



**REPUBLIC OF BULGARIA  
MINISTRY OF ENVIRONMENT AND WATER  
EXECUTIVE ENVIRONMENT AGENCY**

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**Bulgaria's Informative Inventory Report 2022 (IIR)**

**Submission under the UNECE Convention on Long-Range  
Transboundary Air Pollution**

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Executive Environment Agency at the Ministry of Environment and Water  
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## **PART1 : EXECUTIVE SUMMARY**

Bulgaria has signed and ratified the 1981 Geneva Convention on Long-range Transboundary Air Pollution (CLRTAP). The aim of the Convention is to protect the population and the environment against air pollution, to limit and gradually to reduce and to prevent air pollution including long-range transboundary air pollution. Under the CLRTAP eight Protocols including the Gothenburg Protocol require an annual emission reporting. The Gothenburg Protocol is a multi-pollutant protocol designed to reduce acidification, eutrophication and ground-level ozone by setting national emissions ceilings for sulphur dioxide, nitrogen oxides, volatile organic compounds and ammonia which were to be met till 2010 and maintained afterwards. Negotiations on a revision of the Protocol resulted in emission reduction commitments for 2020 and beyond expressed as a percentage reduction from the 2005 emission level have been finalised in 2012.

Following its obligations under the CLRTAP, Bulgaria annually submits its air pollution emission inventory as well as an Informative Inventory Report (IIR).

### **Bulgarian National Inventory System**

Bulgaria's reporting obligations to the

- Convention on Long-range Transboundary Air Pollution (LRTAP) of the United Nations Economic Commission for Europe (UNECE),
- United Nations Framework Convention on Climate Change (UNFCCC),
- European Commission (EC),
- European Environment Agency

are being administered by the Ministry of Environment and Water (MoEW). The Executive Environment Agency (ExEA) has been identified as the responsible organization for preparation of Bulgaria's National GHGs inventory under the UNFCCC and the Kyoto Protocol, air pollutants inventory under UNECE/CLRTAP and it is designated as single national entity.

The legal, institutional and procedural arrangements within the Bulgarian National Inventory System (NIS) have been implemented since 2010.

The air pollutants inventory under the UNECE/CLRTAP and EU National Emissions Ceilings Directive is planned, prepared and managed in the frame of newly established NIS.

All activities on planning, preparation and management of inventory under UNFCCC and UNECE/CLRTAP are regulated by Ordinance on the order and the way for organizing the national inventories of emissions of harmful substances and greenhouse gases into the atmosphere, adopted by Regulation of the Council of Ministers 261/28.08.2014 (last update SG 47/2019).

### **CLARIFICATION OF THE REASON FOR DIFFERENCES IN REPORTED NATIONAL TOTALS WITH UNFCCC REPORTS**

There are differences between reported national totals for UNECE/CLRTAP and UNFCCC reports. The reasons for the differences have both methodological and structural origin. Generally, the results obtained by the IPCC methods differ from the results of the air pollutant inventory, which is carried out in compliance with the CORINAIR methodology.

For UNECE/CLRTAP inventory, the National Statistical Institute (NSI) has the main responsibility for estimation of emissions in Energy (excluding sub-sector Transport and Solvents) and Industrial processes. Thus different sources of information are still used for preparation of GHGs and air pollutant inventories for the sectors mentioned above (NSI data, EUROSTAT Energy Balance, EU-ETS data, EPTR data, PRODPROM data, Agrostatistic data and etc.).

The future plan of the NIS is the same team, which is dealing with GHGs inventory to be also responsible for preparation of UNECE/CLRTAP inventory.

The Bulgarian Informative Inventory Report (IIR) follows the recommended structure by Annex II\_v2018 of EMEP/CEIP and starts with an executive summary, which presents an updated information annually.

**Chapter 1** makes an introduction, including general information on the process of elaboration of the inventories in Bulgaria, description of the key sources of air emissions, assessment of the methods, sources and emission factors as well as the applied QA/QC system.

**Chapter 2** provides an analysis of the key trends by sources/gases type.

**Chapters 3–7** provide information in detail on the emissions from the different activity sectors.

**Chapter 8** presents information for recalculations and planned improvements done for the submission 2022.

**Chapter 9** presents information for projections.

**Chapter 10** provides information on reporting of gridded emissions and LPS .

**Chapter 11** provides information on adjustments

The annexes to the Report (IIR) provide results of key category assessment and references as well.

## CHAPTER 1. INTRODUCTION

The National Inventory of Bulgaria is prepared in collaboration of the NSI, MOEW and the ExEA. **National Inventory Background**

Bulgaria has signed and ratified the Geneva Convention on Long-range Transboundary Air Pollution (CLRTAP) in 1981 as well as its related Protocols

- The 1985 Helsinki Protocol on the Reduction of Sulphur Emissions or their Transboundary Fluxes by at least 30%
- The 1988 Sofia Protocol concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes
- The 1984 Geneva Protocol on Long-term Financing of the Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)
- The 1991 Geneva Protocol on the Control of Emissions of Volatile Organic Compounds or their Transboundary Fluxes
- The 1994 Oslo protocol on Further Reduction of Sulphur Emissions
- The 1998 Aarhus Protocol on Heavy Metals
- The 1998 Aarhus Protocol on Persistent Organic Pollutants
- The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone

According to the obligations of the CLRTAP, Bulgaria has the obligation to annually report data on emissions of air pollutants covered in the Convention and its Protocols: these are the main pollutants NO<sub>x</sub>, SO<sub>x</sub>, NMVOC, NH<sub>3</sub> and CO, Particulate Matter (PM), Persistent Organic Pollutants (POPs) and Heavy Metals (HM).

The complete set of tables for 1990-2020 in the NFR format (version 2020) are submitted separately in digital form only.

### **Institutional arrangements**

Bulgaria's reporting obligations to the

- Convention on Long-range Transboundary Air Pollution (LRTAP) of the United Nations Economic Commission for Europe (UNECE),
- United Nations Framework Convention on Climate Change (UNFCCC),
- European Commission (EC),
- European Environment Agency,

are being administered by the Ministry of Environment and Water (MoEW). The Executive Environmental Agency (ExEA) has been identified as the responsible organization to prepare the Bulgaria's National GHGs inventory under the UNFCCC and the Kyoto Protocol, air pollutant inventory under UNECE/CLRTAP and it is designated as single national entity.

The legal, institutional and procedure arrangements within the Bulgarian National Inventory System (NIS) have been implemented since 2010.

The air pollutant inventory under the UNECE/CLRTAP and EU National Emissions Ceilings Directive are planned, prepared and managed in the frame of newly established NIS.

As it is illustrated in Figure 1 and outlined in the following chapter the preparation of the inventory has an institutional "home" that is ultimately responsible for managing the process and has a legal authority to collect data and submit it on the behalf of Bulgaria.

