a response to the request from the Environment Agency No. 13-07/3044 dated 13.07.2020, regarding 2017-2019 years.
Type and source of EF and OF	It is considered that during the use of aerosols, 100 per cent of the chemical is emitted into the atmosphere. The respective emissions occur within 1-2 years after sales.
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	5% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2F4 'Aerosols' (Metered Dose Aerosols).

2.2.6. Category 2G 'Other Product Manufacture and Use'

Tables 2.2.6.1 – 2.2.6.6 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2G 'Other Product Manufacture and Use'.

Table 2.2.6.1: Information on Source Category 2G1 'Electrical Equipment' – SF_6 and PFCs

Sector	Industrial Processes and Product Use
Category	2G Other Product Manufacture and Use
Source / Gas	2G1 Electrical Equipment / SF_6 and PFCs
Key Category?	No
Category Description / Definition	Sulphur hexafluoride (SF_6) and PFCs are used for electrical insulation and current interruption in equipment used in the transmission and distribution of electricity. Emissions occur at each phase of the equipment life cycle, including manufacturing, installation, use, servicing, and disposal. Most of the SF_6 and PFCs used in electrical equipment is used in gas insulated switchgear and substations (GIS) and in gas circuit breakers (GCB), though some SF_6 is used in high voltage gas-insulated lines (GIL), outdoor gas-insulated instrument transformers and other equipment. The emissions from this category depend not only on the installed (banked) or consumed quantities of SF_6, but also very much on the tightness of the products and the handling processes applied.
Country Detail	SF_6 insulated switchgear and circuit breakers were first used in the Republic of Moldova in 2003, while PFCs in 2006. A general increasing trend can be observed, and particularly since 2006, the use of equipment with SF_6 as insulating gas has increased strongly. This type of equipment is not produced in the Republic of Moldova and there is no export of SF_6 and PFCs in equipment. Thus, starting with 2003, the Moldavian companies initiated the use of medium-tension electrical circuit breakers (10 and 35 kV) and high-tension electrical circuit breakers (110 kV, 330 kV and 400 V), the SF_6 charge in each case varying between 0.95 and 45.0 kg. In conformity with the manufacturer's technical log, the first repairs shall take place after 35 years of operation.
Equation (Describe variables for method used)	Emissions from use of sulphur hexafluoride and PFCs as insulation medium in high and medium tension electrical circuit breakers were estimated based on Tier 1 estimation methodology (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Equation 8.1, page 8.8). Total Emissions = M • EF + EI • EF + EU • EF + ED • EF Where: Total Emissions – emissions from use of SF_6 and PFCs as insulation medium in high and medium tension electrical circuit breakers, tones; M – manufacturing emissions, tones; EF – manufacturing EF, fraction SF_6 and PFCs consumption by manufacturers; default emission factors: 7 per cent for sealed pressure electrical equipment (MV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.2, page 8.15) and 8.5 per cent for closed pressure electrical equipment (HV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.3, page 8.16); EI – installation emissions, tones; EF – installation EF, total nameplate capacity of new equipment filled on site; EU – equipment use emissions, tones; EF – equipment use EF; total nameplate capacity of installed equipment (includes emissions due to leakage, servicing, and maintenance as well as failures); default emission factors: 0.2 per cent for sealed pressure electrical equipment (MV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.2, page 8.15) and 2.6 per cent for closed pressure electrical equipment (HV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.3, page 8.16); ED– equipment disposal emissions, tones; EF – equipment disposal EF; total nameplate capacity of retiring equipment, fraction of SF_6 and PFC remaining at retirement (the life expectancy of the equipment in European countries is over 35 years); default emission factors: 93 per cent for sealed pressure electrical equipment (MV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.2, page 8.15) and 95 per cent for closed pressure electrical equipment (HV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.3, page 8.16).
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 8 'Other product manufacture and use', Section 8.2 'Emissions of SF6 and PFCs from electrical equipment', Pages 8.6-8.22. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this emission source and unavailability of country specific emission factors, the Tier 1 methodology has been used.

Type and source of activity data	The dynamic of high-tension electrical circuit breakers installation process, as well as the number of available units in bulk at the end of calendar year is provided in Table 4-166, respectively in Tables 4-167 and 4-168 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). Information was provided by ICS Premier Energy SRL through the Official Letter No. 0201/65392 dated 15.08.2011, as a response to the request from the MoEN No. 03-07/1337 dated 08.08.2011, regarding the period 2005-2010; Official Letter from 13.01.2014, as a response to the request from the CCO, MoEN No. 320/2014-01-01 dated 03.01.2014, regarding the period 2011-2012; Official Letter dated 10.05.2016, as a response to the request from the CCO No. 512/2016-05-09 dated 10.05.2016, regarding 2015; Official Letter dated 23.01.2018, as a response to the request from the CCO No. 601/2017-12-03 dated 14.12.2017, regarding 2016 year; Official Letter dated 19.02.2020, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020, regarding 2017-2019 years; as well as by 'MOLDELECTRICA' S.O.E. though the Official Letter No 46-47/1795 dated 23.08.2011, as a response to the request from the MoEN No. 03-07/1337 din 08.08.2011, regarding the period 2003-2010; Official Letter No 46-47/112 dated 17.01.2014, as a response to the request from the CCO of the MoEN No. 320/2014-01-01 dated 03.01.2014, regarding the period 2011-2013; Official Letter No. 46-74/937 dated 25.05.2016, as a response to the request from the CCO No. 512/2016-05-01 dated 10.05.2016, regarding 2015 year; Official Letter No. 46-74/1 dated 03.01.2018, as a response to the request from the CCO No. 601/2017-12-03 dated 14.12.2017, regarding 2016 year; Official Letter No. 46-74/333 dated 28.02.2020, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020, regarding 2017-2019 years.
Type and source of EF and OF	– Manufacturing EF, fraction SF_6 and PFCs consumption by manufacturers; default emission factors: 7 per cent for sealed pressure electrical equipment (MV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.2, page 8.15) and 8.5 per cent for closed pressure electrical equipment (HV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.3, page 8.16); – Equipment use EF; total nameplate capacity of installed equipment (includes emissions due to leakage, servicing, and maintenance as well as failures); default emission factors: 0.2 per cent for sealed pressure electrical equipment (MV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.2, page 8.15) and 2.6 per cent for closed pressure electrical equipment (HV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.3, page 8.16); – Equipment disposal EF; total nameplate capacity of retiring equipment, fraction of SF_6 and PFC remaining at retirement (the life expectancy of the equipment in European countries is over 35 years); default emission factors: 93 per cent for sealed pressure electrical equipment (MV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.2, page 8.15) and 95 per cent for closed pressure electrical equipment (HV switchgear) containing SF_6 (2006 IPCC Guidelines, Volume 3, Chapter 8.1, Table 8.3, page 8.16).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	20% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2G1 'Electrical Equipment'.

Table 2.2.6.2: Information on Source Category 2G3 'N_2O from Product Uses'

Sector	Industrial Processes and Product Use
Category	2G Other Product Manufacture and Use
Source / Gas	2G3 N_2O from Product Uses (N_2O for anesthetic use in medical application) / N_2O
Key Category?	No
Category Description / Definition	This source covers evaporative emissions of nitrous oxide (N_2O) that arise from medical applications (anesthetic use, analgesic use and veterinary use). N_2O is used during anesthesia for two reasons: (a) as an anesthetic andanalgesic and as (b) a carrier gas for volatile fluorinatedhydrocarbon anesthetic such as isoflurane, sevofluraneand desflurane.
Country Detail	N_2O emissions in this sector arising from the use of N_2O in the health service within 1990-2007 time series. In conformity with the response of the Ministry of Health to the last Letter of the Ministry of Environment dated 1st of March 2011, since 2007 in the Republic of Moldova N_2O is not used in anesthesia anymore.
Equation (Describe variables for method used)	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 8: Other product manufacture and Use, page 8.37. N_2O Emissions = N_2O consumption (AD) * Emission factor (EF) Methodology: Tier 1
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3, Chapter 8 'Other product manufacture and use', Section 8.4 'N_2O from product uses', Pages 8.35-8.40. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	Consumption of N_2O as provided by the Ministry of Health through the Official Letter No. 01-9/2513 dated 9.11.2007, as a response to Official Letter No. 01-07/1608 dated 15.10.2007 from the MENR; Official Letter No. 01-9/550 dated 01.03.2011, as a response to Official Letter No. 03-07/175 dated 02.02.2011 from the MoEN.

Type and source of EF and OF	B default, 100 per cent of the whole amount of N_2O used in anesthesia is deemed to be emitted into the atmosphere.
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	3% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2G3 'N_2O from Product Uses'.

Table 2.2.6.3: Information on Source Category 2G4 'Other' (Tobacco Combustion) – CO_2

Sector	Industrial Processes and Product Use
Category	2G Other Product Manufacture and Use
Source / Gas	2G4 Other (Tobacco Combustion) / CO_2
Key Category?	No
Category Description / Definition	This category comprises emissions arising from the combustion (smoking) of tobacco.
Country Detail	Statistical data regarding cigars and cigarettes production, export, import and consumption are available in the Statistical Yearbooks of the RM, the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019', in the statistical database which can be accessed on-line on the NBS website, as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020. It has been considered that cigarettes represent 95 per cent of the total market, while cigars – 5 per cent.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). CO_2 emissions from tobacco combustion use were estimated using the following equation: $CO_2 \text{ emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 emissions – carbon dioxide emissions from tobacco combustion, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC, fraction; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	Statistical data regarding cigars and cigarettes production, export, import and consumption are available in the Statistical Yearbooks for 1994 (page 290), 1999 (page 305), 2003 (page 395), 2006 (page 311), 2007 (page 310), 2008 (page 306), 2009 (page 303), 2010 (page 303), 2011 (page 304), 2012 (page 307), 2013 (page 305), 2014 (page 301); in the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019", as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020. According to the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019) (2.D.3.i „Other solvent and product use", SNAP 060602, page 21), one cigar contains 5 g of tobacco, while one cigarette – only 1 g. In order to estimate the share of fermented tobacco (see Table 4-174 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova), it is considered that cigarettes represent 95 per cent of the total market, while cigars – 5 per cent.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	50% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2G4 'Other' (Tobacco Combustion).

Table 2.2.6.4: Information on Source Category 2G4 'Other' (Tobacco Combustion) – NO_x, CO and NMVOC

Sector	Industrial Processes and Product Use
Category	2G Other Product Manufacture and Use
Source / Gas	2G4 Other (Tobacco Combustion) / NO_x, CO and NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category comprises emissions arising from the combustion (smoking) of tobacco.
Country Detail	Statistical data regarding cigars and cigarettes production are available in the Statistical Yearbooks of the RM, the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019', in the statistical database which can be accessed on-line on the NBS website, as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020. It has been considered that cigarettes represent 95 per cent of the total market, while cigars – 5 per cent.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from tobacco combustion uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \cdot EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the tobacco combustion, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019*, *Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	Statistical data regarding cigars and cigarettes production, export, import and consumption are available in the Statistical Yearbooks for 1994 (page 290), 1999 (page 305), 2003 (page 395), 2006 (page 311), 2007 (page 310), 2008 (page 306), 2009 (page 303), 2010 (page 303), 2011 (page 304), 2012 (page 307), 2013 (page 305), 2014 (page 301); in the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019", as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020. According to the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019) (2.D.3.i „Other solvent and product use", SNAP 060602, page 21), one cigar contains 5 g of tobacco, while one cigarette – only 1 g. In order to estimate the share of fermented tobacco (see Table 4-174 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova), it is considered that cigarettes represent 95 per cent of the total market, while cigars – 5 per cent.
Type and source of EF and OF	**Tier 2 Default EF for 2G4 'Other' ('Tobacco Combustion')**

Source Category	Pollutants	EF	Unit
2G4 'Other' (Tobacco Combustion)	NO_x CO NMVOC	1.8 (1.7-1.9) 55.1 (53-57) 4.84 (2.4-9.7)	kg/t of tobacco

Source: EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 2.D.3.i „Other solvent and product use", SNAP 060602, Table 3-15, page 22-23.

Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

Table 2.2.6.5: Information on Source Category 2G4 'Other' (Use of Shoes) – CO_2

Sector	Industrial Processes and Product Use
Category	2G Other Product Manufacture and Use
Source / Gas	2G4 Other (Use of Shoes) / CO_2

Key Category?	No
Category Description / Definition	This category comprises emissions arising from the use of shoes.
Country Detail	Statistical data regarding shoes production are available in the Statistical Yearbooks of the RM, the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019', as well as in the statistical database which can be accessed on-line on the NBS website.
Equation (Describe variables for method used)	Indirect CO_2 emissions were estimated based on the carbon content in NMVOC emissions. The default value used represents 60% per cent (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17). By oxidizing, this carbon converts into CO_2 in atmosphere (it is assumed that all solvents are of fossil origin). CO_2 emissions from use of shoes use were estimated using the following equation: $CO_2 \text{ emissions} = NMVOC \bullet CC \bullet 44/12$ Where: CO_2 emissions – carbon dioxide emissions from use of shoes, kt/yr; NMVOC – total NMVOC emissions within the respective category, kt/yr; CC – carbon content in NMVOC, fraction; 44/12 – stoichiometric ratio CO_2/C.
Reference	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of all detailed data, the Tier 1 methodology has been used.
Type and source of activity data	Statistical data regarding shoes production, export, import and consumption (see Table 4-176 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) are available in the Statistical Yearbooks of the ATULBD for 1998-2019; Statistical Yearbooks of the RM for 1990-2019, in the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019, as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	CC – carbon content in NMVOC, fraction (the default value used represents 60 per cent, with a margin of 50-70 per cent; 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Industrial Processes and Product Use, Chapter 5: Non-Energy Products from Fuels and Solvent Use, Chapter 5.5: Solvent Use, Section 5.5.4 'Uncertainty assessment', Page 5.17).
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	50% - expert judgement
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 2G4 'Other' (Use of Shoes).

Table 2.2.6.6: Information on Source Category 2G4 'Other' (Use of Shoes) – NMVOC

Sector	Industrial Processes and Product Use
Category	2G Other Product Manufacture and Use
Source / Gas	2G4 Other (Use of Shoes) / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category comprises emissions arising from the use of shoes.
Country Detail	Statistical data regarding shoes production are available in the Statistical Yearbooks of the RM, the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019', in the statistical database which can be accessed on-line on the NBS website, as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from use of shoes uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.D.3.i 'Other Solvent and Product Use', section 3.3 'Tier 2 technology-specific approach': $E_{pollutant} = (AR_{use, technology} \bullet EF_{technology, pollutant}) / 10^3$ Where: $E_{technology, pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use, technology}$ – the activity rate for the use of shoes, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.

Reference	EEA (2019), EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, Technical guidance to prepare national emission inventories. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.
Type and source of activity data	Statistical data regarding shoes production (see Table 4-176 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) are available in the Statistical Yearbooks of the ATULBD for 1998-2019; Statistical Yearbooks of the RM for 1990-2019, in the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019, as well as in the Official Letter No. 28/07-3025 dated 28.02.2020 as provided by the Customs Service of the Republic of Moldova, as a response to the request from the Environment Agency No. 08-310/1 dated 11.02.2020.
Type and source of EF and OF	**Tier 2 Default EF for 2G4 'Other' ('Use of Shoes')** Source Category: 2G4 'Other' (Use of Shoes) | Pollutant: NMVOC | EF: 60 (30-120) | Unit: g/pair of shoes **Source:** EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 2.D.3.i „Other solvent and product use", SNAP 060603, Table 3-16, page 24.
Uncertainty of AD and source	5% - expert judgement
Uncertainty of EF and source	See the 95% confidence interval in the table above (in the brackets, lower-upper).

2.2.7. Category 2H 'Other'

Tables 2.2.7.1 – 2.2.7.2 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 2H 'Other'.

Table 2.2.7.1: Information on Source Category 2H2 'Food and Beverages Industry' (Bread Making and Other Food) – NMVOC

Sector	Industrial Processes and Product Use
Category	2H Other
Source / Gas	2H2 Food and Beverages Industry (Bread Making and Other Food) / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category comprises emissions arising from food manufacturing, which may involve the heating of fats and oils and foodstuffs containing them, the baking of cereals, flour and beans, fermentation in the making of bread, the cooking of vegetables and meats, and the drying of residues. These processes may occur in sources varying in size from domestic households to manufacturing plants.
Country Detail	Statistical data regarding food manufacturing are available in the Statistical Yearbooks of the ATULBD, Statistical Yearbooks of the RM, the Statistical Reports PRODMOLD-A 'Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019', as well as in the statistical database which can be accessed on-line on the NBS website.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from food manufacturing uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.H.2 'Food and beverages', section 3.3 'Tier 2 technology-specific approach': $E_{technology,\ pollutant} = (AR_{use,\ technology} \cdot EF_{technology,\ pollutant}) / 10^3$ Where: $E_{technology,\ pollutant}$ – the emission of the technology and the specified pollutant, t/yr; $AR_{use,\ technology}$ – the activity rate for food manufacturing, t/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/t.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019*, *Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2016. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2018).
Describe How and Why this Method Was Chosen	A Tier 2 methodology has been used due to availability of technology-specific emission factors.

<table>
<tr><td>Type and source of activity data</td><td>Statistical data regarding bread making and other food in the RM within 1990-2019 time periods (see Table 4-186 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) are available in the Statistical Yearbooks of the Republic of Moldova for 1994 (pages 289-290), 1999 (pages 304-305), 2003 (pages 393-394), 2006 (pages 309-310), 2010 (pages 301-303), 2014 (pages 299-301); Statistical Reports PRODMOLD-A „Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019”; as well as in the Statistical Yearbooks of the ATULBD for 1998 (page 177), 2000 (page 100), 2002 (page 104), 2005 (page 94), 2007 (page 93), 2009 (page 93), 2011 (page 95), 2014 (page 89), 2017 (page 102), 2020 (page 103).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Default Emission Factors Used to Estimate NMVOC Emissions from Bread Making and Other Food
<table>
<tr><th>Source</th><th>Bread Making and Other Food</th><th>NMVOC Emission Factor, kg / t</th></tr>
<tr><td rowspan="11">Bread Making and Other Food</td><td>Animal rendering</td><td>0.33 (0.11-0.98)</td></tr>
<tr><td>Meat, fish and poultry</td><td>0.30 (0.03-3)</td></tr>
<tr><td>Fish meal processing</td><td>1.0 (0.35-3.1)</td></tr>
<tr><td>Grain drying</td><td>1.3 (0.13-13)</td></tr>
<tr><td>Sugar; margarine and solid cooking fats</td><td>10 (1-100)</td></tr>
<tr><td>Bread</td><td>4.5 (0.45-45)</td></tr>
<tr><td>Sponge-dough bread</td><td>8 (2.7-24)</td></tr>
<tr><td>White bread</td><td>4.5 (1.5-14)</td></tr>
<tr><td>White bread shortened process</td><td>2 (0.7-6)</td></tr>
<tr><td>Wholemeal bread and light rye bread</td><td>3 (1-9)</td></tr>
<tr><td>Cakes, biscuits and breakfast cereals; animal feed</td><td>1 (0.1-10)</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), 2.H.2 Food and Beverages Industry, SNAP 040605 – Bread, Tables 3-2, 3-3, 3-4, 3-11, 3-18, 3-19, 3-20, 3-21, 3-22. Pages 10-20.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
</table>

Table 2.2.7.2: Information on Source Category 2H2 ‘Food and Beverages Industry’ (Alcoholic Beverages) – NMVOC

Sector	Industrial Processes and Product Use
Category	2H Other
Source / Gas	2H2 Food and Beverages Industry (Alcoholic Beverages) / NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	This category comprises emissions arising from beverages industry. When making any alcoholic beverage, sugar is converted into ethanol by yeast. This is fermentation. The sugar comes from fruit, cereals or other vegetables. These materials may need to be processes before fermentation. For example, in the manufacture of beer, cereals are allowed to germinate, then roasted and boiled before fermentation. To make spirits, the fermented liquid is then distilled. Alcoholic beverages, particularly spirits and wine, may be stored for a number of years before consumption.
Country Detail	Statistical data regarding beverages industry are available in the Statistical Yearbooks of the ATULBD, Statistical Yearbooks of the RM, the Statistical Reports PRODMOLD-A ‘Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2019’, as well as in the statistical database which can be accessed on-line on the NBS website.
Equation (Describe variables for method used)	The Tier 2 approach for pollutant emissions from beverages industry uses the general equation (2) from the EMEP/EEA Air Pollution Emission Inventory Guidebook 2019, NFR 2.H.2 ‘Food and beverages’, section 3.3 ‘Tier 2 technology-specific approach’: $E_{technology,\ pollutant} = (AR_{use,\ technology} \cdot EF_{technology,\ pollutant}) / 10^3$ Where: $E_{technology,\ pollutant}$ – the emission of the technology and the specified pollutant, hl/yr; $AR_{use,\ technology}$ – the activity rate for beverages industry, hl/yr; $EF_{pollutant}$ – the emission factor for this pollutant technology, kg/hl.
Reference	EEA (2019), *EMEP/EEA Air Pollution Emission Inventory Guidebook 2019*, *Technical guidance to prepare national emission inventories*. European Environment Agency, Technical report No 13/2019. Copenhagen, Denmark (available on: http://www.eea.europa.eu//publications/emep-eea-guidebook-2019). National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).

<table>
<tr><td>Describe How and Why this Method Was Chosen</td><td>A Tier 2 methodology has been used due to availability of technology-specific emission factors.</td></tr>
<tr><td>Type and source of activity data</td><td>Statistical data regarding beverages industry in the RM within 1990-2019 time periods (see Table 4-189 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova) are available in the Statistical Yearbooks of the Republic of Moldova for 1994 (pages 289-290), 1999 (pages 304-305), 2003 (pages 393-394), 2006 (pages 309-310), 2010 (pages 301-303), 2014 (pages 299-301); Statistical Reports PRODMOLD-A ‘Total production, as a natural expression, in the Republic of Moldova, by product type, for 2005-2016’; as well as in the Statistical Yearbooks of the ATULBD for 1998 (page 177), 2000 (page 100), 2002 (page 104), 2005 (page. 94), 2007 (page. 93), 2009 (page 93), 2011 (page 95), 2014 (page. 89), 2017 (page 102), 2020 (page 103).</td></tr>
<tr><td>Type and source of EF and OF</td><td>Default EFs Used to Calculate NMVOC Emissions from Alcoholic Beverages
<table>
<tr><th>Source</th><th>Alcoholic beverages</th><th>NMVOC Emission Factor, kg / hl</th></tr>
<tr><td rowspan="6">Alcoholic Beverages</td><td>Red wine</td><td>0.080 (0.03-0.24)</td></tr>
<tr><td>White wine, beer</td><td>0.035 (0.012-0.11)</td></tr>
<tr><td>Spirits (unspecified)</td><td>15.0 (1.5-150)</td></tr>
<tr><td>Whisky / grain whisky / vodka</td><td>7.5 (3.8-15)</td></tr>
<tr><td>Divin (cognac) / brandy</td><td>3.5 (1.2-11)</td></tr>
<tr><td>Other spirits</td><td>0.4 (0.13-1.2)</td></tr>
</table>
Source: EMEP/EEA Atmospheric Emissions Inventory Guidebook, (2019), 2.H.2 Food and Beverages Industry, SNAP 040606 – Wine, SNAP 040607 – Beer, SNAP 040608 – Spirits, Tables 3-24, 3-25, 3-26, 3-27, 3-28, 3-30 and 3-31. Pages 21-24.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>5% - expert judgement</td></tr>
<tr><td>Uncertainty of EF and source</td><td>See the 95% confidence interval in the table above (in the brackets, lower-upper).</td></tr>
</table>

2.3. Agriculture Sector

Relevant information on categories comprised within the inventory, including description of each category allocated to Sector 3 ‘Agriculture’ is provided below.

2.3.1. Category 3A ‘Enteric Fermentation’

Tables 2.3.1.1 – 2.3.1.2 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 3A ‘Enteric Fermentation’.

Table 2.3.1.1: Information on Source Category 3A ‘Enteric Fermentation’ (Dairy Cattle, Non-Dairy Cattle, Sheep, Goat) – CH_4

Sector	Agriculture
Category	3A Enteric Fermentation
Source / Gas	Dairy Cattle, Non-Dairy Cattle, Sheep, Goat / CH_4
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (Category 3A Enteric Fermentation – aggregated for all source)
Category Description / Definition	Methane is produced in herbivores as a by-product of enteric fermentation, a digestive process by which carbohydrates are broken down by microorganisms into simple molecules for absorption into the bloodstream. The amount of methane that is released depends on the type of digestive tract, age, and weight of the animal, and the quality and quantity of the feed consumed.
Country Detail	Dairy cows include mature cows that are producing milk in commercial quantities for human consumption. Following definition in the 2006 IPCC GL, the dairy cow category does not include cows kept principally to produce calves. Non-dairy cattle populations is further classified into subcategories based on animal and feed characteristics: calves and heifers up to 1 year; heifers between 12 and 18 months; heifers between 18 and 24 months, heifers of 24 months and more; breeding males and work bullocks. Sheep include mature ewes (inclusive, breeding ewes for production of offspring and wool production and milking ewes where commercial milk production is the primary purpose), other mature sheep (>1 year) and growing lambs (intact males, castrates and females).

Equation (Describe variables for method used)	Tier 2 Methodology 2006 IPCC GL, page 10.28, equations 10.19 and 10.20: $$\text{Total } CH_4 \text{ enteric} = \Sigma_i E_i [EF(T) \bullet (N_{(T)}/10^6)]$$ Where: Total CH_4 enteric – total CH_4 emissions from Enteric Fermentation, kt CH_4/yr; Ei – is the emissions for the i livestock categories and sub-categories; $EF_{(T)}$ – emission factor for the defined livestock population, kg CH_4/head/yr; $N_{(T)}$ – the number of head of livestock species/category T in the country; T – species/category of livestock. The emission factors for each category of livestock are estimated based on, equation 10.21 from page 10.31: $$EF = [GE \bullet (Y_m/100) \bullet 365/55.65]$$ Where: EF – emission factor, kg CH_4/head/yr; GE – gross energy intake, MJ/head/day; Y_m – methane conversion factor, % of gross energy in feed converted to methane; 55.65 MJ/kg CH_4 – the energy content of methane. The gross energy intake data are obtained using the approach described in Section 10.2.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 10: Emissions from Livestock and Manure Management. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source the Tier 2 methodology has been used
Type and source of activity data	Animal population (thousand heads) and data necessary for calculation of Gross Energy (GE), inclusive: Weight (W) and Mature Weight (MW) in livestock and poultry (kg); Average Daily Weight Gain per Day (WG) (grams); Average Daily and Annual Milk Production per One Cow, One Sheep and One Goat (kg); Average Wool Production per Sheep (kg); Percentage of females that give birth in a year (claves from cows and lambs from sheep giving birth) (%), Number of Offspring – data are provided by the National Bureau of Statistics through Statistical Annual Report No. 24-agr „Animal Breeding Sector". The Number of Livestock and Poultry in all Households Categories as of 1st of January (Annual Reports for 1990-2019) and the Basic Indicators of Animal Breeding Sector Development in all Households Categories in the Republic of Moldova (Annual Reports for 1990-2019). Statistical Yearbooks of Administrative-Territorial Units on Left Bank of Dniester River (ATULBD) for 1998 (page 224), 2002 (page 118), 2006 (page 109), 2010 (page 110), 2014 (page 104), 2017 (page 117), 2020 (page 118). Methane Conversion Factor (Y_m): Y_m – 0.03 for feedlot fed cattle (young animals) and Y_m – 0.065 for dairy cows and other cattle (2006 IPCC Guidelines, Volume 4, Chapter 10, Table 10.12, Pages 10.30 and Tables 10A-1 and 10A-2, Pages 10.72-10.73); for sheep and goats: Y_m – 0.045 for lambs and kids and Y_m – 0.065 for mature rams, ewes and goats (2006 IPCC Guidelines, Volume 4, Chapter 10, Table 10.13, Page 10.31). Other data, necessary for calculation of GE we provided by Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine (Maximovca village, Anenii Noi District, Republic of Moldova). - feeding situation: confined, grazing, pasture conditions; - fat content in milk (%); and - feed digestibility (%).
Type and source of EF and OF	Country Specific EFs for Dairy Cattle, Non-Dairy Cattle, Sheep and Goat - Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine (Maximovca village, Anenii Noi District), the latest data were published in the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (see also Table 5-22 for CS EFs for dairy cattle and non-dairy cattle and Table 5-23 for CS EFs for sheep).
Uncertainty of AD and source	± 10%, expert judgement
Uncertainty of EF and source	± 20% for Tier 2, 2006 IPCC GL, page 10.33, chapter 10.3.4 'Uncertainty assessment'
Potential Improvements	Planned improvements could include updating the AD and productivity indicators used to estimate CH_4 emissions within this source category following a Tier 2 methodology, in particular for cattle and sheep, the animal categories that account for the largest share in the structure of total methane emissions originated from the 3A 'Enteric Fermentation' category.

Table 2.3.1.2: Information on Source Category 3A 'Enteric Fermentation' (Swine, Horses, Asses and Mules, Rabbits) – CH_4

Sector	Agriculture
Category	3A Enteric Fermentation
Source / Gas	Swine, Horses, Asses and Mules, Rabbits / CH_4
Key Category?	No
Category Description / Definition	Methane is produced in herbivores as a by-product of enteric fermentation, a digestive process by which carbohydrates are broken down by microorganisms into simple molecules for absorption into the bloodstream. The amount of methane that is released depends on the type of digestive tract, age, and weight of the animal, and the quality and quantity of the feed consumed.
Country Detail	Following definition in the 2006 IPCC GL, the mature swine include sows in gestation, sows which have farrowed and are nursing young and boars that are used for breeding purposes, while the growing swine include nursery, finishing, gilts that will be used for breeding purposes and growing boars that will be used for breeding purposes.
Equation (Describe variables for method used)	Methodology: Tier 1 2006 IPCC GL, page 10.28, equations 10.19 and 10.20: $\text{Total } CH_4 \text{ enteric} = \Sigma_i E_i [EF(T) \cdot (N_{(T)}/10^6)]$ Where: Total CH_4 enteric – total CH_4 emissions from Enteric Fermentation, kt CH_4/yr; Ei – is the emissions for the i livestock categories and sub-categories; $EF_{(T)}$ – emission factor for the defined livestock population, kg CH_4/head/yr; $N_{(T)}$ – the number of head of livestock species/category T in the country; T – species/category of livestock.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 10: Emissions from Livestock and Manure Management. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	Due to the importance of this source the Tier 2 methodology has been used
Type and source of activity data	Animal population (thousand heads) – data are provided by the National Bureau of Statistics through Statistical Annual Report No. 24-agr „Animal Breeding Sector". The Number of Livestock and Poultry in all Households Categories as of 1st of January (Annual Reports for 1990-2019) and the Basic Indicators of Animal Breeding Sector Development in all Households Categories in the Republic of Moldova (Annual Reports for 1990-2019). Statistical Yearbooks of Administrative-Territorial Units on Left Bank of Dniester River (ATULBD) for 1998 (page 224), 2002 (page 118), 2006 (page 109), 2010 (page 110), 2014 (page 104), 2017 (page 117), 2020 (page 118).
Type and source of EF and OF	IPCC Default EF for developed countries from 2006 IPCC GL, page 10.28, Table 10.10: for Swine – 1.5 kg CH_4/head/yr; Horses – 18 kg CH_4/head/yr; Mules and Asses – 10 kg CH_4/head/yr. Country Specific (Russian Federation) EF for Rabbits – 0.59 kg CH_4/head/yr (National Inventory Report of Russian Federation for 1990 – 2016 period, Chapter 5, Table 5.6, Page 168).
Uncertainty of AD and source	± 10%, expert judgement
Uncertainty of EF and source	± 30% for Tier 1, 2006 IPCC GL, page 10.33, chapter 10.3.4 'Uncertainty assessment'
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for these animal categories under 3A 'Enteric Fermentation' category.

2.3.2. Category 3B 'Manure Management'

Tables 2.3.2.1 – 2.3.2.4 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 3B 'Manure Management'.

Table 2.3.2.1: Information on Source Category 3B 'Manure Management' (Dairy Cattle, Non-Dairy Cattle, Swine) – CH_4

Sector	Agriculture
Category	3B Manure Management
Source / Gas	Dairy Cattle, Non-Dairy Cattle, Swine / CH_4

Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L) (Category 3B Manure Management – aggregated for all sources)
Category Description / Definition	The decomposition of manure under anaerobic conditions (i.e., in absence of oxygen), during storage and treatment, produces CH_4. These conditions occur most readily when large numbers of animals are managed in a confined area (e.g., dairy farms, beef feedlots, and swine and poultry farms), and where manure is disposed of in liquid-based systems. The term 'manure' is used here collectively to include both dung and urine (i.e., the solids and the liquids) produced by livestock.
Country Detail	Dairy cows include mature cows that are producing milk in commercial quantities for human consumption. Following definition in the 2006 IPCC GL, the dairy cow category does not include cows kept principally to produce calves. Non-dairy cattle populations is further classified into subcategories based on animal and feed characteristics: calves and heifers up to 1 year; heifers between 12 and 18 months; heifers between 18 and 24 months, heifers of 24 months and more; breeding males and work bullocks. The mature swine include sows in gestation, sows which have farrowed and are nursing young and boars that are used for breeding purposes, while the growing swine include nursery, finishing, gilts that will be used for breeding purposes and growing boars that will be used for breeding purposes.
Equation (Describe variables for method used)	Tier 2 Methodology 2006 IPCC GL, page 10.37, equation 10.22 $$CH_4 \text{ emissions} = \Sigma_{(T)} [(EF_{(T)} \cdot N_{(T)})/10^6]$$ Where: CH_4 emissions – CH_4 from manure management, for a defined population, kt CH_4/yr; $EF_{(T)}$ – emission factor for the defined livestock population, kg CH_4 /head/yr; $N_{(T)}$ – the number of head of livestock species/category T in the country; T – species/category of livestock. The emission factors for each category of livestock are estimated based on equation 10.23 from page 10.41: $$EF_{(T)} = (VS_{(T)} \cdot 365) \cdot [B_{0(T)} \cdot 0.67 \text{ kg/m}^3 \cdot \Sigma_{(S,k)} (MCF_{(S,k)} / 100) \cdot MS_{(T,S,k)}]$$ Where: $EF_{(T)}$ – annual CH_4 emission factor for livestock category T, kg CH_4/animal/yr; $VS_{(T)}$ – daily volatile solid excreted for livestock category T, kg dm/animal/day; $B_{0(T)}$ – maximum methane producing capacity for manure produced by livestock category T, m^3 CH_4/kg of VS excreted; 0.67 – conversion factor (CF) of m^3 CH_4 to kilograms CH_4; $MCF_{(S,k)}$ – methane conversion factors for each manure management system S by climate region k, %; $MS_{(T,S,k)}$ – fraction of livestock category T's manure handled using management system S in climate region k, dimensionless. The volatile solid is calculated using the equation 10.24 and default values for all parameters except GE and DE, which is taken from the calculation of CH_4 emissions from enteric fermentation. $$VS = [GE \cdot (1 - DE\%/100) + (UE \cdot GE)] \cdot [(1 - ASH/18.45)]$$ Where: VS – volatile solid excretion per day on a dry-organic matter basis, kg VS/day (see Country Specific values in Table 5-28, National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova); GE – gross energy intake, MJ/day; the same values as those used under the 3A 'Enteric Fermentation' category; DE – digestibility of the feed in per cent; for cattle the same values were used as under the 3A 'Enteric Fermentation'; for fattening swine, DE – 85 per cent, while for market swine DE – 75 per cent; (UE • GE) – urinary energy expressed as fraction of gross energy (GE); typically, this value is 0.04GE for cattle and 0.02GE for swine; ASH – the ash content of manure calculated as a fraction of the dry matter feed intake; values used by Austria into its NIR for 1990-2019 were used, 11 per cent for dairy cows, 11.5 per cent for other cattle, the default value of 2 per cent was used for swine (2006 IPCC Guidelines); 18.45 – conversion factor (CF) for dietary GE in MJ per kg of dry matter; this value is relatively constant across a wide range of forage and grain-based feeds commonly consumed by livestock.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 10: Emissions from Livestock and Manure Management. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 2 methodology has been used because this is key source category.

Type and source of activity data	Animal population (thousand heads) and data necessary for calculation of Gross Energy (GE), inclusive: Weight (W) and Mature Weight (MW) in livestock and poultry (kg); Average Daily Weight Gain per Day (WG) (grams); Average Daily and Annual Milk Production per One Cow (kg); Percentage of females that give birth in a year (claves from cows and pigs from sows) (%), Number of Offspring – data are provided by the National Bureau of Statistics through Statistical Annual Report No. 24-agr „Animal Breeding Sector". The Number of Livestock and Poultry in all Households Categories as of 1st of January (Annual Reports for 1990-2019) and the Basic Indicators of Animal Breeding Sector Development in all Households Categories in the Republic of Moldova (Annual Reports for 1990-2019). Statistical Yearbooks of Administrative-Territorial Units on Left Bank of Dniester River (ATULBD) for 1998 (page 224), 2002 (page 118), 2006 (page 109), 2010 (page 110), 2014 (page 104), 2017 (page 117), 2020 (page 118). Other parameters are taken from 2006 IPCC GL and National Inventory Report of Austria for 1990-2019 (2021): – MCF for cool climate (T ≤ 10˚C) are taken from 2006 IPCC GL, page 10.44-47, Table 10.17 – urinary energy (UE) is 0.04 GE for cattle and 0.02 for swine; – ash content of manure (ASH) is 0.11 for dairy cows, 0.115 for other cattle and 0.02 for swine – B_0 0.24 m^3 CH_4 / kg VS for dairy cattle (page 10.77, table 10A-4); 0.18 m^3 CH_4 / kg VS for other cattle (page 10.78, Table 10A-5); 0.45 m^3 CH_4 / kg VS for market swine and breeding swine (pages 10.80-10-81, Tables 10A7-10A-8)
Type and source of EF and OF	Country Specific EFs for Dairy Cattle, Non-Dairy Cattle and Swine - Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine (Maximovca village, Anenii Noi District), the latest data were published in the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (see also CS EFs for dairy cattle, non-dairy cattle and swine in Table 5-37).
Uncertainty of AD and source	± 10%, expert judgement
Uncertainty of EF and source	± 30%, expert judgement (± 30% for Tier 1 and ± 20% for Tier 2, 2006 IPCC GL, page 10.48, chapter 10.3.4 'Uncertainty assessment')
Potential Improvements	Planned improvements could include updating the AD and productivity indicators used to estimate CH_4 emissions within this source category following a Tier 2 methodology, in particular for cattle and swine, the animal categories that account for the largest share in the structure of total methane emissions originated from the 3B 'Manure Management' category.