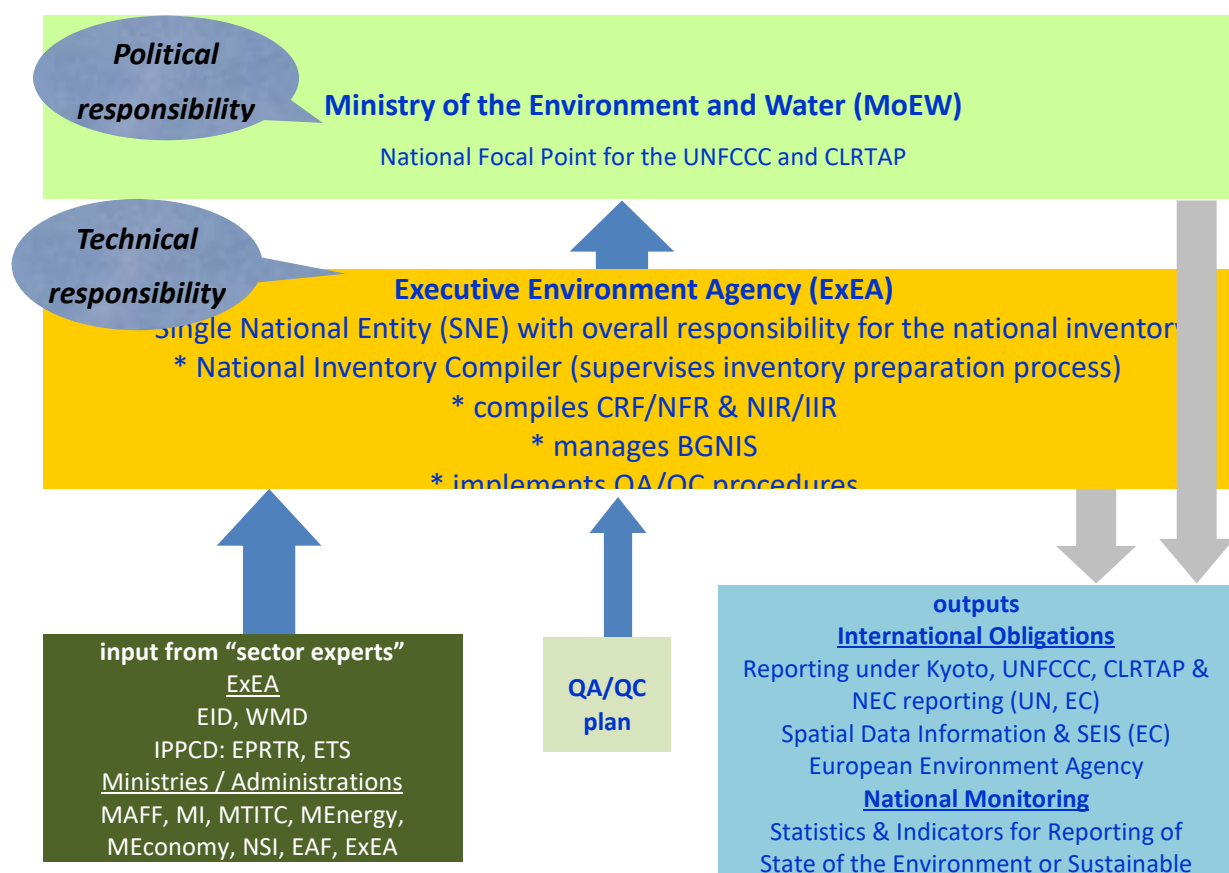


Figure 1: Organizational Chart of the Bulgarian National Inventory System

The overall objective of the NIS is annually to produce a high quality inventory under UNFCCC and UNECE/CLRTAP, with “quality” being defined by the TACCC criteria.

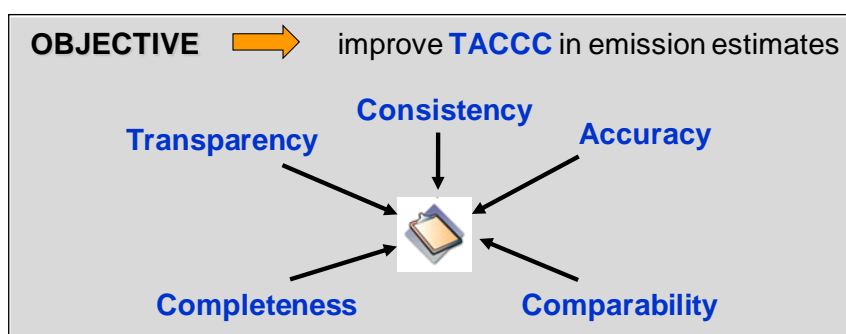


Figure 2: Objectives of the Bulgarian National Inventory System

### Legal basis of the NIS

As it illustrated in Figure 1 and outlined shortly the Bulgaria's reporting obligations to the UNFCCC, UNECE/CLRTAP and EC are being administered by the MoEW. All activities on preparation of GHG and air pollutants inventory in Bulgaria are coordinated and managed on the state level by MoEW.

The ExEA is identified as the responsible organization for preparation/compilation of Bulgaria's National Inventory under the UNFCCC and the Kyoto Protocol and UNECE/CLRTAP and it is designated as single national entity. ExEA has the technical responsibility for the national inventory:

- acts as National Inventory Compiler (supervises inventory preparation process);

- manages NIS;
- compiles CRF/NFR tables and NIR/IIR;
- coordinates the work of engaged consultants for supporting inventory;
- coordinates and implements the activity of the National QA/QC Plan.

The bases for NIS are:

- Environmental Protection Act (EPA, State Gazette No. 91/25.09.2002; corrected, SG No. 96/2002; last amendment June 2020);
- Statute on the organization and structure of ExEA (Decision of Council of ministers 162/03.08.2010, last update 20.09.2019);
- Order № 344/01.12.2020 by the Executive Director of ExEA (Sector experts/QC experts);
- Order № RD-218/05.03.2010 by the Minister of Environment and Water (QA experts);
- Ordinance on the order and the way for organizing the national inventories of emissions of harmful substances and greenhouse gases into the atmosphere, adopted by Regulation of the Council of Ministers 261/28.08.2014, SG 74/2014

Add 1.

EPA (State Gazette No. 91/25.09.2002; corrected, SG No. 96/2002; last amendment 24.04.2012), which establishes the National Environmental Monitoring System, makes clear the responsibility for preparation inventories under both conventions and lists of its tasks

#### Chapter One: GENERAL DISPOSITIONS

Article 11: The Minister of Environment and Water shall perform the following functions:

(2) direct the National Environmental Monitoring System through the Executive Environmental Agency;

Article 13:

(1) The Executive Environmental Agency with the Minister of Environment and Water shall direct the National Environmental Monitoring System.

(2) The Executive Environmental Agency shall be a legal person.

(3) The Executive Environmental Agency shall be managed and represented by an Executive Director.

(4) The operation, the structure, the organization of work and the staffing of the Executive Environmental Agency shall be determined by the Rules of Organization adopted by the Council of Ministers.

#### Chapter Eight: NATIONAL ENVIRONMENTAL MONITORING SYSTEM

Article 144 : (1) The National Environmental Monitoring System shall comprehend to:

1. the national networks for:

2. a system for information on, and control of, air emissions and the state of waste waters;

Add 2.

EPA establishes the national Executive Environment Agency (ExEA) according to Regulation on the organization and structure of ExEA (Decision of Council of ministers 162/03.08.2010), which regulates its responsibilities for monitoring of the environment as well as the responsibility for preparing of emission inventories.

The Environment Monitoring Directorate of ExEA prepares and annually updates the air emissions inventories [according to article 17 (6) of the above Regulation].

Add 3.

In order to increase the capacity in ExEA for adequate planning, preparation and management of emissions inventory an Order № 202/29.09.2010 has been issued by the Executive Director of ExEA, later on replaced by Order № 344/01.12.2020. The order regulates the names and responsibilities of the experts from Emission Inventory Department within the ExEA, engaged in the preparation of the National GHGs and air pollutants emission inventory (Sector experts/QC experts).

Add 4.

In order to assure the quality of the information reported to UNFCCC and UNECE/CLRTAP and to support the single national entity, the Minister of Environment and Water has issued an order № RD-218/05.03.2010, which regulates the names and responsibilities of the MoEW and ExEA QA experts for implementation of the requirements of National QA/QC Plan in emission inventory of sectors Energy, Industry, Solvents, Agriculture, LULUCF and Waste.

Add 5.

The NIS has been enshrined in law through a special Regulation of the Council of Ministers 261/28.08.2014, SG 47/2019. The regulation establishes and maintains the institutional, legal and procedural arrangements necessary to perform the general and specific functions of NIS, defined in Decision 19/CMP.1 for national systems. The regulation reinforces the existing institutional agreements by specifying the roles of all data providers.

In order to strengthen the institutional arrangements and fulfil the required general and specific functions of BGNIS official agreements between MoEW and the main data providers were signed in 2010:

- National Statistical Institute (RD21-35/12.02.2010);
- Ministry of Agriculture and Food and its body Executive Forest Agency (04-00-517/26.02.2010 and RD 50-47/15.03.2010);
- Ministry of Economy and Energy (14/06/2010);
- Ministry of Interior (MI) (08/06/2010).

The agreements ensure the support from these organizations regarding the choice of the activity data and EFs and methods, in the compilation of emission estimates and QA/QC of these estimates.

The ExEA as Single National Entity coordinates all activities, related to collecting inventory data of GHG and air pollutant emissions by the following state authorities:

- National Statistics Institute (NSI);
- Ministry of Agriculture, Food and Forestry /MAFF/ and their relevant services (Agrostatistic Directorate and Executive Forestry Agency);
- Ministry of Economy (MEconomy)
- Ministry of Energy (MEnergy);
- Ministry of Interior (MI);
- Ministry of Environment and Water (MoEW);
- Ministry of Transport, Information Technologies and Communications (MTITC).