Table 2.3.2.2: Information on Source Category 3B 'Manure Management' (Sheep, Goat, Horses, Mules and Asses, Poultry, Rabbit) – CH_4

Sector	Agriculture
Category	3B Manure Management
Source / Gas	Sheep, Goat, Horses, Mules and Asses, Poultry, Rabbit / CH_4
Key Category?	No
Category Description / Definition	The decomposition of manure under anaerobic conditions (i.e., in absence of oxygen), during storage and treatment, produces CH_4. These conditions occur most readily when large numbers of animals are managed in a confined area (e.g., dairy farms, beef feedlots, and swine and poultry farms), and where manure is disposed of in liquid-based systems. The term 'manure' is used here collectively to include both dung and urine (i.e., the solids and the liquids) produced by livestock.
Country Detail	Sheep include mature ewes (inclusive, breeding ewes for production of offspring and wool production and milking ewes where commercial milk production is the primary purpose), other mature sheep (>1 year) and growing lambs (intact males, castrates and females). Poultry include chickens (including, broiler chickens grown for producing meat, layer chickens for producing eggs, where manure is managed in dry systems, layer chickens for producing eggs, where manure is managed in wet systems and chickens under free-range conditions for egg and meat production), turkeys (including, breeding turkeys in confinement systems, turkeys grown for producing meat in confinement systems and turkey under free-range conditions for meat production), ducks (including, breeding ducks and ducks grown for producing meat), geese (including, breeding geese and geese grown for producing meat).
Equation (Describe variables for method used)	Tier 1 Methodology 2006 IPCC GL, page 10.37, equation 10.22 $CH_4 \text{ emissions} = \Sigma_{(T)} [(EF_{(T)} \cdot N_{(T)})/10^6]$ Where: CH_4 emissions – CH_4 from manure management, for a defined population, kt CH_4/yr; $EF_{(T)}$ – emission factor for the defined livestock population, kg CH_4 /head/yr; $N_{(T)}$ – the number of head of livestock species/category T in the country; T – species/category of livestock.

Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 10: Emissions from Livestock and Manure Management. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because this category is not a key source category and also because not all enhanced characterization data are available.
Type and source of activity data	Animal population (thousand heads) – data are provided by the National Bureau of Statistics through Statistical Annual Report No. 24-agr „Animal Breeding Sector". The Number of Livestock and Poultry in all Households Categories as of 1st of January (Annual Reports for 1990-2019) and the Basic Indicators of Animal Breeding Sector Development in all Households Categories in the Republic of Moldova (Annual Reports for 1990-2019). Statistical Yearbooks of Administrative-Territorial Units on Left Bank of Dniester River (ATULBD) for 1998 (page 224), 2002 (page 118), 2006 (page 109), 2010 (page 110), 2014 (page 104), 2017 (page 117), 2020 (page 118).
Type and source of EF and OF	IPCC Default EF for developed countries and cool climate (T < 15°C) from 2006 IPCC GL, pages 10.40-10.41, Tables 10.15-10.16: sheep – 0.19 kg CH_4/head/yr; goat – 0.13 kg CH_4/head/yr; horses – 1.56 kg CH_4/head/yr; mules and asses – 0.76 kg CH_4/head/yr; chicken – 0.03 kg CH_4/head/yr; broiler – 0.02 kg CH_4/head/yr; turkeys – 0.09 kg CH_4/head/yr; ducks – 0.02 kg CH_4/head/yr; rabbits – 0.08 kg CH_4/head/yr.
Uncertainty of AD and source	± 10%, expert judgement
Uncertainty of EF and source	± 30%, for Tier 1 (2006 IPCC GL, page 10.48, chapter 10.3.4 'Uncertainty assessment')
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for these animal categories under 3B 'Manure Management' category.

Table 2.3.2.3: Information on Source Category 3B 'Manure Management' (All Animal Types) – Direct Emissions – N_2O

Sector	Agriculture
Category	3B Manure Management
Source / Gas	3Ba. Direct emissions / All animal types / N_2O
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L); Tier 2: Yes: 1990 (L), 2019 (L, T) (Category 3Ba Direct N_2O Emissions from Manure Management – aggregated)
Category Description / Definition	Direct N_2O emissions occur via combined nitrification and denitrification of nitrogen contained in the manure. The emission of N_2O from manure during storage and treatment depends on the nitrogen and carbon content of manure, and on the duration of the storage and type of treatment. Nitrification (the oxidation of ammonia nitrogen to nitrate nitrogen) is a necessary prerequisite for the emission of N_2O from stored animal manures. Nitrification is likely to occur in stored animal manures provided there is a sufficient supply of oxygen. Nitrification does not occur under anaerobic conditions. Nitrites and nitrates are transformed to N_2O and dinitrogen during the naturally occurring process of denitrification, an anaerobic process.
Country Detail	Dairy cows include mature cows that are producing milk in commercial quantities for human consumption. Following definition in the 2006 IPCC GL, the dairy cow category does not include cows kept principally to produce calves. Non-dairy cattle population is further classified into subcategories based on animal and feed characteristics: calves and heifers up to 1 year; heifers between 12 and 18 months; heifers between 18 and 24 months, heifers of 24 months and more; breeding males and work bullocks. Sheep include mature ewes (inclusive, breeding ewes for production of offspring and wool production and milking ewes where commercial milk production is the primary purpose), other mature sheep (>1 year) and growing lambs (intact males, castrates and females). The mature swine include sows in gestation, sows which have farrowed and are nursing young and boars that are used for breeding purposes, while the growing swine include nursery, finishing, gilts that will be used for breeding purposes and growing boars that will be used for breeding purposes. Poultry include chickens (including, broiler chickens grown for producing meat, layer chickens for producing eggs, where manure is managed in dry systems, layer chickens for producing eggs, where manure is managed in wet systems and chickens under free-range conditions for egg and meat production), turkeys (including, breeding turkeys in confinement systems, turkeys grown for producing meat in confinement systems and turkey under free-range conditions for meat production), ducks (including, breeding ducks and ducks grown for producing meat), geese (including, breeding geese and geese grown for producing meat).

Equation (Describe variables for method used)	Tier 2 Methodology 2006 IPCC GL, Volume 4, Chapter 10, page 10.54, equation 10.25: $N_2O_{D\,(mm)} = [\sum_{(S)}[\sum_{(T)}(N_{(T)} \bullet Nex_{(T)} \bullet MS_{(T,S)})] \bullet FE_{3(S)}] \bullet 44/28$ Where: $N_2O_{D\,(mm)}$ – direct N_2O emissions from category 3B Manure Management in the country (kg N_2O/yr); $N_{(T)}$ – number of head of livestock species/category T in the country; $Nex_{(T)}$ – annual average N excretion per head of species/category T in the country (kg N/animal/yr); $MS_{(T,S)}$ – fraction of total annual nitrogen excretion for each livestock species/category T that is managed in manure management system S in the country, dimensionless; $FE_{3(S)}$ – emission factor for direct N_2O emissions from manure management system S in the country, (kg N_2O-N/kg N in manure management system S); S – manure management system; T – species/category of livestock. 44/28 – conversion of $(N_2O\text{-}N)_{(mm)}$ emissions to $N_2O_{(mm)}$ emissions. The calculation of the average N excretion rates $Nex_{(T)}$ is based on equation 10.30, page 10.57: $Nex_{(T)} = N_{rate(T)} \bullet (TAM/1000) \bullet 365$ Where: $Nex_{(T)}$ – annual N excretion for livestock category T (kg N/animal/yr); $N_{rate\,(T)}$ – default N excretion rate (kg N (1000 kg animal mass)/day); $TAM_{(T)}$ – typical animal mass for livestock category T (kg/animal/yr). Rates of annual N excretion for each livestock species/category $Nex_{(T)}$ were estimates using equation 10.31, page 10.58: $Nex_{(T)} = N_{intake\,(T)} \bullet (1 - N_{retention\,(T)})$ Where: $N_{intake\,(T)}$ – the annual N intake per head of animal of species/category T, (kg N/animal/yr); $N_{retention\,(T)}$ – fraction of annual N intake that is retained by animal of species/category T, dimensionless.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 10: Emissions from Livestock and Manure Management. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 2 methodology has been used because this is a key source category.
Type and source of activity data	Animal population (thousand heads) and data necessary for calculation of the average N excretion rates $Nex_{(T)}$, inclusive: Weight (W) and Mature Weight (MW) in livestock and poultry (kg) – data are provided by the National Bureau of Statistics through Statistical Annual Report No. 24-agr „Animal Breeding Sector". The Number of Livestock and Poultry in all Households Categories as of 1st of January (Annual Reports for 1990-2019) and the Basic Indicators of Animal Breeding Sector Development in all Households Categories in the Republic of Moldova (Annual Reports for 1990-2019). Statistical Yearbooks of Administrative-Territorial Units on Left Bank of Dniester River (ATULBD) for 1998 (page 224), 2002 (page 118), 2006 (page 109), 2010 (page 110), 2014 (page 104), 2017 (page 117), 2020 (page 118). The Average Annual $N_{ex(T)}$ Excretion by Main Livestock and Poultry Categories (kg N/head/year) in the Republic of Moldova within 1990-2019 periods are provided in Table 5-44 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information on the Manure Management Systems Usage (MS%) in the RM within 1989-2019 periods is based on a study developed in May-June 2015 by the specialists from the Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine and the National Agency for Food Security (Cosman et al., 2015). In the process of carrying out this study, dairy cows and other cattle farms with a herd of more than 5 heads were inspected, as well as pig farms with more than 30 heads and the largest poultry farms in the country. The study comprised all districts of the country. In total, manure management systems from 179 farms were inspected, of which 96 cattle farms, 66 pig farms and 17 poultry farms (see also information provided in Tables 5-34 and 5-35 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	IPCC default EFs for direct N_2O emissions from manure management are from 2006 IPCC GL, pages 10.62-10.64, Table 10.21.
Uncertainty of AD and source	± 30 %, expert judgement
Uncertainty of EF and source	± 100%, 2006 IPCC GL, page 10.66, section 10.5.4 'Uncertainty assessment'.
Potential Improvements	The planned improvements could include collecting additional data, in particular on country specific manure management systems (historical data, starting with 1990, as well as recent information, for every 3 years), as well as those related to country specific N excreted rates (kg N/head/year) for different animal categories.

Table 2.3.2.4: Information on Source Category 3B 'Manure Management' (All Animal Types) – Indirect Emissions – N_2O

Sector	Agriculture
Category	3B Manure Management
Source / Gas	3Bb. Indirect emissions / All animal types / N_2O
Key Category?	Tier 2: Yes: 1990 (L), 2019 (L, T) (Category 3Bb Indirect N_2O Emissions from Manure Management – aggregated)
Category Description / Definition	Indirect emissions result from volatile nitrogen losses that occur primarily in the forms of ammonia and NO_x. The fraction of excreted organic nitrogen that is mineralized to ammonia nitrogen during manure collection and storage depends primarily on time, and to a lesser degree temperature. Simple forms of organic nitrogen such as urea and uric acid are rapidly mineralized to ammonia nitrogen, which is highly volatile and easily diffused into the surrounding air. Nitrogen losses begin at the point of excretion in houses and other animal production areas and continue through on-site management in storage and treatment systems (i.e., manure management systems). Nitrogen is also lost through runoff and leaching into soils from the solid storage of manure at outdoor areas, in feedlots and where animals are grazing in pastures. Pasture losses are considered separately in Chapter 11, Section 11.2, N_2O Emissions from Managed Soils, as emissions of nitrogen compounds from grazing livestock.
Country Detail	Dairy cows include mature cows that are producing milk in commercial quantities for human consumption. Following definition in the 2006 IPCC GL, the dairy cow category does not include cows kept principally to produce calves. Non-dairy cattle populations is further classified into subcategories based on animal and feed characteristics: calves and heifers up to 1 year; heifers between 12 and 18 months; heifers between 18 and 24 months, heifers of 24 months and more; breeding males and work bullocks. Sheep include mature ewes (inclusive, breeding ewes for production of offspring and wool production and milking ewes where commercial milk production is the primary purpose), other mature sheep (>1 year) and growing lambs (intact males, castrates and females). The mature swine include sows in gestation, sows which have farrowed and are nursing young and boars that are used for breeding purposes, while the growing swine include nursery, finishing, gilts that will be used for breeding purposes and growing boars that will be used for breeding purposes. Poultry include chickens (including, broiler chickens grown for producing meat, layer chickens for producing eggs, where manure is managed in dry systems, layer chickens for producing eggs, where manure is managed in wet systems and chickens under free-range conditions for egg and meat production), turkeys (including, breeding turkeys in confinement systems, turkeys grown for producing meat in confinement systems and turkey under free-range conditions for meat production), ducks (including, breeding ducks and ducks grown for producing meat), geese (including, breeding geese and geese grown for producing meat).
Equation (Describe variables for method used)	Tier 2 Methodology 2006 IPCC GL, Volume 4, Chapter 10, equation10.26 on page 10.54 and equation 10.27 on page 10.56: $$N_2O_{G(mm)} = [\sum_{(S)} [\sum_{(T)} (N_{(T)} \cdot Nex_{(T)} \cdot MS_{(T,S)}) \cdot (Frac_{GasMS}/100)_{(T,S)}] \cdot FE_4 \cdot 44/28$$ Where: $N_2O_{G(mm)}$ – indirect N_2O emissions due to volatilization of N from Manure Management in the country (kg N_2O/yr); $N_{(T)}$ – number of head of livestock species/category T in the country; $Nex_{(T)}$ – annual average N excretion per head of species/category T in the country (kg N/animal/yr); $MS_{(T,S)}$ – fraction of total annual nitrogen excretion for each livestock species/category T that is managed in manure management system S in the country, dimensionless; $Frac_{GasMS}$ – per cent of managed manure nitrogen for livestock category T that volatilizes as NH_3 and NO_x in the manure management system S, per cent (see in Table 10.22, page 10.65, Chapter 10, Volume 4, 2006 IPCC Guidelines); FE_4 – emission factor for N_2O emissions from atmospheric deposition of nitrogen on soils and water surfaces, the default value is 0.01 kg N_2O-N/kg NH_3-N+NO_x-N volatilized (see Table 11.3, page 11.24, Chapter 11, Volume 4, 2006 IPCC Guidelines); S – manure management system; T – species/category of livestock. 44/28 – conversion of (N_2O-N)(mm) emissions to N_2O (mm) emissions. 2006 IPCC GL, Volume 4, Chapter 10, equation10.28 on page 10.56 and equation 10.29 on page 10.57: $$N_2O_{L(mm)} = [\sum_{(S)} [\sum_{(T)} (N_{(T)} \cdot Nex_{(T)} \cdot MS_{(T,S)}) \cdot (Frac_{leach\ MS}/100)_{(T,S)}] \cdot FE_5 \cdot 44/28$$ Where: $N_2O_{L(mm)}$ – indirect N_2O emissions due to N leaching and runoff (kg N_2O/yr); $N_{(T)}$ – number of head of livestock species/category T in the country; $Nex_{(T)}$ – annual average N excretion per head of species/category T in the country (kg N/animal/yr); $MS_{(T,S)}$ – fraction of total annual nitrogen excretion for each livestock species/category T that is managed in manure management system S in the country, dimensionless; $Frac_{leach\ MS}$ – per cent of managed manure nitrogen losses for livestock category T due to runoff and leaching during solid and liquid storage of manure (typical range 1-20 per cent); FE_5 – emission factor for N_2O emissions from nitrogen leaching and runoff, kg N_2O-N/kg N leaching/runoff (default: 0.0075 kg N_2O-N/kg N leaching/runoff) (see Table 11.3, page 11.24, Chapter 11, Volume 4, 2006 IPCC Guidelines); S – manure management system; T – species/category of livestock; 44/28 – conversion of $(N_2O\text{-}N)_{L(mm)}$ emissions to $N_2O_{L(mm)}$ emissions.

Equation (Describe variables for method used)	2006 IPCC GL, Volume 4, Chapter 10, equation10.34 on page 10.65: $N_{MMS\_Avb} = \sum_{(S)} \{\sum_{(T)} [(N_{(T)} \cdot Nex_{(T)} \cdot MS_{(T,S)}) \cdot (1\text{-}Frac_{Loss\ MS}/100)] + [N_{(T)} \cdot Nex_{(T)} \cdot N_{bending\ MS}]\}$ Where: N_{MMS_Avb} – amount of managed manure nitrogen available for application to managed soils or for feed, fuel, or construction purposes, kg N/yr; $N_{(T)}$ – number of head of livestock species/category T in the country; $Nex_{(T)}$ – annual average N excretion per animal of species/category T in the country, kg N/animal/yr; $MS_{(T,S)}$ – fraction of total annual nitrogen excretion for each livestock species/category T that is managed in manure management system S in the country, dimensionless; $Frac_{Loss\ MS}$ – amount of managed manure nitrogen for livestock category T that is lost in the manure management system S, per cent (see Table 10.23, page 10.67, Chapter 10, Volume 4, 2006 IPCC Guidelines); $N_{bedding\ MS}$ – amount of nitrogen from bedding (to be applied for solid storage and deep bedding MMS if known organic bedding usage), kg N/animal/year; S – manure management system; T – species/category of livestock.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 10: Emissions from Livestock and Manure Management and Chapter 11: N_2O Emissions from managed Soils, and CO_2 Emissions from Lime and Urea Application. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Describe How and Why this Method Was Chosen	The Tier 2 methodology has been used because this is a key source category.
Type and source of activity data	Animal population (thousand heads) and data necessary for calculation of the average N excretion rates $Nex_{(T)}$, inclusive: Weight (W) and Mature Weight (MW) in livestock and poultry (kg) – data are provided by the National Bureau of Statistics through Statistical Annual Report No. 24-agr „Animal Breeding Sector". The Number of Livestock and Poultry in all Households Categories as of 1st of January (Annual Reports for 1990-2019) and the Basic Indicators of Animal Breeding Sector Development in all Households Categories in the Republic of Moldova (Annual Reports for 1990-2019). Statistical Yearbooks of Administrative-Territorial Units on Left Bank of Dniester River (ATULBD) for 1998 (page 224), 2002 (page 118), 2006 (page 109), 2010 (page 110), 2014 (page 104), 2017 (page 117), 2020 (page 118). The Average Annual $N_{ex(T)}$ Excretion by Main Livestock and Poultry Categories (kg N/head/year) in the Republic of Moldova within 1990-2019 periods are provided in Table 5-44 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021). The information on the Manure Management Systems Usage (MS%) in the RM within 1989-2019 periods is based on a study developed in May-June 2015 by the specialists from the Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine and the National Agency for Food Security (Cosman et al., 2015). In the process of carrying out this study, dairy cows and other cattle farms with a herd of more than 5 heads were inspected, as well as pig farms with more than 30 heads and the largest poultry farms in the country. The study comprised all districts of the country. In total, manure management systems from 179 farms were inspected, of which 96 cattle farms, 66 pig farms and 17 poultry farms (see also information provided in Tables 5-34 and 5-35 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021).
Type and source of EF and OF	IPCC default EFs for indirect N_2O emissions from manure management are from 2006 IPCC GL, Volume 4, Chapter 10, pages 10.65-10.67, Tables 10.22 and 10.23, respectively from Chapter 11, page 11.24, Table 11.3.
Uncertainty of AD and source	± 30 %, expert judgement
Uncertainty of EF and source	± 150%, 2006 IPCC GL, Chapter 10, page 10.67, section 10.5.4 'Uncertainty assessment' and Chapter 11, page 11.24, section 11.2.2.4 'Uncertainty assessment'.
Potential Improvements	The planned improvements could include collecting additional data, in particular on country specific manure management systems (historical data, starting with 1990, as well as recent information, for every 3 years), as well as those related to country specific N excreted rates (kg N/head/year) for different animal categories.

2.3.3. Category 3D 'Agricultural Soils'

Tables 2.3.3.1 – 2.3.3.2 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 3D 'Agricultural Soils'.

Table 2.3.3.1: Information on Source Category 3D 'Agricultural Soils' – Direct Soil Emissions – N_2O

Sector	Agriculture
Category	3D Agricultural Soils
Source / Gas	3Da. Direct N_2O Soil Emissions / N_2O
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (Category 3Da Direct N_2O Soil Emissions – aggregated for all sources)
Category Description / Definition	In most soils, an increase in available N enhances nitrification and denitrification rates which then increase the production of N_2O. Increases in available N can occur through human-induced N additions or change of land-use and/or management practices that mineralize soil organic N. The following N sources are included in the methodology for estimating direct N_2O emissions from managed soils: – synthetic N fertilizers (F_{SN}); – organic N applied as fertilizer (e.g., animal manure, compost, sewage sludge, rendering waste) (F_{ON}); – urine and dung N deposited on pasture, range and paddock by grazing animals (F_{PRP}); – N in crop residues including from N-fixing crops and from forages during pasture renewal (F_{CR}); – N mineralization associated with loss of soil organic matter (F_{SOM}); and – drainage/management of organic soils (i.e., histosols) (F_{OS}).
Country Detail	The main sources of direct N_2O soil emissions in the Republic of Moldova are as following – in 1990: synthetic fertilizers (36.8%), organic N applied as fertilizers (21.8%), N mineralization associated with loss of soil organic matter (23.0%) and N in crop residues including from N-fixing crops and from forages during pasture renewal (13.9%), while in 2019: synthetic fertilizers (41.5%), N mineralization associated with loss of soil organic matter (30.7%), N in crop residues including from N-fixing crops and from forages during pasture renewal (16.8%) and organic N applied as fertilizers (6.6%). Fertilizers that are not appropriate for agricultural production (mineral fertilizers for balcony flowers, lawns and similar) are not included.
Equation (Describe variables for method used)	Tier 1 Methodology 2006 IPCC GL, Volume 4, Chapter 11, equation11.1 on pages 11.7 and 11.10: $N_2O_{DIRECT} = N_2O_{SN} + N_2O_{ON} + N_2O_{CR} + N_2O_{PRP} + N_2O_{SOM}$ and $N_2O_{DIRECT} = [(N_2O\text{-}N_{N\ inputs} + N_2O\text{-}N_{PRP})] \cdot 44/28$ Where: $N_2O\text{-}N_{N\ inputs} = (F_{SN} + F_{ON} + F_{CR} + F_{SOM}) \cdot EF_1$ $N_2O\text{-}N_{PRP} = F_{PRP} \cdot EF_3$ When: $N_2O_{SN} = F_{SN} \cdot EF_1 \cdot 44/28$ Where: N_2O_{SN} – N_2O emissions from applied inorganic nitrogen fertilizers (kt/yr); F_{SN} – annual amount of inorganic nitrogen fertilizers applied to soils (kg N/yr); EF_1 – emission factor for N_2O emissions from N inputs; default: 0.01 kg N_2O-N/kg N applied; range: 0.003-0.03 kg N_2O-N/kg N (see also Table 11.1, page 11.11); [44/28] – stoichiometric ratio of nitrogen content in N_2O-N and N_2O. $N_2O_{ON} = F_{ON} \cdot EF_1 \cdot 44/28$ Where: N_2O_{ON} – N_2O emissions from applied organic N fertilizers (kt/yr); $F_{ON} = (F_{AM} + F_{SEW} + F_{COMP} + F_{OOA})$, total annual amount of organic N fertilizers applied to soils other than by grazing animals (kg N/yr); F_{AM} – annual amount of animal manure N applied to soils (kg N/yr); F_{SEW} – annual amount of total sewage N that is applied to soils (kg N/yr); F_{COMP} – annual amount of total compost N applied to soils (kg N/yr); F_{OOA} – annual amount of other organic amendments used as fertilizer (kg N/yr); EF_1 – default EF: 0.01 kg N_2O-N/kg N applied (range: 0.003-0.03 kg N_2O-N/kg N) (see also Table 11.1, page 11.11); [44/28] – stoichiometric ratio of nitrogen content in N_2O-N and N_2O. Where: N_2O_{PRP} – N_2O emissions from urine and dung deposited by grazing animals; F_{PRP} – annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock (kg N/yr);

Equation
(Describe variables for method used)

$$N_2O_{PRP} = F_{PRP} \cdot EF_{3\ PRP} \cdot 44/28$$
$$F_{PRP} = \sum_{(s)} [(N_{(T)} \cdot Nex_{(T)}) \cdot MS_{(T, PRP)}]$$

Where:

$N_{(T)}$ – number of head of livestock species/category T in the country (see 3A source category);
$Nex_{(T)}$ – annual average N excretion per animal of species/category T in the country (kg N/animal/yr) (see 3B source category);
$MS_{(T, PRP)}$ – fraction of annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock/number of head of livestock species/category T (see 3B source category);
$EF_{3(PRP)}$ – default emission factor values are: 0.02 kg N_2O-N/kg N for cattle, swine and poultry; 0.01 kg N_2O-N/kg N for other animal categories (see Table 11.1, page 11.11);
[44/28] – stoichiometric ratio of nitrogen content in N_2O-N and N_2O.

$$N_2O_{CR} = F_{CR} \cdot EF_1 \cdot 44/28$$

Where:

F_{CR} – annual amount of N in crop residues returned to soils annually, t N/yr;
EF_1 – default value of emission factor is 0.01 kg N_2O-N/kg N (see also Table 11.1, page 11.11);
[44/28] – stoichiometric ratio of nitrogen content in N_2O-N and N_2O.

When:

$$F_{CR} = (Crop_{(T)} \cdot R_{AG\ (T)} \cdot (1\text{-}Frac_{Remove\ (T)}) + Crop_{(T)} \cdot R_{BG\ (T)}) \cdot (P_{CR}/10^2) \cdot (k_6/10^2)$$

Where:

$Crop_{(T)}$ – harvested annual dry matter yield for crop T t.d.m./ha;
$Crop_{(T)} = Yield\ Fresh_{(T)} \cdot DRY$
$Yield\ Fresh_{(T)}$ – harvested fresh yield for crop T, t/ha;
DRY – dry matter fraction of harvested crop T, kg dm/t of yield (see Table 5-70 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova; see also Table 11.2, page 11.17, Chapter 11, Volume 4, 2006 IPCC Guidelines);
$R_{AG\ (T)}$ – ratio of above-ground residues dry matter to harvested yield for crop T (Crop(T)), t.d.m_{AG}/t.d.m (see Table 5-70 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova; information is based on Nicolaev N., Boincean B., Sidorov M., Vanicovici Gh., Coltun V. (2006), Agrotechnics. Ministry of Education and Youth of the RM – Balti: Presa universitara balteană, 2006, P. 298);
$R_{BG\ (T)}$ – ratio of below-ground residues to harvested yield for crop T, t.d.m_{BG}/t dm (see Table 5-70 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova; see also Table 11.2, page 11.17, Chapter 11, Volume 4, 2006 IPCC Guidelines);
$Frac_{Remove\ (T)}$ – fraction of above-ground residues of crop T removed and used for other purposes (see Table 5-70 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova; see also Table 11.2, page 11.17, Chapter 11, Volume 4, 2006 IPCC Guidelines);
P_{CR} = amount of nitrogen in crop residues (% a.s.) (Table 5-71 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova);
k_6 = coefficient reflecting the N in crop residues (Banaru, 2002) (see Table 5-71 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova; information is based on Banaru A. (2002), Methodological Guidelines to Determine Humus Balance in Arable Soils, Ministry of Agriculture and Food Industry of the RM, Institute of Pedology, Agrochemistry and Soil Protection „Nicolae Dimo" and TACIS FDMOL 9901 Project 'Support to Developing Education, Research and Extension Services in Agriculture', Chisinau, 2002, 23 pages).

$$N_2O_{SOM} = F_{SOM} \cdot EF_1 \cdot 44/28$$

Where:

EF_1 – default 0.01 kg N_2O-N/kg N applied (range: 0.003-0.03 kg N_2O-N/kg N) (see also Table 11.1, page 11.11);
[44/28] – stoichiometric ratio between the content of nitrogen in N_2O-N and N_2O;
F_{SOM} – the net annual amount of N mineralized in mineral soils as a result of loss of soil carbon through change in land use or management (t N/yr);
$F_{(SOM)}$ was estimated using equation 11.8, page 11.16, Chapter 11, Volume 4, 2006 IPCC Guidelines:

$$F_{SOM} = \sum [(\Delta C_{mineral} \cdot 1/R)]$$

Where:

R – carbon and nitrogen ratio in the soil organic matter (C : N); the 2006 IPCC Guidelines default value of 10 (range from 8 to 15) is used for arable soils; according the national scientific sources (Krupenikov, Ganenko, 1984), the C : N ratio in the soil organic matter in the Republic of Moldova is around 10.7 (range from 10.1 to 11.3);
$\Delta C_{mineral}$ – annual change in carbon stocks in mineral soils, (t C/yr) (see Table 5-78 from the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova; was estimated using the "Methodology for determining the carbon balance in agricultural lands for estimating GHG emissions" (which is based on Banaru, Anatol (2000), Methodology to Calculate CO_2 Emissions from Agricultural Soils, In the collection of papers „Climate Change: Research, Studies, Solutions, Ministry of Environment / UNDP Moldova. „Bons Offices" S.R.L. Chisinau, 2000. P. 115-123), see more details in the Annex A3-4.2 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova).

References	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 11: N_2O Emissions from managed Soils, and CO_2 Emissions from Lime and Urea Application. National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova (2021) (in English). Banaru Anatol (2000), Methodology to Calculate CO_2 Emissions from Agricultural Soils, In the collection of papers „Climate Change: Research, Studies, Solutions, Ministry of Environment / UNDP Moldova. „Bons Offices" S.R.L. Chisinau, 2000. P. 115-123 (in Rumanian). Banaru A. (2002), Methodological Guidelines to Determine Humus Balance in Arable Soils, Ministry of Agriculture and Food Industry of the RM, Institute of Pedology, Agrochemistry and Soil Protection „Nicolae Dimo" and TACIS FDMOL 9901 Project 'Support to Developing Education, Research and Extension Services in Agriculture', Chisinau, 2002, 23 pages (in Rumanian). Krupenikov I.A., Ganenco V.P. (1984), Chernozems: Comparative Features, Genesis. Humus Conditions. In the book 'Soils of Moldova'. V.1, Chisinau, 1984, pp. 86-96 (in Russian).
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because the CS EFs are not available.
Type and source of activity data	– Synthetic and Organic N fertilizers – National Bureau of Statistics through the Statistical Yearbooks of the RM for 1988 (page 280), 1994 (page 239), 1999 (page 330), 2003 (page 442), 2006 (page 352), 2011 (page 345) 2014 (page 345), 2017 (page 306) and 2019 (page 296); Statistical Yearbooks of the Administrative-Territorial Units on the Left Bank of Dniester for 1998 (page 230), 2000 (page 107), 2002 (page 111), 2006 (page 108), 2009 (page 107), 2012 (page 114), 2017 (page 110), 2020 (page 111). The National Bureau of Statistics is collecting statistical data on the amount of synthetic and organic N fertilizers applied to soils through Questionnaire no. 9-agr "The use of phytosanitary products and the introduction of synthetic and organic fertilizers in the crop yield of year…". This questionnaire is submitted annually to the territorial statistical institution, by December 5, by agricultural enterprises and organizations irrespective of the organizational-legal and property forms (including individual farms with a total area of 50 ha and more) depending on the location of the land. Individual farms with an area less than 50 ha are not required to report the data related to the type of fertilizers applied to soil. Considering that most of the livestock and poultry population is included in individual farms which, also do not report to the territorial statistical institution, it is obvious that the statistical data on the organic N fertilizers reported in the statistical yearbooks is much underestimated. – Organic N fertilizers – following the above-mentioned information, within the latest inventory cycle, the amount of organic N fertilizers applied to soils was estimated based on the information on the total amount of excreted nitrogen ($N_{ex(T)}$) in all manure management systems and the amount managed manure nitrogen available for application to managed soils (N_{MMS_Avb}) (see the information provided in Table 5-54 of the National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova); – Urine and dung N deposited on pasture, range and paddock by grazing animals – in order to estimate the amount of nitrogen from urine and dung deposited by grazing animals (see Table 5-67 from National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova), there were used activity data on the total population of livestock and poultry from the Statistical Annual Report No. 24-agr 'Animal Breeding Sector': 'The Number of Livestock and Poultry in all Households Categories as of 1st of January' (annually for 1990-2019 periods), the - Statistical Yearbooks of the ATULBD (identical AD to those used under the 3A 'Enteric Fermentation' and 3B 'Manure Management'), country specific data on nitrogen excretion rate $N_{ex(T)}$ (in kg N/head/yr) and country specific values of the different manure management systems usage in the Republic of Moldova (identical to those used under the 3B 'Manure Management'); – N in crop residues – National Bureau of Statistics on-line database, Section 'Sown Area, crops average yield and harvest within 1980-2019: <http://statbank.statistica.md/pxweb/Database/RO/16%20AGR/AGR02/AGR02.asp>; Statistical Yearbooks for ATULBD: 1998 (page 218-223), 2000 (page 109-113), 2002 (page 113-117), 2003 (page 106-109), 2006 (page 101-104), 2009 (page 97-99), 2011 (page 100-102), 2014 (page 94-96), 2017 (page 111-114), 2020 (page 111-116). – N mineralization associated with loss of soil organic matter – calculated by the specialist of the Institute of Pedology, Agrochemistry and Soil Protection "Nicolae Dimo" (see details above with reference to N_2O_{SOM}).
Type and source of EF and OF	IPCC Default EFs from 2006 IPCC GL, page 11.11, table 11.1: – EF_1 for N additions from mineral fertilizers, organic amendments, crop residues, and N mineralized from mineral soils as a result of loss of soil carbon – 0.01 kg N_2O-N/kg N; – $EF_{3\ PRP,\ CPP}$ for cattle (dairy, non-dairy and buffalo), poultry and pigs – 0.02 kg N_2O-N/kg N; – $EF_{3\ PRP,\ SO}$ for sheep and 'other animals' – 0.01 kg N_2O-N/kg N.
Uncertainty of AD and source	synthetic N fertilizers ± 5%, expert judgment; – organic N applied as fertilizer (e.g., animal manure, compost, sewage sludge, rendering waste) ± 30%, expert judgment; – urine and dung N deposited on pasture, range and paddock by grazing animals ± 30%, expert judgment; – N in crop residues including from N-fixing crops and from forages during pasture renewal ± 5%, expert judgment; – N mineralization associated with loss of soil organic matter ± 5%, expert judgment.

Uncertainty of EF and source	– synthetic N fertilizers ± 6%, expert judgment; – organic N applied as fertilizer (e.g., animal manure, compost, sewage sludge, rendering waste) ± 6%, expert judgment; – urine and dung N deposited on pasture, range and paddock by grazing animals ± 50%, expert judgment; – N in crop residues including from N-fixing crops and from forages during pasture renewal ± 25%, expert judgment; – N mineralization associated with loss of soil organic matter ± 25%, expert judgment.
Potential Improvements	Potential improvements could include activities focused on obtaining more precise activity data and country specific coefficients and parameters used to estimate direct N_2O emissions from nitrogen mineralization associated with loss of soil carbon as a result of land-use or management change under the 3D 'Agriculture Soils' category.

Table 2.3.3.2: Information on Source Category 3D 'Agricultural Soils' – Indirect Soil Emissions – N_2O

Sector	Agriculture
Category	3D Agricultural Soils
Source / Gas	3Db. Indirect N_2O Soil Emissions / N_2O
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (Category 3Db Indirect N_2O Soil Emissions – aggregated for all sources)
Category Description / Definition	Indirect emissions consist from two pathways. The first of these pathways is the volatilization of N as NH_3 and oxides of N (NO_x), and the deposition of these gases and their products NH_4^+ and NO_3^- onto soils and the surface of lakes and other waters. The second pathway is the leaching and runoff from land of N from synthetic and organic fertilizer additions, crop residues, mineralization of N associated with loss of soil C in mineral and drained/managed organic soils through land-use change or management practices, and urine and dung deposition from grazing animals. This methodology described addresses the following N sources of indirect N_2O emissions from managed soils arising from agricultural inputs of N: – synthetic N fertilizers (F_{SN}); – organic N applied as fertilizer (e.g., animal manure, compost, sewage sludge, rendering waste) (F_{ON}); – urine and dung N deposited on pasture, range and paddock by grazing animals (F_{PRP}); – N in crop residues including from N-fixing crops and from forages during pasture renewal (F_{CR}); and – N mineralization associated with loss of soil organic matter (F_{SOM}).
Country Detail	The main sources of indirect N_2O soil emissions in the Republic of Moldova are as following – in 1990: N_2O emissions from leaching and runoff from managed soils in regions where leaching and runoff occurs (71.9%) and N_2O emissions from atmospheric deposition of N volatilized from managed soils (28.1%), while in 2019: N_2O emissions from leaching and runoff from managed soils in regions where leaching and runoff occurs (78.5%) and N_2O emissions from atmospheric deposition of N volatilized from managed soils (21.5%).
Equation (Describe variables for method used)	Tier 1 Methodology 2006 IPCC GL, Volume 4, Chapter 11, equation11.9 on page 11.21: $$N_2O_{ATD} = \{(F_{SN} \bullet Frac_{GASF}) + ((F_{ON} + F_{PRP}) \bullet Frac_{GASM})\} \bullet EF_4 \bullet 44/28$$ Where: N_2O_{ATD} – N_2O emissions from atmospheric deposition of N volatilized from managed soils; F_{SN} – annual amount of inorganic N fertilizers applied to soils (t N/yr); $Frac_{GASF}$ – fraction of inorganic fertilizers N that volatilizes as NH_3 and NO_x, t N volatilized (the default value is 0.1 t NH_3-N + NO_x-N/t N in inorganic N fertilizers applied to soils) (range from 0.03-0.3 t NH_3-N + NO_x-N/t N in inorganic N fertilizers applied to soils) (see also Table 11.3, page 11.24); F_{ON} – annual amount of managed animal manure, compost, sewage sludge and other organic N additions applied to soils (t N/yr); F_{PRP} – annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock (t N/yr); $Frac_{GASM}$ – fraction of applied organic N fertilizers materials (F_{ON}) and of urine and dung N deposited by grazing animals (F_{PRP}) that volatilizes as NH_3 and NO_x, (the default value is 0.2 t NH_3-N + NO_x-N/t N in manure) (range from 0.05 to 0.5 t NH_3-N + NO_x-N/t N in manure) (see also Table 11.3, page 11.24); EF_4 – emission factor for N_2O emissions from atmospheric deposition of N on soils and water surfaces (the default value is 0.01 t N_2O-N/t NH_3-N + NO_x-N volatilized) (range from 0.002 to 0.05 t N_2O-N/t NH_3-N and NO_x-N volatilized) (see also table 11.3, page 11.24); [44/28] – stoichiometric ratio of nitrogen content in N_2O-N and N_2O.