*Other arrangement of the Bulgarian National Inventory System:*

- Large industrial plants;
- Branch Business Associations

and aggregates on a national level the data relevant for GHG and air pollutant emissions.

### **Inventory preparation process**

All activities on planning, preparation and management of inventory under UNFCCC and UNECE/CLRTAP are determined by the Regulation of the Council of Ministers 261/28.08.2014, (last update SG 47/2019).

The responsibilities of all engaged institutions for preparation of UNECE/CLRTAP emission inventory for 2022 submission are presented in Table 1 and the sources of activity data are presented in Table 2.

**Table 1: Preparation of UNECE/CLRTAP emission inventory by institutions**

Sector NFR	Activity data	Methodology and selection of emission factors	Preparation of inventories
Energy NFR 1A1 NFR 1A2	NSI ExEA	NSI ExEA MoEW	NSI ExEA
Energy/Transport NFR 1A3	NSI	ExEA, NSI MI, MTITC	External consultants ExEA
	MI		
	MTITC		
Energy NFR 1A4	NSI	ExEA NSI	ExEA NSI
Energy NFR 1B	NSI	NSI	NSI ExEA
	MEnergy		
Industry processes NFR 2	NSI	NSI Installations operators	NSI ExEA
Solvents use NFR 2	NSI	ExEA	ExEA
	ExEA		
Agriculture NFR 3	ExEA MAFF	ExEA	ExEA
Waste NFR 5	NSI	ExEA	ExEA
	ExEA		

**Table 2: Sources of activity data for preparation of national air pollutant emission inventory**

Sectors	Data Source of Activity Data	Activity Data Supplier	
1. Energy	National Statistical Institute	NSI MoEW	National Statistical Institute Ministry of Environment and Water
1.A Fuel Combustion	Plant operator data and Energy balance	NSI MoEW	National Statistical Institute Ministry of Environment and Water
1.A.3 Transport	Energy balance	NSI	National Statistical Institute
	Statistics vehicle fleet	MI RCD	Ministry of Interior Road Control Department
		MTITC	Ministry of Transport, Information Technologies and Communications
		MAFF	Ministry of Agriculture, Food and Forestry
1.B Fugitive emissions	Energy balance	NSI	National Statistical Institute

Sectors	Data Source of Activity Data	Activity Data Supplier	
2.1. Industrial processes	National production statistics	NSI	National Statistical Institute
	National registers (E-PRTR)	ExEA	Executive Environment Agency
2.2. Solvents and Other product use	National production statistics National VOC register	NSI ExEA	National Statistical Institute Executive Environment Agency
3. Agriculture	National agriculture statistics	MAFF	Department under the Ministry of Agriculture, Food and Forestry
4. Waste	National statistics	NSI	National Statistical Institute
	National studies	ExEA	Executive Environment Agency/ Waste Department

The information is collected on the annual basis. The ExEA sends every year letters with request for provisions of the necessary activity data to every one of the information sources, including the deadline for response. The type of the necessary data, as well as the deadlines for submissions to ExEA are regulated by the official agreements with NSI, MAFF, MI, MEconomy and MEnergy and by the Regulation of the Council of Ministers (261/28.08.2014, SG 47/2019) as well.

Due to the fact that NSI uses up-to-date statistical methods and procedures for data collection, summarizing and structuring which are harmonized with EUROSTAT is the main data provider for the inventory. NSI has two level hierarchical structures - National office and Regional offices. The primary statistical questionnaires are collected at the regional statistical offices, examined for consistency of the data and processed. The National office receives the primary information and the processed information from the regional offices and develops the National totals and balances. The annual national energy and material balances as well as the data related to the solid waste generation and the wastewater treatment are prepared by NSI, which has the main responsibility for estimation of emissions in Energy (excluding sub-sectors Transport and Residential heating) and Industry.

The estimations of emissions in sectors Transport, Residential heating, Solvents, Agriculture and Waste are calculated by the sector experts in the Emission Inventory Department (EID) or by external consultants. The inventory team of EID has the main role in NIS as National Inventory Compiler (supervises inventory preparation process, compiles CRF/NFR tables and NIR/IIR, manages BGNIS and implements QA/QC procedures on a national level).

The inventory uses also data, received directly from large point sources under EU ETS and E-PRTR obligations.

### **Procedural arrangements**

The inventory preparation process covers:

- ▶ Identification key source categories;
- ▶ Preparation of estimates and ensuring that appropriate methods are used to estimate emissions from key source categories;
- ▶ Collecting sufficient amount of activity data, processing information, and emission factors as it is necessary to support the methods selected for estimating emissions;
- ▶ Making a quantitative estimate of inventory uncertainty for each source category and for the inventory in total;
- ▶ Recalculations of previously submitted estimates if needed;
- ▶ Compile the national inventory;
- ▶ Implementing general inventory QC procedures (tier 1) in accordance with its QA/QC plan;

- ▶ Apply source category specific QC procedures (tier 2) for key source categories and for those individual source categories in which significant methodological and/or data revisions have occurred;
- ▶ Collection of all data collected together with emission estimates in a database (see below), where data sources are well documented for future reconstruction of the inventory.

### The responsibilities of the Sector experts

Within the inventory system specific responsibilities for the different emission source categories are defined (“sector experts”), as well as for all activities related to the preparation of the inventory, including QA/QC, data management and reporting.

The sector experts are in charge of specific responsibilities related to choice of methods, data collection, processing and archiving activity data. Sector experts are also responsible for performing Quality Control (QC) activities that are incorporated in the Quality Management System (QMS) (see below). Plan for improvement of the NIS is the same team, which is dealing with GHG inventory to be also responsible for preparation of UNECE/CLRTAP inventory. Thus the differences between both conventions will be gradually eliminated.

### Documentation and data archiving

In August 2010 a System for sector expert workflow organization, inventory documentation and data archiving has been established in the ExEA.

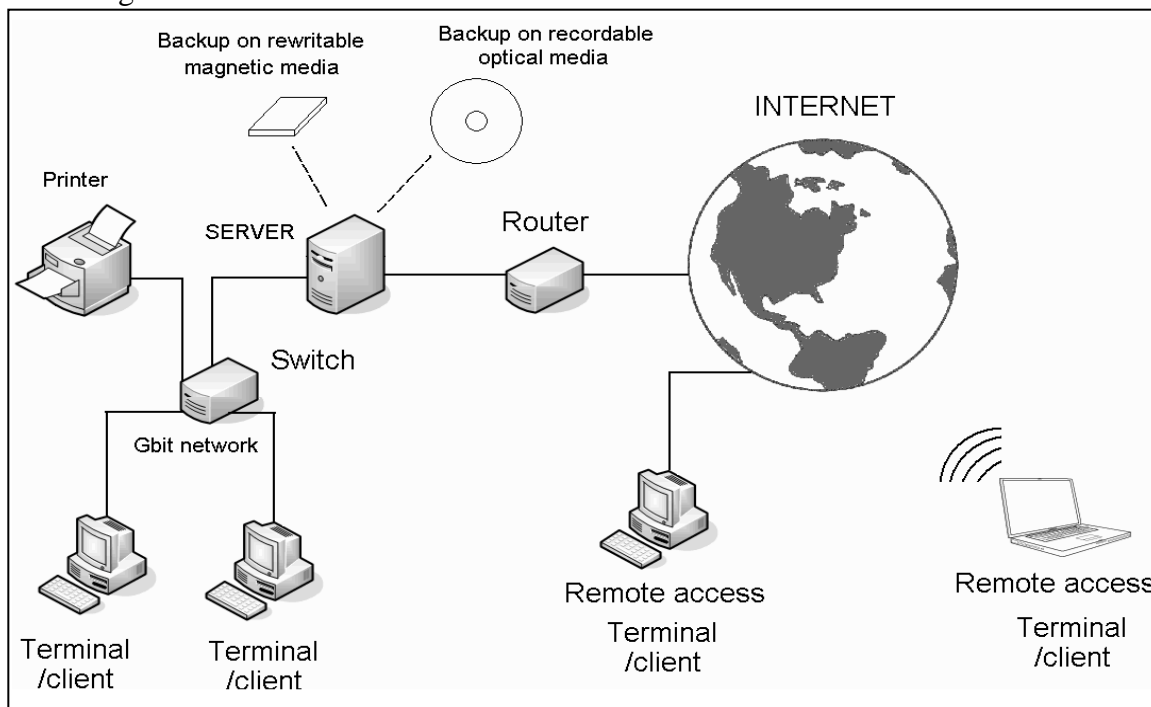


Figure 3: Documentation and data archiving in ExEA

### Methods and data sources

According to Clean Air Act (CAA), article 25 (6) The Minister of Environment and Water in co-ordination with the interested ministers approves of a Methodology for the calculation, with balance methods, of the emissions of harmful substances (pollutants), emitted in the ambient air. This national Methodology (approved with Order RD 77/03.02.2006 of MoEW) is harmonized with the CORINAIR methodology for calculation of the emissions according to the UNECE/CLRTAP.

In 2007, MoEW/ExEA ran a project for development of a Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC, i.e. to update the present Methodology under article 25 (6) CAA (approved with Order RD 40 from 22.01.2008 of MOEW). The aim of the project was the harmonization of the national Methodology with IPCC, including the three main greenhouse gases – CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O (plus relevant ODS and SF<sub>6</sub>).

The emission inventory under UNECE/CLRTAP for 2022 submission is prepared based on:

- ✓ EMEP/EEA Guidebook 2019 Emission Factors (EF);
- ✓ National Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC;
- ✓ International Emission Factor Data Base;
- ✓ Country-specific EF.
- ✓ Activity data from the NSI, MI, MTITC, MEconomy, MEnergy, MAFF, EAF, ExEA, MOEW (Table 2)

## KEY CATEGORIES

### Methodological approach to identify key categories

It is a good practice for each country to identify its national key categories in a systematic and objective way. This can be achieved by a quantitative analysis of the relationship between the magnitude of emissions in each one year (level) and the change in the emissions year to year (trend) of each category's emissions compared to the total national emissions.

Key category analysis is prepared based on the methodology set in the EMEP/EEA air pollutant emission inventory guidebook. The methodology follows the IPCC approach to produce pollutant-specific key categories and covers Approaches 1 and 2 for both level and trend assessments. The two approaches developed by the IPCC and described below, for performing the key category analysis can be used for identifying the key categories for each pollutant. Both approaches identify key categories in terms of their contribution to the absolute level of the national emissions and to the trend of emissions.

- In Approach 1: Key categories are identified using a predetermined cumulative emissions threshold. Key categories are those which, when summed together in descending order of magnitude, cumulatively add up to 80% of the total level.
- In Approach 2: Key categories can be derived by inventory compilers if category uncertainties or parameter uncertainties are available. Under Approach 2 the categories are sorted according to their contribution to uncertainty.

For preparation of the key category analysis and based on the inventory data available Approach 1 has been selected in the country.

### Level assessment

The contribution of each source category to the total national inventory level is calculated according to equation (1) (level assessment (Approach 1)):

Key category level assessment = source category estimate / total contribution

$$L_{x,t} = Ex,t / \Sigma Et \quad (1)$$

Where:

$L_{x,t}$  = level assessment for source  $x$  in latest inventory year (year  $t$ )

$Ex,t$  = value of emission estimate of source category  $x$  in year  $t$

$\Sigma Et$  = total contribution, which is the sum of the emissions in year  $t$ , calculated using the aggregation level chosen by the country for key category analysis

A key category analysis (Approach 1) for each pollutant, based on the latest inventory year is presented in an Appendix 1. The source categories are presented in the tables, sorted by largest contribution to national total. Key categories are those that, when summed together in descending order of magnitude, add up to 80 % of the total in column Cumulative total.

## QA/QC and verification methods

### Quality management system

As it is written above the ExEA is responsible for the preparation of GHG and air pollutant inventory under UNFCCC, UNECE/CLRTAP and EC. The ExEA is also responsible for coordination and implementation of QA/QC activities for the national inventories. A quality manager is in place.

The Bulgarian Quality Management System was established in the frame of project with Bulgarian Academy of Science, Geophysical Institute. The project was carried out and finished in 2008.

The QA/QC plan is an internal document to organize, plan and implement QA/QC activities. Once developed for the next submission, it is referenced and used in subsequent inventory preparation, or modified as appropriate.

The QA/QC plan has been updated in 2014 in order to implement the newly established legal, institutional and procedural arrangements within the NIS. The updated National QA/QC Plan was approved by the Ministry of Environment and Water in January 2015.

National QA/QC Plan includes following elements:

- Responsible institutions;
- Data collection;
- Preparation of inventory;
- QC Procedures;
- QA Procedures and Verification;
- Uncertainty evaluation;
- Organisation of the activities in quality management system;
- Documentation and archiving.

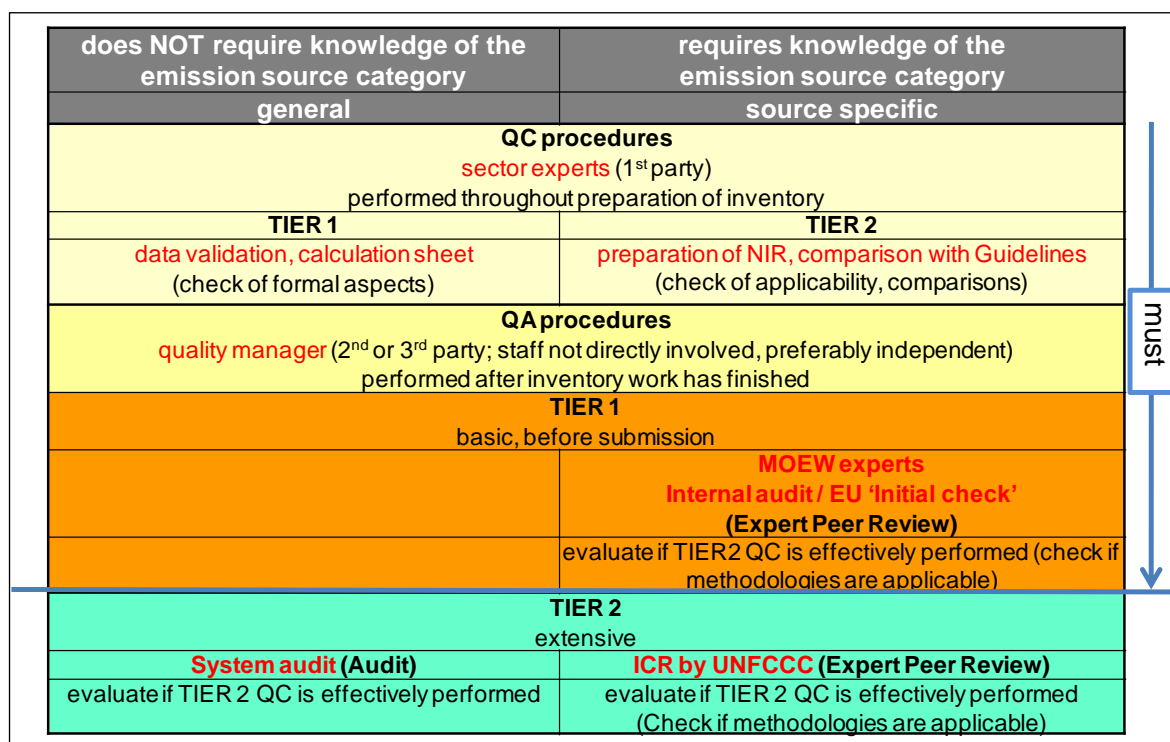


Figure 4: National quality assurance and quality control program

The legal and institutional arrangements within the NIS regulate the responsibilities of all engaged institutions for implementation of the requirements of the National QA/QC Plan.

The QC procedures are performed by experts, who are directly involved in the process of preparation of inventory with their specific responsibilities.

The QC procedures are implemented by all activity data provider and ExEA's sector experts and/or external consultants.