Equation (Describe variables for method used)	2006 IPCC GL, Volume 4, Chapter 11, equation11.10 on page 11.21: $N_2O_L = \{(F_{SN} + F_{ON} + F_{PRP} + F_{CR} + F_{SOM}) \cdot Frac_{LEACH-(H)}\} \cdot EF_5 \cdot 44/28$ Where: N_2O_L – N_2O emissions from leaching and runoff from managed soils in regions where leaching and runoff occurs; F_{SN} – annual amount of inorganic nitrogen fertilizers applied to soils (t N/yr); F_{ON} – annual amount of managed animal manure, compost, sewage sludge and other organic nitrogen applied to soils (t N/yr); F_{PRP} – annual amount of urine and dung nitrogen deposited by grazing animals on pasture, range and paddock (t N/yr); F_{CR} – nitrogen in crop residues (above- and below-ground), including N-fixing crops and forage/pasture renewal returned to soils (t N/yr); F_{SOM} – annual amount of nitrogen mineralized in mineral soils associated with loss of soil carbon from soil organic matter as a result of changes to land use or management (t N/yr); $Frac_{LEACH}$ – fraction of all nitrogen added to/mineralized in managed soils that is lost through leaching and run-off, kg N: the default value is 0.3 kg N/kg N additions or deposited by grazing animals (range: 0.1-0.8 t N/t N) (see also Table 11.3, page 11.24); EF_5 – emission factor for N_2O emissions from nitrogen leaching and run-off (the default value is 0.0075 t N_2O-N/t N leaching/runoff) (range: 0.0005-0.025 t N_2O-N/t N leaching / runoff) (see also Table 11.3, page 11.24); [44/28] – stoichiometric ratio of nitrogen content in N_2O-N and N_2O.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 11: N_2O Emissions from managed Soils, and CO_2 Emissions from Lime and Urea Application.
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because the CS EFs are not available.
Type and source of activity data	The activity data are the same as for source category 3Da Direct N_2O Soil Emissions.
Type and source of EF and OF	IPCC Default EFs are from 2006 IPCC GL, page 11.24, table 11.3: – EF_4 (N volatilization and re-deposition): 0.01 kg N_2O-N / kg NH_3-N + NO_x-N volatilized; – EF_5 (leaching / runoff): 0.0075 kg N_2O-N / kg N leaching/runoff; – $Frac_{GASF}$ (volatilization from synthetic fertilizer): 0.10 kg NH_3-N + NO_x-N / kg N in synthetic fertilizers applied to soils; – $Frac_{GASM}$ (volatilization from all organic N fertilizers applied and dung and urine deposited by grazing animals): 0.20 kg NH_3-N + NO_x-N / kg N applied or deposited; – $Frac_{LEACH}$ (N losses by leaching/runoff for regions where Σ (rain in rainy season) – Σ (PE in same period) > soil water holding capacity, or where irrigation (except drip irrigation) is employed): 0.3 kg N/kg N additions or deposited by grazing animals.
Uncertainty of AD and source	– atmospheric deposition of N volatilized from managed soils ± 70%, expert judgment; – N leaching and runoff from managed soils in regions where leaching and runoff occurs ± 75%, expert judgment
Uncertainty of EF and source	– atmospheric deposition of N volatilized from managed soils ± 150%, expert judgment; – N leaching and runoff from managed soils in regions where leaching and runoff occurs ± 150%, expert judgment
Potential Improvements	No potential improvements are planned to be implemented in the next inventory cycle for source category 3Db 'Indirect N_2O Soil Emissions'.

2.3.4. Category 3H 'Urea Application'

Table 2.3.4.1 below comprises relevant information on source allocated to category 3H 'Urea Application'.

Table 2.3.4.1: Information on Source Category 3H 'Urea Application' – CO_2

Sector	Agriculture
Category	3H Urea Application
Source / Gas	Urea Application / CO_2
Key Category?	No
Category Description / Definition	Adding urea to soils during fertilization leads to a loss of CO_2 that was fixed in the industrial production process. Urea ($CO(NH_2)_2$) is converted into ammonium (NH_4^+), hydroxyl ion (OH^-), and bicarbonate (HCO_3^-), in the presence of water and urease enzymes. Similar to the soil reaction following addition of lime, bicarbonate that is formed evolves into CO_2 and water.
Country Detail	No urea is produced in the Republic of Moldova. The urea consumption increased significantly since 1995 (82.7 tons) to 2019 (54,041.7 tons).

Equation (Describe variables for method used)	Tier 1 Methodology 2006 IPCC GL, Volume 4, Chapter 11, equation11.13 on page 11.32: $CO_2 = M \cdot EF \cdot 44/12$ Where: CO_2 – annual CO_2 emissions from urea application (kt/yr); M – annual amount of urea fertilization (kt urea/yr); EF – emission factor, tons C/tons urea (default value: 0.20 t C/t urea) (see on page 11.32, section 11.4.1 'Choice of method', Chapter 11, Volume 4, 2006 IPCC Guidelines); [44/12] – stoichiometric ratio of carbon content in CO_2-C and CO_2.
Reference	2006 IPCC Guidelines for national Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Lan Use, Chapter 11: N_2O Emissions from managed Soils, and CO_2 Emissions from Lime and Urea Application.
Describe How and Why this Method Was Chosen	The Tier 1 method has been chosen because this category is not a key source category and also because a CS EF is not available.
Type and source of activity data	Data on urea import in the Republic of Moldova are provided by the Custom Service of the Republic of Moldova.
Type and source of EF and OF	The IPCC default emission factor (0.20 t C / t urea) is from 2006 IPCC Guidelines (see on page 11.32, section 11.4.1 'Choice of method', Chapter 11: N_2O Emissions from managed Soils, and CO_2 Emissions from Lime and Urea Application.
Uncertainty of AD and source	± 30%, expert judgment
Uncertainty of EF and source	± 50%, expert judgment
Potential Improvements	Potential improvements could include updating AD used to estimate CO_2 emissions from urea application in the Republic of Moldova based on alternative sources of information (other than those provided by the Custom Service of the Republic of Moldova).

2.4. Land Use, Land-Use Change and Forestry Sector

Relevant information on categories comprised within the inventory, including description of each source and/or sink category allocated to Sector 4 'LULUCF' is provided below.

2.4.1. Category 4A 'Forest Land'

Tables 2.4.1.1 – 2.4.1.3 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4A 'Forest Land'.

Table 2.4.1.1: Information on Category 4A 'Forest Land' – CO_2

Sector	LULUCF
Category	4A Forest Land
Source and/or Sink Category / Gas	4A1 Forest Land Remaining Forest Land – CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T)
Category Description / Definition	According to the national definition, '*forest*' is an element of geographical landscape, a functional unit of the biosphere, composed of the totality of forest vegetation (dominated by trees and shrubbery), live layers, animals and microorganisms which are interdependent in their biological development and affect their habitat. Lands covered with forest vegetation occupying areas over 0.25 ha are regarded as forests. The minimal consistency of trees and shrubbery for the lands with forest vegetation to be considered forests should reach an operational level of 30 per cent. The consistency requirement should apply only to trees and shrubbery with a natural potential to reach a minimum height of 5 meters at maturity.
Country Detail	The 4A1 "Forest Lands Remaining Forest Lands" category covers estimation of CO_2 emissions/removals from the Republic of Moldova's forests, including above-ground and below-ground biomass (biomass increments in forests, losses from authorized and illegal harvesting etc.). In the Republic of Moldova, the areas covered with forests are 373.2 thousand ha in 2019 or circa 11.3 per cent of the country's territory. In order to ensure a constant ecological equilibrium and a stronger effect on the climate and hydrological conditions, enhance productivity of agricultural lands, forest lands should occupy at least 15 percent of the country's territory. The total volume of standing wood mass in the forests of the Republic of Moldova is circa 45.4 million m^3, on average 118 m^3 per hectare. The average forest increment is 3.8 m^3/year/ha, and the total average increment is circa 1,418.2 thousand m^3/year.

[18] Dry Matter.

Equation
(Describe variables for method used)

Methodology: Tier 2. Equations 2.9-2.13 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Pages 2.15-2.17):

1. Annual changes in carbon stocks due to biomass increment in forest land remaining forest land (in stem, branches, leaves, roots), using the following equation:

$$\Delta C_G = \sum (A \cdot G_{total} \cdot CF)$$

Where:

ΔC_G – annual changes in carbon stocks due to biomass increment in forest land remaining forest land, t C/yr;
A – area of forest land remaining forest land, ha;
CF – carbon fraction of dry matter;
G_{total} – annual biomass increment above and below-ground (t d.m.[18]/yr/ha), calculated using the following equation:

$$G_{total} = \sum \{Iv \cdot BCEF_I \cdot (1 + R)\}$$

Where:

Iv – net annual increment of growing stock, m^3/yr/ha;
R – below-ground biomass to above-ground biomass ratios;
$BCEF_I$ – biomass conversion and expansion factors.

In above-ground biomass increment for the appropriate group of species/vegetation (t of above-ground biomass increment/m^3 total current increments), estimated by formula:

$$BCEF_I = BEF_I \cdot D$$

Where:

BEF_I – biomass expansion factors for conversion of annual net increment to above-ground tree biomass increment;
D – basic wood density, t MC/m^3 volume for standing wood.

2. Annual decrease in carbon mass through biomass removals (from authorized felling and illegal logging, disturbances etc.), estimated by the following formula:

$$\Delta C_L = L_{felling} + L_{fuelwood} + L_{perturbations}$$

Where:

ΔC_L – annual decrease in carbon stocks due to biomass loss (felling and other losses), t C/yr;
$L_{felling}$ – annual carbon loss due to commercial felling, t C/yr;
$L_{fuelwood}$ – annual carbon loss due to fuel wood gathering, t C/yr;
$L_{perturbations}$ – annual carbon loss due to loss of biomass affected by disturbances (diseases and pests, natural calamities, mass droughts etc.), t C/yr.

The respective indicators were estimated by the following formula:

$$L_{felling} = \{H \cdot BCEF_R \cdot (1+R)\} \cdot CF$$

Where:

H – annual wood removals, m^3;
$BCEF_R$ – biomass conversion and expansion factors for extracted round wood (t of biomass extracted /m^3 extractions), which can be estimated by the following formula:

$$BCEF_R = D \cdot BEF_R$$

Where:

D – basic wood density (t MC/m^3 volume for standing wood);
BEF_R – biomass expansion factor for extracted round wood;

$$L_{fuelwood} = [\{FG_{trees} \cdot BCEF_R \cdot (1+R)\} + FG_{parts\ of\ trees} \cdot D] \cdot CF$$

Where:

FG_{trees} – annual volume of fuelwood removal of whole trees, m^3;
$FG_{parts\ of\ trees}$ – annual volume of fuelwood removal as parts of trees, m^3;
$BCEF_R$ – biomass conversion and expansion factors for extracted fuelwood (t of biomass extracted /m^3 extractions), which can be estimated by the following formula:

$$BCEF_R = D \cdot BEF_R$$

Where:

D – basic wood density (t d.m/m^3 volume for standing wood);
BEF_R – biomass expansion factor for fuel wood removals;

$$L_{perturbations} = \{A_{perturbations} \cdot BW \cdot (1 + R) \cdot CF \cdot fd\}$$

Where:

$A_{perturbations}$ – areas affected by disturbances (diseases and pests, natural calamities, mass droughts etc.), ha/yr;
BW – average of above-ground biomass of forest areas affected by disturbances, t d.m/ha;
R – below-ground biomass to above-ground biomass ratios;
CF – carbon fraction of dry matter;
fd – fraction of above-ground biomass lost in disturbance, t d.m/ha;

Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Pages 2.15-2.17)
Describe How and Why this Method Was Chosen	In principle, for both stages, the methodologies described in the 2006 IPCC Guidelines are applicable under the conditions of the RM. At the same time, country specific emission/removals factors were used, regarding annual biomass increment, the share of carbon in biomass etc., as well as sectorial activity data (forest land areas by species/categories of species, afforestation, wood mass harvesting etc.).
Type and source of activity data	Data on the areas of forest land in the Republic of Moldova, in the time series from 1990 through 2019, available into a series of national/sectorial reports on forestry resources (National Report on Forestry Resources of the Republic of Moldova (2011); General Land Cadasters for 1990-2019 periods; OSC Report on updating basic indicators for forest and other types of forest vegetation in the Republic of Moldova (2016); Land Use and Land Use-Change Matrix for 1970-2019 periods, beginning with 2013, information on the distribution of predominant forest species were taken from Forestry Research and Management Institute (ICAS) database. The volume of commercial timber, as well as the quantity of fuel wood gathered in the RM, revealed illegal logging (on other owners lands, inclusively), data being provided by the "Moldsilva" Agency, and the Inspectorate for Environmental Protection, as well as data available in the Statistical Yearbooks of the ATULBD on fuel wood harvests in forests on the left bank of Dniester river: Statistical Records/Reports of Agency "Moldsilva", Environmental Agency and of the Inspectorate for Environmental Protection for the 1990-2019 time series; D. Galupa, I. Talmaci, L. Spitoc, Study for the Republic of Moldova "Ensuring sustainability of forests and livelihoods through improving governance and control of illegal logging". Chisinau, Editorial Center of UASM, 2005, 116 pages; Statistical Yearbooks of the ATULBD (2000-2019); Galupa D., Ciobanu A., Scobioala M. et al. (2011), Illegal logging of forest vegetation in the Republic of Moldova. Analytical study, Chisinau, "Moldsilva" Agency, 38 pages.
Type and source of EF and OF	For to estimate annual biomass increments and losses, country specific emission factors were calculated/developed, were used production tables, data on actual productivity of stands, according to the forest planning records (Osadcev.G. Ivankov P.T., Sergovskii P.S. et al. (1955), Guidebook on Woodworking (for Forest Farms Consumer Goods Manufacturing Workshops). Moscow, 1955 (in Russian); Giurgiu V., Decei I., Armasescu S. Biometriy of Trees and Stands in Romania, 1972; Shvidenko A.Z., Savich J.N. (1987), Reference Materials for Evaluation of Forests in Ukraine and Moldova. Kiev, Urozhai, 1987 (in Russian); Kapp G., Velsen-Zerweck M., Horst A., Horn L., Galupa D. Talmaci I. et al.: The Baseline Study for the Soil Conservation Project in Moldova, 2003; Vanin S. I. (1949), Wood Science, Moscow (in Russian).
Uncertainty of AD and source	±15%, expert judgment
Uncertainty of EF and source	±5%, expert judgment
Potential Improvements	Data regarding the actual consumption of fuel wood from the managed forest land of the RM, as well as updating national emission/removal factors (basic wood density, biomass expansion factors etc.).

Species	Average annual net increments, m^3/ha	Basic wood density, t.d.m./m^3 fresh volume	Biomass expansion factor for current increments, BEF_1	Biomass expansion factor for commercial felling harvest, BEF_R	Root-shoot ratio appropriate to increments	Carbon fraction of dry matter	Fraction of biomass left to decay in forest,%
Quercus spp.	3.9	0.835	1.20	1.20	0.40	0.50	0.05
Carpinus spp.	5.0	0.85	1.20	1.10	0.35	0.50	0.05
Fraxinus spp.	4.4	0.72	1.20	1.20	0.28	0.49	0.05
Acer spp.	2.3	0.75	1.20	1.15	0.28	0.49	0.05
Ulmus spp.	2.9	0.70	1.20	1.15	0.28	0.49	0.05
Tilia spp.	6.4	0.55	1.20	1.15	0.21	0.50	0.05
Salix spp.	6.5	0.38	1.20	1.20	0.21	0.49	0.05
Pinus spp.	4.7	0.535	1.15	1.10	0.46	0.51	0.05
Populus spp.	5.2	0.51	1.20	1.20	0.21	0.50	0.05
Robinia spp.	3.2	0.78	1.20	1.20	0.28	0.49	0.05
Other species	3.0	0.70	1.20	1.15	0.28	0.50	0.05

Table 2.4.1.2: Information on Category 4A 'Forest Land' – CO_2

Sector	LULUCF
Category	4A Forest Land
Source and/or Sink Category / Gas	4A2 Land Converted to Forest Land – CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T)

Category Description / Definition	This category includes land (degraded land, non-productive agricultural land, etc.) subject to conversion to forests (afforestation). The category includes above-ground and below-ground biomass (biomass increment in new forests; losses / gains of biomass due to conversion), carbon losses (carbon losses / gains due to conversion).
Country Detail	The conversion to forest land included afforestation under the Moldova Soil Conservation Project (MSCP) and Moldova Community Forestry Development Project (MCFDP). Both projects are implemented under the Clean Development Mechanism (CDM) of the Kyoto Protocol, and have completed all national and international validation and registration procedures. Several goals are achieved within the respective projects: restoration of degraded land, improvement of local population supply with forest products and GHG absorption gain. The total area planted within these projects represent circa 28.8 thousand ha. The net CO_2 emissions reduction into the atmosphere will account for circa 4.8 million tons (MSCP – 3.6 million t; MCFDP – 1.2 million t).
Equation (Describe variables for method used)	Methodology: Tier 2 and Tier 3. For estimate CO_2 removals from 4A2 "Land Converted to Forest Land" is establishing current biomass increments (according to the results from the international monitoring and certification of MSCP and MCFDP). For estimations it was used Equation 2.15 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$$ Where: ΔC_B – annual change in carbon stocks in biomass on land converted to forest land, t C/yr; ΔC_G – annual increase in carbon stocks in biomass due to growth on land converted to forest land, t C/yr; $\Delta C_{Conversion}$ – initial change in carbon stocks in biomass resulting from the land-use conversion, t C/yr; ΔC_L – annual decrease in biomass carbon stocks due to losses from harvesting, fuel wood gathering and disturbances on land converted to forest land, disturbances t C/yr Initial changes in carbon stocks in biomass on land converted to forest land ($\Delta C_{Conversion}$) were estimated using Equation 2.16 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_{Conversion} = \sum\{(B_{After} - B_{Before}) \cdot \Delta A_{TO\ OTHERS}\} \cdot CF$$ Where: B_{After} – biomass stocks on land immediately after the conversion, t d.m./ha; B_{Before} – biomass stocks on land before the conversion, t d.m./ha; $\Delta A_{TO\ OTHERS}$ – area of land-use converted to forest land in a certain year, ha/yr; *CF* – carbon fraction of dry matter.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20)
Describe How and Why this Method Was Chosen	The estimation process considered increases in dead wood (litter) and in organic soil carbon since afforestation is primarily done on degraded land with a low fertility, with forest vegetation contributing substantially to carbon gain.
Type and source of activity data	General Land Cadasters for 1970-2019 periods; Land Use and Land Use-Change Matrix for 1970-2019 periods. PDD for MSCP and MCFDP; Annual Reports from Agency "Moldsilva" to the World Bank for 2004-2016 time series; Monitoring Reports from Agency "Moldsilva" for MSCP and MCFDP (2012; 2013; 2017; 2018).
Type and source of EF and OF	**Country specific emission factors have been used (Monitoring Reports from "Moldsilva" Agency for MSCP and MCFDP (2012; 2013; 2017; 2018)**

Indicators	Units	Value
Annual average carbon gains in biomass (trees and shrubs)	Mg C/ha/yr	1.74
Annual average carbon gains in dead wood (litter)	Mg C/ha/yr	0.41
Annual average organic carbon gains in soil	Mg C/ha/yr	0.32
Conversion period	years	20

Uncertainty of AD and source	±15%, expert judgment
Uncertainty of EF and source	±5%, expert judgment
Potential Improvements	Primary data on the categories of land converted to forest land.

Table 2.4.1.3: Information on Category 4A 'Forest Land' – CH_4, N_2O, NO_x and CO

Sector	LULUCF
Category	4A Forest Land
Source and/or Sink Category / Gas	4A2 Land Converted to Forest Land – CH_4, N_2O, NO_x and CO
Key Category?	No

Category Description / Definition	This category includes forests affected by different spontaneous or human-generated fires. Due to the specific features of local forests (predominance of deciduous species), this phenomenon is relatively limited.
Country Detail	Most fires are located in young forests or stands, in particular in the vicinity of croplands or localities.
Equation (Describe variables for method used)	The methodology used to estimate non-CO_2 emissions is a Tier 1 method (2006 IPCC Guidelines), applying the Equation 2.27 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.42) $L_{fire} = A \cdot M_B \cdot C_f \cdot G_{ef} \cdot 10^{-3}$ Where: L_{fire} – amount of GHG emissions (including non-CO_2) from fires, t/yr; A – area burnt, ha/yr; M_B – mass of fuel available for combustion, t/ha; C_f – combustion factor, the default value used is 0.45 (2006 IPCC Guidelines, Volume 4, Chapter 2, Table 2.6, Page 2.48); $M_B \cdot C_f$ – the amount of fuel actually burnt, its value, according to MSCP and MCFDP estimates is 32 632.6 kg d.m./ha; G_{ef} – emission factor, kg/t d.m. burnt.
Reference	2006 IPCC Guidelines, Volume 4, Chapter 2: Equation 2.27, Tables 2.5-2.6, Pages 2.42-2.48; Monitoring Reports from Agency "Moldsilva" for MSCP and MCFDP (2012-2013; 2017-2018).
Describe How and Why this Method Was Chosen	The methodology described in the IPCC 2006 Guideline is fully applicable to the Republic of Moldova, covering the entire calculation process.
Type and source of activity data	Activity data on forest land affected by fires are available in Statistical Yearbooks of the RM and those of the ATULBD (Statistical Yearbooks of the RM for 1994 (page 38), 1999 (page 20), 2007 (page 22), 2011 (page 22), 2014 (page 22), 2015 (page 22); NBS, Statistics for Geography and Environment (Forest Fires, as of November 1 (2010-2019); Statistical Yearbooks of the ATULBD for 2000 (page 88), 2002 (page 91), 2007 (page 81), 2009 (page 80), 2011 (page 82), 2014 (page 78), 2015 (page 88), 2016 (page 88), 2017 (page 91), 2020 (page 92).
Type and source of EF and OF	**EFs for different forest types, kg GHG / t d.m (2006 IPCC Guidelines, Volume 4, Chapter 2, Table 2.5, Page 2.47)**

	CO	CH_4	N_2O	NO_x
Temperate Forests	107	4.7	0.26	3.0

Uncertainty of AD and source	±10%, expert judgment
Uncertainty of EF and source	±30%, expert judgment
Potential Improvements	For the next inventory cycles, it will be considered to improve emission factors from forest fires, but also national forest fire records, in particular for land outside the Agency „Moldsilva".

2.4.2. Category 4B 'Cropland'

Tables 2.4.2.1 – 2.4.2.3 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4B 'Cropland'.

Table 2.4.2.1: Information on Category 4B 'Cropland' – CO_2

Sector	LULUCF
Category	4B Cropland
Source and/or Sink Category / Gas	4B1 Cropland Remaining Cropland (4B1.1 Cropland Covered with Woody Vegetation and 4B1.2 Annual Change in Carbon Stocks in Mineral Soils) – CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T)
Category Description / Definition	Under the 4B category there are reported CO_2 emissions/removals estimates originated from two sub-categories: 4B1 "Cropland Remaining Cropland". For a clearer exposition of the calculation exercise for the 4B1 "Cropland Remaining Cropland" category, the obtained results are presented separately for three subcategories: 4B1.1 "Cropland Covered with Woody Vegetation", 4B1.2 "Annual Change in Carbon Stocks in Mineral Soils".
Country Detail	The 4B1.1 "Cropland Covered with Woody Vegetation" category comprises CO_2 removals/emissions from cropland covered with woody vegetation, including above-ground and below-ground biomass in protection forest strips, trees and shrubs plantations, other types of forest vegetation, as well as from perennial plantations: orchards, vineyards, trees from private gardens etc. Under the 4B1.2 "Annual Change in Carbon Stocks in Mineral Soils" category there are reported CO_2 emissions from mineral soils. This source has a significant share in the total emissions from the sector 4 'LULUCF', as according the General Land Cadaster of the Republic of Moldova (standing as of 01.01.2020), this source includes arable lands with a share of over 55.2 per cent of the total, which is 1868.68 thousand ha. It should be mentioned that over the period from 1990 through 2019, the areas of arable lands remained relatively constant, increasing only by 7 per cent.

Equation (Describe variables for method used)	Methodology: Tier 2 For estimating CO2 removals/emissions within the source 4B1.1 "Cropland Covered with Woody Vegetation" under the 4B1 "Cropland Remaining Cropland", it was necessary to determine current biomass increments in woody vegetation not included in forestry resources and perennial plantations, according to production tables, forest planning, scientific sources, data from "Moldova Agricultural Competitiveness Project" (MACP). The calculation was done based on annual change in carbon stocks as a result of perennial woody crops growth (in stem, shoots, leaves and roots), by using Equations 2.9 – 2.14 from the 2006 IPCC Guidelines (pages 2.14 – 2.18). The process had two steps: 1. Annual change in carbon stocks as a result of perennial woody crops growth (in stem, shoots, leaves and roots), using the general equation: $\Delta CG = \sum (A \bullet G\ total \bullet CF)$ Where: ΔCG – annual increase in biomass carbon stocks due to biomass growth in land remaining in the same land-use category (perennial plantations), t C/yr; A – area of perennial plantations remaining in the same land-use category, ha; CF – carbon fraction of dry matter; $G\ total$ – total annual biomass growth (t d.m./yr/ha). 2. Annual decrease in carbon stocks due to biomass losses (from wood removal (harvest)/authorized and illegal logging), using the general equation: $\Delta CL = L\ felling + L\ fuelwood + L\ perturbations$ Where: ΔCL – annual decrease in carbon stocks due to biomass loss (harvesting/felling and other types of removals), t C/yr; $L\ felling$ – annual biomass loss due to wood removals, t C/yr; $L\ fuelwood$ – annual biomass carbon loss due to fuelwood removals, t C/yr; $L\ perturbations$ – annual biomass carbon loss due to disturbances (diseases, pests, natural disasters, mass droughts etc.), t C/yr. In order to estimate emissions within the category 4B1.2 "Annual Change in Carbon Stocks in Mineral Soils" it was used a Tier 2 approach and Equation 2.25 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.30): $\Delta C_{Mineral} = (SOC_0 - SOC_{(0-T)}) / T$ Where, $\Delta C_{Mineral}$ – annual change in carbon stocks in mineral soils, t C/yr; SOC_0 – soil organic carbon stock in the last year of an inventory period, t C; $SOC_{(0-T)}$ – soil organic carbon stock at the beginning of the inventory time period, t C; T – time dependence of stock change factors which is the default time period for transition from equilibrium SOC values, yr (was used the period of 20 years). In order to estimate CO_2 emissions from annual change in carbon stocks in mineral soils the following equation was used: $CO_2 = \Delta C_{Mineral} \bullet 44/12$ Where, CO_2 – emissions from carbon losses in mineral soils due to land-use change for cropland and soil management practices, Gg/yr;, $[44/12]$ – stoichiometric ration between carbon content in CO_2 and C.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Pages 2.15 – 2.18, Page 2.30, Pages 2.40-2.49)
Describe How and Why this Method Was Chosen	The calculation methods used to estimate CO_2 removals/emissions from 4B1 "Cropland Remaining Cropland" were those available in the 2006 IPCC Guidelines. At the same time, country specific emission/removal factors were used regarding the annual biomass increments, the share of carbon in biomass etc., as well as AD by sector (area covered with forest stripes, trees and shrubs plantations, orchards, vineyards, wood harvesting, area of mineral soils used for agriculture).
Type and source of activity data	General Land Cadasters for 1970-2019 periods; Land Use and Land Use-Change Matrix for 1970-2019 periods. The evidences of Inspectorate for Environmental Protection. Data from "Moldova Agricultural Competitiveness Project" (MACP). Evolution of Wood Harvested from Other Types of Woody Vegetation in the RM within 1990-2019 periods.
Type and source of EF and OF	In order to estimate annual biomass increments and losses in perennial woody crops, country specific emission factors were developed. Calculation of such factors was based on production tables, data on productivity of protection forest belts taken from data accounting and forest planning records, as well as data from scientific literature on perennial plantations management (Ukrainian Forest Management Service: Forestry Resources of the Moldavian Soviet Socialist Republic, standing as of 1.01.1988, Irpeni, 1988; Gh. Vdovii, D. Galupa et al. (1997), National Report on Forestry Resources of the Republic of Moldova, Giurgiu V., Decei I., Armasescu S. Biometry of Trees and Stands in Romania, 1972; Kapp G., Velsen-Zerweck M., Horst A., Horn L., Galupa D. Talmaci I. et al.: The Baseline Study for the Moldova Soils Conservation Project, 2003; National GHG Inventory Report for Hungary, 2014).

Uncertainty of AD and source	±10, expert judgment
Uncertainty of EF and source	±10, expert judgment
Potential Improvements	For the next inventory cycle it will be considered the possibility to improve records pertaining to actual volume of wood from forest stripes management as well as other types of forest vegetation and also activities aimed at verification of emission/removal factors specific to perennial plantations (current biomass increments, biomass harvesting during the cleaning cuttings).

Table 2.4.2.2: Information on Category 4B 'Cropland' – CO_2

Sector	LULUCF
Category	4B Cropland
Source and/or Sink Category / Gas	4B2 Land Converted to Cropland – CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L)
Category Description / Definition	The 4B "Cropland" category includes a wide range of arable lands with the primary goal of cultivating different types of crops and/or protecting them against unfavorable climatic factors. Thus, within this category the following types of arable lands are included: perennial plantations (vineyards and orchards, including fruit trees nurseries, woody vegetation in individual gardens); other forest vegetation, including forest protection stripes and green areas; arable soils.
Country Detail	For a clearer exposition of the calculation exercise for the 4B2 "Land Converted to Cropland" subcategory includes lands subject to conversion which previously had a certain volume of biomass (forests, grasslands, perennial plantations, forest stripes) or lacked vegetation (settlements, wetlands).The 4B2 "Land Converted to Cropland" subcategory includes lands subject to conversion which previously had a certain volume of biomass (forests, grasslands, perennial plantations, forest stripes) or lacked vegetation (settlements, wetlands).
Equation (Describe variables for method used)	Methodology: Tier 2 In order to estimate CO_2 removals/emissions from the 4B2 "Land Converted to Cropland" category there were calculated carbon stock in biomass (losses and increments) due to the conversion of land from natural conditions and other uses to cropland, including deforestation, conversion of pasture and grazing lands as well as perennial plantations to cropland etc. At the same time, estimates for this category also included N_2O emissions resulting from conversion of grassland to cropland. In the process of assessing the annual change in carbon stocks due to the conversion of different types of land to cropland Equation 2.15 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20) was used: $$\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$$ Where: ΔC_B – annual change in carbon stocks in biomass on land converted to cropland, t C/yr; ΔC_G – annual increase in carbon stocks in biomass due to growth on land converted to cropland, t C/yr; $\Delta C_{Conversion}$ – initial change in carbon stocks in biomass resulting from the land-use conversion, t C/yr; ΔC_L – annual decrease in biomass carbon stocks due to the conversion to cropland, t C/yr. Initial changes in carbon stocks in biomass on land converted to forest land ($\Delta C_{Conversion}$) were estimated using Equation 2.16 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_{Conversion} = \sum\{(B_{After} - B_{Before}) \cdot \Delta A_{TO\ OTHERS}\} \cdot CF$$ Where: B_{After} – biomass stocks on land immediately after the conversion, t d.m.//ha; B_{Before} – biomass stocks on land before the conversion, t d.m./ha; $\Delta A_{TO\ OTHERS}$ – area of land-use converted to cropland in a certain year, ha/yr; *CF* – carbon fraction of dry matter. At the same time, the estimation process considered increases in dead wood (litter) and in organic soil carbon, since the change in land-use category has a major impact on the respective stocks. Non-CO_2 emissions (N_2O) resulting from the conversion of grassland to cropland were estimated using Equation 11.8 from the 2006 IPCC Guidelines (Volume 4, Chapter 11, page 11.16): $$F_{SOM} = \sum_{LU} [(\Delta C_{Mineral,\ LU} \cdot 1/R) \cdot 1000]$$ Where: F_{SOM} – the net annual amount of N mineralized in mineral soils as a result of loss of soil carbon through change in land use or management, kg N; $\Delta C_{Mineral,LU}$ – average annual loss of soil carbon for each land-use type (*LU*), tones C; *R* – *C:N* ratio of the soil organic matter. A default value of 15 for the *C:N* ratio (R) may be used for situations involving land-use change from Forest Land or Grassland to Cropland, in the absence of more specific data for the area. A default value of 10 may be used for situations involving management changes on Cropland Remaining Cropland; *LU* – land-use and/or management system type. AD on areas subject to conversion to this category are available in the General Land Cadaster of the RM, and are included in the Land Use and Land Use-Change Matrix for 1970-2019 periods. The main types of land converted to cropland are grassland and settlements.

Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Pages 2.14 – 2.18, Page 2.20, Page 2.30, Pages 2.40-2.49); Chapter 11, page 11.16).
Describe How and Why this Method Was Chosen	The calculation methods used to estimate CO_2 removals/emissions were those available in the 2006 IPCC Guidelines. At the same time, country specific emission/removal factors were used regarding the annual biomass increments, the share of carbon in biomass etc., as well as AD by sector (area covered with forest stripes, trees and shrubs plantations, orchards, vineyards, wood harvesting, area of mineral soils used for agriculture).
Type and source of activity data	General Land Cadasters for 1970-2019 periods; Land Use and Land Use-Change Matrix for 1970-2016 periods. The evidences of Inspectorate for Environmental Protection. Data from "Moldova Agricultural Competitiveness Project" (MACP). Evolution of Wood Harvested from Other Types of Woody Vegetation in the RM within 1990-2019 periods
Type and source of EF and OF	Country specific EFs were calculated/developed in order to establish the annual increments/losses of biomass and carbon stocks in soil on lands subject to conversion to cropland. Calculation of such factors was based on production tables including data on productivity of protection forest belts taken from data accounting and forest planning records, "Moldsilva" Agency Monitoring Reports on MSCP and MCFDP from 2012; 2013; 2017; 2018, as well as data from scientific literature on biomass increments and perennial plantations management ("Soil Quality Monitoring in the Republic of Moldova (database, conclusions, forecasts, recommendations), 2010; Miron A., Vedutenco D. et al., Report on drafting management plans for grasslands in Orhei National Park, 2014; National GHG Inventory Report for Hungary, 2014; "Moldsilva" Agency Reports on MSCP and MCFDP monitoring from 2012; 2013; 2017; 2018).
Uncertainty of AD and source	±10, expert judgment
Uncertainty of EF and source	±10, expert judgment
Potential Improvements	It is planned to carry out activities aimed at reducing uncertainties associated with the results obtained under the respective source category, including by improving the country specific methodology (Banaru, 2000) and improving the quality of used activity data, in order to make possible estimation of CO_2 emissions/removals from "Annual Change in Carbon Stocks in Mineral Soils".

Table 2.4.2.3: Information on Category 4B 'Cropland' – CH_4, N_2O, NO_x, CO

Sector	LULUCF
Category	4B Cropland
Source and/or Sink Category / Gas	4B1.3. Non-CO_2 Emissions from Post-Harvest Field Burning of Crop Residues (stubble fields burning)
Key Category?	No.
Category Description / Definition	Under the 4B1.3. "Non-CO_2 Emissions from Post-Harvest Field Burning of Agricultural Residues (Stubble Fields Burning)" only non-CO_2 emissions (CH_4, N_2O, NO_x and CO) are monitored under this category (as CO_2 emissions are not regarded as a source of emissions, carbon emitted in atmosphere is considered to be re-absorbed in the following agricultural cycle).
Country Detail	4B1.3 "Non-CO_2 Emissions from Post-Harvest Field Burning of Agricultural Residues (stubble fields burning)". The activity data on areas sown with grain crops (wheat and barley) are available in the Statistical Yearbooks of the Republic of Moldova and those of ATULBD. The information on post-harvest field burning of crop residues (stubble fields burning) cases in the RM is reported annually by the State Ecological Inspectorate's territorial inspectors. The activity data on the amount of crop residues available to be combusted on field were inferred from information on average crop yield per hectare, by multiplying it to the dry matter fraction in the basic yield of the respective crop (default value is 0.89). While estimating the amount of agricultural residues available for combustion on site, a mean arithmetic value between wheat and barley was used which is closely related to the average yield per hectare, actually reported in the Republic of Moldova over the reference period.
Equation (Describe variables for method used)	Non-CO_2 emissions from post-harvest field burning of crop residues (stubble fields burning) within the 4B "Cropland" were estimated by using a Tier 1 methodology (2006 IPCC Guidelines, Vol. 4, Chapter 2.4, Pages 2.40-2.49), based on Equation 2.27 (2006 IPCC Guidelines, Vol. 4, Chapter 2, Page 2.42): $L\ fire = A \bullet MB \bullet Cf \bullet Gef \bullet 10^{-3}$ Where: *L fire* – amount of non-CO_2 greenhouse gas emissions from vegetation fires (field burning of crop residues or stubble fields burning), t/yr; *A* – area burnt, ha/yr; *MB* – mass of fuel available for combustion, t/ha; *Cf* – combustion factor; IPCC default value is 0.90 (2006 IPCC Guidelines, Volume 4, Chapter 2, Table 2.6, Page 2.49); *MB* • *Cf* – amount of fuel actually burnt; default for "Crop Residues" (post-harvest field burning), in particular, for wheat and barley residues, which are more frequently burned in the Republic of Moldova, is 4 t.d.m./ha; *Gef* – default EF (g/kg d.m.)
Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Pages 2.40-2.49); Statistical Yearbooks of the Republic of Moldova and those of ATULBD.
Describe How and Why this Method Was Chosen	The amount of crops residues vary in different years, and depend on crops and management technologies. It should be noted that though burning of stubble fields is prohibited by law, this practice still persists in the RM. Crop residues are burnt in fields to clear the stubble fields from the straw left after reaping (in the RM, stubble fields are most often burnt after reaping of wheat and barley) and to prepare the fields for the next agricultural cycle.

Type and source of activity data	Activity data on forest land affected by fires are available in Statistical Yearbooks of the RM and those of the ATULBD (Statistical Yearbooks of the RM for 1994 (page 38), 1999 (page 20), 2007 (page 22), 2011 (page 22), 2014 (page 22), 2015 (page 22); NBS, Statistics for Geography and Environment (Forest Fires, as of November 1 (2010-2019); Statistical Yearbooks of the ATULBD for 2000 (page 88), 2002 (page 91), 2007 (page 81), 2009 (page 80), 2011 (page 82), 2014 (page 78), 2015 (page 88), 2016 (page 88), 2017 (page 91), 2019 (page 89), 2020 (page 92).
Type and source of EF and OF	EFs for Field Burning of Crop Residues, g/kg d.m. (2006 IPCC Guidelines (Volume 4, Chapter 2, Table 2.5, Page 2.47)
Uncertainty of AD and source	±10%, expert judgment
Uncertainty of EF and source	±50%, expert judgment
Potential Improvements	No improvements are planned for this category.

2.4.3. Category 4C 'Grassland'

Tables 2.4.3.1 – 2.4.3.2 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4C 'Grassland'.