Table 3: QC experts within the BGNIS

Responsibility	QC experts
Activity data	NSI, MAFF, MI, MTITC, MEconomy, MEnergy, EAF, ExEA, MOEW

Methodology and selection of emission factors	ExEA, MAFF, MI, MTITC, MEconomy, MEnergy, NSI, EAF, MOEW
Inventory preparation	Sector experts ExEA, NSI and/or external consultants

The QC experts are:

- experts, responsible for activity data provision;
- experts, involved in the choice of method and selection of emission factors;
- sector experts and/or consultants, who prepare the sector inventories, including preparation of reporting tables and respective chapters from the national reports;

All institutions, engaged in the functioning of NIS are responsible for quality of information, which are provided according their competence to the ExEA for preparation of national emission inventories. The institutions are obligated to implement all requirements of the international and national standards for collection, processing and provision of activity data from them competence.

**Quality Assurance (QA)** is a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. The quality assurance process includes expert review was conducted in two stages: a review of the initial set of emission estimates and, a review of the estimates and text of the Inventory Report.

QA experts could be:

- Sector experts from the MoEW, which are engaged through internal administrative order by the minister of environment and water ;
- Experts from research institutes in accordance with them competence;
- Other external reviewer (national and/or international).

The QA procedures include the following checks in accordance with ECE/EB.AIR/97:

- **Transparency** means that Parties should provide clear documentation and report a level of disaggregation that sufficiently allows individuals or groups other than the designated emission expert or the compiler of the inventory or projection to understand how the inventory was compiled and assure it meets good practice requirements. The transparency of reporting is fundamental to the effective use, review and continuous improvement of the inventory and projection;
- **Consistency** means that estimates for any different inventory years, gases and source categories are made in such a way that differences in the results between years and source categories reflect real differences in emission estimates. Annual emissions, as far as possible, should be calculated using the same method and data sources for all years, and resultant trends should reflect real fluctuations in emissions and not the changes resulting from methodological differences. Consistency also means that, as far as practicable and appropriate, the same data are reported under different international reporting obligations. For projections, consistency means that a year of the submitted inventory is used as a basis;
- **Comparability** means that the national inventory and projection is reported in such a way that allows it to be compared with other Parties. This can be achieved by using accepted methodologies as elaborated in section V below, by using the reporting templates and through the use of the harmonized Nomenclature for Reporting (NFR), as specified in annex III to these Guidelines;
- **Completeness** means that estimates are reported for all pollutants, all relevant source categories and all years and for the entire territorial areas of Parties covered by the reporting requirements set forth in the provisions of the Convention and its protocols. Where numerical information on emissions under any source category is not provided, the appropriate notation key defined in section II.C of annex I to these Guidelines should be used when filling in the reporting template and their absence should be documented;

- **Accuracy** means that emissions are neither systematically overestimated nor underestimated, as far as it can be judged. This means that Parties will endeavour to remove bias from the inventory estimates and minimize uncertainty.

For 2022 submission the **QA procedures** are implemented by the sector experts within the MoEW and experts from the ExEA, who are not directly involved in the preparation of inventory (Order № RD-218/05.03.2010 by the minister) or external reviewers.

The **expert peer review** present opportunity to uncover technical issues related to the application of methodologies, selection of activity data, or the development and choice of emission factors. The comments received during these processes are reviewed and, as appropriate, incorporated into the Inventory Report or reflected in the inventory estimates.

#### **Information of the QA/QC activities**

The cycle of QA/QC activity for inventory consists of the following steps:

1. The QA/QC Manager prepares a Plan for implementation of QA/QC activities for the current submission. The check lists with all specific QA/QC procedures are part of the plan;
2. The plan for QA/QC must be sent to all engaged QC and QA experts for implementation;
3. In the process of preparation of inventory the QC experts (activity data provider and ExEA's sector experts) apply each of the specific procedures set in the check list for each of the sources categories they are responsible for.
4. The QA/QC Manager coordinates the exchange of the check lists between the QC experts for correction of the findings with input data for calculation of emissions (activity data and EF).
5. The QA/QC Manager sends to the QA experts the prepared by ExEA's sector expert and/or external consultants CRF/NFR tables and respective chapters from NIR/IIR;
6. The QA/QC Manager coordinates the exchange of the check lists between the QA experts and ExEA's sector expert and/or external consultants for correction of the findings with quality of the inventory (CRF/NFR and NIR/IIR);
7. The QA/QC Manager prepares a summary of the results from implemented QA/QC checks.
8. The QA/QC Manager prepares an attendant file for implemented procedures;
9. The QA/QC Manager prepares a report to the executive director of the ExEA for results of the performed QA/QC procedures and improvement plan for the next reporting round;
10. The QA/QC Manager is responsible for documentation and archiving of all documents, related to perform QA/QC procedures in the national System for documentation and archiving of inventory in ExEA.

#### **QA/QC activities of data provider**

The QA/QC Plan is provided for implementation to all institutions, which are engaged in the process of preparation of emissions inventories under UNFCCC and UNECE/CLRTAP as provision of the relevant activity data.

Based on the National QA/QC Plan each of the institutions has nominated experts, responsible for preparation of the required information as well as for implementation of QA/QC procedures.

The QC experts are all experts from the institutions, who are engaged to participate in the activity of BGNIS and to implement the requirements of National QA/QC Plan.

All institutions, engaged in the functioning of BGNIS are responsible for quality of information, provided in accordance with their competence to the ExEA for preparation of national emission inventories.

The institutions are obligated to implement all requirements of the international and national standards for collection, processing and provision of activity data according to their competence.

The QC experts fill in a check-list, which is an annex to the National QA/QC plan. The QC experts fill the check-list for the sector they are responsible for and in the part "Review of input data for calculation of emissions", "Activity data" and/or "Method and EF".

The check list contains all general and specific procedures for QC. It consist information for carried out review by the QC experts, including findings and corrections made.

The check lists are filled in by QC experts in accordance with their responsibilities and for each category (CRF/NFR).

The check lists are exchanged between QC experts for correction of the findings with input data for calculation of emissions in the respective sectors.

General (QC) procedures are described in Checklists that is part of QA/QC Plan.

As it is written above for 2022 submission the **QA procedures** are implemented by sector experts within the MoEW and experts from the ExEA, who are not directly involved in the preparation of inventory (Order № RD-218/05.03.2010 by the minister) or external reviewers.

The QA experts fill a check list in the part “Review of reporting tables and National report” in the sector in accordance to their competence.

The check list contains all general and specific procedures for QA. It consists of information concerning the carried out reviews by the QA experts, including findings and corrections implemented.

The check lists are filled out by QA experts in accordance with their responsibilities for each category (NFR).

The check lists are exchanged between QA experts and QC experts for correction of the findings with reporting tables and respective chapters from national reports.

### **Quality Management of the Sources of Initial Data**

Each organization – data source, solves the quality management issues in accordance with its internal rules and provisions. With some of the sources as NSI, MAFF, etc., those rules follow strictly the international practices. For example, QA/QC procedures with NSI have been harmonized with the relevant instructions and provisions of EUROSTAT. Strict rules on data processing and storage, harmonized with international organizations. Some of the large enterprises – emission sources, have well-arranged and effective quality management systems. Most of them have introduced quality management systems on the basis of ISO 9001:2000 standard.

### **GENERAL UNCERTAINTY EVALUATION**

The overall uncertainty is closely related to the emission sources data uncertainty (fuels, activities, processes, etc.) and to the emission factor uncertainty.

The uncertainty of the emission sources can be defined during data collection and processing, and it is a part of procedures, applied by the NSI and its regional structures. Different criteria for uncertainty assessment are used, for example as statistical subtraction, on the basis on differences between the production, import, export and consumption of fuels, through expert assessments, etc. The uncertainty of the emission factors depends on the origin of the factors applied.

As it is written above the further plan of the BGNIS is the same team, which is dealing with GHG inventory to be also responsible for preparation of UNECE/CLRTAP inventory.

### **GENERAL ASSESSMENT OF COMPLETENESS**

#### **Sources Not Estimated (NE)**

The next table presents the NFR source categories, which continue to be problematic for assessment, because of the data gaps (lack of activity data and/or EFs).

**Table 4: Explanation to the Notation key NE**

<b>NFR 14 code</b>	<b>Substance(s)</b>	<b>Reason for not estimated</b>
1A3eii	All	Activity data gaps
1A5b	All	Activity data gaps
2A5a	PM	Activity data gaps
2A5c	PM	Activity data gaps
2C7d	All	Activity data gaps
2I	All	Activity data gaps
2J	All	Activity data gaps
2L	All	Activity data gaps

**Sources Included Elsewhere (IE)**

The next table presents the NFR source categories, which are included elsewhere in the reporting table. The main reason for such aggregation is lack of representative activity data for separate assessment.