Table 2.4.3.1: Information on Category 4C 'Grassland' – CO_2

Sector	LULUCF
Category	4C Grassland
Source and/or Sink Category / Gas	4C1 Grassland Remaining Grassland – CO_2
Key Category?	No
Category Description / Definition	Subcategory 4C1 "Grassland Remaining Grassland" includes land which has always been covered with perennial herbaceous vegetation and used as pastures or hayfields, land covered with perennial herbaceous vegetation from other categories of use (land under improvement and fertility restoration; landslides) as well as land transformed into pastures more than 20 years ago.
Country Detail	Based on the inventory surveys of the grasslands from the National Park Orhei (EU/UNDP "Clima East" Project, 2014-2016), Soroca and Stefan Voda districts ("Integration of Biodiversity Conservation Priorities into Territorial Planning Policies and Land Use Practices in Moldova, 2015-2016" Project) it is observed that grasslands (pastures and hayfields) in these areas, like most in the RM are managed traditionally in an extensive and unsystematic way. The practiced system is characterized by minimal care work, or even by total lack and by the lack of correlation between the production capacity of grasslands and their loading with animals. For this reason, grasslands cannot be fully used due to under-exploitation/sub-loading with animals (which is why the invasion of grassland with spontaneous shrubby vegetation occurs) or can be overloaded, failing to provide sufficient food for the entire livestock.
Equation (Describe variables for method used)	Methodology: Tier 1. The Tier 1 approach from the 2006 IPCC Guidelines does not imply the use of equations.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 6, Pages 6.6-6.7)
Describe How and Why this Method Was Chosen	For the grasslands with a relatively constant productivity over time, where has been no intervention in order to increase the productivity, the Tier 1 approach from the 2006 IPCC Guidelines considers the biomass stock in balance, respectively, the stock does not change in time and space on a national scale. Thus, CO_2 emissions/removals from grassland remaining grassland are not estimated.
Type and source of activity data	The main source of references for the areas of these lands is the General Land Cadaster of the RM for the reporting period.
Type and source of EF and OF	Country specific EFs have been used (Forest Research and Management Institute Reports (2014-2016) on Grassland Inventory within the Orhei National Park)
Uncertainty of AD and source	± 15%, expert judgment
Uncertainty of EF and source	± 10%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of land use categories to which converted lands are transferred to, will be considered for the next inventory cycles in the Republic of Moldova.

Table 2.4.3.2: Information on Category 4C 'Grassland' – CO_2

Sector	LULUCF
Category	4C Grassland
Source and/or Sink Category / Gas	4C2 Land Converted to Grassland – CO_2

Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T)
Category Description / Definition	The "Land Converted to Grassland" category includes land with forest vegetation, arable land, perennial plantations (vineyards and orchards), as well as wetlands (marshes, wetlands saturated by water), settlements converted to grasslands in the last 20 years.
Country Detail	Conversion of cropland to grassland is a regular process over the past 50 years in the Republic of Moldova, because a considerable part of cropland is severely affected by erosion and reached to an extremely low level of economic efficiency of cropping.
Equation (Describe variables for method used)	Methodology: Tier 2. Equation 2.15 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$ Where: ΔC_B – annual change in carbon stocks in biomass on land converted to grassland, t C/yr; ΔC_G – annual increase in carbon stocks in biomass due to growth on land converted to grassland, t C/yr; $\Delta C_{Conversion}$ – initial change in carbon stocks in biomass on land converted to grassland, t C/yr; ΔC_L – annual decrease in biomass carbon stocks on land converted to grassland, due to grass/biomass harvest, disturbances t C/yr. Initial changes in carbon stocks in biomass on land converted to grassland ($\Delta C_{Conversion}$) were estimated using Equation 2.16 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $\Delta C_{Conversion} = \sum\{(B_{After} - B_{Before}) \cdot \Delta A_{TO\ OTHERS}\} \cdot CF$ Where: B_{After} – biomass stocks on land immediately after the conversion, t d.m.//ha; B_{Before} – biomass stocks on land before the conversion, t d.m./ha; $\Delta A_{TO\ OTHERS}$ – area of land-use converted to land use category in a certain year, ha/yr; CF – carbon fraction of dry matter.
Reference	2006 IPCC Guidelines, (Volume 4, Chapter 2, Page 2.20)
Describe How and Why this Method Was Chosen	GHG emissions/removals from this category result from land-use change, changes in land management thus eliminating the existing vegetation and its replacement with grassland vegetation. GHG inventory for land categories converted to grassland includes the assessment of changes in carbon stocks for the following carbon pools: biomass, litter, soil. In order to estimate CO_2 removals in biomass on land converted to grassland, the annual increments in perennial herbaceous vegetation on newly-formed grasslands, as well as the differences of initial biomass for land previously covered with forest vegetation were established, according to the available data at national level.
Type and source of activity data	In order to estimate CO_2 emissions/removals from the conversion of different land categories in grassland, from the General Land Cadaster of the RM, as well as the Reports of the "Moldsilva" Agency and the Reports of the Inspectorate for Environmental Protection, have been taken the areas of cropland and wetlands converted to grassland, as well as forest areas and other types of forest vegetation destroyed by illegal logging.
Type and source of EF and OF	Country specific emission factors have been used (Giurgiu V., Decei I., Armasescu S. Biometry of Trees and Rammels in Romania, 1972; Kapp G., Velsen-Zerweck M., Horst A., Horn L., Galupa D. Talmaci I. et al.: The baseline study for the „Soils Conservation Project in Moldova", 2003; Official Monitor Nr. 46-49, Government Resolution Nr. 367 from 13.04.2000, 'On approval the National Program to Combat Desertification 2000'; National GHG Inventory Report for Hungary, 2014; "Soil Quality Monitoring in the Republic of Moldova (database, conclusions, forecasts, recommendations)", 2010)
Uncertainty of AD and source	± 15%, expert judgment
Uncertainty of EF and source	± 10%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of land use categories to which converted lands are transferred to, will be considered for the next inventory cycles in the Republic of Moldova.

2.4.4. Category 4D 'Wetlands'

Tables 2.4.4.1 – 2.4.4.2 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4D 'Wetlands'.

Table 2.4.4.1: Information on Category 4D 'Wetlands' – CO_2

Sector	LULUCF
Category	4D Wetlands
Source and/or Sink Category / Gas	4D1 Wetlands Remaining Wetlands – CO_2
Key Category?	No

Category Description / Definition	The 4D1 "Wetlands Remaining Wetlands" category include any land that is covered or saturated by water for all or only a part of the year (for example, marshes), and does not fall into the Forest Land, Cropland, Grassland or Settlements categories. It also includes storage water reservoirs - managed ponds, as well as unmanaged natural lakes and rivers and lands subject to internal conversion, not generating essential changes in carbon stocks, maintaining a steady balance.
Country Detail	Due to the particularities of lands in the RM included in the 4D1 "Wetlands Remaining Wetlands" category (land without forest/herbaceous vegetation and/or no management activities contributing to essential changes in carbon stocks) a neutral balance was established in the main carbon stocks (above- and below-ground biomass, dead organic matter, soils).
Equation (Describe variables for method used)	The Tier 1 approach from the 2006 IPCC Guidelines does not imply the use of equations.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 7, Page 7.20)
Describe How and Why this Method Was Chosen	A neutral balance was established in the main carbon stocks (above- and below-ground biomass, dead organic matter, soils).
Type and source of activity data	AD on areas within this category are available in the General Land Cadaster of the RM and are also included in the Land Use and Land Use-Change Matrix for 1970-2019 periods.
Type and source of EF and OF	No emission factors were used.
Uncertainty of AD and source	± 10%, expert judgment
Uncertainty of EF and source	± 10%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of initial land use categories from which they were converted to wetlands, will be considered for the next inventory cycles in the Republic of Moldova.

Table 2.4.4.2: Information on Category 4D 'Wetlands' – CO_2

Sector	LULUCF
Category	4D Wetlands
Source and/or Sink Category / Gas	4D2 Land Converted to Wetlands – CO_2
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (T)
Category Description / Definition	Category 4D2 "Land Converted to Wetlands" include different land types which were previously covered by a certain amount of biomass and other land without initial vegetation converted to wetlands. The main land categories converted to wetlands are croplands and grasslands.
Country Detail	Category of biomass loss was establish due to conversion of different land types which were previously covered by a certain amount of biomass (forest vegetation, grassland, perennial plantations etc.). At the same time, were estimated biomass increments due to conversion of different land types without initial vegetation (other land).
Equation (Describe variables for method used)	Methodology: Tier 2. The calculation process of CO_2 removals/emissions is based on the annual increments in carbon stocks due to current biomass growth, and uses Equation 2.15 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$$ Where: ΔC_B – annual change in carbon stocks in biomass on land converted to wetlands, t C/yr; ΔC_G – annual increase in carbon stocks in biomass due to growth on land converted to wetlands, t C/yr; $\Delta C_{Conversion}$ – initial change in carbon stocks in biomass on land converted to wetlands, t C/yr; ΔC_L – annual decrease in biomass carbon stocks on land converted to wetlands, due to grass/biomass harvest, disturbances t C/yr. Initial changes in carbon stocks in biomass on land converted to wetlands ($\Delta C_{Conversion}$) were estimated using Equation 2.16 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_{Conversion} = \sum\{(B_{After} - B_{Before}) \cdot \Delta A_{TO\ OTHER}\} \cdot CF$$ Where: B_{After} – biomass stocks on land immediately after the conversion, t d.m./ha; B_{Before} – biomass stocks on land before the conversion, t d.m./ha; $\Delta A_{TO\ OTHERS}$ – area of land-use converted to land use category in a certain year, ha/yr; CF – carbon fraction of dry matter.
Reference	2006 IPCC Guidelines, (Volume 4, Chapter 2, Page 2.20; Chapter 7, Page 7.20).
Describe How and Why this Method Was Chosen	In order to estimate CO_2 removals/emissions a biomass loss was establish due to conversion of different land types which were previously covered by a certain amount of biomass (forest vegetation, grassland, perennial plantations etc.). At the same time, were estimated biomass increments due to conversion of different land types without initial vegetation (other land).

Type and source of activity data	AD on areas subject to conversion within this category are available in the General Land Cadaster of the RM and are also included in the Land Use and Land Use-Change Matrix for 1970-2019 periods.
Type and source of EF and OF	**Country specific emission factors have been used**

Conversion	Indicators	Period, years	Units	Indicators Value
Grassland to Wetlands	Annual average carbon increments in biomass (herbaceous cover)	year 1	Mg C/ha/yr	0.0
	Annual average carbon increments in dead organic matter (litter)	year 1	Mg C/ha/yr	0.0
	Annual average increments in soil organic carbon	years 1-20	Mg C/ha/yr	0.0
Other land to Wetlands	Annual average carbon increments in biomass (herbaceous cover)	year 1	Mg C/ha/yr	4.2
	Annual average carbon increments in dead organic matter (litter)	year 1	Mg C/ha/yr	0.0
	Annual average increments in soil organic carbon	years 1-20	Mg C/ha/yr	2.4818

Uncertainty of AD and source	± 10%, expert judgment
Uncertainty of EF and source	± 10%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of initial land use categories from which they were converted to wetlands, will be considered for the next inventory cycles in the Republic of Moldova.

2.4.5. Category 4E 'Settlements'

Tables 2.4.5.1 – 2.4.5.3 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4E 'Settlements'.

Table 2.4.5.1: Information on Category 4E 'Settlements' – CO_2

Sector	LULUCF
Category	4E Settlements
Source and/or Sink Category / Gas	4E1 Settlements Remaining Settlements – CO_2.
Key Category?	No
Category Description / Definition	The category include all developed land (constructions, streets, yards, markets and parks, roads etc.), including transportation infrastructure and all size settlements if they are not accounted in another land-use category.
Country Detail	Basically, this category include areas covered with vegetation. Depending on the type of vegetation, a part of land inside settlements was included in 4B "Cropland" (parks, public gardens, green areas, perennial plantations etc.) and 4C "Grassland" (pastures and hayfields) categories.
Equation (Describe variables for method used)	Methodology: Tier 1 The 4E1 "Settlements Remaining Settlements" category includes lands without forest/herbaceous vegetation and/or no management activities contributing to essential changes in carbon stocks); thus, a neutral balance was established in the main carbon stocks (above- and below-ground biomass, dead organic matter, soils).
Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Page Pages 2.19 - 2.20, Chapter 8, Page 8.7)
Describe How and Why this Method Was Chosen	This approach was applied because the methodology proposed by the IPCC Guidance 2006 is currently the only relevant solution for RM. A neutral balance was established in the main carbon stocks (above- and below-ground biomass, dead organic matter, soils).
Type and source of activity data	AD on areas within this category are available in the General Land Cadaster of the RM and are also included in the Land Use and Land Use-Change Matrix for 1970-2019 periods.
Type and source of EF and OF	N/A
Uncertainty of AD and source	±10%, expert judgment
Uncertainty of EF and source	N/A
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) will be considered for the next inventory cycles in the Republic of Moldova.

Table 2.4.5.2: Information on Category 4E 'Settlements' – CO_2

Sector	LULUCF
Category	4E Settlements
Source and/or Sink Category / Gas	4E2 Land Converted to Settlements – CO_2.
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T)
Category Description / Definition	This category include a biomass loss of carbon in soils was established due to conversion of different land types which were previously covered by a certain amount of biomass (forest vegetation, grassland, perennial plantations etc.). The calculation process of CO_2 removals/emissions is based on the annual increments in carbon stocks due to current biomass growth.
Country Detail	In the RM the conversion of land to settlements has their priority cropland, grassland and other land.
Equation (Describe variables for method used)	Methodology: Tier 2. From calculations uses Equation 2.15 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$ Where: ΔC_B – annual change in carbon stocks in biomass on land converted to settlements, t C/yr; ΔC_G – annual increase in carbon stocks in biomass due to growth on land converted to settlements, t C/yr; $\Delta C_{Conversion}$ – initial change in carbon stocks in biomass on land converted to settlements, t C/yr; ΔC_L – annual decrease in biomass carbon stocks on land converted to settlements, due to grass/biomass harvest, disturbances t C/yr. Initial changes in carbon stocks in biomass on land converted to settlements ($\Delta C_{Conversion}$) were estimated using Equation 2.16 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $\Delta C_{Conversion} = \sum\{(B_{After} - B_{Before}) \cdot \Delta A_{TO\ OTHERS}\} \cdot CF$ Where: B_{After} – biomass stocks on land immediately after the conversion, t d.m.//ha; B_{Before} – biomass stocks on land before the conversion, t d.m./ha; $\Delta A_{TO\ OTHERS}$ – area of land-use converted to land use category in a certain year, ha/yr; CF – carbon fraction of dry matter.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20);
Describe How and Why this Method Was Chosen	The methodology described in the IPCC 2006 Guideline is fully applicable to the Republic of Moldova, covering the entire calculation process.
Type and source of activity data	AD on areas within this category are available in the General Land Cadaster of the RM and are also included in the Land Use and Land Use-Change Matrix for 1970-2016 periods.
Type and source of EF and OF	Country specific emission factors were developed (within EU/UNDP "Clima East" Project, respectively based on two other CDM Projects: MSCP and MCFDP, as well as from other relevant information) in order to estimate annual biomass increments / losses on land converted to settlements.
Uncertainty of AD and source	±10%, expert judgment
Uncertainty of EF and source	±10%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of initial land use categories from which they were converted to settlements, will be considered for the next inventory cycles in the Republic of Moldova.

Table 2.4.5.3: Information on Category 4E 'Settlements' – N_2O

Sector	LULUCF
Category	4E Settlements
Source and/or Sink Category / Gas	4E2 Land Converted to Settlements – N_2O
Key Category?	No
Category Description / Definition	This category estimates non-CO_2 emissions from the conversion of different land categories to the 4E 'Settlements' category.
Country Detail	For this category of inventory on the RM, non-CO_2 emissions come from the conversion of grassland to settlements.

Equation (Describe variables for method used)	Non-CO_2 emissions (N_2O) resulting from the conversion of grassland to settlements were estimated using Equation 11.8 from the 2006 IPCC Guidelines (Volume 4, Chapter 11, page 11.16): $F_{SOM} = \sum_{LU} [(\Delta C_{Mineral, LU} \cdot 1/R) \cdot 1000]$ Where, F_{SOM} – the net annual amount of N mineralized in mineral soils as a result of loss of soil carbon through change in land use or management, kg N; $\Delta C_{Mineral, LU}$ – average annual loss of soil carbon for each land-use type (LU), tones C; R – C:N ratio of the soil organic matter. A default value of 15 for the C:N ratio (R) may be used for situations involving land-use change from Forest Land or Grassland to Cropland, in the absence of more specific data for the area. A default value of 10 may be used for situations involving management changes on Cropland Remaining Cropland; LU – land-use and/or management system type.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 11, page 11.16).
Describe How and Why this Method Was Chosen	Country specific emission factors were developed (within EU/UNDP "Clima East" Project, respectively based on two other CDM Projects: MSCP and MCFDP, as well as from other relevant information) in order to estimate annual biomass increments / losses on land converted to settlements.
Type and source of activity data	AD on areas subject to conversion within this category are available in the General Land Cadaster and are also included in the Land Use and Land Use-Change Matrix for 1970-2019 periods. The main land categories converted to settlements are croplands and grasslands.
Type and source of EF and OF	There are default factors established according to the 2006 IPCC Guidelines (Volume 4, Chapter 11, page 11.16).
Uncertainty of AD and source	±10%, expert judgment
Uncertainty of EF and source	±30%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of initial land use categories from which they were converted to settlements, will be considered for the next inventory cycles in the Republic of Moldova.

2.4.6. Category 4F 'Other Land'

Tables 2.4.6.1 – 2.4.6.2 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4F 'Other Land'.

Table 2.4.6.1: Information on Category 4F 'Other Land' – CO_2

Sector	LULUCF
Category	4F Other Land
Source and/or Sink Category / Gas	4F1 Other Land Remaining Other Land – CO_2;
Key Category?	No
Category Description / Definition	The 4F "Other Land" category includes in particular bare soil, ravines, pits, rock, etc., as well as all land that do not fall into any of the other categories 4A-4E (for example, river banks, rocks). This category is also used to close the sum of areas from the total official land of the country.
Country Detail	N/A.
Equation (Describe variables for method used)	Methodology: Tier 1. Due to the particularities of lands in the RM included in the 4F1 "Other Land Remaining Other Land" category (land without forest/herbaceous vegetation and/or no management activities contributing to essential changes in carbon stocks) a neutral balance was established in the main carbon stocks (above- and belowground biomass, dead organic matter, soil).
Reference	2006 IPCC Guidelines (Volume 4, Chapter 9, Pages 9.4 – 9.5)
Describe How and Why this Method Was Chosen	A neutral balance was established in the main carbon stocks (above- and below-ground biomass, dead organic matter, soils).
Type and source of activity data	AD on areas within this category are available in the General Land Cadaster of the RM and are also included in the Land Use and Land Use-Change Matrix for 1970-2016 periods.
Type and source of EF and OF	No emission factors were used.
Uncertainty of AD and source	±10%, expert judgment
Uncertainty of EF and source	±10%, expert judgment
Potential Improvements	N/A.

Table 2.4.6.2: Information on Category 4F 'Other Land' – CO_2

Sector	LULUCF
Category	4F Other Land
Source and/or Sink Category / Gas	4F2 Land Converted to Other Land – CO_2
Key Category?	No
Category Description / Definition	The 4F2 "Land Converted to Other Land" category a biomass loss was establish due to conversion of different land types which were previously covered by a certain amount of biomass (forest vegetation, grassland, perennial plantations etc.).
Country Detail	The main land categories converted to other land are forest lands, grasslands and croplands – arable soils.
Equation (Describe variables for method used)	Methodology: Tier 2. From calculation uses Equation 2.15 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_B = \Delta C_G + \Delta C_{Conversion} - \Delta C_L$$ Where: ΔC_B – annual change in carbon stocks in biomass on land converted to other land, t C/yr; ΔC_G – annual increase in carbon stocks in biomass due to growth on land converted to other land, t C/yr; $\Delta C_{Conversion}$ – initial change in carbon stocks in biomass on land converted to other land, t C/yr; ΔC_L – annual decrease in biomass carbon stocks on land converted to other land, due to grass/biomass harvest, disturbances t C/yr. Initial changes in carbon stocks in biomass on land converted to other land ($\Delta C_{Conversion}$) were estimated using Equation 2.16 from the 2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20): $$\Delta C_{Conversion} = \sum\{(B_{After} - B_{Before}) \cdot \Delta A_{TO\ OTHERS}\} \cdot CF$$ Where: B_{After} – biomass stocks on land immediately after the conversion, t d.m.//ha; B_{Before} – biomass stocks on land before the conversion, t d.m./ha; $\Delta A_{TO\ OTHERS}$ – area of land-use converted to land use category in a certain year, ha/yr; CF – carbon fraction of dry matter.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 2, Page 2.20; Chapter 9, Page 9.4-9.9)
Describe How and Why this Method Was Chosen	The calculation process of CO_2 removals/emissions is based on the annual increments in carbon stocks due to current biomass growth.
Type and source of activity data	AD on areas subject to conversion within this category are available in the General Land Cadaster of the RM and are also included in the Land Use and Land Use-Change Matrix for 1970-2019 periods.
Type and source of EF and OF	Country specific emission factors were developed within two CDM Projects: MSCP and MCFDP, as well as from other relevant information in order to estimate annual biomass increments/losses on land converted to other land.
Uncertainty of AD and source	± 10%, expert judgment
Uncertainty of EF and source	± 10%, expert judgment
Potential Improvements	The possibility to improve the cadastral records (as the main reference sources for AD) pertaining to specification of initial land use categories from which they were converted to other land, will be considered for the next inventory cycles in the RM. At the same time, it is necessary to analyze the input and output process of land within the 4F "Other Land" category, including in terms of establishing the average conversion period.

2.4.7. Category 4G 'Harvested Wood Products'

Table 2.4.7.1 below comprise relevant information on source and/or sink categories comprised within the inventory, including description of each source and/or sink by gas allocated to category 4G 'Harvested Wood Products'.

Table 2.4.7.1: Information on Category 4G 'Harvested Wood Products' – CO_2

Sector	LULUCF
Category	4G Harvested Wood Products
Source and/or Sink Category / Gas	4G Harvested Wood Products – CO_2
Key Category?	Tier 1: Yes: 2019 (T); Tier 2: Yes: 2019 (T)
Category Description / Definition	Category includes CO_2 removals/emissions from wood products harvested/processed, imported or exported (rough round wood; saw logs, timber, wood panels) used in the national economy.
Country Detail	In the RM, wood harvesting from forests takes place during the process of tending cutting (spacing, cleaning, thinning and hygiene cuts), final harvesting (regeneration cuts, preservation, hygiene) and ecological reconstruction.
Equation (Describe variables for method used)	For 4G "Harvested Wood Product" category a Tier 1 approach was used (2006 IPCC Guidelines), respectively default emission/removal factors. For the calculations, the IPCC „HWP Calculator" module ("Production Approach") was used.
Reference	2006 IPCC Guidelines (Volume 4, Chapter 12, Page 12.29-12.30).
Describe How and Why this Method Was Chosen	This approach was selected due to deficiencies related to activity data, especially for the period 1961-1991.
Type and source of activity data	AD regarding 1961-2019 time series on wood products included in 4G "Harvested Wood Products" are partly available in the official statistics of the RM, in particular for 1961-1993 periods. For 1994-2019 time series AD from FAOSTAT database were used.
Type and source of EF and OF	**Emission/removal factors were used according to the 2006 IPCC Guidelines (Volume 4, Chapter 12, Table 12.2, Page 12.17 and Table 12.4, Page 12.19)**

Categories	Indicators	Units	Indicators Value
Period of use	Solid wood products (timber, saw logs and veneer, rough round wood, wood panels etc.)	years	30.0
	Paper products	years	3.0
Conversion factor	Timber, other types of round wood (saw logs and veneer, etc.)	t C/m^3	0.5
	Wood panels	t C/m^3	0.295
	Paper and cardboards	t C/t	0.45

Uncertainty of AD and source	± 30%, expert judgment
Uncertainty of EF and source	± 10%, expert judgment
Potential Improvements	The possibility to improve the statistical records (as the main reference sources for AD) pertaining to wood products production/export/import will be considered for the next inventory cycles in the Republic of Moldova.

2.5. Waste Sector

Relevant information on categories comprised within the inventory, including description of each category allocated to Sector 5 'Waste' is provided below.

2.5.1. Category 5A 'Solid Waste Disposal'

Tables 2.5.1.1-2.5.1.2 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 5A 'Solid Waste Disposal'.

Table 2.5.1.1: Information on Category 5A 'Solid Waste Disposal' – CH_4

Sector	Waste
Category	5A Solid Waste Disposal
Source / Gas	5A1. Managed waste disposal sites – CH_4 5A2. Unmanaged waste disposal sites – CH_4 5A3. Uncategorized waste disposal sites – CH_4
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (source category 5A Solid Waste Disposal – aggregated for all sources)
Category Description/Definition	Treatment and disposal of municipal, industrial and other solid waste produces significant amounts of methane (CH_4). In addition to CH_4, solid waste disposal sites (SWDS) also produce biogenic carbon dioxide (CO_2) and non-methane volatile organic compounds (NMVOCs) as well as smaller amounts of nitrous oxide (N_2O), nitrogen oxides (NO_x) and carbon monoxide (CO). Decomposition of organic material derived from biomass sources (e.g., crops, wood) is the primary source of CO_2 released from waste. These CO_2 emissions are not included in national totals, because the carbon is of biogenic origin and net emissions are accounted for under the AFOLU Sector. Within the 5A1 Waste disposal sites is monitored CH_4 emissions from solid waste disposal in landfills. The methane generating potential depends on the morphological composition of the MSW and on the disposal practices and type of landfills (managed or unmanaged).
Country Detail	The spreadsheet keeps a running total of the amount of decomposable DOC in the disposal site, taking account of the amount deposited each year and the amount remaining from previous years. This is used to calculate the amount of DOC decomposing to CH_4 and CO_2 each year. The model then calculates the amount of CH_4 generated from the DDOCm, and subtracts the CH_4 recovered and CH_4 oxidized in the cover material to give the amount of CH_4 emitted. Calculation is based on waste composition data. The amounts of each type of degradable waste material (food, garden and park waste, paper and cardboard, wood, textiles, etc.) in MSW are entered separately.
Equation (Describe variables for method used.)	Tier 3 methodological approach - the methane emissions estimation is based on the first-order decomposition method (IPCC FOD) method using a mix of default and CS parameters. Methane emissions were calculated according to Equation 3.1 of the IPCC 2006 Guidelines (Volume 5, Chapter 3, p. 3.8): $$\text{Emissions } CH_4 = [\Sigma_x CH_4 \text{ generated}_{x,T} - R_T] \bullet (1-OX_T)$$ Where: Emissions CH4 - Methane emissions in year T, thousand tons; T - year of inventory; x - category or type of waste; R_T - methane recovered in the inventory year T, thousand tons; OX_T - oxidation factor in year T (fraction).
Reference	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (IPCC, 2006), Volume 5, Chapter 3, pages 3.1-3.40.
Describe How and Why this Method Was Chosen	Due to the importance of this source and availability of CS parameters and EFs, the Tier 3 methodology has been used.
Type and source of activity data	Amount of waste generated and transported to landfills (kt) – National Statistical Bureau of the Republic of Moldova. Half-lives and k: IPCC default for wet and temperate climate **CS values for DOC and DOCf values are provided in the table below:**

	DOC	DOCf
1986	0.2069	0.5178
1993	0.1891	0.5258
1996	0.1522	0.5667
1999	0.1091	0.6353
2001	0.1009	0.6207
2003	0.1201	0.6277
2005	0.1410	0.5935
2012	0.1405	0.4985
2016	0.1475	0.4204

Type and source of activity data	**National values for fraction of methane are provided in the table below:** C --> CH4 / C --> CO2 1986: 0.5315 / 0.4685 1993: 0.5400 / 0.4600 1996: 0.5453 / 0.4547 1999: 0.5545 / 0.4455 2001: 0.5510 / 0.4490 2003: 0.5452 / 0.4548 2005: 0.5563 / 0.4437 2012: 0.5423 / 0.4577 2016: 0.5524 / 0.4476 Delay time (months) = 6 Methane conversion factor (MCF) = 1 (managed); 0.8 (unmanaged deep); 0.4 (unmanaged shallow) Oxidation factor = 0 Methane recovery (MRj) - Annual Reports on the Activity of the National Agency for Energy Regulation, <http://anre.md/ro/reports/8>.
Type and source of EF and OF	Country Specific Emission Factors values, as reported in the Chapter 7 'Waste' of the 'National Inventory Report: 1990-2019. Greenhouse Gas Sources and Sinks in the Republic of Moldova' (2021).
Uncertainty of AD and source	± 30% - expert judgement (based on the 2006 IPCC GL)
Uncertainty of EF and source	± 40% - expert judgement (based on the 2006 IPCC GL)
Potential Improvements	Among the main priorities is the need to foster improved statistical recording related to waste. Waste management will be essentially restructured. Thus, in the period 2018-2020, several legislative acts were adopted for the coherent application of the Law on Waste, 209/2016, in particular Government Decision on approval Waste list no. 99/2018, which transposes the Commission Decision 2000/532 / EC. At the same time, the approach to waste data record keeping was reviewed, by approving the Government Decision no. 501/2018 on the Instruction on records keeping and reporting of waste data and information on waste management, and Government Decision no. 682/2018 on approving the Concept of Automated Waste Management Information System and the reporting system has been developed - www.siamd.gov.md. It must be acknowledged, however, that 2020 was the first reporting year in the new system and the information gathered does not reflect the real situation in the field of waste management. Thus, for example, the volumes of MSW generated in rural localities are not subject to statistical records, as there are usually no registered waste collection services. In addition, although there are waste processing companies operating in the Republic of Moldova, the information on the quantities of recycled waste is not subject to strict statistical records. Taking into account the tendency of the Republic of Moldova to align with EU standards, the sector is to be essentially restructured. In this context, most MSW deposits are to be re-cultivated, and their number - drastically reduced. With regard to the elaboration of the next reports to the United Nations Framework Convention on Climate Change, the activity data will be updated, in particular the coefficient of transformation of the quantity of MSW from m^3 to kt. In recent years, the share of packaging has increased, and according to the data provided by waste collection service from Chisinau, $1m^3$ of MSW corresponds to 180-200 kg, which will cause the revision of the coefficient of 0.4 kg / 1 m^3 of MSW and to reduce it. In the next period, it is expected to assess the activity data reported in the Automated Information System National Pollutant Release and Transfer Register and the Waste Management Automated Information System. It is also proposed to update the study on the morphological composition of municipal solid waste in Chisinau, Causeni and Straseni, with the involvement of the Environmental Reference Laboratory of the Environmental Agency. At the same time, it will be necessary to weigh the waste trucks in order to deduce the coefficient of transformation of the volume of MSW. Another aspect that needs to be mentioned is the recently adopted Law no. 89/2020 on the ratification of the Financing Agreement between the Republic of Moldova and the European Investment Bank regarding the implementation of the project "Solid waste in the Republic of Moldova". Through this agreement signed on October 18, 2019 between the European Investment Bank and the Government of the Republic of Moldova, a loan of 100 million euros will be granted for the improvement of solid waste management services in the country. The first installment is EUR 25 million. The Agreement aims to implement the Waste Management Strategy 2013-2027 in the Republic of Moldova, involving projects aimed at modernizing and developing solid waste management systems in eight regions of the country. The projects will provide the localities with new collection systems, mechanical-biological waste treatment facilities and new regional sanitary warehouses for the whole country. The projects will aim to reduce the negative impact on the environment and human health, by modernizing waste collection systems and separate collection of recyclable materials and bio-waste, as well as rehabilitating or closing landfills. Regional landfills will be equipped with biogas recovery systems.

Table 2.5.1.2: Information on Category 5A 'Solid Waste Disposal' – NMVOC

Sector	Waste
Category	5A Solid Waste Disposal

Source / Gas	5A1. Managed waste disposal sites – NMVOC 5A2. Unmanaged waste disposal sites – NMVOC 5A3. Uncategorized waste disposal sites – NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	In addition to CH_4, solid waste disposal sites (SWDS) also produce non-methane volatile organic compounds (NMVOCs), which are considered to be GHG precursors.
Country Detail	NMVOC emissions from SWDS were estimated using the methodological approach available in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), based on default emission factors.
Equation (Describe variables for method used)	NMVOC Emissions were calculated according to the Equation 1, EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019, Category 5A "Biological treatment of waste – solid waste disposal on land" (page 5): $NMVOC\ Emissions = W \cdot EF \cdot 10^{-6}$ Where: NMVOC Emissions – NMVOC emissions in inventory year, kt / yr; W – amount of solid waste disposed, kt / yr; EF – emission factor, kg NMVOC / kt of waste; 10^{-6} – conversion factor, from kg to kt
Reference	EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Section 5.A 'Biological treatment of waste – solid waste disposal on land', pages 1-7
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Amount of waste generated and transported to landfills (kt) – National Statistical Bureau of the Republic of Moldova.
Type and source of EF and OF	EF default value used - 1.56 kg NMVOC/t of solid waste, as available in the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 5A "Biological treatment of waste – solid waste disposal on land", Table 3-1, page 5.
Uncertainty of AD and source	± 30% - expert judgement
Uncertainty of EF and source	± 20% - expert judgement (based on EMEP/EEA Air Pollutant Emission Inventory Guidebook, 2019).

2.5.2. Category 5B 'Biological Treatment of Solid Waste'

Tables 2.5.2.1-2.5.2.3 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 5B 'Biological Treatment of Solid Waste'.

Table 2.5.2.1: Information on Category 5B 'Biological Treatment of Solid Waste'– CH_4

Sector	Waste
Category	5B 'Biological Treatment of Solid Waste'
Source / Gas	5B1 Composting – CH_4
Key Category?	No
Category Description/Definition	Composting is an aerobic process and a large fraction of the degradable organic carbon (DOC) in the waste material is converted into carbon dioxide (CO_2). CH_4 is formed in anaerobic sections of the compost, but it is oxidized to a large extent in the aerobic sections of the compost. The estimated CH4 released into the atmosphere ranges from less than 1 percent to a few per cent of the initial carbon content in the material.
Country Detail	Emission estimation for Category 5B "Biological treatment of solid waste" has been carried out for the first time in this inventory cycle, this process can be improved in the following cycles. The composting of waste is not a common practice in our country, being used only at municipal level in Chisinau. This it is characteristic for householders in the rural areas, mainly for the manure and vegetable waste.

Equation (Describe variables for method used.)	The CH_4 emissions were calculated according to the Equation 4.1 of the 2006 IPCC Guidelines, Vol. 5, page 4.5: $CH_4 \text{ Emissions} = \Sigma_i (M_i \bullet EF_i) \bullet 10^{-3} - R$ Where: CH_4 Emissions - CH_4 emissions in inventory year, kt / yr; Mi - mass of organic waste treated by biological treatment type i, Gg EF - emission factor for treatment i, g CH_4/kg waste treated i - composting or anaerobic digestion R - total amount of CH_4 recovered in inventory year, Gg CH_4 10^{-3} - conversion factor from kg to kt.
Reference	IPCC 2006 Guidelines, Vol. 5, pages 4.4-4.8.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Amount mass of organic waste treated by biological treatment – Municipal entities responsible for the waste collection. Assumption on share of biodegradable waste composted, based on generated MSW.
Type and source of EF and OF	EFs default value used – 4 kg CH_4/kg waste treated – available in the 2006 IPCC Guidelines, Vol. 5, Chapter 4, page 4.6.
Uncertainty of AD and source	± 50% - expert judgement (based on IPCC 2006 Guidelines)
Uncertainty of EF and source	± 50% - expert judgement (based on IPCC 2006 Guidelines)
Potential Improvements	As the estimation of emissions for category 5B "Biological treatment of solid waste" was performed for the first time in this inventory cycle, this process can be improved in the following cycles. Thus, for example, the practices of composting organic waste at national level are to be specified, in order to determine the existence of these platforms in urban and rural localities, especially where there are collection services. In the same time, with the implementation of a new integrated waste management system, waste composting facilities shall be created, which would considerably reduce the impact on the environment and take control of biogas emissions from the new systems.

Table 2.5.2.2: Information on Category 5B 'Biological Treatment of Solid Waste' – N_2O

Sector	5 Waste
Category	5B 'Biological Treatment of Solid Waste'
Source / Gas	5B1 Composting – N_2O
Key Category?	No
Category Description/Definition	Composting is an aerobic process and a large fraction of the degradable organic carbon (DOC) in the waste material is converted into carbon dioxide (CO_2). Composting can also produce emissions of N_2O. The range of the estimated emissions varies from less than 0.5 percent to 5 percent of the initial nitrogen content of the material. Poorly working composts are likely to produce more both of CH_4 and N_2O.
Country Detail	Emission estimation for Category 5B "Biological treatment of solid waste" has been carried out for the first time in this inventory cycle, this process can be improved in the following cycles. The composting of waste is not a common practice in our country, being used only at municipal level in Chisinau. This it is characteristic for householders in the rural areas, mainly for the manure and vegetable waste.
Equation (Describe variables for method used.)	The emission of N_2O were calculated according to the Equation 5.5 of the IPCC 2006 Guidelines, Vol. 5, page 5.14, $N_2O \text{ Emissions} = \Sigma_i (M_i \bullet EF_i) \bullet 10^{-3}$ Where: N_2O Emissions – N_2O emissions in inventory year, kt/yr; Mi – mass of organic waste treated by biological treatment type i, Gg; EF_i – N_2O emission factor, kg N_2O/kt waste type i; 10^{-3} – conversion factor, from kg to kt; i – category or type of waste incinerated/open-burned, specified as follows: MSW – municipal solid waste; ISW: industrial solid waste; HW: hazardous waste; CW: clinical waste, SS: sewage sludge; others (to be specified).

Reference	IPCC 2006 Guidelines, Vol. 5, pages 4.5-4.6.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Amount mass of organic waste treated by biological treatment – Municipal entities responsible for the waste collection. Assumption on share of biodegradable waste composted, based on generated MSW.
Type and source of EF and OF	EFs default value used – 0.24 kg N_2O/t of MSW – available in the 2006 IPCC Guidelines, Vol. 5, Chapter 4, Table 5.6, page 4.6.
Uncertainty of AD and source	± 50% - expert judgement (based on 2006 IPCC Guidelines)
Uncertainty of EF and source	± 50% - expert judgement (based on 2006 IPCC Guidelines)
Potential Improvements	As the estimation of emissions for category 5B "Biological treatment of solid waste" was performed for the first time in this inventory cycle, this process can be improved in the following cycles. Thus, for example, the practices of composting organic waste at national level are to be specified, in order to determine the existence of these platforms in urban and rural localities, especially where there are collection services. In the same time, with the implementation of a new integrated waste management system, waste composting facilities shall be created, which would considerably reduce the impact on the environment and take control of biogas emissions from the new systems.