**Table 5: Explanation to the Notation key IE**

NFR 14 code	Substance(s)	Included in NFR code	Reason for IE
1A2b	All		Lack of representative activity data on desegregated level
1A2c	All	1A2a	Lack of representative activity data on desegregated level
1A2e	All	1A2a	Lack of representative activity data on desegregated level
1A4bii	All	1A3b	Lack of representative activity data on desegregated level
1A4ciii	All	1A4cii	Lack of representative activity data on desegregated level
1A5a	All	1A4a	Lack of representative activity data on desegregated level
5C1bii	All	5C1bi	Definitions difference
5D2	NMVOC	5D2	Lack of representative activity data on desegregated level

**Other notation keys****Table 6: Sub-sources accounted for in reporting codes "other"**

NFR 14 code	Substance(s) reported	Sub-source description
1 A 1 c	All	NO
1 A 2 gviii	All	NO
1 A 3 eii	All	NE
1 A 5 b	All	NE
2 A 6	All	NA
2 B 10 a	All	04 04 01 Sulfuric acid 04 04 04 Ammonium sulphate 04 04 05 Ammonium nitrate 04 04 06 Ammonium phosphate 04 04 07 NPK fertilisers 04 04 13 Chlorine production 04 04 14 Phosphate fertilizers 04 04 15 Storage and handling of inorganic chemical products 04 05 01 Ethylene 04 05 02 Propylene 04 05 07 Polyethylene – High Density 04 05 09 Polypropylene 04 05 11 Polystyrene 04 05 14 Styrene-butadiene rubber (SBR) 04 05 15 Acrylonitrile butadiene styrene (ABS) resins 04 05 17 Formaldehyde 04 05 19 Phtalic anhydride 04 05 20 Acrylonitrile
2 B 10 b	All	NA
2 C 4	All	NO
2 C 7 b	All	NO
2 C 7 c	All	NO
2 D 3i	All except heavy metals	NA
2 B 5 b	All	04 04 15
2 G	All	06 04 04 06 04 05 06 04 06

<b>NFR 14 code</b>	<b>Substance(s) reported</b>	<b>Sub-source description</b>
2 H 3	All	NO
2 L	All	NE
5 C 1 bvi	All	NO
5 D 3	All	NO
6 A	All	NO

## CHAPTER 2. EXPLANATION OF KEY TRENDS

A key category analysis (Approach 1) for each pollutant, based on the latest inventory year is presented in an Appendix 1. The source categories are presented in the tables, sorted by largest contribution to national total. Key categories are those that, when summed together in descending order of magnitude, add up to 80 % of the total in column Cumulative total.

There are changes in the time trend for key categories and pollutants and the reasons for these changes are as follows:

- Till 2008 inventory year the emissions from Transport and Other mobile sources and machinery were estimated based on activity data set in the national statistic, prepared for national reporting obligations. These data were differently aggregated compared to the National Energy Balance. Thus the national total for Road transport was allocated in NFR 1A3b and all other quantity of fuel used was allocated in national total for other transport in NFR 1A5b.
- Emissions from the Road transport sub-sector are estimated applying the COPERT 5.3 model. The main activity data used for the calculations is the number of vehicles disaggregated per vehicle category and technology and the mileage, which is estimated based on the reported fuel consumption in the National energy balance. The emission factors are taken from latest EMEP/EEA Emission Inventory Guidebook, implementing a Tier 3 methodological approach. For the other sub-sectors in the Transport sector is also used data from the national energy balance and emission factors from the EMEP/EEA Emission Inventory Guidebook.
- The Eurostat Energy Balance provides data for Aviation, Road Transport, Railways, Navigation and Other transport.
- In 2022 submission the Eurostat Energy Balance is incorporated also in inventory of sub-Sector 1A4b and Residential: Stationary plants. The emission factors are revised in accordance with EMEP/CORINAIR Emission Inventory Guidebook 2019.

## CHAPTER 3. ENERGY (NFR SECTOR 1) OVERVIEW

Sector 1 Energy considers emissions originating from fuel combustion activities:

- 1A1 Energy Industries
- 1A2 Manufacturing Industries and Construction
- 1A3 Transport
- 1A4 Other sectors (commercial and residential)
- 1A5 Other (Military)

as well as fugitive emissions from fuels (NFR 1B)

- 1B1 Solid fuels
- 1B2 Oil and natural gas

All emissions originating from stationary fuel combustion activities in the energy and manufacturing industries, commercial, agricultural and residential sectors, mobile fuel combustion activities resulting from aviation, road transportation, railways and navigation (Category 1A), as well as fugitive emissions from fuels (Category 1B) are accounted in the energy sector.

Emissions from energy sector are the main source of all pollutants in Bulgaria: in 2020 the sector is responsible for about 40 % of national total SO<sub>x</sub> emissions and about 15 % of national total NO<sub>x</sub> emissions.

The emission inventory in Energy (NFR sector 1) for 2022 submission under UNECE/CLRTAP is prepared based on:

1. Emission Factors, taken from:
  - a. EMEP/EEA Guidebook 2019;
  - b. International Emission Factor Data Base;
  - c. Plant and Country - specific EF;
  - d. National Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC, last update 2011 (see chapter 1.4).
2. Activity data, provided by
  - National Statistic
  - Eurostat Energy Balance

The responsibility for preparation of inventory in Energy (NFR sector 1) is mixed between ExEA and NSI.

The ExEA is responsible for estimation of emissions in the following sub-categories:

- Sub-sector Transport and
- Sub-sector Residential: Stationary plants
- Sub-sector Mobile Combustion in manufacturing industries and construction: Off-road vehicles
- Sub-sector Agriculture/Forestry/Fishing: Off-road vehicles and other machinery.

The NSI is responsible for estimation of all other sub-sectors in Energy:

- Energy Industries (1A1);
- Manufacturing Industries and Construction (1A2);
- Other sectors - Commercial, Agriculture and Forestry (1A4);
- Other (1A5);

and fugitive emissions from:

- Coal Mining (1B1);
- Extraction, Transportation and Distribution of Petrol Products and Natural Gas (1B2).

NSI uses up-to-date statistical methods and procedures for data collection, summarizing and structuring which are harmonized with EUROSTAT. NSI has two level hierarchical structure - National office and Regional offices. The primary statistical questionnaires are collected at the regional statistical offices, examined for consistency of the data and processed. The National office receives the primary information and the processed information from the regional offices and develops the National totals and balances.

The activity data are collected by the NSI - through questionnaires/forms in which each facility/boiler is described separately and the quantities of fuels used in it. For each fuel, the form shall indicate the following characteristics, net calorific value, sulfur, carbon and ash content, including treatment facilities for each facility. Large fuel users provide data from their own analyzes or from their suppliers. If these indicators are not available for smaller installations below 50 megawatts, they provide the data from the suppliers (if any), otherwise they use those specified in the form, which are standard indicators for the most commonly used ones in the country. The form can be viewed on the NSI website.

## SOURCE CATEGORY 1A – FUEL COMBUSTION ACTIVITIES

### SUB-SECTOR ENERGY INDUSTRIES (NFR 1A1)

#### Source category description

- Public Electricity and Heat Production (NFR 1A1a);
- Petroleum Refining (NFR 1A1b);
- Manufacture of Solid fuels Production and Other Energy Industries (NFR 1A1c).

**Table 7: Sub-sector Energy Industries**

NFR 14 code		Sub-source description SNAP 97 items
1A1a	Public electricity and heat production	<b>Public power</b> 010101 Combustion plants $\geq$ 300 MW (boilers) 010102 Combustion plants $\geq$ 50 and $<$ 300 MW (boilers) 010103 Combustion plants $<$ 50 MW (boilers) 010104 Gas turbines 010105 Stationary engines <b>District heating plants</b> 010201 Combustion plants $\geq$ 300 MW (boilers) 010202 Combustion plants $\geq$ 50 and $<$ 300 MW (boilers) 010203 Combustion plants $<$ 50 MW (boilers) 010204 Gas turbines 010205 Stationary engines
1A1b	Petroleum refining	<b>Petroleum refining plants</b> 010302 Combustion plants $\geq$ 50 and $<$ 300 MW (boilers) 010303 Combustion plants $<$ 50 MW (boilers) 010306 Process furnaces
1A1c	Manufacture of solid fuels and other energy industry	NO

The activities under NFR 1A1c Manufacture of solid fuels and other energy industry do not exist in Bulgaria. The only plant “Kremikovci” was closed in 2008/2009.