Table 2.5.2.3: Information on Category 5B 'Biological Treatment of Solid Waste' – CO

Sector	5 Waste
Category	5B 'Biological Treatment of Solid Waste'
Source / Gas	5B1 Composting – CO
Key Category?	No
Category Description/Definition	Composting and anaerobic digestion of organic waste, such as food waste, garden (yard) and park waste and sludge, is common both in developed and developing countries. Advantages of the biological treatment include: reduced volume in the waste material, stabilization of the waste, destruction of pathogens in the waste material, and production of biogas for energy use. The end products of the biological treatment can, depending on its quality, be recycled as fertilizer and soil amendment, or be disposed in SWDS. Waste composting can be a source of GHG gases, including of CO.
Country Detail	Emission estimation for Category 5B "Biological treatment of solid waste" has been carried out for the first time in this inventory cycle, this process can be improved in the following cycles. The composting of waste is not a common practice in our country, being used only at municipal level in Chisinau. This it is characteristic for householders in the rural areas, mainly for the manure and vegetable waste.
Equation (Describe variables for method used.)	The CO emission were calculated according to the EMEP / EEA Guide to Inventory of Atmospheric Emissions (2019), $CO\ Emissions = W \bullet EF \bullet 10^{-6}$ Where: CO Emissions – CO emissions in inventory year, kt/yr; M – mass of organic waste treated, kt/year; EF_i – CO emission factor, kg CO/kt waste type i; 10^{-6} – conversion factor, from kg to kt.
Reference	EMEP / EEA Guide to Inventory of Atmospheric Emissions, 2019
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Amount mass of organic waste treated by biological treatment – Municipal entities responsible for the waste collection. Assumption on share of biodegradable waste composted, based on generated MSW.
Type and source of EF and OF	EFs default value used – 0.56 kg CO/t of MSW – available in the EMEP / EEA Guide to the Inventory of Atmospheric Emissions (2019), Source Category 5.B1 "Biological treatment of waste - composting", Table 3-2, page 6).
Uncertainty of AD and source	± 50% - expert judgement (based on 2006 IPCC Guidelines)
Uncertainty of EF and source	± 50% - expert judgement (based on 2006 IPCC Guidelines)

Potential Improvements	Transposition of Commission Decision 2000/532/EC on the List of wastes, including hazardous waste, pursuant to the Waste Act, no. 209 of 29.07.2016 will create premises for improving waste management activity data. The practice of composting organic waste at national level is to be further assessed, in order to determine the existence of such practice in urban and rural localities, especially where there are sanitation services. The implementation of a new integrated waste management system will contribute to the development of waste composting facilities, which would considerably reduce the impact on the environment and take control of biogas emissions from the new systems.

2.5.3. Category 5C 'Incineration and Open Burning of Waste'

Tables 2.5.3.1-2.5.3.4 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 5C 'Incineration and Open Burning of Waste'.

Table 2.5.3.1: Information on Category 5C 'Incineration and Open Burning of Waste' – CO_2

Sector	5 Waste
Category	5C Incineration and Open Burning of Waste
Source / Gas	5C2 Open burning of waste – CO_2
Key Category?	No
Category Description/Definition	Open burning of waste can be defined as the combustion of unwanted combustible materials such as paper, wood, plastics, textiles, rubber, waste oils and other debris in nature (open-air) or in open dumps, where smoke and other emissions are released directly into the air without passing through a chimney or stack. Open burning can also include incineration devices that do not control the combustion air to maintain an adequate temperature and do not provide sufficient residence time for complete combustion. This waste management practice is used in many developing countries while in developed countries open burning of waste may either be strictly regulated, or otherwise occur more frequently in rural areas than in urban areas. Only CO_2 emissions resulting from oxidation, during incineration and open burning of carbon in waste of fossil origin (e.g., plastics, certain textiles, rubber, liquid solvents, and waste oil) are considered net emissions and should be included in the national CO_2 emissions estimate. The CO_2 emissions from combustion of biomass materials (e.g., paper, food, and wood waste) contained in the waste are biogenic emissions and should not be included in national total emission estimate.
Country Detail	The incineration of waste practice is predominantly characteristic to rural areas, both in households and on landfills in order to reduce the volume of solid waste disposed, mainly by burning organic waste (paper, cardboard, plastics and vegetable waste).
Equation (Describe variables for method used.)	The CO_2 emissions were calculated according to the Equation 5.2 of 2006 IPCC Guidelines, Vol. 5, page 5.7: $CO_2\ Emissions = MSW \cdot \Sigma_j (WF_j \cdot dm_j \cdot CF_j \cdot FCF_j \cdot OF_j) \cdot 44/12$ Where: CO_2 Emissions – CO_2 emissions in inventory year, kt/yr; MSW – total amount of municipal solid waste as wet weight incinerated or open-burned, kt/yr; WF_j – fraction of waste type/material of component j in the MSW as wet weight incinerated or open-burned; dm_j – dry matter content in the component j of the MSW incinerated or open-burned; CF_j – fraction of carbon in the dry matter (carbon content) of component j; FCF_j – fraction of fossil carbon in the total carbon of component j; OF_j – oxidation factor; 44/12 – conversion factor from C to CO_2. When: $\sum WF_j = 1$, j – component of the MSW incinerated/open-burned such as paper and cardboard, textiles, food waste, wood, garden (yard) and park waste, disposable nappies, rubber and leather, plastics, metal, glass, other inert waste.

Equation (Describe variables for method used.)	The amount of waste open-burned each year was estimated using Equation 5.7 from the 2006 IPCC Guidelines (Vol. 5, Chapter 5.3.2, page 5.16): $MSW_B = P \cdot P_{frac} \cdot MSW_P \cdot B_{frac} \cdot 365 \cdot 10^{-6}$ Where: MSW_B – total amount of municipal solid waste open-burned, kt/yr; P – population, capita; P_{frac} – fraction of population burning waste (fraction); MSW_P – per capita waste generation, kg waste/capita/day; B_{frac} – fraction of the waste amount that is burned relative to the total amount of waste treated (fraction); 365 – number of days per year 10^{-6} – conversion factor from kg to kt Methodology: Tier 1
Reference	2006 IPCC Guidelines, Vol. 5, pages 5.5-5.11.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Population number – National Statistical Bureau of the Republic of Moldova. Amount of clinical waste generated and burned – the number of beds – from National Statistical Bureau of the Republic of Moldova, the clinical waste generation per bed – estimated on the basis of data provided by National Public Health Agency of the Ministry of Health of the Republic of Moldova related to quantity of clinical waste generated per institution. Daily ratio of generated MSW - Waste Management Strategy of the Republic of Moldova 2013-2027 and estimations on the basis of the data from the National Statistical Bureau.
Type and source of EF and OF	**EFs are calculated from default parameters from 2006 IPCC Guidelines, Vol. 5, Table 2.4 and 5.2**

	Unit	Wood and paper	MSW	Clinical waste	Other industrial
dm (%)	%	85	90	35	50
CF	%	50	3	60	50
FCF	%	0	100	40	90
OF	%	100	100	100	100
EF	kg C/t waste	425	27	84	225

	EF kg CO_2/t waste = EF kg C/t waste • 44/12
Uncertainty of AD and source	± 40% - expert judgement (based on 2006 IPCC Guidelines)
Uncertainty of EF and source	± 25% - expert judgement (based on 2006 IPCC Guidelines)
Potential Improvements	Transposition of Commission Decision 2000/532/EC on the List of wastes, including hazardous waste, pursuant to the Waste Act, no. 209 of 29.07.2016 will create premises for improving waste management activity data. Thus, in the perspective of the coming years, the economic agents that treat the waste thermally will be obliged to report waste management data in Waste Management Automated Information System. It will therefore be possible to improve the quality of activity data used to assess emissions from source category 5C "Waste Incineration and Burning". Other important document is the GD No. 501 of 29.05.2018 on approval the Instruction on evidence and transmission of data and information waste management and management. Adoption of the List of waste, including hazardous waste was done by GD no 99 of 30.01.2018. It will help to improve the national statistical records waste management according to EU requirements and will allow meeting the commitments the Republic of Moldova has made while ratifying international treaties on environmental protection and effective reporting on their coherent implementation. The implementation of the integrated waste management system, which will involve separate collection of waste, will reduce the amount of combustible waste which is open burnt in landfills or at home by the population.

Table 2.5.3.2: Information on Category 5C 'Incineration and Open Burning of Waste' – CH_4

Sector	Waste
Category	5C Incineration and Open Burning of Waste
Source / Gas	5C2 Open burning of waste – CH_4

Key Category?	No
Category Description/Definition	Open burning of waste can be defined as the combustion of unwanted combustible materials such as paper, wood, plastics, textiles, rubber, waste oils and other debris in nature (open-air) or in open dumps, where smoke and other emissions are released directly into the air without passing through a chimney or stack. Open burning can also include incineration devices that do not control the combustion air to maintain an adequate temperature and do not provide sufficient residence time for complete combustion. This waste management practice is used in many developing countries while in developed countries open burning of waste may either be strictly regulated, or otherwise occur more frequently in rural areas than in urban areas. Methane emissions from incineration and open burning of waste are a result of incomplete combustion. Important factors affecting the emissions are temperature, residence time, and air ratio (air volume in relation to the waste amount).
Country Detail	The incineration of waste practice is predominantly characteristic to rural areas, both in households and on landfills in order to reduce the volume of solid waste disposed, mainly by burning organic waste (paper, cardboard, plastics and vegetable waste).
Equation (Describe variables for method used.)	The CH_4 emissions were calculated according to the Equation 5.4 of the 2006 IPCC Guidelines, Vol. 5, page 5.12: $CH_4 \text{ Emissions} = \Sigma_i (IW_i \bullet EF_i) \bullet 10^{-6}$ Where: CH_4 Emissions – CH_4 emissions in inventory year, kt / yr; IW_i – amount of solid waste of type i incinerated or open-burned, kt / yr; EF_i – aggregate CH4 emission factor, kg CH4 / kt waste type I; 10^{-6} – conversion factor, from kg to kt; i – category or type of waste incinerated/open-burned, specified as follows: MSW – municipal solid waste; ISW: industrial solid waste; HW: hazardous waste; CW: clinical waste, SS: sewage sludge; others (to be specified). The amount of municipal waste open-burned each year was estimated using Equation 5.7 from the 2006 IPCC Guidelines (Vol. 5, Chapter 5.3.2, page 5.16): $MSW_B = P \bullet P_{frac} \bullet MSW_P \bullet B_{frac} \bullet 365 \bullet 10^{-6}$ Where: MSW_B – total amount of municipal solid waste open-burned, kt/yr; P – population, capita; P_{frac} – fraction of population burning waste (fraction); MSW_P – per capita waste generation, kg waste/capita/day; B_{frac} – fraction of the waste amount that is burned relative to the total amount of waste treated (fraction); 365 – number of days per year 10^{-6} – conversion factor from kg to kt Methodology: Tier 1
Reference	IPCC 2006 Guidelines, Vol. 5, pages 5.11-5.13.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Population number – National Statistical Bureau of the Republic of Moldova. Amount of clinical waste generated and burned – the number of beds – from National Statistical Bureau of the Republic of Moldova, the clinical waste generation per bed – estimated on the basis of data provided by National Public Health Agency of the Ministry of Health of the Republic of Moldova related to quantity of clinical waste generated per institution. Daily ratio of generated MSW - Waste Management Strategy of the Republic of Moldova 2013-2027 and estimations on the basis of the data from the National Statistical Bureau
Type and source of EF and OF	EFs default value used – 6.5 kg CH_4/t MSW – available in the 2006 IPCC Guidelines, Vol. 5, Chapter 5, page 5.20.
Uncertainty of AD and source	± 40% - expert judgement (based on IPCC 2006 Guidelines)
Uncertainty of EF and source	± 50% - expert judgement (based on IPCC 2006 Guidelines)
Potential Improvements	Transposition of Commission Decision 2000/532/EC on the List of wastes, including hazardous waste, pursuant to the Waste Act, no. 209 of 29.07.2016 will create premises for improving waste management activity data. Thus, in the perspective of the coming years, the economic agents that treat the waste thermally will be obliged to report waste management data in an Automated Information System. It will therefore be possible to improve the quality of activity data used to assess emissions from source category 5C "Waste Incineration and Burning". Other important document is the GD no 501 of 29.05.2018 on approval the Instruction on evidence and transmission of data and information waste management and management. Adoption of the List of waste, including hazardous waste was done by GD no 99 of 30.01.2018. It will help to improve the national statistical records waste management according to EU requirements and will allow meeting the commitments the Republic of Moldova has made while ratifying international treaties on environmental protection and effective reporting on their coherent implementation. The implementation of the integrated waste management system, which will involve separate collection of waste, will reduce the amount of combustible waste which is open burnt in landfills or at home by the population.

Table 2.5.3.3: Information on Category 5C 'Incineration and Open Burning of Waste' – N_2O

Sector	5 Waste
Category	5C Incineration and Open Burning of Waste
Source / Gas	5C2 Open burning of waste – N_2O
Key Category?	No
Category Description/Definition	Open burning of waste can be defined as the combustion of unwanted combustible materials such as paper, wood, plastics, textiles, rubber, waste oils and other debris in nature (open-air) or in open dumps, where smoke and other emissions are released directly into the air without passing through a chimney or stack. Open burning can also include incineration devices that do not control the combustion air to maintain an adequate temperature and do not provide sufficient residence time for complete combustion. This waste management practice is used in many developing countries while in developed countries open burning of waste may either be strictly regulated, or otherwise occur more frequently in rural areas than in urban areas. Nitrous oxide is emitted in combustion processes at relatively low combustion temperatures between 500 and 950°C. Other important factors affecting the emissions are the type of air pollution control device, type and nitrogen content of the waste and the fraction of excess air.
Country Detail	The incineration of waste practice is predominantly characteristic to rural areas, both in households and on landfills in order to reduce the volume of solid waste disposed, mainly by burning organic waste (paper, cardboard, plastics and vegetable waste).
Equation (Describe variables for method used.)	The emission of N_2O were calculated according to the Equation 5.5 of the IPCC 2006 Guidelines, Vol. 5, page 5.14, $N_2O\ Emissions = \Sigma_i (IW_i \bullet EF_i) \bullet 10^{-6}$ Where: N_2O Emissions – N_2O emissions in inventory year, kt/yr; IW_i – amount of solid waste of type i incinerated or open-burned, kt/yr; EF_i – N_2O emission factor, kg N_2O/kt waste type i; 10^{-6} – conversion factor, from kg to kt; i – category or type of waste incinerated/open-burned, specified as follows: MSW – municipal solid waste; ISW: industrial solid waste; HW: hazardous waste; CW: clinical waste, SS: sewage sludge; others (to be specified). The amount of municipal waste open-burned each year was estimated using Equation 5.7 from the 2006 IPCC Guidelines (Vol. 5, Chapter 5.3.2, page 5.16): $MSW_B = P \bullet P_{frac} \bullet MSW_P \bullet B_{frac} \bullet 365 \bullet 10^{-6}$ Where: MSW_B – total amount of municipal solid waste open-burned, kt/yr; P – population, capita; P_{frac} – fraction of population burning waste (fraction); MSW_P – per capita waste generation, kg waste/capita/day; B_{frac} – fraction of the waste amount that is burned relative to the total amount of waste treated (fraction); 365 – number of days per year 10^{-6} – conversion factor from kg to kt Methodology: Tier 1
Reference	IPCC 2006 Guidelines, Vol. 5, pages 5.13-5.15.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Population number – National Statistical Bureau of the Republic of Moldova. Amount of clinical waste – National Public Health Agency of the Ministry of Health of the Republic of Moldova. Daily ratio of generated MSW – Waste Management Strategy of the Republic of Moldova 2013-2027.
Type and source of EF and OF	EFs default value used – 0.15 kg N_2O/t of MSW – available in the 2006 IPCC Guidelines, Vol. 5, Chapter 5, Table 5.6, page 5.22.
Uncertainty of AD and source	± 40% - expert judgement (based on 2006 IPCC Guidelines)
Uncertainty of EF and source	± 100% - expert judgement (based on 2006 IPCC Guidelines)

Potential Improvements	Transposition of Commission Decision 2000/532/EC on the list of wastes, including hazardous waste, pursuant to the Waste Act, no. 209 of 29.07.2016 will create premises for improving waste management activity data. Thus, in the perspective of the coming years, the economic agents that treat the waste thermally will be obliged to report waste management data in an Automated Information System. It will therefore be possible to improve the quality of activity data used to assess emissions from source category 5C "Waste Incineration and Burning". Other important document is the GD no 501 of 29.05.2018 on approval the Instruction on evidence and transmission of data and information waste management and management. Adoption of the List of waste, including hazardous waste was done by GD no 99 of 30.01.2018. It will help to improve the national statistical records waste management according to EU requirements and will allow meeting the commitments the Republic of Moldova has made while ratifying international treaties on environmental protection and effective reporting on their coherent implementation. The implementation of the integrated waste management system, which will involve separate collection of waste, will reduce the amount of combustible waste which is open burnt in landfills or at home by the population.

Table 2.5.3.4: Information on Category 5C 'Incineration and Open Burning of Waste' – NO_x, CO, NMVOC, SO_2

Sector	Waste
Category	5C Incineration and Open Burning of Waste
Source / Gas	5C2 Open burning of waste – NO_x, CO, NMVOC, SO_2
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	The emissions arising from open burning depend on a number of factors. The most important variables are the type of waste burned and the moisture content of the waste. The ambient temperature and wind conditions, and the density/compactness of the pile of waste also affect the combustion conditions and hence the emissions. In many cases the combustion will be slow and inefficient, and therefore emissions of carbon monoxide (CO) and volatile organic compounds (VOCs) will be more significant than emissions of oxides of nitrogen (NOx). The burning of plastics is likely to produce particularly toxic emissions, such as dioxins, other chlorinated organic compounds and cyanides. The application of abatement equipment to open burning is impractical.
Country Detail	The incineration of waste practice is predominantly characteristic to rural areas, both in households and on landfills in order to reduce the volume of solid waste disposed, mainly by burning organic waste (paper, cardboard, plastics and vegetable waste).
Equation (Describe variables for method used)	The indirect GHG emissions (NO_x, CO, NMVOC and SO_2) from open burning of waste were calculated according to the Equation 1 of the EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 5.C.2 Open burning of waste, page 6: $$\text{Indirect GHG Emissions} = \Sigma_i (IW_i \bullet EF_i) \bullet 10^{-6}$$ Where: Indirect GHG Emissions – indirect GHG emissions (NO_x, CO, NMVOC and SO_2) in inventory year, kt/yr; IW_i – amount of solid waste of type i incinerated or open-burned, kt/yr; EF_i – emission factor, kg indirect GHG/kt waste; 10^{-6} – conversion factor, from kg to kt; i – category or type of waste incinerated/open-burned, specified as follows: MSW – municipal solid waste; ISW: industrial solid waste; HW: hazardous waste; CW: clinical waste, SS: sewage sludge; others (to be specified). The amount of municipal waste open-burned each year was estimated using Equation 5.7 from the 2006 IPCC Guidelines (Vol. 5, Chapter 5.3.2, page 5.16): $$MSW_B = P \bullet P_{frac} \bullet MSW_P \bullet B_{frac} \bullet 365 \bullet 10^{-6}$$ Where: MSW_B – total amount of municipal solid waste open-burned, kt/yr; P – population, capita; P_{frac} – fraction of population burning waste (fraction); MSW_P – per capita waste generation, kg waste/capita/day; B_{frac} – fraction of the waste amount that is burned relative to the total amount of waste treated (fraction); 365 – number of days per year; 10^{-6} – conversion factor from kg to kt. Methodology: Tier 1
Reference	EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 5.C.2 Open burning of waste, pages 3-12.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Population number – National Statistical Bureau of the Republic of Moldova; Amount of clinical waste generated and burned – the number of beds – from National Statistical Bureau of the Republic of Moldova, the clinical waste generation per bed – estimated on the basis of data provided by National Public Health Agency of the Ministry of Health of the Republic of Moldova related to quantity of clinical waste generated per institution. Daily ratio of generated MSW – Waste Management Strategy of the Republic of Moldova 2013-2027 and estimations on the basis of the data from the National Statistical Bureau.

Type and source of EF and OF	Default EFs for Estimating Indirect GHG Emissions from the EMEP/EEA Atmospheric Emissions Inventory Guidebook (2019), Source Category 5.C.2 "Open Burning of Waste", Table 3-1, page 6 and EMEP/EEA Atmospheric Emissions Inventory Guidebook (2016), Source Category 5.C.1.b.iii "Clinical Waste Incineration", Table 3-1, page 8.

	NO_x, kg/t of waste	CO, kg/t of waste	NMVOC, kg/t of waste	SO_2, kg/t of waste
Solid Waste	3.8	55.83	1.23	0.11
Clinical waste	2.3	0.19	0.70	0.54

Uncertainty of AD and source	± 40% - expert judgement (based on 2006 IPCC Guidelines)
Uncertainty of EF and source	± 50% - expert judgement (based on EMEP/EEA Air Pollutant Emission Inventory Guidebook, 2019)

2.5.4. Category 5D 'Wastewater Treatment and Discharge'

Tables 2.5.4.1-2.5.4.4 below comprise relevant information on source categories comprised within the inventory, including description of each source by gas allocated to category 5D 'Wastewater Treatment and Discharge'.

Table 2.5.4.1: Information on Category 5D1 'Domestic wastewater' – CH_4

Sector	Waste
Category	5D. Wastewater Treatment and Discharge
Source / Gas	5D1. Domestic wastewater – CH_4
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (source category 5D. Wastewater Treatment and Discharge – aggregated for all sources)
Category Description/Definition	Wastewater can be a source of methane (CH_4) when treated or disposed anaerobically. It can also be a source of nitrous oxide (N_2O) emissions. Wastewater originates from a variety of domestic, commercial and industrial sources and may be treated on site (uncollected), sewered to a centralized plant (collected) or disposed untreated nearby or via an outfall. Domestic wastewater is defined as wastewater from household water use, while industrial wastewater is from industrial practices only. The degree of wastewater treatment varies in most developing countries. Domestic wastewater is treated in centralized plants, pit latrines, septic systems or disposed of in unmanaged lagoons or waterways, via open or closed sewers. The most common wastewater treatment methods in developed countries are centralized aerobic wastewater treatment plants and lagoons for both domestic and industrial wastewater. To avoid high discharge fees or to meet regulatory standards, many large industrial facilities pre-treat their wastewater before releasing it into the sewage system. Domestic wastewater may also be treated in on-site septic systems.
Country Detail	The discharge of wastewater from consumers is carried out through sewage disposal networks, which currently do not fully cover the localities in the regions of the country. The quality of sewerage services provided to the population is low. All urban areas in development regions have wastewater treatment plants, but most existing facilities are damaged and inefficient. Most existing stations offer only mechanical treatment, while high-energy biological installations are decommissioned due to high operating costs. The quality of treated wastewater in all urban areas, except for some cities, does not correspond to the existing discharge rules.
Equation (Describe variables for method used)	Equation 6.3 from the 2006 IPCC Guidelines (Volume 5, Chapter 6, page 6.13): $TOW = P \cdot BOD \cdot 0.001 \cdot I \cdot D$ Where: TOW – total organics in wastewater in inventory year, kg BOD/yr; P – country population in inventory year (person); BOD – country-specific per capita BOD in inventory year, g/person/day; 0.001 = conversion from grams BOD to kg BOD; I – correction factor for additional industrial BOD discharged into sewers (for collected the default is 1.25, for uncollected the default is 1.00); D – number of days in a calendar year (365 days in regular years and 366 days in leap years: 1992, 1996, 2000, 2004, 2008, 2012). Equation 6.2 from the 2006 IPCC Guidelines (Volume 5, Chapter 6, page 6.12): $EF_j = B_0 \cdot MCF_j$ Where: EF_j – emission factor, kg CH_4/kg BOD_5; j – each treatment/discharge pathway or system; B_0 – maximum methane producing capacity, kg CH_4/kg BOD_5; MCF_j – methane correction factor (fraction).

Equation (Describe variables for method used)	Equation 6.1 from the 2006 IPCC Guidelines (Volume 5, Chapter 6, page 6.11): CH_4 Emissions = $[\sum_{ij} (U_i \cdot T_{i,j} \cdot EF_j)] \cdot (TOW\text{-}S)\text{-}R$ Where: CH_4 Emissions – methane emissions in inventory year, kg CH_4/yr; TOW – total organics in wastewater in inventory year, kg BOD/yr; S – organic component removed as sludge in inventory year, kg BOD/yr; U_i – fraction of population in income group i, in inventory year (fraction); $T_{i,j}$ – degree of utilization of treatment/discharge pathway or system, j, for each income group fraction i, in inventory year (fraction); i – income group: rural – low income, urban - high income and urban - low income; j – each treatment/discharge pathway or system; EF_j – emission factor, kg CH_4/kg BOD; R – amount of methane recovered in inventory year, kg CH_4/yr. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 5, Chapter 6, pages 6.9-6.12.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Population (P) and share of different groups – National Statistical Bureau of the Republic of Moldova. Degradable organic component indicator (BOD) – in the Republic of Moldova the country-specific value is 60 BOD/person/day (SNIP G.03.02-2015, Table 7.1). Correction factor for additional industrial BOD discharged into sewers (I) – IPCC default value – for collected the default is 1.25, for uncollected the default is 1.00.
Type and source of EF and OF	Maximum methane producing capacity (B_0) – IPCC default value – default value used is 0.6 (Volume 5, Chapter 6, Table 6.2, page 6.12). Methane correction factor (MCF) – IPCC default values (Volume 5, Chapter 6, Table 6.3, page 6.13).
Uncertainty of AD and source	Population – ± 5%, expert judgement (based on 2006 IPCC Guidelines) BOD – ± 30%, expert judgement (based on 2006 IPCC Guidelines) Fraction of population income group – ± 15%, expert judgement (based on 2006 IPCC Guidelines) Fraction of population devised depending on income level – ± 15%, expert judgement (based on 2006 IPCC Guidelines) Degree of utilization of treatment/discharge pathway or system for each income group – ± 15%, expert judgement (based on 2006 IPCC Guidelines)
Uncertainty of EF and source	B_0 – ± 30%, expert judgement (based on 2006 IPCC Guidelines) MCF for well managed plants – ± 10%, expert judgement (based on 2006 IPCC Guidelines) MCF for not well managed plants – ± 30%, expert judgement (based on 2006 IPCC Guidelines) MCF for latrines – ± 50%, expert judgement (based on 2006 IPCC Guidelines)
Potential Improvements	In order to improve the access of the population to quality water supply and sewerage services, in the Republic of Moldova actions are taken to plan the sector at different levels. At the national level, the Government Decision no. 199/2014 Water Supply and Sanitation Strategy (2014–2030) (amended by Government Decision no. 442/2020), which denotes the impact of climate change, combined with water scarcity in the country, requires an integrated urban planning. The general objective of the Strategy is to ensure the gradual access to safe water and adequate sanitation for all localities and population of the Republic of Moldova, thus contributing to the improvement of health, dignity and quality of life and economic development of the country. Regulation on the conditions of wastewater discharge into water bodies, approved by Government Decision no. 802/2013 aims to regulate the conditions of discharge, introduction of specific substances in water. Thus, the regulation specifies the emission limit values that apply to the discharge of wastewater from industrial sectors (activities) in a body of surface water. Regulation on the requirements for the conditions of collection, treatment and discharge of wastewater in the sewerage system and / or in water outlets for urban and rural localities, approved by Government Decision no. 950/2013 aims to regulate the conditions of collection, treatment of wastewater discharge into the sewerage system and / or water outlets. Thus, the Regulation stipulates the maximum permissible limit values for the loading of wastewater with pollutants for natural discharge, which will contribute to the safe reduction of emissions from this sector. Both regulations need to be properly enforced. There is need to apply the following economic instruments: appropriate combination of tariffs, fees and transfers to finance recurring and capital costs and to boost other forms of financing; predictability of public subsidies to facilitate investment (planning); tariff policies that make services accessible to all, including the poorest categories, while ensuring the sustainability of service providers. The planning perspective of the sector can significantly improve the management of wastewater and sludge from this category. Sludge treatment actions will reduce the risk of affecting the quality of natural water resources, which is becoming increasingly sensitive to climate change. The actions listed above will contribute to fulfillment of the Republic of Moldova's obligations towards the Protocol on Water and Health and other international acts, which aim to reduce the share of the population without access to drinking water sources and sewerage systems, and in the same time and the provisions of UNFCCC. The planning of gradual harmonization of national water legislation with that of the European Union is also a good tool for increasing the implementation of best practices, wastewater and sludge treatment technologies, which would allow the capture and sustainable use of methane emissions from sludge storage fields (including for the production of heat and power). As regards the potential improvements for the methodology of calculation CH_4, it would be recommended to conduct a study of the possibility of using national information on the CBO fraction removed with sludge, maximum methane formation capacity, methane correction factor and other relevant parameters which will improve the quality of the national inventories of greenhouse gas emissions.

Table 2.5.4.2: Information on Category 5D2 'Industrial wastewater' – CH_4

Sector	Waste
Category	5D Wastewater Treatment and Discharge
Source / Gas	5D2. Industrial wastewater – CH_4
Key Category?	Tier 1: Yes: 1990 (L), 2019 (L, T); Tier 2: Yes: 1990 (L), 2019 (L, T) (source category 5D. Wastewater Treatment and Discharge – aggregated for all sources)
Category Description/Definition	Industrial wastewater may be treated on site or released into domestic sewer systems. If it is released into the domestic sewer system, the emissions are to be included with the domestic wastewater emissions. This section deals with estimating CH_4 emissions from on-site industrial wastewater treatment. Only industrial wastewater with significant carbon loading that is treated under intended or unintended anaerobic conditions will produce CH_4. Organics in industrial wastewater are often expressed in terms of COD. In some cases industrial wastewater is discharged directly into bodies of water, while major industrial facilities may have comprehensive in-plant treatment.
Country Detail	In the Republic of Moldova, the industrial wastewater treatment is done by household wastewater treatment plants, thus it is treated together with household wastewater. After generation, the industrial wastewater is discharged into sewage systems for household wastewater and is treated together with domestic wastewater by wastewater treatment plants. From among all industries, manufacture contributes the most to generation of wastewater with a high content of biodegradable organic substances. The wastewater (a mixture of domestic and industrial wastewater) is subject to classical (mechanical and biological) treatment under aerobic conditions. However, due to incorrect exploitation of existing treatment plants, a part of the wastewater (around 20% of total) is treated under anaerobic conditions.
Equation (Describe variables for method used.)	Equation 6.6 from the 2006 IPCC Guidelines (Volume 5, Chapter 6, page 6.22): $TOW_i = P_i \bullet W_i \bullet COD_i$ Where, TOW_i - total organically degradable material in wastewater for industry i, kg COD/yr; i - industrial sector; P_i - total industrial product for industrial sector i, t/yr; W_i - wastewater generated, m^3/t product; COD_i - chemical oxygen demand (industrial degradable organic component in wastewater), kg COD/m^3. Equation 6.2 from the 2006 IPCC Guidelines (Volume 5, Chapter 6, page 6.12): $EF_j = B_0 \bullet MCF_j$ Where: EF_j – emission factor, kg CH_4/kg COD; j – each treatment/discharge pathway or system; B_0 – maximum methane producing capacity, kg CH_4/kg COD; MCF_j – methane correction factor (fraction). Equation 6.1 from the 2006 IPCC Guidelines (Volume 5, Chapter 6, page 6.11): $CH_4 \text{ Emissions} = [\sum_{ij}(U_i \bullet T_{i,j} \bullet EF_j)] \bullet (TOW\text{-}S)\text{-}R$ Where: CH_4 Emissions – methane emissions in inventory year, kg CH_4/yr; TOW – total organics in wastewater in inventory year, kg COD/yr; S – organic component removed as sludge in inventory year, kg BOD/yr; U_i – fraction of population in income group i, in inventory year (fraction); $T_{i,j}$ – degree of utilization of treatment/discharge pathway or system, j, for each income group fraction i, in inventory year (fraction); i – income group: rural, urban high income and urban low income; j – each treatment/discharge pathway or system; EF_j – emission factor, kg CH_4/kg COD; R – amount of methane recovered in inventory year, kg CH_4/yr. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 5, Chapter 6, pages 6.12-6.24.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.

<table>
<tr><td>Type and source of activity data</td><td>Industrial production and number of economic agents in territorial profile – National Statistical Bureau of the Republic of Moldova; Wastewater generated and COD – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.9, page 6.22; Mircea Gh. Negulescu et al. (1968), Industrial Wastewater Treatment, Technical Publishing House, Bucharest, 1968; CEC All Union Scientific Research Institute for Water Supply, Sewage, Hydraulic Engineering Works and Engineering Hydrogeology (VNII VODGEO GOSSTROI of the USSR), 1982. Consolidated Norms in Water Supply and Water Disposal for Different Industries, Moscow, 1982; Sewage System for Populated Areas and Industrial Plants. Handbook. “Stroiizdat” Moscow, 1981.
<table>
<tr><th>Industry Production by Type</th><th>COD_i – industrial degradable organic component, kg COD/m^3</th><th>W_i – amount of wastewater generated per industrial production output unit, m^3/t</th></tr>
<tr><td>Canned meat</td><td>4.1</td><td>13.0</td></tr>
<tr><td>Canned vegetables and fruits</td><td>5.0</td><td>20.0</td></tr>
<tr><td>Beer</td><td>2.9</td><td>6.3</td></tr>
<tr><td>Wine and sparkling wine</td><td>1.5</td><td>23.0</td></tr>
<tr><td>Cognac and brandy</td><td>11.0</td><td>24.0</td></tr>
<tr><td>Meat and sausages</td><td>4.1</td><td>13.0</td></tr>
<tr><td>Milk products</td><td>2.7</td><td>7.0</td></tr>
<tr><td>Sugar</td><td>3.2</td><td>11.0</td></tr>
<tr><td>Fish</td><td>2.5</td><td>13.0</td></tr>
<tr><td>Vegetable oil and fats</td><td>0.8</td><td>3.1</td></tr>
<tr><td>Soft drinks</td><td>1.0</td><td>3.8</td></tr>
<tr><td>Corrugated cardboard</td><td>9.0</td><td>162.0</td></tr>
<tr><td>Plastics and resins</td><td>3.7</td><td>0.6</td></tr>
<tr><td>Paint and varnishes</td><td>3.0</td><td>67.0</td></tr>
<tr><td>Detergents and soap</td><td>0.6</td><td>2.5</td></tr>
<tr><td>Leather</td><td>7.0</td><td>4.2</td></tr>
<tr><td>Textiles</td><td>1.0</td><td>42.6</td></tr>
</table></td></tr>
<tr><td>Type and source of EF and OF</td><td>Maximum methane producing capacity (B_0) – default value used for industrial wastewater is 0.25 – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.2, page 6.12;
Methane correction factor (MCF) – IPCC default values, 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.3, page 6.13.</td></tr>
<tr><td>Uncertainty of AD and source</td><td>Industrial production – ±25%, expert judgement (based on 2006 IPCC Guidelines)</td></tr>
<tr><td>Uncertainty of EF and source</td><td>B_0 – ±30%, expert judgement (based on 2006 IPCC Guidelines);
MCF for well managed plants – ±10%, expert judgement (based on 2006 IPCC Guidelines);
MCF for not well managed plants – ±30%, expert judgement (based on 2006 IPCC Guidelines).</td></tr>
<tr><td>Potential Improvements</td><td>In order to improve the access of the population to quality water supply and sewerage services, in the Republic of Moldova actions are taken to plan the sector at different levels. At the national level, the Government Decision no. 199/2014 Water Supply and Sanitation Strategy (2014–2030) (amended by Government Decision no. 442/2020), which denotes the impact of climate change, combined with water scarcity in the country, requires an integrated urban planning. The general objective of the Strategy is to ensure the gradual access to safe water and adequate sanitation for all localities and population of the Republic of Moldova, thus contributing to the improvement of health, dignity and quality of life and economic development of the country. Regulation on the conditions of wastewater discharge into water bodies, approved by Government Decision no. 802/2013 aims to regulate the conditions of discharge, introduction of specific substances in water. Thus, the regulation specifies the emission limit values that apply to the discharge of wastewater from industrial sectors (activities) in a body of surface water. Regulation on the requirements for the conditions of collection, treatment and discharge of wastewater in the sewerage system and / or in water outlets for urban and rural localities, approved by Government Decision no. 950/2013 aims to regulate the conditions of collection, treatment of wastewater discharge into the sewerage system and / or water outlets. Thus, the Regulation stipulates the maximum permissible limit values for the loading of wastewater with pollutants for natural discharge, which will contribute to the safe reduction of emissions from this sector. Both regulations need to be properly enforced. Also, the economic operators shall be provided with wastewater treatment facilities that would ensure pretreatment of water before discharge into the public sewerage network. There is need to apply the following economic instruments: appropriate combination of tariffs, fees and transfers to finance recurring and capital costs and to boost other forms of financing; predictability of public subsidies to facilitate investment (planning); tariff policies that make services accessible to all, including the poorest categories, while ensuring the sustainability of service providers. The planning perspective of the sector can significantly improve the management of wastewater and sludge from this category. Sludge treatment actions will reduce the risk of affecting the quality of natural water resources, which is becoming increasingly sensitive to climate change. The actions listed above will contribute to fulfillment of the Republic of Moldova’s obligations towards the Protocol on Water and Health and other international acts, which aim to reduce the share of the population without access to drinking water sources and sewerage systems, and in the same time and the provisions of UNFCCC. The planning of gradual harmonization of national water legislation with that of the European Union is also a good tool for increasing the implementation of best practices, wastewater and sludge treatment technologies, which would allow the capture and sustainable use of methane emissions from sludge storage fields (including for the production of heat and power). As regards the potential improvements for the methodology of calculation CH_4, it would be recommended to conduct a study of the possibility of using national information on the CBO fraction removed with sludge, maximum methane formation capacity, methane correction factor and other relevant parameters which will improve the quality of the national inventories of greenhouse gas emissions.</td></tr>
</table>

Table 2.5.4.3: Information on Category 5D 'Wastewater Treatment and Discharge', 5D1 'Domestic wastewater' – N_2O

Sector	Waste
Category	5D Wastewater Treatment and Discharge
Source / Gas	5D1 Domestic wastewater – N_2O
Key Category?	No
Category Description/Definition	Nitrous oxide emissions can occur as direct emissions from treatment plants or from indirect emissions from wastewater after disposal of effluent into waterways, lakes or the sea. Direct emissions from nitrification and denitrification at wastewater treatment plants may be considered as a minor source. Typically, these emissions are much smaller than those from effluent and may only be of interest to countries that predominantly have advanced centralized wastewater treatment plants with nitrification and denitrification steps.
Country Detail	N_2O emissions from human sewage is comprised in this sector.
Equation (Describe variables for method used.)	Equation 6.7 from the 2006 IPCC Guidelines, Volume 5, Chapter 6, page 6.25: $N_2O\ Emissions = N_{EFFLUENT} \cdot EF_{EFFLUENT} \cdot 44/28$ Where: N_2O Emissions – N_2O emissions in inventory year, kg N_2O/yr; $N_{EFFLUENT}$ – total nitrogen in the effluent discharged to aquatic environments, kg N/yr; $E_{FEFFLUENT}$ – emission factor for N_2O emissions from discharged to wastewater, kg N_2O-N/kg N; [44/28] – stoichiometric ratio of N_2O-N to N_2O Equation 6.8 from the 2006 IPCC Guidelines, Volume 5, Chapter 6, page 6.25: $N_{EFFLUENT} = (P \cdot Protein \cdot F_{NPR} \cdot F_{NON-CON} \cdot F_{IND-COM}) - N_{SLUDGE}$ Where: $N_{EFFLUENT}$ – total annual amount of nitrogen in the wastewater effluent, kg N/yr; P – human population; Protein – annual per capita protein consumption, kg/person/yr; F_{NPR} – fraction of nitrogen in protein, default = 0.16 kg N/kg protein $F_{NON-CON}$ – factor for non-consumed protein added to the wastewater $F_{IND-COM}$ – factor for industrial and commercial co-discharged protein into the sewer system N_{SLUDGE} – nitrogen removed with sludge, kg N/yr. Equation 6.9 from the 2006 IPCC Guidelines, Volume 5, Chapter 6, page 6.26: $N_2O_{PLANT} = P \cdot T_{PLANT} \cdot F_{IND\_COM} \cdot EF_{PLANT}$ Where: N_2O_{PLANT} – total N_2O emissions from plants in inventory year, kg N_2O/yr; P – human population; T_{PLANT} – degree of utilization of modern, centralized WWT plants, %; $F_{IND-COM}$ – fraction of industrial and commercial co-discharged protein; EF_{PLANT} – emission factor, 3.2 g N_2O/person/year. Methodology: Tier 1
Reference	2006 IPCC Guidelines, Volume 5, Chapter 6, pages 6.24-6.27.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Population (P) – National Statistical Bureau of the Republic of Moldova; Protein consumption (Protein) – United Nations Food and Agriculture Organization (FAO); Fraction of nitrogen in protein (F_{NPR}) – default value 0.16 kg N/kg protein – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.11, page 6.27; T_{plant} – country-specific; $F_{NON-CON}$ – 1.1 for countries with no garbage disposals, 1.4 for countries with garbage disposals – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.11, page 6.27; $F_{IND-COM}$ – default value 1.25 – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.11, page 6.27.