The activity data for NFR 1A1a and 1A1b are presented in the NFR reporting tables.

#### Trend description

Total energy consumption of fuels for public electricity and heat consumption changed since 1990. The main reasons are the rising electricity demand and a notable drop in 1992-1993 and 2008-2009

due to the economic crisis. From 1990 to the present time, fuel switch changed slightly from coal to natural gas. In 2009 fuel consumption of all fuels decreased as a result of the economic crises. The economic recovery in 2010 led to an increasing fuel consumption because of the increasing electricity demand. In 2011 fuel consumption of solid fuels mainly lignite increased remarkable. Figures for emissions of sulphur dioxide, nitrogen oxides and TSP, emitted into the atmosphere from large combustion plants, included in energy sector (1A1a Public electricity and heat production), are derived from the monthly reports from automatic system for continuous measurement of the plants for the years the years 2012, ..., 2019 and 2020.

## **PUBLIC ELECTRICITY AND HEAT PRODUCTION (NFR 1A1a)**

### **Source category description**

This category includes large power plants from the public sector (excluding factory power plants) and district heating companies. All installed facilities in this sector using solid fuels as the main fuel are equipped with treatment plants to reduce emissions of dust and sulfur dioxide. All these installations, with their commissioning, have been built with treatment facilities for purification of dust emissions at norms much higher than the ones established now. Over the years and the need to reduce emissions of sulfur oxides, sulfur treatment plants are gradually introduced, which is the reconstruction of existing facilities for purification of legal particles. With the introduction of SOI of the existing installations the reduction of the dust emissions is in the order of 10 times. The first SOI was put into operation in 2002/2003. To comply with nitrogen oxide pollutant standards, plants using natural gas and liquid fuels are equipped with low-nitrogen burners, and those with solid forests use different techniques to reduce emissions within the established limits. Over the years, these plants have replaced high-sulfur fuel oil with low-sulfur or natural gas

### **Methodological issues**

To estimate the emissions of Tier 2 and Tier 3 approach is chosen. Emissions are estimated using the general Tier 2 equation:

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  - annual emission of pollutant

$EF_{\text{pollutant}}$  - emission factor of pollutant

$AR_{\text{fuel}}$  - consumption activity rate by fuel consumption

When selecting the EF, the relevant technology of the facility and the degree of purification for the respective pollutant are used.

NSI used EF for individual calculation of emissions after correction in accordance with sulphur and dust content in the fuel.

After performing the calculations, the emissions of total dust, sulfur dioxide and nitrogen oxides of large combustion plants are corrected with those measurements provided by the continuous measurements systems.

Currently the inventory takes into account emissions which are also reported under the Directive 2010/75/EC on the limitation of emissions of certain pollutants into the air from large combustion plants (the LCP Directive). Validated daily or hourly average values are used, as there is no legal basis for not using the validated average emission values for calculating annual emission values. Furthermore, since for these plants the compliance with SO<sub>2</sub> ELVs is determined with rates of desulphurisation, the subtraction of the confidence interval is not likely to have been used for estimating SO<sub>2</sub> emissions.

**Activity data**

The activity data are collected by the NSI - as described above.

**Emission factors**

For calculate the emissions is used the EFs described in EMEP/EEA Guidebook 2019: chapter 1.A.1 Energy industries, Table 3-9 to 3-20 (without TSP and SO<sub>2</sub>) - for boilers over 50 MW.

For calculate the emissions is used the EFs described in EMEP/EEA Guidebook 2019: chapter 1.A.4.a.i, Table 3.21, Table 3.24, Table 3.27, Table 3.28, Table 3.29, Table 3.30 and Table 3.31 (without SO<sub>2</sub>) - for boilers under 50 MW.

Emissions of PM<sub>2.5</sub> from 1990 to 2011 have been recalculated according to the technical correction proposed by technical review expert team (TERT) in 2021 inventory review.

Emissions of PM<sub>2.5</sub> and PM<sub>10</sub> from 2012 to 2020 are calculated with EF as follows:

1. For LCPs burning only one type of fuel, the EF for TSP is determined directly from the continuous measuring system results and those for PM<sub>10</sub> and PM<sub>2.5</sub> - by their share of total dust emissions, as indicated in the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019.

1. For LCPs in which two fuels are burned at the same time, the EF for the pollutants listed has been determined as follows:

- EF for TSP for each fuel was determined by dividing the measured emissions using the ratio of EF for TSP for the different fuels specified in the EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019, as well as taking into account the imported heat from each fuel;
- EF for PM<sub>10</sub> and PM<sub>2.5</sub>, respectively, are determined by their share of total dust emissions indicated for each fuel in the EMEP / EEA Air Pollutant Emission Inventory Guidebook 2019.

TSP emissions are obtained from the dates of continuous measurements systems. These systems evaluate only emissions of TSP and do not separate them into fractions of PM<sub>2.5</sub> and PM<sub>10</sub> respectively.

To calculate the EF of sulfur oxides, use the following formula described in the manual, using the specified amounts of sulfur in the fuels from the operators or, if not, the standard ones from the NSI form.

$$EF\ SO_2 = [S] \times 20,000 / CV_{Net}$$

where:

EF SO<sub>2</sub> is the SO<sub>2</sub> emission factor (g/GJ)

[S] is sulphur content of the fuel (% w/w)

CV<sub>Net</sub> is fuel CV (GJ/tonne, net basis).

**Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

**Source specific planned improvements**

Improvements in this category are not planned.

**PETROLEUM REFINING (NFR 1A1b)****Source category description**

Category 1A1b covers emissions released from production and combustion processes within a refinery.

This category includes emissions from boilers in the oil industry and heating (tube) furnaces in the processing of petroleum products.

Emissions in this category vary over the years, as a large combustion plant owned by the largest refinery is converted into a Public Power Plant for a certain period of time, then returned to the refinery structure, so emissions over the years are reported in 1A1b then in 1A1a and for several

years again in 1A1b. The fuels used in this category are liquid and gaseous, and in recent years the use of factory gas has prevailed and natural gas.

#### **Methodological issues**

To estimate the emissions of Tier 2 and Tier 3 approach is chosen. Emissions are estimated using the general Tier 2 equation:

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  - annual emission of pollutant

$EF_{\text{pollutant}}$  - emission factor of pollutant

$AR_{\text{fuel}}$  - consumption activity rate by fuel consumption

#### **Activity data**

The activity data are collected by the NSI - as described above.

#### **Emission factors**

For calculate the emissions is used the EFs described in EMEP/EEA Guidebook 2019: from Table 4-2 to 4-8 - heating (tube) furnaces.

For large combustion plants, the EFs described in Chapter 1A1a shall be used for liquid fuels and NG, and Table 4-2 for fuel Refinery Gas.

To calculate the EF of sulfur oxides, use the following formula described in the manual, using the specified amounts of sulfur in the fuels from the operators or, if not, the standard ones from the NSI form.

$$EF_{SO_2} = [S] \times 20000 / CV_{\text{Net}}$$

where:

$EF_{SO_2}$  is the  $SO_2$  emission factor (g/GJ)

[S] is sulphur content of the fuel (% w/w)

$CV_{\text{Net}}$  is fuel CV (GJ/tonne, net basis).

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

Improvements in this category are not planned.

### **MANUFACTURE OF SOLID FUELS PRODUCTION AND OTHER ENERGY INDUSTRIES (NFR 1A1c)**

Currently there are no operating installations in this category in the country, the last working one ceased its activity in 2008.

### **SUB-SECTOR MANUFACTURING INDUSTRIES AND CONSTRUCTION (NFR 1A2)**

#### **Source category description**

Sub-sector Manufacturing Industries and Construction (NFR 1A2) includes emissions from fuel combustion in the following sub categories:

- Ferrous Metallurgy (NFR 1A2a);
- Non-ferrous Metallurgy (NFR 1A2b);
- Chemical Industry (NFR 1A2c);
- Pulp and Paper Production and Printing Industry (NFR 1A2d);
- Food Industry (NFR 1A2e);

- Other (NFR 1A2f).