Type and source of EF and OF	$EF_{EFFLUENT}$ – default value used represent 0.005 kg N_2O-N/kg N – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.11, page 6.27; EF_{PLANTS} – default value, 3.2 g N_2O/person/year – 2006 IPCC Guidelines, Volume 5, Chapter 6, Table 6.11, page 6.27.
Uncertainty of AD and source	Population – ±5%, expert judgement Protein consumption – ±10%, expert judgement T_{plant} – ±20% expert judgement
Uncertainty of EF and source	±25%, expert judgement
Potential Improvements	The legislation and regulatory framework, which is already in place such as Strategy on water supply and sanitation for 2014–2028 (Government Decision No. 199 as of 20.03.2014, modified by Government Decision no 442/2020), Regulation on Wastewater Discharge in Water Bodies, approved through the Government Decision No. 802 as of 09.10.2013 and Regulation on the requirements for the conditions of collection, treatment and discharge of wastewater in the sewerage system and / or in water outlets for urban and rural localities, approved by Government Decision no. 950/2013, sets the objectives of gradual access to safe water and adequate sanitation for all localities and population of the Republic of Moldova and regulate the conditions of collection and treatment of wastewater in the sewerage system and/or in water outlets. Proper enforcement of all these regulations is needed in order to ensure the achievement of the established targets and objectives.

Table 2.5.4.4: Information on Category 5D 'Wastewater Treatment and Discharge', 5D1 'Domestic wastewater' – NMVOC

Sector	Waste
Category	5D Wastewater Treatment and Discharge
Source / Gas	5D1 Domestic wastewater – NMVOC
Key Category?	Not applicable for pollutant emissions.
Category Description / Definition	Wastewater originates from a variety of domestic, commercial and industrial sources and may be treated on site (uncollected), sewered to a centralized plant (collected) or disposed untreated nearby or via an outfall. In urban areas, non-methane volatile organic compounds (NMVOC) emissions from waste water treatment plants will be of local importance.
Country Detail	In the Republic of Moldova, the industrial wastewater treatment is done by household wastewater treatment plants, thus it is treated together with household wastewater. After generation, the industrial wastewater is discharged into sewage systems for household wastewater and is treated together with domestic wastewater by wastewater treatment plants. From among all industries, manufacture contributes the most to generation of wastewater with a high content of biodegradable organic substances. The wastewater (a mixture of domestic and industrial wastewater) is subject to classical (mechanical and biological) treatment under aerobic conditions. However, due to incorrect exploitation of existing treatment plants, a part of the wastewater (around 20% of total) is treated under anaerobic conditions.
Equation (Describe variables for method used)	The NMVOC emissions were calculated according to the Equation 1, EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 5.D 'Wastewater handling', page 6: $NMVOC\ Emissions = AR \cdot EF \cdot 10^{-6}$ Where: NMVOC Emissions – NMVOC emissions in inventory year, kt/yr; AR – the activity rate for total wastewater discharged in inventory year, million m^3/yr; EF – emission factor, mg NMVOC/m^3 wastewater discharged; 10^{-6} – conversion factor, from kg to kt.
Reference	EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), Category 5.D 'Wastewater handling', pages 3-11.
Describe How and Why this Method Was Chosen	Due to the lower importance of this source and unavailability of detailed data from measurements, the Tier 1 methodology has been used.
Type and source of activity data	Total wastewater discharged – National Statistical Bureau of the Republic of Moldova.
Type and source of EF and OF	Default emission factor – 15 kg NMVOC/million m^3 wastewater discharged – EMEP/EEA Air Pollutant Emission Inventory Guidebook (2016), source category 5D "Wastewater Handling", Table 3-1, page 7.
Uncertainty of AD and source	±5%, expert judgement (based on the 2006 IPCC Guidelines)
Uncertainty of EF and source	±20%, expert judgement (based on the EMEP/EEA Air Pollutant Emission Inventory Guidebook, 2019)

Chapter 3: Description of QA/QC Procedures

1: Institutional Arrangements

2: Methods and Data Documentation

3: Description of QA/QC Procedures

4: Description of Archiving System

5: Key Category Analysis

6: National Inventory Improvement Plan

Contact data of the Coordinator of the National Greenhous Gas Inventory Working Group

Country	Republic of Moldova	**Postal address:**	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova
Name:	Taranu Marius	**Telephone/Fax:**	+373 22 23 22 47
Position:	Coordinator of the National GHG Inventory Working Group	**E-mail:**	marius.taranu@uipm.gov.md
Organization:	Public Institution "Environmental Projects Implementation Unit"	**URL:**	http://www.clima.md

3. Quality Assurance/Quality Control Procedures

3.1. Background

Quality assurance and quality control measures are two distinct types of activities. The IPCC defines each as follows:

- **Quality Assurance (QA)** – a planned system of review procedures conducted by personnel not directly involved in the inventory development process, to verify whether data quality related objectives have been achieved, confirm that the inventory represents the best possible estimate of emissions and removals, given the available data and scientific knowledge. At the same time, it contributes to ensuring the quality control programs efficiency.
- **Quality Control (QC)** – a system of routine technical activities implemented by the inventory development team to measure and control the quality of the inventory as it is prepared. Quality control includes general methods such as data accuracy and estimates calculation control, as well as use of approved standardized procedures for calculating emissions, measurements, uncertainties estimates, information archiving and reporting (Tier 1).

A higher tier QC includes technical review of key categories, activity data and emission factors, and estimation methods used.

Quality control ensures:

i) constant and thorough inventory verification to confirm that the data are intact, accurate and complete;

ii) identification and correction of errors or omissions;

iii) documentation and archiving of all information underlying the inventory development and registration of all QC activities;

The Quality Assurance and Quality Control Plan contains the following elements:

- List of personnel responsible for coordinating QA/QC;
- General (Tier 1) QC procedures;
- Source-specific (Tier 2) QC procedures;
- QA review procedures;
- Reporting, documentation and archiving procedures.

Each of these elements are described in more detail below.

3.2. Quality Assurance and Quality Control Plan

The written QA/QC Plan is a fundamental element of the National QA/QC System. This plan outlines QA/QC activities performed, the personnel responsible for these activities, and the schedule for completing these activities. The following sections describe the QA/QC Plan that the Republic of Moldova is following to ensure a high-quality national inventory.

3.3. Quality Assurance and Quality Control Personnel

The QA/QC Coordinator is the main person responsible for implementing the QA/QC Plan. In this role, the QA/QC Coordinator:

- Clarifies and communicates QA/QC responsibilities to inventory members;
- Develops and implements an overall QA/QC timeline and when external reviews will occur based on the GHG inventory schedule;
- Develops and maintains QA/QC checklists appropriate to various inventory team member roles, and collects and reviews the accuracy of the checklists and follow up when necessary to ensure that the required QA/QC procedures are implemented;
- Ensure the timely and accurate completion of QA/QC checklists and the related activities;
- Manages and delivers documentation of QA/QC activities to the inventory lead and archive coordinator;
- Coordinates external reviews of the inventory document and ensures that comments are incorporated into the inventory;
- Monitors the QA/QC procedures used during both the inventory development process and the compilation of information used in the inventory;
- Communicates the progress and results of the QA/QC plan to all members of the team and to interested stakeholders;
- Produces a partial report at the end of each phase of the inventory process and a final report scoring the resulting inventory in terms of QA/QC for external audits.

In this role, the QA/QC Coordinator communicates with several other inventory members. Table 3.1 summarizes the key personnel responsible for QA/QC activities.

Table 3.1: Personnel Responsible for QA/QC Activities

Title	QA / QC Responsibility	Name	Organization	Contact Information
Inventory Coordinator	All aspects of the inventory program, cross-cutting QA/QC	Marius Taranu, MSc in Biology	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: marius.taranu@uipm.gov.md
QA / QC Coordinator	Implementing the overall QA / QC Plan	Marius Taranu, MSc in Biology	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel.: +373-22-23-22-47, E-mail: marius.taranu@uipm.gov.md
Energy Sector Lead	Implement categories specific QA/QC procedures (Tier 1 and Tier 2 procedures listed in Tables 3.2 and 3.3 below) (Energy)	Elena Bicova, PhD in Power Engineering	Institute of Power Engineering	St. Academiei 5, room 443, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-74-94, E-mail: bicovaelena279@gmail.com

Title	QA / QC Responsibility	Name	Organization	Contact Information
Industrial Processes and Product Use Sector Lead	Implement categories specific QA / QC procedures (Tier 1 and Tier 2 procedures listed in Tables 3.2 and 3.3 below) (Industrial Processes and Product Use)	Anatolie Tarita, PhD in Biology	Institute of Ecology and Geography	St. Academiei 3, room 437, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-71-89-38, +373-22-72-17-74, E-mail: anatolietarita@gmail.com
Agriculture Sector Lead	Implement categories specific QA / QC procedures (Tier 1 and Tier 2 procedures listed in Tables 3.2 and 3.3 below) (Agriculture)	Sergiu Cosman, PhD in Agriculture	Scientific-Practical Institute for Biotechnology in Animal Breeding and Veterinary Medicine	Maximovca village, Anenii-Noi district, MD-6525, Republic of Moldova Tel.: +373-22-35-93-57; +373-22-35-92-95, E-mail: sergiu_cosman@mail.ru
Land Use, Land-Use Change and Forestry Sector Lead	Implement categories specific QA / QC procedures (Tier 1 and Tier 2 procedures listed in Tables 3.2 and 3.3 below) (Land Use, Land-Use Change and Forestry)	Ion Talmaci, MSc in Biology	Forestry Research and Management Institute, Moldsilva Agency	St. Calea Iesilor 69, MD-2069, Chisinau, Republic of Moldova Tel.: +373-22-92-89-59, E-mail: iontalmaci@mail.ru
Waste Sector Lead	Implement categories specific QA / QC procedures (Tier 1 and Tier 2 procedures listed in Tables 3.2 and 3.3 below) (Waste)	Tatiana Tugui, PhD in Chemistry	Public Institution "Environmental Projects Implementation Unit"	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova, Tel./Fax: +373-22-22-25-42, E-mail: tuguitatiana@ymail.com
External Reviewer - Energy Sector	Review of the inventory by an expert who was not directly involved in compiling the GHG inventory (Energy Sector), to confirm that the inventory provides the best possible estimate of emissions and removals	Michael Tirsu, PhD in Power Engineering	Institute of Power Engineering	St. Academiei 5, room 400, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-53-84, Fax: +373-22-73-53-82 E-mail: tirsu.mihai@gmail.com
External Reviewer - Industrial Processes and Product Use Sector	Review of the inventory by an expert who was not directly involved in compiling the GHG inventory (Industrial Processes and Product Use Sector), to confirm that the inventory provides the best possible estimate of emissions and removals	Natalia Beglet, PhD in Power Engineering	Technical University of Moldova, Faculty of Urbanism and Architecture, Program "Engineering of Heat, Gas and Climate Control Systems in Buildings and Environment Protection"	St. 31 August 1989 78/2, MD-2004, Chisinau, Republic of Moldova, Tel: +373-68-16-88-22 E-mail: natalia.beglet@gmail.com
External Reviewer - Agriculture Sector (Agriculture Soils)	Review of the inventory by an expert who was not directly involved in compiling the GHG inventory (Agriculture Sector), to confirm that the inventory provides the best possible estimate of emissions and removals	Tamara Leah, Prof., PhD Agriculture	Institute of Soil Science, Agrochemistry and Soil Protection "Nicolae Dimo"	St. Ialoveni 100, MD-2070, Chisinau, Republic of Moldova Tel: +373-22-28-48-43 / 28-48-62, Fax: +373-22-28-48-55 E-mail: tamaraleah09@gmail.com
External Reviewer - Land Use, Land-Use Change and Forestry	Review of the inventory by an expert who was not directly involved in compiling the GHG inventory (Land Use, Land-Use Change and Forestry Sector), to confirm that the inventory provides the best possible estimate of emissions and removals	Victor Sfecla, MSc in Biology	State Agricultural University of Moldova, Faculty of Horticulture, Department of Forestry and Public Gardens	St. Mircesti 44, MD-2049, Chisinau, Republic of Moldova Tel: +373-22-43-22-05 / 43-28-09 E-mail: v.sfecla@gmail.com
External Reviewer - Waste Sector	Review of the inventory by an expert who was not directly involved in compiling the GHG inventory (Waste Sector), to confirm that the inventory provides the best possible estimate of emissions and removals	Tamara Guvir	Independent consultant	Tel: +373-68-022-203 E-mail: guvir.tamara@gmail.com

3.4. Communicating Quality Assurance and Quality Control Plan

The contents of the QA/QC Plan are communicated to inventory team members and outside experts so that the procedures can be effectively implemented, evaluated, and improved. The QA/QC Coordinator implements the following QA/QC procedures:

- Convene a meeting with all team members to develop and/or update the QA/QC Plan;
- Distribute the QA/QC Plan to all team members required to perform QA/QC;
- Conduct a "kick-off" meeting with all of those working on the inventory, introduce QA/QC Plan and distribute QC checklists;
- Send written or electronic memos reminding team members of their QA/QC responsibilities and overall schedule.

3.5. General (Tier 1) QC Procedures for Source/Sink Category Leads

A minimum set of QC procedures are followed each inventory consecutive cycle for all categories to ensure that basic standards of quality are met. These standards focus on the processing, handling, documenting, archiving, and reporting procedures common to all categories. Table 3.2 lists the specific Tier 1 QC activities with indication of deadlines by when the activities were completed.

Table 3.2: General (Tier 1) QC Activities

QC activity	Quality Control and Verification Procedures	Task completed		Corrective action taken	
		Name	Date	Supporting documents	Date
Data Gathering, Input, and Handling Checks					
Check that assumptions and criteria for the selection of AD and EFs are documented.	• Cross-check descriptions of activity data and emission factors with information on categories and ensure that these are properly recorded and archived.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/10/2020	N/A	N/A

Check for transcription errors in data input and reference.	• Confirm that bibliographical data references are properly cited in the internal documentation (MDD report)
	• Cross-check a sample of input data from each category (either measurements or parameters used in calculations) for transcription errors.
	• Utilize electronic data where possible to minimize transcription errors.
	• Check that spreadsheet features are used to minimize user/entry error:
	  ○ Avoid hardwiring factors into formulas.
	  ○ Create automatic look-up tables for common values used throughout calculations.
	  ○ Use cell protection so fixed data cannot accidentally be changed.
	  ○ Build in automated checks, such as computational checks for calculations, or range checks for input data.
		Elena Bicova
		Anatol Tarita
		Sergiu Cosman
		Ion Talmaci
		Tatiana Tugui
			30/11/2020	N/A	N/A

Check that emissions/removals are calculated correctly.	• Reproduce a representative sample of emissions/removals calculations. • If models are used, selectively mimic complex model calculations with abbreviated calculations to judge relative accuracy.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/11/2020	N/A	N/A

QC activity	Quality Control and Verification Procedures	Task completed		Corrective action taken	
		Name	Date	Supporting documents	Date
Check that parameter and emission/removal units are correctly recorded and that appropriate conversion factors are used.	• Check that units are properly labelled in calculation sheets and (MDD template report) • Check that units are correctly carried through from beginning to end of calculations. • Check that conversion factors are correct. • Check that temporal and spatial adjustment factors are used correctly.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/11/2020	N/A	N/A
Check the integrity of database files.	• Confirm that the appropriate data processing steps are correctly represented in the database. • Confirm that data relationships are correctly represented in the database. • Ensure that data fields are properly labelled and have the correct design specifications. • Ensure that adequate documentation of database and model structure and operation are archived.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/11/2020	N/A	N/A
Check for consistency in data between categories.	• Identify parameters (e.g., activity data, constants) that are common to multiple categories and confirm that there is consistency in the values used for these parameters in the emissions/removals calculations.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A
Check that the movement of inventory data among processing steps is correct.	• Check that emissions/removals data are correctly aggregated from lower reporting levels to higher reporting levels when preparing summaries. • Check that emissions/removals data are correctly transcribed between different intermediate products.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A
Data Documentation					
Review of internal documentation and archiving.	• Check that there is detailed internal documentation to support the estimates and enable duplication of calculations. • Check that every primary data element has a reference for the source of the data (via cell comments or another system of notation). • Check that inventory data, supporting data, and inventory records are archived and stored to facilitate detailed review. • Check that the archive is closed and retained in secure place following completion of the inventory • Check integrity of any data archiving arrangements of outside organizations involved in inventory preparation.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A
Calculation Checks					
Check methodological and data changes resulting in recalculations.	• Check for temporal consistency in time series input data for each category. • Check for consistency in the algorithm/method used for calculations throughout the time series. • Reproduce a representative sample of emission calculations to ensure mathematical correctness.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A
Check time series consistency	• Check for temporal consistency in time series input data for each category. • Check for consistency in the algorithm/method used for calculations throughout the time series. • Check methodological and data changes resulting in recalculations. • Check that the effects of mitigation activities have been appropriately reflected in time series calculations.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A

QC activity	Quality Control and Verification Procedures	Task completed		Corrective action taken	
		Name	Date	Supporting documents	Date
Check completeness	• Confirm that estimates are reported for all categories and for all years from the appropriate base year over the period of the current inventory. • For subcategories, confirm that the entire category is being covered. • Proved clear definition of 'Other' type categories. • Check that known data gaps that result in incomplete category emissions/removals estimates are documented, including qualitative evaluation of the importance of the estimate in relation to total net emissions (e.g. subcategories classified as 'not estimated').	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A
Trend checks	• For each category, compare current inventory estimates to previous estimates, if available. If there are significant changes or departures from expected trends, re-check estimates and explain any difference. Significant changes in emissions or removals from previous years may indicate possible input or calculation errors. • Check value of implied emission factors (aggregate emissions/removals divided by activity data) across time series. Are changes in emissions or removals being captured? • Check if there any unusual or unexplained trends noticed for activity data or other parameters across the time series.	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A
Source: This list has been adapted from the 2006 IPCC Guidelines for National GHG Inventories.					

3.6. Category-Specific (Tier 2) Procedures

In addition to the Tier 1 QC procedures outlined in the preceding section, Tier 2 QC procedures, particularly for select key categories, were applied.

These key categories are:

1) 1A1 - Fuel Combustion Activities - Energy Industries – Liquid Fuels - CO_2
2) 1A1 - Fuel Combustion Activities - Energy Industries – Solid Fuels - CO_2
3) 1A1 - Fuel Combustion Activities - Energy Industries – Gaseous Fuels - CO_2
4) 1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2
5) 1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2
6) 1A3c - Fuel Combustion Activities - Transport - Railways - CO_2
7) 1A4a - Fuel Combustion Activities - Other Sectors – Commercial/Institutional - CO_2
8) 1A4b - Fuel Combustion Activities - Other Sectors – Residential - CO_2
9) 1A4b - Fuel Combustion Activities - Other Sectors – Residential - CH_4
10) 1A4c - Fuel Combustion Activities - Other Sectors – Agriculture/Forestry/Fishery - CO_2
11) 1B2 - Fugitive Emissions from Fuels - Oil and Natural Gas - CH_4
12) 2A1 - Mineral industry - Cement Production - CO_2

13) 2D - Non-energy Products from Fuels and Solvent Use – CO_2
14) 2F1 - Product Uses as Substitutes for ODS - Refrigeration and Air Conditioning - HFCs
15) 2F2 - Product Uses as Substitutes for ODS - Foam Blowing Agents - HFCs
16) 3A - Enteric Fermentation - CH_4
17) 3B - Manure Management - CH_4
18) 3Ba - Manure Management - N_2O
19) 3Bb - Indirect N2O Emissions from Manure Management - N_2O
20) 3Da - Direct N2O Emissions from Managed Soils - N_2O
21) 3Db - Indirect N2O Emissions from Managed Soils - N_2O
22) 4A1 - Forest Land Remaining Forest Land (Removals) - CO_2
23) 4A2 - Land Converted to Forest Land (Removals) - CO_2
24) 4B1 - Cropland Remaining Cropland (Emissions) - CO_2
25) 4B2 - Land Converted to Cropland (Removals) - CO_2
26) 4C2 - Land Converted to Grassland (Removals) - CO_2
27) 4D2 - Land Converted to Wetlands (Removals) - CO_2
28) 4E2 - Land Converted to Settlements (Emissions) - N_2O
29) 4F2 - Land Converted to Other Lands (Removals) - CO_2
30) 4G - Harvested Wood Products - CO_2
31) 5A - Solid Waste Disposal - CH_4
32) 5D - Wastewater Treatment and Discharge - CH_4

Specific procedures (Tier2) verification and QC procedures are listed in Table 3.3.

Table 3.3: Category-Specific (Tier 2) QC Procedures

QC activity	Quality control and Verification Procedures	Task completed		Corrective action taken	
		Name	Date	Supporting documents	Date
Assess the applicability of IPCC default factors	• Evaluate whether national conditions are similar to those used to develop the IPCC default factors • Compare default factors to site or plant-level factors • Consider options for obtaining country-specific factors • Document results of this assessment	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/06/2020	N/A	N/A

QC activity	Quality control and Verification Procedures	Task completed		Corrective action taken	
		Name	Date	Supporting documents	Date
Review country-specific factors	• QC the data used to develop the country-specific factor • Assess whether secondary studies used to develop country-specific factors used Tier 1 QC activities • Compare country-specific factors to IPCC defaults; document any significant discrepancies • Compare country-specific factors to site or plant-level factors • Compare to factors from other countries (using IPCC Emission Factor Database) • Document results of this assessment	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/09/2020	N/A	N/A
Review measurements	• Determine if national or international (e.g., ISO) standards were used in measurements • Ensure measurement equipment is calibrated and maintained properly • Compare direct measurements with estimates using a factor; document any significant discrepancies	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/10/2020	N/A	N/A
Evaluate time series consistency	• Review significant (>10%) changes in year-over-year estimates for categories and sub-categories • Compare top-down and bottom-up estimates for similar orders of magnitude • Conduct reference calculations that use stoichiometric ratios and conservation of mass and land	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Ţugui	30/11/2020	N/A	N/A
Review national level activity data	• Determine the level of QC performed by the data collection agency. If inadequate, consider alternative data sources such as IPCC defaults and international data sets. Adjust the relevant uncertainty accordingly. • Evaluate time series consistency • Compare activity data from multiple references if possible	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/11/2020	N/A	N/A
Review site-specific activity data	• Determine if national or international (e.g., ISO) standards were used in estimates • Compare aggregated site-specific data (e.g. production) to national statistics/data • Compare data across similar sites • Compare top-down and bottom-up estimates for similar orders of magnitude	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/11/2020	N/A	N/A
QC uncertainty estimates	• Apply QC techniques to uncertainty estimates • Review uncertainty calculations • Document uncertainty assumptions and qualifications of any experts consulted	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30/11/2020	N/A	N/A
Verify GHG estimates	• Compare estimates to other national or international estimates at the national, gas, sector, or sub-sector level as available	Elena Bicova Anatol Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31/12/2020	N/A	N/A

3.7. Quality Assurance (QA) Procedures

Expert review offers the opportunity to uncover technical issues related to the application of methodologies, selection of activity data, and development and choice of emission factors. Because of their knowledge and experience in areas related to the inventory, the listed experts indicated in Table 3.4, below, have been included in the QA process. Their comments have been reviewed and addressed, as appropriate, prior to the submission of the Inventory of anthropogenic GHG emissions by sources and sinks of CO_2 in the current inventory cycle.

Table 3.4: External Reviewers

Name	Organization	Area of Expertise	Contact Information	Comment Summary
Michael Tirsu, PhD in Power Engineering, Director	Institute of Power Engineering	Energy	St. Academiei 5, room 400, MD-2028, Chisinau, Republic of Moldova Tel.: +373-22-73-53-84, Fax: +373-22-73-53-82 E-mail: tirsu.mihai@gmail.com	Worked with Ms. Elena Bicova, Energy Sector Lead, to uncover sectoral technical issues related to the application of methodologies, selection of activity data, and development and choice of emission factors.
Natalia Beglet, PhD in Power Engineering, Head of Program	Technical University of Moldova, Faculty of Urbanism and Architecture, Program "Engineering of Heat, Gas and Climate Control Systems in Buildings and Environment Protection"	Engineering of Heat, Gas and Climate Control Systems in Buildings, Environment Protection, Industrial Processes	St. 31 August 1989 78/2, MD-2004, Chisinau, Republic of Moldova, Tel: +373-68-16-88-22 E-mail: natalia.beglet@gmail.com	Worked with Mr. Anatolie Tarita, IPPU Sector Lead, to uncover sectoral technical issues related to the application of methodologies, selection of activity data, and development and choice of emission factors.
Tamara Leah, Prof., PhD Agriculture, Deputy-Director	Institute of Soil Science, Agrochemistry and Soil Protection "Nicolae Dimo"	Biology, Pedology and Soil Protection	100, Ialoveni Str., 1st floor, MD-2070, Chisinau, Republic of Moldova Tel: +373-22-28-48-43 / 28-48-62, Fax: +373-22-28-48-55 E-mail: tamaraleah09@gmail.com	Worked with Mr. Sergiu Cosman, Agriculture Sector Lead, to uncover sectoral technical issues related to the application of methodologies, selection of activity data, and development and choice of emission factors.
Victor Sfecla, Senior Lecturer	State Agricultural University of Moldova, Faculty of Horticulture, Department of Forestry and Public Gardens	Forestry	St. Mircesti 44, MD-2049, Chisinau, Republic of Moldova Tel: +373-22-43-22-05 / 43-28-09 E-mail: v.sfecla@gmail.com	Worked with Mr. Ion Talmaci, LULUCF Sector Lead, to uncover sectoral technical issues related to the application of methodologies, selection of activity data, and development and choice of emission factors.
Tamara Guvir	Independent consultant	Waste Management and Environment Protection	Tel: +373-68-022-203 E-mail: guvir.tamara@gmail.com	Worked with Ms. Tatiana Tugui, Waste Sector Lead, to uncover sectoral technical issues related to the application of methodologies, selection of activity data, and development and choice of emission factors.

3.8. Supplemental QA/QC Checklists

Coordinator QA / QC Checklist

Activities	Tasks completed	
	Name	Date
• Clarify and communicate QA/QC responsibilities to inventory team members.	Marius Taranu	30.04.2020
• Develop and QA/QC checklists appropriate to roles on the inventory team	Marius Taranu	31.05.2020
• Distribute QA/QC checklist to appropriate inventory team members and set deadline for completion.	Marius Taranu	30.06.2020
• Ensure the timely and accurate completion of QA/QC checklists and related activities by checking in with team members.	Marius Taranu	Continuous
• Collect completed QA/QC checklists and forms.	Marius Taranu	31.12.2020
• Review completed QA/QC checklists and forms for completeness and accuracy.	Marius Taranu	31.01.2021
• Deliver documentation of QA/QC activities to the inventory and archive coordinators.	Marius Taranu	31.02.2021
• Coordinate external reviews of the inventory document and ensure that comments are incorporated into the inventory. Steps to coordinating external reviewers include: 1. Identify external reviewers (e.g., through category leads). 2. Set review schedule. 3. Establish review format (e.g., digital mark-up in Word or Excel). 4. Contact external reviewers informing them of the schedule and expectations. 5. Distribute Inventory draft for review. 6. Collect and compile review comments. 7. Deliver compiled comments to inventory and archive coordinators. 8. Update inventory, as appropriate based on comments.	Marius Taranu	30.04.2021

Inventory Lead Checklist: Cross-Cutting Checks for Overall Inventory Quality

Activities	Task Completed	
	Name	Date
Emission Calculations Across GHG Emission and Removal Categories		
• Identify parameters that are common across categories (e.g. conversion factors, carbon content coefficients, etc.) and check for consistency	Marius Taranu	31.01.2021
• Check that using same data inputs (e.g. animal population data) report comparable values (i.e., analogous in magnitude)	Marius Taranu	31.01.2021
• Check across categories that same electronic data set is used for common data (e.g., linking animal population data to the enteric fermentation and manure management calculations)	Marius Taranu	31.01.2021
• Check that the number of significant digits or decimal places for common parameters, conversion factors, emission factors, or activity data is consistent across categories	Marius Taranu	31.01.2021
• Check that total emissions are reported consistently (in terms of significant digits or decimal places) across categories	Marius Taranu	31.01.2021
• Check that emissions data are correctly aggregated from lower reporting levels to higher reporting levels	Marius Taranu	31.01.2021
Documentation		
• Check if internal documentation practices are consistent across categories	Marius Taranu	31.03.2021
Completeness		
• Check for completeness across categories and years	Marius Taranu	31.03.2021
• Check that data gaps are identified and reported as required	Marius Taranu	31.03.2021
• Compare current national inventory estimates with previous years'	Marius Taranu	31.03.2021
Maintaining Master Inventory File: Spreadsheets and Inventory Document		
• Have file control procedures been followed?	Marius Taranu	31.03.2021

Inventory Lead Checklist: Detailed Checklist for Inventory Document

Activities	Task Completed	
	Name	Date
Front Section		
• Cover page has correct date, title, and contact address	Marius Taranu	30.04.2021
• Tables of contents/tables/figures are accurate: titles match document, pages match; numbers run consecutively and have correct punctuation	Marius Taranu	30.04.2021
• The Executive Summary and Introduction are updated with appropriate years and discussion of trends	Marius Taranu	30.04.2021
Tables and Figures		
• All numbers in tables match numbers in spread sheets	Marius Taranu	30.04.2021
• Check that all tables have correct number of significant digits	Marius Taranu	30.04.2021
• Check alignment in columns and labels	Marius Taranu	30.04.2021
• Check that table formatting is consistent	Marius Taranu	30.04.2021
• Check that all figures are updated with new data and referenced in the text	Marius Taranu	30.04.2021
• Check table and figure titles for accuracy and consistency with content	Marius Taranu	30.04.2021
Equations		
• Check for consistency in equations	Marius Taranu	30.04.2021
• Check that variables used in equations are defined following the equation	Marius Taranu	30.04.2021
References		
• Check consistency of references, and that in text citations and references match	Marius Taranu	30.04.2021
General Format		
• All acronyms are spelled out first time and not subsequent times throughout each chapter	Marius Taranu	30.04.2021
• All fonts in text, headings, titles, and subheadings are consistent	Marius Taranu	30.04.2021
• All highlighting, notes, and comments are removed from document	Marius Taranu	30.04.2021
• Size, style, and indenting of bullets are consistent	Marius Taranu	30.04.2021
• Spell check is complete	Marius Taranu	30.04.2021
Other Issues		
• Check that each section is updated with current year (or most recent year that inventory report includes)	Marius Taranu	30.04.2021

Chapter 4: Description of Archiving System

Contact data of the Coordinator of the National Greenhous Gas Inventory

Country	Republic of Moldova	**Postal address:**	St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova
Name:	Taranu Marius	**Telephone/Fax:**	+373 22 23 22 47
Position:	Coordinator of the National Greenhouse Gas Inventory	**E-mail:**	marius.taranu@uipm.gov.md
Organization:	Public Institution "Environmental Projects Implementation Unit"	**URL:**	http://www.clima.md

4. Description of Archiving System

4.1. Background

Archives refer to a collection of records that have been created during the development of the inventory (references, methodological choice, expert comments, revisions, etc.), as well as document the location where these records are kept. The Archiving System is a critical component of the inventory development process and is important for sustaining the National Inventory System of the Republic of Moldova. An Archiving System helps make a national inventory transparent and reproducible, and facilitates development of subsequent inventories by future inventory staff and sector/category leads (individuals responsible for developing estimates within a particular sector). Each new inventory cycle will benefit from effective data and document management during development of the previous inventory.

All information used to create the inventory is archived in a single location in both electronic and hard copy (paper) storage so that future inventory managers can reference all relevant files to respond to reviewer feedback including questions about methodologies. Archived information includes all emission factors and activity data at the most detailed level, and documentation of how these factors and data have been generated and aggregated for the preparation of the inventory. This information also includes internal documentation on QA/QC procedures, external and internal reviews, documentation of annual key categories and key category identification, and planned inventory improvements. Copies of archived documents are kept in multiple locations to reduce the risk of losing all records due to theft or disaster (e.g., fire, earthquake, or flooding).

4.2. Assess Existing Archiving Program and Procedures

Below are provided the archiving procedures applied for the documents and files available from the previous inventory cycle.

- Documents and files available from the previous inventory cycle are stored both electronically and in hard copies.
- The Inventory Coordinator, who acts also as Archiving System Coordinator has access to archived information, as well as the Director of Public Institution “Environmental Projects Implementation Unit”.
- Most documents are kept both in draft and final versions.
- Contact names are available as a List by category and sector of responsibility.

Further are provided the procedures used for archiving documents and files available from the latest inventory cycle.

- Documents and files available from the current inventory cycle are stored both electronically and in hard copies.
- The information is stored in the premises of the Public Institution “Environmental Projects Implementation Unit” at: St. Alexandru cel Bun 51A, MD 2012, Chisinau, Republic of Moldova.
- The information is stored both on the hard drive and external memory support; the initially received information is usually available only on paper, then it is scanned and stored also in electronic format.

- The files are named based on the reference name document and date of receipt.
- To reflect subsequent updates, the file names are changed by providing the date of last update.

Once filled in electronically, the 6 National System Templates are kept by the Archiving System Coordinator, including:

- Template 1: “Institutional Arrangements”
- Template 2: “Methods and Data Documentation”
- Template 3 “Description of QA/QC Procedures “
- Template 4: “Description of Archiving System”.
- Template 5: “Key Categories Analysis”.
- Template 6: “National Inventory Improvement Plan”.

4.3. Archive System

The following sections describe the Archive System followed by the national entity designated with responsibility for developing national GHG inventory to ensure a high-quality national inventory based on an assessment of existing practices as described in section 4.2 above.

4.3.1. Archiving Coordinator Role and Responsibilities

The role of Archiving Coordinator is designated at the beginning of the inventory cycle. The Archiving Coordinator is responsible for ensuring that all archiving procedures are performed for the inventory and all supporting documents and spreadsheets are retained appropriately. The Archiving Coordinator is also responsible for clarifying who is responsible for carrying out archive procedures at various levels, as well as for ensuring that all team members know their archiving responsibilities, including which documents should be archived.

These responsibilities require that the Archiving Coordinator:

- Communicates archiving system plan, procedures, and responsibilities to other staff;
- Determines archiving tasks and assign tasks to staff, create a checklist of archiving procedures for team members;
- Draws up a checklist of archiving procedures to be followed by inventory team members;
- Ensures that the archive procedures (see section 4.3.2 below) are carried out effectively;
- Serve as the keeper of the permanent archive and respond to future requests to view archive materials.

4.3.2. Archive Procedures

It is essential to outline each aspect of the archiving process so that these procedures can be effectively implemented. The archive plan developed by the Archive Coordinator will take into account the following:

Management of Files

The Archiving Coordinator ensures the Sector Leads and their teams follow the appropriate file management procedures and naming conventions for version control outlined below:

- Titles of spreadsheet files containing GHG estimates include the IPCC category name, inventory year, and the date the file was last saved. For example, the naming convention includes the category and inventory year, such as: "1A3_Transport_2016 (30-06-2018).xls" spreadsheet or "1A3_Transport_2016_FINAL.xls".
- Both the printed copies of documents and external memory supports exhibit a colored sticker according to the sector. There is also an identification methodology for the documents and folders which identifies the sector, type of report, and date.
    - Example: MD NGI EN FR 30-04-21
    - The first 5 digits, MD NGI, mean: "Moldova National GHG Inventory"
    - The next 2 digits are the name of the sector:
        - EN → Energy → red
        - IP → Industrial Processes and Product Use → blue
        - AG → Agriculture → yellow
        - LU → Land Use, Land Use Change, and Forestry → green
        - WA → Waste → brown
    - The next 2 digits identify the type of report:
        - FR → Final Report
        - PR → Preliminary Report
    - The next 6 identify the date of the report:
        - day-month-year → dd-mm-yy
    - All documentation exists on hard drives, external memory supports and, in extent possible, also in printed copies. The documentation will be kept at Public Institution "Environmental Projects Implementation Unit", as well as at the key partner institutions (Institute of Power Engineering and the Forestry Research and Management Institute).

Data Retention

At the end of each cycle inventory, spreadsheets and other electronic files used to create inventory estimates are provided to the Archiving Coordinator.

The essential components of the archive are:

- Data and calculation spreadsheets and other electronic files for every category used to create inventory estimates.
- QA/QC Plan with completed checklists.
- Key category analysis spreadsheets.
- Internal and external review comments and responses.
- Latest draft and final electronic versions of the inventory document (National Inventory Report), in Romanian and English (for use as a starting point to update the inventory in the future).
- Updated Template 1: "Institutional Arrangements" and Template 2: "Methods and data documentation", which are used to list and check references.

The Archiving Coordinator will take the files listed above and archive the files on the hard drive as well as on an external memory support. The contents of the hard drive as well as the external memory support, is clearly labelled and organized into several subfolders for easy reference. Subfolders exist for each sector and then contain several subfolders within each sector folder to catalogue, track and organize the archived materials. For example, each sector folder may contain subfolders for items such as data collection spreadsheets, calculation spreadsheets, written documents, and data sources.

Document Retention

Activity data and other reference documents used to create the inventory are collected and provided to the Archiving Coordinator by each Sector Lead. Vital information from publications, contacts, and other sources are also included in the documents provided to the Archiving Coordinator. This information includes, at a minimum, the title page with the name of the author(s), pages of actual data used, pages explaining data used, and pages describing methodologies used.

These documents include:

- All new reference documents for the current year's inventory records file, which is referred to as the inventory archive. The Archiving Coordinator is responsible for reviewing the references cited in the inventory, collecting, and cataloguing all new documents. References that are already in the records file from the previous inventory cycle are not included.
- Draft versions (in both electronic and hard copy) used for the internal and external peer reviews, as well as the final submitted versions of the inventory.
- The final version of the National Inventory System Report (compilation of completed templates including: 'Institutional Arrangements', 'QA/QC Plan', 'Description of Archiving System', 'Key Category Analysis', and 'National Inventory Improvement Plan').
    - Each Sector Lead is responsible for documenting and completing their respective components of any distributed inventory template (e.g. sec-

toral portion of 'Institutional Arrangements' template). Once completed, the templates are submitted to the Archiving Coordinator / Inventory Coordinator. Printed and electronic versions are stored with the Archiving Coordinator / Inventory Coordinator at the Public Institution "Environmental Projects Implementation Unit".

- Documents created to address comments received during any official review periods or from expert reviews. These documents include both, comments received verbatim, as well as the response and subsequent actions taken by the inventory staff.

Storage Mechanisms

All archive materials are duplicated, catalogued and placed in the archive. Duplicate copies of the archive files are stored in the Institute of Power Engineering, as well as in the Forestry Research and Management Institute. An index describing the contents of the archive is placed at the front. The Archiving Coordinator chooses a centralized and secure location (Public Institution "Environmental Projects Implementation Unit", St. Alexandru cel Bun 51A, MD-2012, Chisinau, Republic of Moldova) for the placement of the hard copy and electronic archive.

4.3.3. Overall Archive Procedures Checklist

To ensure a successful archiving system, the Archiving Coordinator uses a comprehensive checklist. Checklists help to ensure that all archiving procedures occur in a timely and complete manner.

The final archiving task list and schedule show all archiving tasks, corresponding task leaders, and due dates. The Archiving Coordinator ensures that all tasks are outlined prior to the start of any archive procedure. The Archiving Coordinator is also responsible for assigning task leaders to accomplish each archive task prior to the due date. The Archiving Coordinator completes staffing for each task and date due at the beginning of the inventory cycle. Table 4.1 below provides the comprehensive checklist used by the Archiving Coordinator.

Table 4.1: Archive Tasks, Responsibilities and Schedule

Subtask	Date Due	Task Completed	
		Name:	Date
Archiving Coordinator			
Communicate archiving plan to all persons working on the inventory, especially the Sector Leads. Also ensure Sector Leads understand their specific responsibilities and corresponding deadlines.	December 2020	Marius Taranu	31.12.2020
Compile electronic versions of QA/QC checklists.	January 2021	Marius Taranu	15.01.2021
Compile electronic versions of spreadsheets used to estimate emissions by sector (draft, review, and final versions) to track progress and changes.	January 2021	Marius Taranu	31.01.2021
Create official archive by placing all paper copies with an index in a centrally located filing cabinet.	March 2021	Marius Taranu	31.03.2021
Catalogue all documents (references and comments) using a unique tracking number and index.	March 2021	Marius Taranu	31.03.2021
Collect copies of all references.	March 2021	Marius Taranu	31.03.2021
Request any references that are missing from the archive from those working on the inventory. Send reminders as needed.	March 2021	Marius Taranu	31.03.2021
Ensure that all paper materials are present in the official archive by reviewing the contents against the table of contents contained in the file drawer.	March 2021	Marius Taranu	31.03.2021
Compile electronic versions of Key Category Analysis.	March 2021	Marius Taranu	31.03.2021
Ensure that all electronic files listed above are contained on hard drive and on the external memory support and that the external memory support is placed together with other official archive materials.	March 2021	Marius Taranu	31.03.2021

Subtask	Date Due	Task Completed	
		Name:	Date
Save all electronic files on hard drive and external memory supports.	April 2021	Marius Taranu	30.04.2021
Collect copies of final versions of inventory document.	April 2021	Marius Taranu	30.04.2021
Compile electronic versions of draft and final versions of the inventory document.	April 2021	Marius Taranu	30.04.2021
Distribute electronic files at the start of next inventory update.	July 2021	Marius Taranu	01.07.2021
Sector Category Lead(s)			
Send electronic versions of spreadsheets used to estimate emissions to Inventory Coordinator (using naming convention).	October 2020	Elena Bicova Anatolie Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31.10.2020
Send summary or list of QA/QC steps and corrective actions (by category) to Inventory Coordinator.	November 2020	Elena Bicova Anatolie Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30.11.2020
Create an index of documents and files for electronic and hardcopy storage.	March 2021	Elena Bicova Anatolie Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	31.03.2021
Save all final electronic files on an archive external memory support and label it as *FINAL* with name of source/sector, date, and contact information and send copy to Inventory Coordinator.	April 2021	Elena Bicova Anatolie Tarita Sergiu Cosman Ion Talmaci Tatiana Tugui	30.04.2021

4.4. Recommended Improvements to the Inventory Archive System

Table 4.2 provides a list of suggested improvements to the archive system. These improvements should be incorporated into the archive system in future years.

Table 4.2: Recommended Improvements to the Inventory Archive System

Improvement #	Archive System Task	Recommended Improvement
1	Database Lead	Responsibilities need to be defined for a database lead. It is necessary to appoint a person responsible for the database who will ensure that all the inventory archival procedures, corresponding documents and supporting spreadsheets identified under the IPCC guidelines are accurately followed. He/she will also be responsible to ensure that all the members of the team know their responsibilities with regard to archiving. The most important points that the designated coordinator should take into account are the following: (i) ensure an effective archiving process; (ii) ensure that copies from all new reference documents are adequately archived; (iii) establish a checklist for the archiving procedures to be used by the members of the inventory team; (iv) to be responsible for the permanent archive and to respond to future request in regard to archiving materials.
2	Reference Document Lead	Responsibilities need to be defined for consultants responsible for collecting reference documents and corresponding cataloging. The responsibilities in regard to reference documents from specific consultants (staff members that have the responsibility to develop GHG emission estimates for a particular sector) should be designated and notified from the beginning of the inventory process.

Chapter 5: Key Category Analysis

Contact data of the Coordinator of the National Greenhous Gas Inventory

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5. Key Category Analysis

5.1. Background

The concept of "key categories" was created by the IPCC as a way to help countries prioritize resources for improving national greenhouse gas inventories[19]. Key categories have the greatest contribution to the overall level of national emissions. When an entire time series of emission estimates is prepared, key categories can also be identified as those categories that have the largest influence on the trend of emissions over time[20]. In addition, when uncertainty estimates are incorporated into emission estimates, additional key categories are identified.

The results of the key category analysis provide a country with a list of their most important inventory categories. This list is a starting point from which a country can begin the process of improving their greenhouse gas inventory. To improve the national greenhouse gas inventory, it may be necessary to consider applying more accurate or higher tier methodologies, collect more detailed activity data, or develop country-specific emission factors. These activities all require additional resources, and it is not possible to make improvements for every inventory category. The inventory category list resulting from this analysis can provide a quantitative framework for the national greenhouse gas inventory team to develop an inventory improvement plan. The key category analysis also provides more complete and transparent information for the National Communications and Biennial Update Reports.

This report presents the results of the IPCC Approach 1 and Approach 2 methodologies for determining key categories (referred to as Tier 1 and Tier 2 throughout this template). In the Tier 1 methodology, key categories are identified using a pre-determined cumulative emissions threshold, where key categories are those that, when summed together in descending order of magnitude, add up to 95% of the total level. The Tier 2 methodology to identify key categories can be used if category uncertainties or parameter uncertainties are available. Under the Tier 2 key category methodology, source or sink categories are sorted or ranked according to their contribution to uncertainty, and emissions are weighted by their combined uncertainty, in addition to contribution to total emissions.

5.2. Key Category Software

The Key Categories Analysis was performed using the key categories calculation software developed by the US Environmental Protection Agency (US EPA's Key Category Calculation Tool v2.5)[21].

The completed key category file was saved as "EPA_KCA_Tool_2020_FINAL.xls". This spreadsheet exists on the Inventory Coordinator's computer at the Public Institution "Environmental Projects Implementation Unit". An electronic copy was also submitted to the Archiving Coordinator and is stored within the KCA folder in the GHG Inventory archives. All results presented in this template come from this spreadsheet and the specific Excel spreadsheet tabs is referenced below each table in this template.

[19] The 1996 IPCC Guidelines refer to "key source categories" which has been revised in subsequent IPCC Guidelines to "key categories" since sinks are also included in the analysis.

[20] The 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006) defines a key category as a "category that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of greenhouse gases in terms of the absolute level, the trend, or the uncertainty in emissions and removals. Whenever the term key category is used, it includes both source and sink categories". See Chapter 4, "Methodological Choice and Identification of Key Categories", in IPCC 2006 for more information, <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>

[21] <https://19january2017snapshot.epa.gov/climatechange/national-ghg-inventory-capacity-building_.html>

5.3. Tier 1 Current Year Level Analysis

When inventory categories are sorted in order of decreasing GHG magnitude, those that fall at the top of the list and cumulatively account for 95% of emissions are considered key categories. They are those inventory categories that contribute the most to overall national total emissions.

Table 5.1 presents the results of the IPCC Tier 1 key category level analysis for the most recent or current year 2019. There is a total of 17 key categories based on the Tier 1 level assessment, without LULUCF.

Table 5.1: Key Categories Based on Contribution to Total National Emissions in 2019, without LULUCF

Key Categories from Tier 1 Current Year Level Assessment, without LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Level assessment	Cumulative Sum (%)
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.23	22.6%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.19	41.2%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	1,448.88	0.10	51.6%
5A - Solid Waste Disposal - CH_4	1,231.59	0.09	60.6%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.06	66.9%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	715.98	0.05	72.1%
2A1 - Mineral industry - Cement Production - CO_2	523.88	0.04	75.8%
3A - Enteric Fermentation - CH_4	441.65	0.03	79.0%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.03	81.9%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	331.26	0.02	84.3%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	325.35	0.02	86.6%
3Db - Indirect N2O Emissions from Managed Soils - N_2O	246.13	0.02	88.4%
5D - Wastewater Treatment and Discharge: Domestic - CH_4	237.68	0.02	90.1%
3B1 - Direct N2O Emissions from Manure Management - N_2O	228.87	0.02	91.8%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.02	93.3%
2D - Non-Energy Products from Fuels and Solvent Use - CO_2	143.53	0.01	94.4%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.01	95.4%

Table 5.2 presents the results of the IPCC Tier 1 key category level analysis for the most recent or current year 2019. There is a total of 23 key categories based on the Tier 1 level assessment, with LULUCF.

Table 5.2: Key Categories Based on Contribution to National Net Emissions in 2019, with LULUCF

Key Categories from Tier 1 Current Year Level Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Level assessment	Cumulative Sum (%)
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.16	16.5%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.14	30.1%
4B1 - Cropland Remaining Cropland (Emissions) - CO_2	1,799.17	0.10	39.6%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	1,448.88	0.08	47.3%
5A - Solid Waste Disposal - CH_4	1,231.59	0.07	53.8%

Key Categories from Tier 1 Current Year Level Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Level assessment	Cumulative Sum (%)
4A1 - Forest Land Remaining Forest Land (Removals) - CO_2	-1,231.10	0.07	60.3%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.05	64.9%
4A2 - Land Converted to Forest Land (Removals) - CO_2	-719.55	0.04	68.7%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	715.98	0.04	72.5%
4F2 - Land Converted to Other Lands (Emissions) - CO_2	611.79	0.03	75.8%
2A1 - Mineral industry - Cement Production - CO_2	523.88	0.03	78.5%
3A - Enteric Fermentation - CH_4	441.65	0.02	80.9%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.02	82.9%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	331.26	0.02	84.7%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	325.35	0.02	86.4%
4C2 - Land Converted to Grassland (Removals) - CO_2	-293.29	0.02	88.0%
3Db - Indirect N2O Emissions from Managed Soils - N_2O	246.13	0.01	89.3%
5D - Wastewater Treatment and Discharge: Domestic - CH_4	237.68	0.01	90.5%
3B1 - Direct N_2O Emissions from Manure Management - N_2O	228.87	0.01	91.7%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.01	92.9%
4E2 - Land Converted to Settlements (Emissions) - N_2O	161.28	0.01	93.7%
2D - Non-Energy Products from Fuels and Solvent Use - CO_2	143.53	0.01	94.5%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.01	95.2%

5.4. Tier 1 Base Year Level and Trend Analyses

When inventory categories are sorted in order of decreasing GHG magnitude, those that fall at the top of the list and cumulatively account for 95% of emissions are considered key categories. They are those inventory categories that contribute the most to overall national total emissions.

Table 5.3 presents the base year level results of the IPCC Tier 1 key category level analysis for the base year 1990. There is a total of 18 key categories based on the Tier 1 level assessment, without LULUCF.

Table 5.3: Key Categories Based on Contribution to Total National Emissions in 1990, without LULUCF

Key Categories from Tier 1 Base Year Level Assessment, without LULUCF	Base Year Emissions Estimate (Gg CO_2 Eq.)	Level assessment	Cumulative Sum (%)
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	7,447.11	0.16	16.4%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	7,414.29	0.16	32.8%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	6,438.89	0.14	47.0%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	4,410.07	0.10	56.7%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	4,112.35	0.09	65.8%
3A - Enteric Fermentation - CH_4	2,189.43	0.05	70.6%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	1,916.83	0.04	74.8%

Key Categories from Tier 1 Base Year Level Assessment, without LULUCF	Base Year Emissions Estimate ($Gg\ CO_2\ Eq.$)	Level assessment	Cumulative Sum (%)
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	1,548.35	0.03	78.2%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	1,413.84	0.03	81.3%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	1,172.73	0.03	83.9%
5A - Solid Waste Disposal - CH_4	1,046.73	0.02	86.2%
2A1 - Mineral industry - Cement Production - CO_2	971.70	0.02	88.4%
3B1 - Direct N_2O Emissions from Manure Management - N_2O	871.91	0.02	90.3%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	812.24	0.02	92.1%
3B - Manure Management - CH_4	495.10	0.01	93.2%
1A3c - Fuel Combustion Activities - Transport - Railways - CO_2	403.47	0.01	94.1%
3Db - Indirect N2O Emissions from Managed Soils - N_2O	361.04	0.01	94.9%
5D - Wastewater Treatment and Discharge: Domestic - CH_4	352.96	0.01	95.7%

Table 5.4 presents the base year level results of the IPCC Tier 1 key category level analysis for the base year 1990. There is a total of 23 key categories based on the Tier 1 level assessment, with LULUCF.

Table 5.4: Key Categories Based on Contribution to National Net Emissions in 1990, with LULUCF

Key Categories from Tier 1 Base Year Level Assessment, with LULUCF	Base Year Emissions Estimate ($Gg\ CO_2\ Eq.$)	Level assessment	Cumulative Sum (%)
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	7,447.11	0.14	14.1%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	7,414.29	0.14	28.1%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	6,438.89	0.12	40.3%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	4,410.07	0.08	48.6%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	4,112.35	0.08	56.4%
4B1 - Cropland Remaining Cropland (Emissions) - CO_2	2,602.98	0.05	61.3%
3A - Enteric Fermentation - CH_4	2,189.43	0.04	65.5%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	1,916.83	0.04	69.1%
4A1 - Forest Land Remaining Forest Land (Removals) - CO_2	-1,579.04	0.03	72.1%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	1,548.35	0.03	75.0%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	1,413.84	0.03	77.7%
4C2 - Land Converted to Grassland (Removals) - CO_2	-1,205.69	0.02	80.0%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	1,172.73	0.02	82.2%
5A - Solid Waste Disposal - CH_4	1,046.73	0.02	84.2%
4A2 - Land Converted to Forest Land (Removals) - CO_2	-984.39	0.02	86.1%
2A1 - Mineral industry - Cement Production - CO_2	971.70	0.02	87.9%
3B1 - Direct N_2O Emissions from Manure Management - N_2O	871.91	0.02	89.5%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	812.24	0.02	91.1%
4D2 - Land Converted to Wetlands (Removals) - CO_2	-555.38	0.01	92.1%

Key Categories from Tier 1 Base Year Level Assessment, with LULUCF	Base Year Emissions Estimate (Gg CO_2 Eq.)	Level assessment	Cumulative Sum (%)
3B - Manure Management - CH_4	495.10	0.01	93.1%
1A3c - Fuel Combustion Activities - Transport - Railways - CO_2	403.47	0.01	93.8%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	361.04	0.01	94.5%
5D - Wastewater Treatment and Discharge: Domestic - CH_4	352.96	0.01	95.2%

Table 5.5 presents the results of the IPCC key category trend analysis. The key categories are listed in order of decreasing contribution to the overall trend. Together they account for at least 95% of the overall trend in national total emissions. There is a total of 20 key categories based on the trend analysis, without LULUCF.

Table 5.5: Key Categories Based on Contribution to Overall Trend in Total National Emissions, without LULUCF

Key Categories from Tier 1 Trend Assessment, without LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Trend assessment	Cumulative Sum (%)
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	3.08	0.05	22.3%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	1.76	0.04	41.5%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.03	54.4%
5A - Solid Waste Disposal - CH_4	1,231.59	0.02	63.4%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.02	71.8%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.01	76.9%
2A1 - Mineral industry - Cement Production - CO_2	523.88	0.01	79.1%
3A - Enteric Fermentation - CH_4	441.65	0.00	81.3%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	325.35	0.00	82.8%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.00	84.2%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.00	85.5%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	246.13	0.00	86.9%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	715.98	0.00	88.2%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.00	89.4%
5D - Wastewater Treatment and Discharge - CH_4	237.68	0.00	90.7%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	1,448.88	0.00	91.8%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	331.26	0.00	92.7%
1A3c - Fuel Combustion Activities - Transport - Railways - CO_2	24.53	0.00	93.7%
2F2 - Product Uses as Substitutes for Ozone Depleting Substances - Foam Blowing Agents - HFCs	89.00	0.00	94.6%
3B - Manure Management - CH_4	66.59	0.00	95.4%

Table 5.6 presents the results of the IPCC key category trend analysis. The key categories are listed in order of decreasing contribution to the overall trend. Together they account for at least 95% of the overall trend in national total emissions. There is a total of 25 key categories based on the trend analysis, with LULUCF.

Table 5.6: Key Categories Based on Contribution to Overall Trend in National Net Emissions, with LULUCF

Key Categories from Tier 1 Trend Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Trend assessment	Cumulative Sum (%)
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	3.08	0.05	14.1%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	1.76	0.04	26.2%
4C2 - Land Converted to Grassland (Removals) - CO_2	-293.29	0.03	36.4%
4A1 - Forest Land Remaining Forest Land (Removals) - CO_2	-1,231.10	0.03	44.8%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.02	52.1%
4B1 - Cropland Remaining Cropland (Emissions) - CO_2	1,799.17	0.02	57.8%
4A2 - Land Converted to Forest Land (Removals) - CO_2	-719.55	0.02	63.3%
5A - Solid Waste Disposal - CH_4	1,231.59	0.02	68.6%
4D2 - Land Converted to Wetlands (Removals) - CO_2	-82.81	0.02	73.6%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.01	77.9%
4F2 - Land Converted to Other Lands (Emissions) - CO_2	611.79	0.01	81.2%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.01	84.1%
3A - Enteric Fermentation - CH_4	441.65	0.00	85.7%
2A1 - Mineral industry - Cement Production - CO_2	523.88	0.00	86.9%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	325.35	0.00	87.9%
4G - Harvested Wood Products - CO_2	-57.56	0.00	88.8%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.00	89.6%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.00	90.4%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	246.13	0.00	91.1%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.00	91.9%
5D - Wastewater Treatment and Discharge - CH_4	237.68	0.00	92.6%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	331.26	0.00	93.3%
4E2 - Land Converted to Settlements (Emissions) - N_2O	161.28	0.00	94.0%
1A3c - Fuel Combustion Activities - Transport - Railways - CO_2	24.53	0.00	94.6%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	715.98	0.00	95.2%

5.5. Tier 2 Current Year Level Analysis

The Tier 2 approach to assessing key categories, as defined in the IPCC's 2006 Guidelines (IPCC 2006), incorporates each source and sink category's associated uncertainty estimates into the equation to identify any additional key categories not already identified in the Tier 1 assessment. When inventory categories are sorted in order of decreasing GHG magnitude with the incorporated uncertainty, those that fall at the top of the list and cumulatively account for 90% of emissions are considered key categories.

Table 5.7 presents the results of the IPCC Tier 2 key category level analysis for the year 2019. There is a total of 15 key categories based on the Tier 2 current year level analysis, without LULUCF.

Table 5.7: Key Categories Based on Contribution to Total National Emissions with Incorporated Uncertainty in 2019, without LULUCF

Key Categories from Tier 2 Current Year Level Assessment, without LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Relative level assessment with uncertainty	Cumulative Sum (%)
5A - Solid Waste Disposal - CH_4	1,231.59	0.20	20.3%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	246.13	0.14	33.9%
3B1 - Direct N_2O Emissions from Manure Management - N_2O	228.87	0.08	41.8%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.08	49.5%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.07	56.8%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.06	62.8%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.05	67.4%
5D - Wastewater Treatment and Discharge - CH_4	237.68	0.04	71.8%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.04	75.3%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	1,448.88	0.03	78.7%
3A - Enteric Fermentation - CH_4	441.65	0.03	82.0%
3B5 - Indirect N_2O Emissions from Manure Management - N_2O	49.60	0.03	84.5%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.02	86.9%
2D - Non-Energy Products from Fuels and Solvent Use - CO_2	143.53	0.02	88.8%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	715.98	0.02	90.5%

Table 5.8 presents the results of the IPCC Tier 2 key category level analysis for the year 2019. There is a total of 21 key categories based on the Tier 2 current year level analysis, with LULUCF.

Table 5.8: Key Categories Based on Contribution to National Net Emissions with Incorporated Uncertainty in 2019, with LULUCF

Key Categories from Tier 2 Current Year Level Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Relative level assessment with uncertainty	Cumulative Sum (%)
5A - Solid Waste Disposal - CH_4	1,231.59	0.16	16.1%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	246.13	0.11	26.8%
4B1 - Cropland Remaining Cropland (Emissions) - CO_2	1,799.17	0.07	33.5%
3B1 - Direct N_2O Emissions from Manure Management - N_2O	228.87	0.06	39.7%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.06	45.8%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.06	51.6%
4A1 - Forest Land Remaining Forest Land (Removals) - CO_2	-1,231.10	0.05	56.6%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.05	61.4%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.04	65.0%
5D - Wastewater Treatment and Discharge - CH_4	237.68	0.04	68.5%
4A2 - Land Converted to Forest Land (Removals) - CO_2	-719.55	0.03	71.5%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.03	74.3%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	1,448.88	0.03	76.9%
3A - Enteric Fermentation - CH_4	441.65	0.03	79.5%

Key Categories from Tier 2 Current Year Level Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Relative level assessment with uncertainty	Cumulative Sum (%)
4F2 - Land Converted to Other Lands (Emissions) - CO_2	611.79	0.02	81.8%
3B5 - Indirect N_2O Emissions from Manure Management - N_2O	49.60	0.02	83.8%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.02	85.7%
2D - Non-Energy Products from Fuels and Solvent Use - CO_2	143.53	0.02	87.2%
4C2 - Land Converted to Grassland (Removals) - CO_2	-293.29	0.01	88.6%
4E2 - Land Converted to Settlements (Emissions) - N_2O	161.28	0.01	89.9%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	715.98	0.01	91.2%

5.6. Tier 2 Base Year and Trend Analyses with Incorporated Uncertainty

Table 5.9 presents the results of the IPCC Tier 2 key category level analysis for the year 1990. There is a total of 17 key categories based on the Tier 2 base year level analysis, without LULUCF.

Table 5.9: Key Categories Based on Contribution to Total National Emissions with Incorporated Uncertainty in 1990, without LULUCF

Key Categories from Tier 2 Base Year Level Assessment, without LULUCF	Base Year Emissions Estimate (Gg CO_2 Eq.)	Relative level assessment with uncertainty	Cumulative Sum (%)
3B1 - Direct N_2O Emissions from Manure Management - N_2O	871.91	0.13	13.1%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	361.04	0.09	21.8%
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	7,447.11	0.08	29.4%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	7,414.29	0.08	36.9%
5A - Solid Waste Disposal - CH_4	1,046.73	0.08	44.4%
3A - Enteric Fermentation - CH_4	2,189.43	0.07	51.4%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	6,438.89	0.07	58.0%
3B5 - Indirect N_2O Emissions from Manure Management - N_2O	244.71	0.05	63.4%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	1,172.73	0.05	67.9%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	4,410.07	0.04	72.4%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	4,112.35	0.04	76.6%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	812.24	0.04	80.7%
5D - Wastewater Treatment and Discharge: Domestic - CH_4	352.96	0.03	83.6%
3B - Manure Management - CH_4	495.10	0.02	85.8%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	273.92	0.02	87.8%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	1,916.83	0.02	89.7%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	1,548.35	0.02	91.3%

Table 5.10 presents the results of the IPCC Tier 2 key category level analysis for the year 1990. There is a total of 22 key categories based on the Tier 2 base year level analysis, with LULUCF.

Table 5.10: Key Categories Based on Contribution to National Net Emissions with Incorporated Uncertainty in 1990, with LULUCF

Key Categories from Tier 2 Base Year Level Assessment, with LULUCF	Base Year Emissions Estimate ($Gg\ CO_2\ Eq.$)	Relative level assessment with uncertainty	Cumulative Sum (%)
3B1 - Direct N_2O Emissions from Manure Management - N_2O	871.91	0.11	11.2%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	361.04	0.07	18.6%
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	7,447.11	0.06	25.0%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	7,414.29	0.06	31.4%
5A - Solid Waste Disposal - CH_4	1,046.73	0.06	37.9%
3A - Enteric Fermentation - CH_4	2,189.43	0.06	43.9%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	6,438.89	0.06	49.4%
3B5 - Indirect N_2O Emissions from Manure Management - N_2O	244.71	0.05	54.0%
4B1 - Cropland Remaining Cropland (Emissions) - CO_2	2,602.98	0.05	58.5%
3Da - Direct N2O Emissions from Managed Soils - N_2O	1,172.73	0.04	62.4%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CO_2	4,410.07	0.04	66.2%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	4,112.35	0.04	69.8%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	812.24	0.04	73.3%
4A1 - Forest Land Remaining Forest Land (Removals) - CO_2	-1,579.04	0.03	76.4%
4C2 - Land Converted to Grassland (Removals) - CO_2	-1,205.69	0.03	79.0%
5D - Wastewater Treatment and Discharge: Domestic - CH_4	352.96	0.02	81.5%
3B - Manure Management - CH_4	495.10	0.02	83.4%
4A2 - Land Converted to Forest Land (Removals) - CO_2	-984.39	0.02	85.3%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	273.92	0.02	87.0%
1A2 - Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	1,916.83	0.02	88.7%
1A4c - Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	1,548.35	0.01	90.0%
1A4a - Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	1,413.84	0.01	91.2%

Table 5.11 presents the results of the IPCC Tier 2 key category trend analysis. The key categories are listed in order of decreasing contribution to the overall trend when uncertainty in incorporated. Together they account for at least 90% of the overall trend in national total emissions. There is a total of 17 key categories based on the trend analysis, without LULUCF.

Table 5.11: Key Categories Based on Contribution to Overall Trend in Total National Emissions with Incorporated Uncertainty, without LULUCF

Key Categories from Tier 2 Trend Assessment, without LULUCF	Current Year Emissions Estimate ($Gg\ CO_2\ Eq.$)	Relative Trend assessment with uncertainty	Cumulative Sum (%)
5A - Solid Waste Disposal - CH_4	1,231.59	0.24	23.7%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	246.13	0.12	35.5%
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	3.08	0.08	43.8%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	1.76	0.07	51.0%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.07	58.1%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.05	63.0%

Key Categories from Tier 2 Trend Assessment, without LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Relative Trend assessment with uncertainty	Cumulative Sum (%)
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.04	66.8%
5D - Wastewater Treatment and Discharge - CH_4	237.68	0.04	70.7%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH4	213.83	0.03	74.1%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.03	77.2%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	391.10	0.03	79.8%
3A - Enteric Fermentation - CH_4	441.65	0.03	82.4%
3B1 - Direct N_2O Emission from Manure Management - N_2O	228.87	0.02	84.4%
3B5 - Indirect N_2O Emissions from Manure Management - N_2O	49.60	0.02	86.4%
2F2 - Product Uses as Substitutes for Ozone Depleting Substances - Foam Blowing Agents - HFCs	89.00	0.02	88.4%
2D - Non-Energy Products from Fuels and Solvent Use - CO_2	143.53	0.02	89.9%
3B - Manure Management - CH_4	66.59	0.01	91.2%

Table 5.12 presents the results of the IPCC Tier 2 key category trend analysis. The key categories are listed in order of decreasing contribution to the overall trend when uncertainty in incorporated. Together they account for at least 90% of the overall trend in national total emissions. There is a total of 22 key categories based on the trend analysis, with LULUCF.

Table 5.12: Key Categories Based on Contribution to Overall Trend in Total National Emissions with Incorporated Uncertainty, with LULUCF

Key Categories from Tier 2 Trend Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Relative Trend assessment with uncertainty	Cumulative Sum (%)
5A - Solid Waste Disposal - CH_4	1,231.59	0.15	14.7%
4C2 - Land Converted to Grassland (Removals) - CO_2	-293.29	0.10	25.0%
4A1 - Forest Land Remaining Forest Land (Removals) - CO_2	-1,231.10	0.07	32.4%
3Db - Indirect N_2O Emissions from Managed Soils - N_2O	246.13	0.07	39.5%
1A1 - Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	3.08	0.06	45.1%
4A2 - Land Converted to Forest Land (Removals) - CO_2	-719.55	0.05	49.9%
1A1 - Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	1.76	0.05	54.7%
4B1 - Cropland Remaining Cropland (Emissions) - CO_2	1,799.17	0.04	59.2%
3Da - Direct N_2O Emissions from Managed Soils - N_2O	871.01	0.04	63.6%
4D2 - Land Converted to Wetlands (Removals) - CO_2	-82.81	0.04	67.6%
1A3b - Fuel Combustion Activities - Transport - Road transportation - CO_2	2,567.77	0.03	70.5%
4F2 - Land Converted to Other Lands (Emissions) - CO_2	611.79	0.03	73.1%
2F1 - Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	138.64	0.02	75.5%
5D - Wastewater Treatment and Discharge - CH_4	237.68	0.02	77.8%
1A4b - Fuel Combustion Activities - Other Sectors - Residential - CH_4	213.83	0.02	79.9%
3A - Enteric Fermentation - CH_4	441.65	0.02	81.8%
3B1 - Direct N_2O Emissions from Manure Management - N_2O	228.87	0.02	83.6%
1A1 - Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	3,115.59	0.02	85.3%

Key Categories from Tier 2 Trend Assessment, with LULUCF	Current Year Emissions Estimate (Gg CO_2 Eq.)	Relative Trend assessment with uncertainty	Cumulative Sum (%)
4G - Harvested Wood Products - CO_2	-57.56	0.02	86.8%
1B2b - Fugitive Emissions from Fuels - Oil and Natural Gas - Natural gas - CH_4	391.10	0.02	88.3%
3B5 - Indirect N_2O Emissions from Manure Management - N_2O	49.60	0.01	89.8%
2F2 - Product Uses as Substitutes for Ozone Depleting Substances - Foam Blowing Agents - HFCs	89.00	0.01	91.0%

5.7. Methodology

The methodologies used in this report are taken from *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. More detailed descriptions of the methodologies can be found in these documents.

5.7.1. Tier 1 Level Assessment

For a Tier 1 Level Assessment of key categories, calculate the contribution of each inventory category's emissions to the total national inventory level, according to Equation 1:

EQUATION 1

$$\text{Key Category Level Assessment} = \frac{|\text{Source or Sink Category Estimate}|}{\text{Total Contribution}}$$

$$L_{x,t} = |E_{x,t}| \Big/ \Sigma_y |E_{y,t}|$$

where:

$L_{x,t}$ = the level assessment for source or sink category *x* in year *t*

$|E_{x,t}|$ = the absolute value of emission or removal estimate of source or sink category *x* in year *t*

$\Sigma_y |E_{y,t}|$ = the total contribution, which is the sum of the absolute values of emissions and removals in year *t* calculated using the aggregation level chosen by the country for key category analysis. Because both emissions and removals are entered with positive sign, the total contribution/level can be larger than a country's total emissions less removals.

This equation determines the contribution of each inventory category's GHG emissions to the national total. Key categories are those that, when added together in descending order of magnitude, constitute at least 95% of the total emissions for a given year.

5.7.2. Tier 1 Trend Assessment

The contribution of each category's emission trend to the trend in the total inventory can be assessed if more than one year of inventory data are available, according to Equation 2:

EQUATION 2

$$T_{x,t} = \frac{|E_{x,0}|}{\sum_y |E_{y,0}|} \bullet \left| \left[\frac{(E_{x,t} - E_{x,0})}{|E_{x,0}|} \right] - \frac{(\sum_y E_{y,t} - \sum_y E_{y,0})}{|\sum_y E_{y,0}|} \right|$$

where:

$T_{x,t}$	=	the trend assessment of source or sink category *x* in year *t* as compared to the base year (year 0)
$\|E_{x,0}\|$	=	the absolute value of emission or removal estimate of source or sink category *x* in year 0
$E_{x,t}$ and $E_{x,0}$	=	the real values of estimates of source or sink category *x* in years *t* and 0, respectively
$\Sigma_y E_{y,t}$ and $\Sigma_y E_{y,0}$	=	the total inventory estimates in years *t* and 0, respectively

The trend assessment for an individual source or sink category is the change in the category emission/removal over time, computed by subtracting the base year (year 0) estimate for source or sink category *x* from the current year (year *t*) estimate, and dividing by the current year estimate. The total trend is the change in the total inventory emissions over time, computed by subtracting the base year (year 0) estimate for the total inventory from the current year (year *t*) estimate, and dividing by the current year estimate.

The trend assessment will identify inventory categories that have a trend different from the trend of the overall inventory. As differences in trend are more significant to the overall inventory level for larger inventory categories, the result of the trend difference (i.e., the inventory category trend minus the total trend) is multiplied by the result of the level assessment from the base year ($L_{x,t}$ from Equation 1) to provide appropriate weighting. Thus, key categories will be those where the inventory category trend diverges significantly from the total trend, weighted by the emission level of the inventory category.

This type of key category analysis is only applicable to those countries that have emission inventories for more than one year. Thus, key categories are those whose trend diverges significantly from the total trend, weighted by the level of emissions or removals of the category in the base year. Key categories are those that, when summed together in descending order of magnitude, add up to more than 95% of the total trend.

5.7.3. Tier 2 Level Assessment

The key category analysis is enhanced by incorporating the national source or sink category uncertainty estimates. The contribution of each source or sink category to the total national inventory level as weighted by their respective category percent uncertainty is calculated according to Equation 3:

EQUATION 3

$$LU_{x,t} = (L_{x,t} \bullet U_{x,t}) \Big/ \Sigma_y [\, (L_{y,t} \bullet U_{y,t}) \,]$$

where:

$LU_{x,t}$ = the level assessment for category *x* in latest inventory year (year *t*) with uncertainty

$L_{x,t}$ = the Tier 1 level assessment as computed in Equation 1

$U_{x,t}$ = category percentage uncertainty in year *t* calculated according to the 2006 IPCC Guidelines Chapter 3. If the reported uncertainty is asymmetrical, the larger uncertainty should be used. The relative uncertainty will always have a positive sign.

This equation determines the contribution of each source or sink category's GHG contribution to the national total as weighted by their respective uncertainty estimates. Key categories are those that, when added together in descending order of magnitude, constitute at least 90% of the total emissions for a given year.

5.7.4. Tier 2 Trend Assessment

The contribution of each source or sink category to the trend in the total inventory as weighted by their respective category percent uncertainty can be assessed if more than one year of inventory data is available, according to Equation 4.

EQUATION 4

$$TU_{x,t} = (T_{x,t} \bullet U_{x,t})$$

where:

$TU_{x,t}$ = the trend assessment for category *x* in latest inventory year (year *t*) with uncertainty

$T_{x,t}$ = the Tier 1 trend assessment as computed in Equation 2

$U_{x,t}$ = the category percent uncertainty in year *t* calculated according to the 2006 IPCC Guidelines Chapter 3. If the reported uncertainty is asymmetrical, the larger uncertainty should be used. The relative uncertainty will always have a positive sign.

This type of key category analysis is only applicable to those countries that have emission inventories for more than one year and uncertainty estimates for individual source and sink categories. Thus, key categories are those whose trend diverges significantly from the total trend, weighted by the uncertainty. Key categories are those that, when summed together in descending order of magnitude, add up at least 90% of the total trend.

5.8. References

IPCC (2006), Guidelines for National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change. Prepared by the National Greenhouse Gas Inventories Programme. Published by Institute for Global Environmental Strategies (IGES). Available from: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Chapter 6: National Inventory Improvement Plan

1: Institutional Arrangements

2: Methods and Data Documentation

3: Description of QA/QC Procedures

4: Description of Archiving System

5: Key Category Analysis

6: National Inventory Improvement Plan

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6. National Inventory Improvement Plan

6.1. Objectives

This National Inventory Improvement Plan (NIIP) presents actions that the Republic of Moldova has identified to improve its national GHG inventory systems. The NIIP will guide future efforts to increase the transparency, consistency, comparability, completeness, and accuracy of future inventories. The plan addresses many of the shortcomings of the previous inventory, and will inform future inventory teams of needed improvements. These improvements have been identified through documentation of existing institutional arrangements, category-by-category analyses of methods and data, QA/QC procedures, developing archiving systems, and an assessment of key categories in the Republic of Moldova.

6.2. Institutional Arrangement Priorities

The National Inventory System involves all of the institutional, legal, and procedural arrangements made by the Republic of Moldova for estimating anthropogenic emissions and removals, as well as the reporting and archiving of inventory information. Identified within a National Inventory System is the designated government agency responsible for producing a national greenhouse gas inventory, the key organizations that contribute data and methods, estimates, and the end-users of the inventory.

Preparing a comprehensive inventory requires establishing, identifying, and documenting all relevant contributors to the National Inventory. Assessing and documenting the status of existing institutional arrangements for inventory development will ensure continuity and integrity of the inventory, promote institutionalization of the inventory process, and facilitate prioritization of future improvements.

Table 6.1 lists the priority actions identified in the Chapter 1: Institutional Arrangements.

Table 6.1: Priority Actions for the National Inventory System

Strengths of the National Inventory System Management Structure	Potential Improvements of the National inventory System Management Structure
The key strengths in the management structure of the National Inventory System (NIS) are as follows: • The existence of regulatory provisions (Government Decision No. 1277 as of 26 December 2018 on establishing the National System for Monitoring and Reporting (NSMR) Greenhouse Gas Emissions and Other Information Relevant to Climate Change) that establish the obligation to submit data related to the inventory process of GHG emissions towards specific deadlines to the competent authority designated with responsibility for national inventory preparation; • Existence of a group of qualified experts specializing in areas related to the process of GHG emissions inventory with rich experience gained over the years 1998-2020, starting from the first cycle of GHG emissions inventory conducted during preparation of the First National Communication of the Republic of Moldova to the UNFCCC (1997-2000) and ending with the latest inventory cycles conducted during preparation of the Second Biennial Update Report of the Republic of Moldova under the UNFCCC (2017-2019) and of the Third Biennial Update Report of the Republic of Moldova under the UNFCCC (2020-2021); • Possibilities for elucidation of quantitative and qualitative aspects related to the inventory process from sectorial, national and international statistical reports and publications; • The existence of national studies in various sectorial areas, which allowed for the possibility in the near future to start using calculation methodologies of higher tiers within the national inventory; • The existence of a database of activity data related to the inventory process of GHG emissions, which is updated within each inventory cycle and is maintained institutionally starting from the first cycle of GHG emissions inventory. • Experience gained in implementing quality verification, quality control and quality assurance measures for the national inventory of GHG emissions.	The estimations process of anthropogenic GHG emissions and removals could be also enhanced through the following potential improvements: • Enhancing the level of knowledge of national experts and institutions involved in developing the national GHG emission inventory by organizing a series of thematic trainings; • Enhancing the professional skills of national experts and institutions involved in developing the inventory process, with the purpose of realizing the gradual transition from default EFs and Tier 1 methodologies to country specific EFs and Tier 2 and 3 methodologies, particularly in the case of key categories; • Strengthening the data management system used in each inventory cycle, as well as the periodic archiving of the inventory and the documentation on which inventory was drawn up, in order to comply with the principle of transparency.

Source: Chapter 1: Institutional Arrangements.

6.3. Summary of Key Categories

The concept of "key categories" was created by the IPCC as a way to help countries prioritize resources for improving national greenhouse gas inventories. Key categories have the greatest contribution to the overall level of national emissions. When an entire time series of emission estimates is prepared, key categories can also be identified as those categories that have the largest influence on the trend of emissions over time. In addition, when uncertainty estimates are incorporated into emission estimates, additional key categories are identified.

The results of the key category analysis provide a country with a list of their most important inventory categories. This list is a starting point from which a country can begin the process of improving their greenhouse gas inventory. To improve the national greenhouse gas inventory, it may be necessary to consider applying more accurate or higher tier methodologies, collect more detailed activity data, or develop country-specific emission factors. These activities all require additional resources, and it is not possible to make improvements for every inventory category. Therefore, the Republic of Moldova has identified the categories listed in Table 6.2 as the most important categories contributing to national net emissions. Assessing the methods and data used to estimate emissions and/or removals from these key categories is integral to identifying priorities. These categories were identified through the Key Categories Analysis performed using the key categories calculation software developed by the US Environmental Protection Agency (US EPA's Key Category Calculation Tool v2.5)[22].

The summary results of the IPCC Approach 1 and Approach 2 methodologies for determining key categories (referred to as Tier 1 and Tier 2 throughout this report) are presented below. In the Tier 1 methodology, key categories have been identified using a pre-determined cumulative emissions threshold, where key categories are those that, when summed together in descending order of magnitude, add up to 95% of the total level. Under the Tier 2 key category methodology, source or sink categories have been sorted or ranked according to their contribution to uncertainty, and emissions have been weighted by their combined uncertainty, in addition to contribution to total emissions.

Table 6.2 presents the summary overview of the key categories for the Republic of Moldova's National GHG Inventory, 1990-2019, without LULUCF: based on the Tier 1 approach – 21 key categories by level (L) and 20 key categories by trend (T): based on a Tier 2 approach – 19 key categories by level (L) and 17 key categories by trend (T); with LULUCF: based on the Tier 1 approach – 28 key categories by level (L) and 26 key categories by trend (T), respective, based on a Tier 2 approach – 26 key categories by level (L) and 22 key categories by trend (T).

Table 6.2: Summary Overview of the Republic of Moldova's Key Categories for 1990-2019, Based on a Tier 1 and Tier 2 Approaches

IPCC classification	Key Categories	Gas	Without LULUCF				With LULUCF			
			T1		T2		T1		T2	
			L	T	L	T	L	T	L	T
1A1	Fuel Combustion Activities - Energy Industries (Gaseous Fuel) - CO_2	CO_2	X	X	X	X	X	X	X	X
1A1	Fuel Combustion Activities - Energy Industries (Liquid Fuel) - CO_2	CO_2	X	X	X	X	X	X	X	X
1A1	Fuel Combustion Activities - Energy Industries (Solid Fuel) - CO_2	CO_2	X	X	X	X	X	X	X	X
1A2	Fuel Combustion Activities - Manufacturing Industries and Construction - CO_2	CO_2	X	X	X		X	X	X	
1A3b	Fuel Combustion Activities - Transport - Road transportation - CO_2	CO_2	X	X	X	X	X	X	X	X

[22] <https://19january2017snapshot.epa.gov/climatechange/national-ghg-inventory-capacity-building_.html>

IPCC classification	Key Categories	Gas	Without LULUCF				With LULUCF			
			T1		T2		T1		T2	
			L	T	L	T	L	T	L	T
1A3c	Fuel Combustion Activities - Transport - Railways - CO_2	CO_2	X	X			X	X		
1A4a	Fuel Combustion Activities - Other Sectors - Commercial/Institutional - CO_2	CO_2	X	X			X	X	X	
1A4b	Fuel Combustion Activities - Other Sectors - Residential - CO_2	CO_2	X	X	X		X		X	
1A4b	Fuel Combustion Activities - Other Sectors - Residential - CH_4	CH_4	X	X	X	X	X	X	X	X
1A4c	Fuel Combustion Activities - Other Sectors - Agriculture/Forestry/Fishing - CO_2	CO_2	X	X	X		X	X	X	
1B2	Fugitive Emissions from Fuels - Oil and Natural Gas - Natural Gas - CH_4	CH_4	X	X	X	X	X	X	X	X
2A1	Mineral industry - Cement Production - CO_2	CO_2	X	X			X	X		
2D	Non-Energy Products from Fuels and Solvent Use - CO_2	CO_2	X		X	X	X		X	
2F1	Product Uses as Substitutes for Ozone Depleting Substances - Refrigeration and Air Conditioning - HFCs	HFC	X	X	X	X	X	X	X	X
2F2	Product Uses as Substitutes for Ozone Depleting Substances - Foam Blowing Agents - HFCs	HFC		X		X				X
3A	Enteric Fermentation - CH_4	CH_4	X	X	X	X	X	X	X	X
3B	Manure Management - CH_4	CH_4	X	X	X	X	X		X	
3B1	Direct N_2O Emissions from Manure Management - N_2O	N_2O	X		X	X	X		X	X
3B5	Indirect N_2O Emissions from Manure Management - N_2O	N_2O			X	X			X	X
3Da	Direct N_2O Emissions from Managed Soils - N_2O	N_2O	X	X	X	X	X	X	X	X
3Db	Indirect N_2O Emissions from Managed Soils - N_2O	N_2O	X	X	X	X	X	X	X	X
4A1	Forest Land Remaining Forest Land (Removals) - CO_2	CO_2					X	X	X	X
4A2	Land Converted to Forest Land (Removals) - CO_2	CO_2					X	X	X	X
4B1	Cropland Remaining Cropland (Emissions) - CO_2	CO_2					X	X	X	X
4C2	Land Converted to Grassland (Removals) - CO_2	CO_2					X	X	X	X
4D2	Land Converted to Wetlands (Removals) - CO_2	CO_2					X	X		X
4E2	Land Converted to Settlements (Emissions) - N_2O	CO_2					X	X	X	
4F2	Land Converted to Other Lands (Emissions) - CO_2	CO_2					X	X	X	X
4G	Harvested Wood Products - CO_2	CO_2						X		X
5A	Solid Waste Disposal - CH_4	CH_4	X	X	X	X	X	X	X	X
5D	Wastewater Treatment and Discharge: Domestic - CH_4	CH_4	X	X	X	X	X	X	X	X

Abbreviations: L – Level Assessment; T – Trend Assessment; T1 – Tier 1; T2 – Tier 2.

6.4. Potential Sector and Category Improvements

Priority areas for potential sector and category level improvements are identified below. Table 6.3 lists the problems and potential improvements for categories within the Energy Sector.

Table 6.3: Potential Improvements to the Methodology and Data Documentation Analysis in Energy Sector

Sector	Potential Improvements
1. Energy	Monitoring the GHG emissions from the Sector 1 'Energy' is planned to be improved along with: • The availability of new activity data on fuel consumption for electricity and heat production (source category 1A1 "Energy industry"), for industrial production and the construction sector (source category 1A2 "Manufacturing Industry and Construction"), for the provision of energy of the commercial and institutional sector, residential, agriculture, forestry and fisheries (source category 1A4 "Other sectors"), respectively for other works and energy needs (source category 1A5 "Other"), for the territory on the left bank of the Dniester river (filling in existing gaps for some years); there could also be potential improvements in identifying additional data sources or updating activity data in official statistical publications; • For the category of sources 1A3a "Domestic aviation" in the Energy Balances of the Republic of Moldova, the consumption of aviation gasoline can be found expressly only for the years 1990, 1993 and 1998; there is also a series of activity data associated with aviation gasoline consumption for the years 2011-2019, provided by the Civil Aviation Authority of the Republic of Moldova; however, they allowed the reconstruction by the method of interpolation and / or reallocation from other categories of fuel consumption of fuel within source category 1A3a "Domestic aviation"; the national inventory team is aware of the inconsistency of activity data associated with aviation petrol consumption (information being collected from two separate reference sources), however this inconsistency is difficult to eliminate at the moment; subsequently, various options will be analyzed in order to improve the quality of the national greenhouse gas inventory from the respective source category; • Switch to higher ranking methodologies in the case of sources 1A3aii "Domestic aviation" (Tier 2b) and 1A3c "Railways" (Tier 2) (for the time being, these are not key categories, respectively switch to higher tier calculation methodologies is not cost-effective and the effort to be put in by the national inventory team); • Collecting the activity data necessary for running the COPERT 4.9 or 5.0 (1A3b "Road transportation") for the entire study period (for the time being, it was possible to collect the activity data necessary for running the respective model only for the years 1995-2019); • Availability of additional information on leakage from crude oil and gas distribution systems (from infrastructure for production, collection, processing, refining and distribution of petroleum and natural gas products to final consumers; from equipment operation, evaporation losses, ventilation , flamethrower combustion, accidental emissions due to deterioration of pipeline systems, etc.) (source category 1B2 'Fugitive emissions from oil and natural gas'), i.e. in the case of switching to higher-ranking assessment methodologies; the possibilities for obtaining activity data associated with the consumption of liquefied petroleum gases on the left bank of the Dniester River for the entire reference period will also be assessed; • Moving to a higher ranking methodology for assessing GHG emissions from the "International Aviation" source category (for example, the Tier 3 calculation methodology available in EMEP/EEA Air Pollutant Emission Inventory Guidebook (2019), which considers the actual emission values for each aircraft type according to the flight distance, and the emission calculator available in the updated version of the EMEP / EEA Guide to the inventory of atmospheric emissions (2019) could also be used; • Extension of the method of recording biomass consumption used in the "Research on energy consumption in households", conducted by the NBS of the Republic of Moldova with the support of Energy Community experts in 2015 and for the period 1990-2009, thus ensuring consistency of results for this category of sources for the entire series of years covered by the inventory; • Availability of new activity data on biomass consumption (category of sources "CO_2 emissions from biomass") on the left bank of the Dniester River and filling existing gaps for some years. • Potential improvements within the Sector 1 'Energy' might be achieved also through implementing all recommendations contained in the "Report on the technical review of the National Greenhous Inventories of the Republic of Moldova for 1990-2016 periods – Energy Sector", conducted by Dr. Veronica Ginzburg, Institute of Global Climate and Ecology, Roshidromet / Academy of Science of the Russian Federation within January-February 2019 periods.

Source: Chapter 2: Methods and Data Documentation.

Table 6.4 lists the problems and potential improvements to the categories within the Industrial Processes and Product Use Sector.

Table 6.4: Potential Improvements to the Methodology and Data Documentation Analysis in the Industrial Processes and Product Use Sector

Sector	Potential Improvements
2. Industrial Processes and Product Use	Monitoring the GHG emissions from the Sector 2 'Industrial Processes and Product Use' is planned to be improved along with: • Updating the activity data used for the evaluation of GHG emissions from category 2A "Mineral industry" for the period 1990-2019; • Updating the activity data on the specific consumption of raw materials per ton of production, as well as the specific consumption of electrodes per ton of steel produced (source category 2C1 "Iron and steel production") at the profile enterprises of the Republic of Moldova; • Updating the activity data used for the assessment of GHG emissions from category 2D "Non-energy products from fuels and solvents use" for the period 1990-2019; • Carrying out capacity-building activities in order to set up an online information system for collecting activity data from importers and service companies on the import, use, decommissioning and recycling of refrigerants and equipment containing refrigerants; such an information system will provide the National Agency for the Regulation of Nuclear, Radiological and Chemical Activities, the Environment Agency and the Ministry of Environment with more accurate activity data, which could help reduce uncertainties in assessing emissions from category 2F "Product Uses as Substitutes for ODS'" in the Republic of Moldova;

Sector	Potential Improvements
2. Industrial Processes and Product Use	• Updating the activity data used to assess GHG emissions from category 2G "Other Product Manufacture and Use'" for the period 1990-2019; also in the case of the collection of activity data on the consumption of fireworks (commodity code: 3604 10 000 - signaling and anti-hailing missiles and similar, firecrackers and other pyrotechnic articles and 3604 90 000 - other articles for fireworks) for the period 1990-2012 (during this inventory cycle it was possible to collect information only for the years 2013-2019), in order to assess indirect GHG emissions from the respective emission source (SNAP 060601) under category 2G "Other Product Manufacture and Use'".

Source: Chapter 2: Methods and Data Documentation.

Table 6.5 lists the problems and potential improvements for categories within Agriculture Sector.

Table 6.5: Potential Improvements to the Methodology and Data Documentation Analysis in the Agriculture Sector

Sector	Potential Improvements
3. Agriculture	Monitoring the GHG emissions from the Sector 3 'Agriculture' is planned to be improved along with: • Updating AD and productivity indicators used to estimate GHG emissions within category 3A 'Enteric Fermentation' following a Tier 2 methodology, in particular for cattle and sheep, the animal categories that account for the largest share in the structure of total methane emissions originated from this source category; • Updating AD and productivity indicators used to estimate CH_4 emissions from the 3B 'Manure Management', in particular for 'cattle' and 'swine' livestock categories accounting for the largest share in the structure of total CH_4 emissions originated from this category; as well as updating the values for the main parameters used to develop CS EFs for the respective animal categories following a Tier 2 method; • Estimate the share and usage of manure management systems in the Republic of Moldova (MS%) in order to enhance the accuracy of GHG inventory results within 3B 'Manure Management' (*the activity will be similar to that undertaken within May-June 2015 periods by the specialists from the Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine as well as from the National Agency for Food Security, when dairy cows and other cattle farms with a herd of more than 5 heads were inspected, as well as pig farms with more than 30 heads and the largest poultry farms in the country; the inspections covered 36 districts of the country; in total, manure management systems from 179 farms have been inspected, of which 96 cattle farms, 66 pig farms and 17 poultry farms*) and collecting other relevant data regarding N_2O emissions from the 3B 'Manure Management' category, in particular those related to country specific N excreted rates for different categories (kg N/head/year); • Updating activity data and country specific coefficients and parameters used to estimate direct N_2O emissions from crop residues returned to soils under the 3D 'Agriculture Soils' category; • Updating the national coefficients used to estimate direct N_2O emissions from nitrogen mineralization as a result of carbon losses resulting from changes in the use of agricultural land and soil management practices in the Republic of Moldova; In this regard, it is relevant to establish with a periodicity of at least once every 3 years, the values of humus content in arable soils (layer - 0-30 cm) in the northern part of the country (Napadova commune, Floresti district), respectively in the area of south of the country (Lebedenco commune, Cahul district), as well as in the central part of the country (e.g., Ivancea, Orhei district), to identify the national average (SOC_0) and the average annual losses on the Republic of Moldova during the reporting period to UNFCCC.

Source: Chapter 2: Methods and Data Documentation.

Table 6.6 lists the problems and potential improvements to the categories within LULUCF sector.

Table 6.6: Potential Improvements to the Methodology and Data Documentation Analysis in Land Use, Land-Use Change and Forestry Sector

Sector	Potential Improvements
4. LULUCF	Monitoring the CO_2 emissions/removals from the Sector 4 'Land Use, Land-Use Change and Forestry' is planned to be improved along with: • Improving data regarding the actual consumption of fuel wood from the managed forest land of the RM, primary data and records on the categories of land converted to forest land, as well as updating national emission/removal factors (basic wood density, biomass expansion factors, emission factors from forest fires etc.) (category 4A 'Forest Land'); • Improving records pertaining to actual volume of wood from forest stripes management as well as other types of forest vegetation and also activities aimed at verification of emission/removal factors specific to perennial plantations (current biomass increments, biomass harvesting during the cleaning cuttings) (source category 4B1.1 'Cropland Covered with Woody Vegetation'); • Improving the country specific methodology (Banaru, 2000) and improving the quality of used activity data, in order to make possible estimation of CO_2 emissions/removals from source category 4B1.2 'Annual Change in Carbon Stocks in Mineral Soils'; in collaboration with the specialists from the Institute of Pedology, Agrochemistry and Soil Protection „Nicolae Dimo" and Forestry Research and Management Institute of "Moldsilva" Agency, undertaking also a research study focused on identifying the soil organic carbon stocks (SOC_0) in the most recent years to be covered by in the next inventory cycle; the content of humus in arable soils (the layer of 0-30 cm) has to be identified in representative cites in the northern part of the country (e.g., Napadova, Floresti district), in the southern part of the country (e.g., Lebedenco, Cahul district), as well as in the central part of the country (e.g., Ivancea, Orhei district); the results of the study will be used to estimate CO_2 emissions from annual change in carbon stocks in mineral soils through a Tier 2 methodological approach;

Sector	Potential Improvements
4. LULUCF	• Improving the cadastral records (as the main reference sources for AD) pertaining to specification of initial land use categories to which converted lands are transferred to (categories 4A 'Forest Land', 4B 'Cropland', 4C 'Grassland', 4D 'Wetlands', 4E 'Settlements' and 4F 'Other Land'); • Also, analyzing the input and output process of lands within the 4F 'Other Land' category, inclusive in terms of establishing the average conversion period; • Improving the statistical records (as the main reference sources for AD) pertaining to wood products production/export/import from 4G 'Harvested Wood Products' category; • Raising substantially the quality of GHG inventory in the LULUCF sector, through periodic (e.g., at least once in 5 years) 'Forest Inventory' to provide updated information, not only for the state of forest fund, but also for private forest land or those under the administration of local authorities; also, new production tables and other forest relevant information are needed; to accomplish these imperatives, the inter-institutional collaborative effort, and the needed financial resources may be very significant; thus, it is imperative to identify as soon as possible opportunities for obtaining such a financial support from the international donors and/or partners; • Complete the implementation process of the recommendations contained in the "Report on the technical review of the National Greenhouse Gas Inventories of the Republic of Moldova for 1990-2016 periods – LULUCF Sector", conducted by Dr. Viorel Blujdea from the National Institute for Forestry Research and Development "Marin Dracea" (former ICAS Bucharest, Romania) in January-February 2019.

Source: Chapter 2: Methods and Data Documentation.

Table 6.7 lists the problems and potential improvements to the categories within Waste Sector.

Table 6.7: Potential Improvements to the Methodology and Data Documentation Analysis in the Waste Sector

Sector	Potential Improvements
5. Waste	Monitoring the direct GHG emissions from the Sector 5 'Waste' is planned to be improved along with: • Accomplishing, by the end of the next inventory cycle of an external independent technical evaluation of the GHG inventories – Waste Sector, by an international consultant with a good knowledge of the 2006 IPCC Guidelines and with extensive expertise in assessing GHG inventories of the Annex I Parties; • Adopting a new approach needed to address the environmental issues in the RM, complying with the commitments under the ratified international conventions and agreements, respectively considering sustainable development, as well as the EU integration perspective; • Enforcement of Government Decision on approval Waste List No. 99/2018 and Government Decision No. 501/2018 on the Instruction on records keeping and reporting of waste data and information on waste management; • The modernization of waste management infrastructure according to the Waste Management Strategy of the Republic of Moldova for 2013-2027 years, which foresees the development of integrated municipal waste management through the harmonization of legal, institutional and regulatory framework to the EU standards, based on a regional approach (geographical position, economic development, the existence of access roads, pedological and hydrogeological conditions, population, etc.). The goal is to promote and implement selective collection in all areas both in household sector and in the production sector, as well as sorting, composting and recycling facilities; and the development of waste disposal capacity by creating 7 new SWDS (landfills) at a regional level and 2 new mechanical-biological treatment plants; • Proper implementation of the agreement signed on October 18, 2019 between the European Investment Bank and the Government of the Republic of Moldova aimed at improvement of solid waste management services in the country and implementation of the Waste Management Strategy 2013-2027 in the Republic of Moldova, involving projects aimed at modernizing and developing solid waste management systems in eight regions of the country. The projects will provide the localities with new collection systems, mechanical-biological waste treatment facilities and new regional sanitary warehouses for the whole country, by modernizing waste collection systems and separate collection of recyclable materials and bio-waste, as well as rehabilitating or closing landfills. • Full operationalization of the Waste Management Automated Information System and ensuring reporting of data from all the economic operators subject to reporting obligations; • Conducting a new study on determining the morphological composition of solid municipal waste deposited in various urban areas of the Republic of Moldova, in each locality at least 3 analyses per season (autumn, winter, spring and summer); • Update the activity data, in particular the coefficient of transformation of the quantity of MSW from m^3 to kt; • Improving the population's access to quality water supply and sanitation services, in the context of implementing the Government Decision No. 199 as of 20.03.2014 the Strategy on water supply and sanitation (2014-2028), ensuring gradual access to quality water supply and sanitation services for all in the Republic of Moldova, contributing to the improvement of health, dignity and quality of life as well as to the economic development of the country, including meeting the requirements of the country's population for improved, efficient and cost-effective water supply and sanitation services by achieving the Sustainable Development Goals (SDGs 6.1 and 6.2) by 2030;

Sector	Potential Improvements
5. Waste	• To offer access to the entire population to improved sanitation systems by 2025, including up to 50 per cent to sewage systems; to increase the performance levels of collective systems of water supply, sanitation and other types; to increase the degree of implementation of good practices recognized in the field of integrated water management as well as water and sanitation supply; to decrease by 50 per cent the amount of untreated wastewater discharged as well as reduction of untreated rainwater discharged into natural receptors; to improve the sludge managements and the quality of treated wastewater from centralized sewage systems or other sanitation systems, in the context of fully implementing the Government Decision No. 1063 as of 16.09.2016 on approving the National Program for the Implementation of the Protocol on Water and Health in the Republic of Moldova for 2016-2025; the respective program also plans to establish several indicators to ensure the population's access to improved sanitation systems, and a level of efficiency for managing the collective sanitation systems as well as other systems; to ensure by 2025 effective collective sewage systems in 7 cities in the country, the application of good practices in the field of water supply management, water and sanitation management, to ensure sludge disposal or reuse from centralized collective sewage systems or other types of sewage systems; • Regulate the conditions of discharge, the introduction of specific substances into a body of surface water, groundwater or water fields, in the context of implementing the Regulation on Wastewater Discharge in Water Bodies, approved through the Government Decision No. 802 as of 09.10.2013; the Regulation indicates the emission limit values applicable to the discharge of wastewater from the industrial sectors (activities) into a body of surface water. It is expected that this regulation will produce a positive effect on the quality of the AD and respectively, a decrease of emissions from source category 5D "Wastewater treatment and discharge"; • Regulate the conditions for wastewater collection, treatment and discharge in the sewage system and/or in water basins, in the context of implementing the Regulation on Requirements for Wastewater Collection, Treatment and Discharge in the Sewage System and/or in Water Basins for Urban and Rural Areas, approved through the Government Decision No. 950 as of 25.11.2013; the Regulation provides for the maximum allowable limit values for pollutants in discharged water into natural water basins, which will contribute to a safe decrease of emissions within 5D "Wastewater treatment and discharge" category; • Planning the actions to achieve the harmonization of nation legislation on water with the EU Directives, represents a strong instrument enhancing the implementation of best practices, of wastewater and sludge handling technologies, which would allow capturing and sustainable using of methane emissions from sludge platforms (including for heat and electric power production); • For the next inventory cycle, in order to estimate CH_4 emissions, it is planned also to use country-specific information on BOD_5 values in wastewater; on the fraction of BOD removed with the sludge, maximum methane producing capacity, methane correction factor and other relevant parameters within the 5D "Wastewater treatment and discharge" category.

Source: Chapter 2: Methods and Data Documentation.

6.5. Potential Improvements to QA/QC Procedures

The existing quality assurance (QA) and quality control (QC) procedures (see Chapter 3: Description of QA/QC Procedures), basically, provide for the current needs. In this context, potential improvements to the QA/QC procedures are mostly aimed at improving the efficiency of application thereof, but also attracting experts of higher qualification from abroad and involving them into this exercise, especially for QA exercise.

Table 6.8: Potential Improvements to QA/QC Procedures

Sector	Potential Improvements	
	QC	QA
Energy	The existing verification and quality control procedures largely meet the current needs. The potential improvement is seen as improvements in the efficiency of applying specific procedures (Tier 2) verification and QC procedures to as many key categories from the energy sector as possible.	The existing quality assurance procedures, more or less meet the current needs. However, in the context of the undertaken transition to the reporting requirements of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the fact that energy sector has the largest contribution to total national emissions (67.5% of the national total in 2019), and require more attention to the quality assurance procedures by attracting international consultants with extensive expertise in application of the 2006 IPCC Guidelines. In respective context, it has been organize within the period January-February 2019 the international technical evaluation of the energy sector GHG inventory, conducted by Dr. Veronica Ginzburg from the Institute of Global Climate and Ecology, Roshidromet / Academy of Science of the Russian Federation. Dr. Ginzburg has large experience in compiling the energy sector GHG Inventory in the Russian Federation and also has an extensive international experience (since 2005) in peer reviewing the energy sector GHG inventories of the UNFCCC Annex I Parties. Further improvements will emerge from improving the issues identified during this peer review, and respectively, based on recommendations formulated by Dr. Ginzburg in the "Report on the technical review of the National Greenhouse Gas Inventories of the Republic of Moldova for 1990-2016 periods – Energy Sector". The national inventory team is trying to take into account the recommendations made during the evaluation to the largest possible extent.

Sector	Potential Improvements	
	QC	QA
LULUCF	The existing verification and quality control procedures largely meet the current needs. The potential improvement is seen as improvements in the efficiency of applying specific procedures (Tier 2) verification and QC procedures to as many key categories from the LULUCF sector as possible.	The existing quality assurance procedures, more or less meet the current needs. However, in the context of the transition to the reporting requirements of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and the fact that some key categories representing the LULUCF sector (e.g., 4A 'Forest Land', 4B 'Cropland' and 4C 'Grassland') greatly contribute to the total national emissions, the sector requires greater attention to quality assurance procedures by attracting international consultants with extensive expertise in application of the 2006 IPCC Guidelines. In respective context, the national inventory team is trying fully implementing the recommendations made by the international consultant Dr. Viorel Blujdea from the National Institute for Forestry Research and Development "Marin Dracea" (former ICAS Bucharest) in 2019 during the evaluation to the largest possible extent.

6.6. Potential Archiving System Improvements

The existing national inventory archiving system procedures (see Chapter 4: Description of Archiving System) largely provide for the current needs. Table 6.9 identifies potential improvements needed to strengthen the inventory archiving system procedures, both by the competent authority responsible for managing the national inventory system (Climate Change Office of the Ministry of Environment) and by the partner institutions involved in compiling the GHG inventory at sector level (Energy, IPPU, Agriculture, LULUCF and Waste).

Table 6.9: Potential Improvements to the Archive System

Sector	Potential Improvements
General	• Periodic assessment (at the end of each inventory cycle) of the existent Archiving Program and Procedures and of the Archive System Plan applied by the GHG Inventory Working Group of the Public Institution "Environmental Projects Implementation Unit", aimed to identify improvement opportunities. • Periodic assessment (at the end of each inventory cycle) of the specific archiving procedures (file management, data storage, records keeping, storage mechanisms) applied by the GHG Inventory Working Group of the Public Institution "Environmental Projects Implementation Unit" aimed to identify improvement opportunities. • Responsibilities need to be defined for a database lead. It is necessary to appoint a person responsible for the database who will ensure that all the inventory archival procedures, corresponding documents and supporting spreadsheets identified under the IPCC guidelines are accurately followed. He/she will also be responsible to ensure that all the members of the team know their responsibilities with regard to archiving. The most important points that the designated coordinator should take into account are the following: (i) ensure an effective archiving process; (ii) ensure that copies from all new reference documents are adequately archived; (iii) establish a checklist for the archiving procedures to be used by the members of the inventory team; (iv) to be responsible for the permanent archive and to respond to future request in regard to archiving materials. • Responsibilities need to be defined for consultants responsible for collecting reference documents and corresponding cataloging. The responsibilities in regard to reference documents from specific consultants (staff members that have the responsibility to develop GHG emission estimates for a particular sector) should be designated and notified from the beginning of the inventory process.

6.7. Communication, Outreach, and Training Priorities

It is important to communicate the purpose and results of the inventory to policymakers, academia and public society. To this end, various awareness activities are planned within each inventory cycle, such as:

- meetings, roundtables with stakeholders;
- awareness raising events with policymakers, academia and public society at large on the efforts to be made to increase the quality of national GHG inventory;
- providing feedback to ministries, central public authorities, academia and public society at large;

- communicating the inventory results to data providers, policymakers, academia and public society at large, including through posting relevant information and inventory documents on the Public Institution "Environmental Projects Implementation Unit" website (<www.clima.md>);
- improving relationships with all partner institutions.

At the same time, the Public Institution "Environmental Projects Implementation Unit" pays special attention to the continuous training of hiring inventory staff for acquiring best practices for the GHG emissions inventory compiling. Thus, for example, within the previous inventory cycle the following thematic trainings in the GHG inventories have been carried:

- Mr. Atsushi Sato (Japan), International Trainer in Applying the IPCC Inventory Software of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – AFOLU Sector, provided a 3-days (7-9 June 2016) hands-on training workshop on applying the IPCC Inventory Software of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – AFOLU Sector. Detailed information of hands-on training agenda and outcomes are available on: http://clima.md/libview.php?l=en&id=3953&idc=93. Eleven national experts in GHG inventory, representing various institutions (Climate Change Office, Forest Research and Development Institute of the "Moldsilva" Agency, Institute of Pedology, Agrochemistry and Soil Protection "Nicolae Dimo" and the State Agricultural University of Moldova) have participated to respective hands-on training workshop;
- Mr. Jongikhaya Witi (South Africa), International Trainer in Applying the IPCC Inventory Software of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – Energy, IPPU and Waste Sectors, provided a 3-days (20-22 June 2016) hands-on training on applying the IPCC Inventory Software of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories – Energy, Industrial Processes and Product Use and Waste Sectors. Detailed information of the hands-on training agenda and outcomes are available on the: http://clima.md/libview.php?l=en&id=3954&idc=93. Twelve national experts in GHG inventory, representing various institutions (Climate Change Office, Ozone Office, Environment Pollution Prevention Office, Institute of Power Engineering, Institute of Ecology and Geography, Technical University of Moldova and "TERMOELECTRICA" JSC) have participated to respective hands-on training workshop;
- Mr. Viorel Blujdea (Romania), International Consultant in National Greenhouse Gas (GHG) Inventories – Land Use, Land-Use Change and Forestry (LULUCF) Sector, provided two hands-on trainings in the second half of 2016 year:
  - Hands-on training workshop on developing a database and a land use matrix to be used for developing the national GHG inventory, held since 15 to 17 June 2016. In close cooperation with the National GHG Inventory Coordinator, LULUCF sector lead and national consultants, the international consultant leaded the process of (i) designing the structure and content of the database, as well as of the land use matrix afferent to the LULUCF sector, in accordance with the reporting requirements defined in the IPCC 2006 Guidelines and in the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement); (ii) defining and developing a detailed representation of land use categories with clear explanation on how to implement the land use categories classification in the Republic of Moldova, by considering the national circumstances and existing statistical system in place; (iii) elaborating the list of data needed for being collected for the development of the database and land use matrix covering the 1970-2015 period; (iv) drafting the survey and questionnaire forms, by institutions, referring to the data and information to be collected for developing the database and the land use matrix for the period 1970-2015; (v) developing the database and the land use matrix to be used within the LULUCF sector, covering the period 1970-2015;

– Hands-on training workshop on developing and using the database and the land use matrix (held since 10 to 13 October 2016), to be used for developing the national GHG inventory for 1990-2015 periods, included into the Forth National Communication of the Republic of Moldova under the UNFCCC (2018). In close cooperation with the National GHG Inventory Coordinator, LULUCF sector lead and national consultants, the international consultant leaded the process of finalizing the database and the land use matrix covering the 1970-2015 period. As result of respective two hands-on trainings provided in June and October 2016, the targeted audience (the LULUCF sector inventory team members) have been able to collect the needed activity data and national-specific parameters, requested for building an inventory database and land use matrix covering the 1970-2015 period, used for developing the national GHG inventory for 1990-2015 time-series, in accordance with the reporting requirements defined in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Concomitantly, the National Experts in the energy, agriculture, LULUCF and waste sectors have been involved in 2019 year in training and certification in the use of 2006 IPCC guidelines for national greenhouse gas inventories, using the training and certification programme of the Greenhouse Gas Management Institute[23] (including, training course 501 IPCC: Introduction to Cross-Cutting Issues; training course 511 IPCC: Energy; training course 531 IPCC: Agriculture; training course 541 IPCC: Forestry and Other Land Uses; and training course 551 IPCC: Waste).

In the Republic of Moldova there are also three national experts who were enrolled in the CGE training programme for technical experts undertaking technical analysis of biennial update reports from Parties not included in Annex I to the Convention. Upon successful completion of the respective training (Cluster A - Provisions on reporting information in the BURs and conducting technical analysis of BURs under the ICA process; Module 1: Technical analysis of biennial update reports: an overview; Module 2.1: Technical analysis of biennial update reports: thematic element - Mitigation actions and their effects*; Module 2.2: Technical analysis of biennial update reports: thematic element - National GHG inventories; Module 2.3: Technical analysis of biennial update reports: thematic elements - Finance, technology and capacity building needs and support received) by passing the final exams, the national experts become eligible to be part of a TTE to undertake the technical analysis of biennial update reports (BURs) submitted by developing country Parties.

The country has also five national consultants who has been enrolled and successfully passed the qualification exams of the training programme for members of expert review teams participating in annual reviews under Article 8 of the Kyoto Protocol, organized and conducted by the UNFCCC secretariat following decision 5/CMP.11 adopted at the end of 2015 (including: Overview; National Systems; Application of Adjustments; Modalities for accounting of assigned amounts under Art. 7.4; Review of national registries and information on assigned amounts; and Review of activities under Article 3, paragraphs 3 and 4).

6.8. Prioritized List of Potential Improvements

This section prioritizes the most critical improvements needed, based on an assessment of the relative importance of improvements identified for institutional arrangements, methods and data documentation, quality assurance and quality control procedures, archiving systems, key categories analysis and communication issues, outreach and training (see above).

By addressing these potential improvements, the country can move toward producing a more complete and higher-quality inventory. Table 6.10 lists these potential improvements and identifies the priority level associated with each (High, Medium, or Low).

[23] <https://ghginstitute.org/courses/>.

Table 6.10: National Inventory Improvement Priorities

#	Sector	Priority Level	Improvements Needed
1	General	High	Enhancing the professional capacities of national experts involved in the inventory process, specifically in the application of 2006 IPCC Guidelines and the associated GHG emissions calculation and reporting software, through thematic trainings with participation of international trainers.
2	General	High	Transitioning from default EFs and Tier 1 methodologies to country specific emission factors and Tier 2 and 3 methodologies, particularly focusing on key categories.
3	General	High	Strengthening the data management system for tracking and archiving the inventory information used in each inventory cycle.
4	Energy	High	Implementing in extent possible all recommendations contained in the "Report on the technical review of the National Greenhouse Gas Inventories of the Republic of Moldova for 1990-2016 periods – Energy Sector", conducted by Dr. Veronica Ginzburg, Institute of Global Climate and Ecology, Roshidromet / Academy of Science of the Russian Federation within January-February 2019 periods.
5	Energy	Medium	Transitioning from default EFs and Tier 1 methodologies to country specific emission factors and Tier 2 and 3 methodologies, in particular for the following key categories: 1A3 Transport and 1B2 Fugitive Emissions from Oil and Natural Gas.
6	Industrial Processes and Other Products	High	Setting up an on-line reporting system for collecting AD from companies that import, use, dispose, recover and recycle refrigerants and refrigerant equipment; this information system will provide the Ministry of Environment, Environment Agency and Public Institution "Environmental Projects Implementation Unit" more accurate AD that could potentially help reduce uncertainties in estimating GHG emissions from the 2F 'Product Uses as Substitutes for ODS' category in the Republic of Moldova
7	Agriculture	High	Estimate the share and usage of manure management systems in the Republic of Moldova (MS%) in order to enhance the accuracy of GHG inventory results within 3B 'Manure Management' (the activity will be similar to that undertaken within May-June 2015 periods by the specialists from the Scientific-Practical Institute of Biotechnology in Animal Breeding and Veterinary Medicine as well as from the National Agency for Food Security, when dairy cows and other cattle farms with a herd of more than 5 heads were inspected, as well as pig farms with more than 30 heads and the largest poultry farms in the country; the inspections covered 36 districts of the country; in total, manure management systems from 179 farms have been inspected, of which 96 cattle farms, 66 pig farms and 17 poultry farms).
8	LULUCF	High	Complete the implementation process of the recommendations contained in the "Report on the technical review of the National Greenhouse Gas Inventories of the Republic of Moldova for 1990-2016 periods – LULUCF Sector", conducted by Dr. Viorel Blujdea from the National Institute for Forestry Research and Development "Marin Dracea" (former ICAS Bucharest, Romania) in January-February 2019.
9	LULUCF	High	Raising the quality of GHG inventory in the LULUCF sector, through periodic (e.g., at least once in 5 years) 'Forest Inventory' to provide updated information, not only for the state of forest fund, but also for private forest land or those under the administration of local authorities; also, new production tables and other forest relevant information are needed; to accomplish these imperatives, the inter-institutional collaborative effort, and the needed financial resources may be very significant; thus, it is imperative to identify as soon as possible opportunities for obtaining such a financial support from the international donors and/or partners.
10	LULUCF	Medium	In collaboration with the specialists from the Institute of Pedology, Agrochemistry and Soil Protection „Nicolae Dimo" and Forestry Research and Management Institute of "Moldsilva" Agency, undertake a research study focused on identifying the soil organic carbon stocks (SOC_0) in the most recent years; the content of humus in arable soils (the layer of 0-30 cm) has to be identified in representative cites in the northern part of the country (e.g., Napadova, Floresti district), in the southern part of the country (e.g., Lebedenco, Cahul district), as well as in the central part of the country (e.g., Ivancea, Orhei district); the results of the study will be used to estimate CO_2 emissions from annual change in carbon stocks in mineral soils through a Tier 2 methodological approach.
11	Waste	Medium	Accomplishing an external independent technical evaluation of the GHG inventories – Waste Sector, by an international consultant with a good knowledge of the 2006 IPCC Guidelines and with extensive expertise in assessing GHG inventories of the Annex I Parties.
12	Waste	Medium	Conducting a new study on determining the morphological composition of solid municipal waste deposited in various urban areas of the Republic of Moldova, in each locality at least 3 analyses per season (autumn, winter, spring and summer).