**Table 8: Sub-sector Manufacturing Industries and Construction for 1990-2020**

NFR 14 code		Sub-source description SNAP 97 items
1A2a	Combustion in boilers, gas turbines and stationary engines	030101 Combustion plants $\geq$ 300 MW (boilers) 030102 Combustion plants $\geq$ 50 and $<$ 300 MW (boilers) 030103 Combustion plants $<$ 50 MW (boilers) 030104 Gas turbines 030105 Stationary engines
1A2a	Iron and steel	030203 Blast furnace cowpers 030301 Sinter and pelletizing plants 030302 Reheating furnaces steel and iron 030303 Grey iron foundries
1A2b	Non-ferrous metals	030304 Primary lead production 030305 Primary zinc production 030306 Primary copper production 030307 Secondary lead production 030308 Secondary zinc production 030309 Secondary copper production 030310 Secondary aluminium production
1A2c	Chemicals	Included in 1A2a
1A2d	Pulp, paper and print	030321 Paper-mill industry (drying processes)
1A2e	Food processing, beverages and tobacco	Included in 1A2a
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	030204 Plaster furnaces 030311 Cement (f) 030312 Lime (includ. iron and steel and paper pulp industr.)(f) 030313 Asphalt concrete plants 030314 Flat glass (f) 030315 Container glass (f) 030317 Other glass (f) 030319 Bricks and tiles 030320 Fine ceramic materials
1 A 2 g viii	Stationary combustion in manufacturing industries and construction: Other	030326 Other – Off-road in construction sector

This category includes emissions from stationary combustion plants/boilers (large and small) in industry, as well as emissions from reduction and combustion processes in industry, without and with contact with materials and manufactured products.

#### **TREND DESCRIPTION**

Emissions over the years vary widely, depending on economic crises, privatization processes (before 2000) and the closure of some enterprises - the largest metallurgical plant was shut down (2008), 3 out of 6 cement plants were closed (one before 2000, and two in the period 2011-2015), 2 out of 4 fertilizer plants were also closed (one before 2000 and one in 2004), etc. Along with the termination of the activity of the industrial enterprises, it also terminates the activity of their GGI. In this category at this stage are reported emissions from both combustion processes in industry and emissions from production processes, which at this stage are not separated to be reported in the NFR Sector 2 Industrial processes.

#### **Methodological issues**

A different approach was used to calculate emissions in the individual sub-categories, depending on the facilities and the production process.

**For large and small combustion plants (boilers/boilers) the methodology described for sub-category 1A1a Public electricity and heat production is used.**

For pure combustion processes in industry (without and with contact), in which emissions depend entirely on the fuel used, they are calculated on the basis of the fuels used (furnaces for heating steel and cast iron, kilns for firing bricks, tiles, plaster furnaces and fine ceramics and the like).

For other burning production processes where the emissions from the combustion process cannot be separated from the production process (as indicated in the EMEP / EEA Guidebook 2019), the produced products (cement, lime production, etc.) are used to calculate the emissions. Emissions calculated in this way are not reported in those sub-categories and are transferred purely to NFR Sector 2 Industrial processes.

To estimate the emissions from pure combustion processes in industry of Tier 1 and Tier 2 approach is chosen. Emissions are estimated using the general Tier 2 (similar Tier 1) equation:

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  - annual emission of pollutant

$EF_{\text{pollutant}}$  - emission factor of pollutant

$AR_{\text{fuel}}$  - consumption activity rate by fuel consumption

To estimate the emissions from production process of Tier 2 approach is chosen. Emissions are estimated using the general Tier 2 equation:

$$E_{\text{pollutant}} = \sum A_{\text{products}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  - annual emission of pollutant

$EF_{\text{pollutant}}$  - emission factor of pollutant

$A_{\text{products}}$  - annual production

### Activity data

The activity data are collected by the NSI - as described above.

### Emission factors

**For large and small combustion plants (boilers/boilers) see description in Public electricity and heat production (NFR 1A1a).**

For calculating the emissions from pure combustion processes in industry is used the EFs described in EMEP/EEA Guidebook 2019: chapter 1.A.2 Manufacturing industries and construction (combustion) from Table 3-2 to Table 3-5.

For calculating the emissions from burning production processes in industry is used the EFs described in EMEP/EEA Guidebook 2019: chapter 1.A.2 Manufacturing industries and construction (combustion) from Table 3-7 to Table 3-30.

### Source specific recalculations

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

### Source specific planned improvements

Improvements in this category are not planned.

## TRANSPORT (NFR 1A3)

### SOURCE CATEGORY DESCRIPTION

The ExEA is the responsible institution for estimation of emissions in sub-sector Transport (NFR 1A3).

The IPCC source category for road transport includes emissions from all types of vehicles, light-duty vehicles such as automobiles and light trucks, and heavy-duty vehicles such as tractor trailers and buses, and on-road motorcycles (including mopeds, scooters, and three-wheelers).

Special feature of Bulgarian vehicle fleet is its age structure. In 2020 about 69% from the vehicles are above 15 years and about 43% are more than 20 years old.

The total number of registered vehicles in Bulgaria for the period 1988 – 2020 is presented in the next table. Detailed breakdown of vehicle fleet by fuel, engine size and EURO category standards can be found in Annex 4. Vehicle fleet and mileage data for road transport.

**Table 9: Sub-sector Transport for 1990-2020**

NFR 14 code		Sub-source description SNAP 97 items
1A3aii (i)	Civil aviation (Domestic, LTO)	Air traffic 080501 Domestic airport traffic (LTO cycles - <1000 m)
1A3ai (i)	International aviation (LTO)	080502 International airport traffic (LTO cycles - <1000 m)
1A3aii (ii)	Civil aviation (Domestic, Cruise)	080503 Domestic cruise traffic (>1000 m)
1A3ai (ii)	International aviation (Cruise)	080504 International cruise traffic (>1000 m)(i)
1A3bi	Road transport: Passenger cars	070101 Highway driving 070102 Rural driving 070103 Urban driving
1A3b ii	Road transport: Light duty vehicles	070201 Highway driving 070202 Rural driving 070203 Urban driving
1A3b iii	Road transport: Heavy duty vehicles	070301 Highway driving 070302 Rural driving 070303 Urban driving
1A3b iv	Road transport: Mopeds and motorcycles	0704 Mopeds and Motorcycles < 50 cm <sup>3</sup> 0705 Motorcycles > 50 cm <sup>3</sup> 070501 Highway driving 070502 Rural driving 070503 Urban driving
1A3b v	Road transport: Gasoline evaporation	0706 Gasoline evaporation from vehicles
1A3b vi	Road transport: Automobile tyre and brake wear	0707 Automobile tyre and brake wear
1A3b vii	Road transport: Automobile road abrasion	0708 Road surface wear
1A3c	Railways	080201 Shunting locs 080202 Rail-cars 080203 Locomotives
1A3d ii 1A3di (ii)	National navigation International inland waterways	080402 National sea traffic within EMEP area 080403 National fishing 080404 International sea traffic (international bunkers) 080304 Inland goods carrying vessels
1A3e i	Pipeline compressors	NO
1A4aii	Commercial/institutional: Mobile	
1A4cii 1A4ciii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery Agriculture/Forestry/Fishing: National fishing	

#### **CIVIL AVIATION - DOMESTIC AND INTERNATIONAL, LTO/CRUISE (NFR 1A3a)**

## Description

Category civil aviation includes emissions from all civil commercial use of airplanes (international and domestic) consisting of scheduled and charter traffic for passengers and freights as well as general aviation. Emissions from aviation come from the combustion of jet kerosene and aviation gasoline. Domestic aviation is related to the transport of passengers and cargo as well as general aviation. In the civil aviation are included both scheduled and non-scheduled flights. The international aviation is separated from domestic aviation based on the departure and landing locations.

There are five airports in Bulgaria, located in the towns of Sofia, Burgas, Plovdiv, Varna and Gorna Oriahovitz. For the three of the biggest Bulgarian airports the number of passengers rapidly increased about three times in the period 2000–2019 due to the development of international tourism as well as increased number of business trips. In 2020 there is a large drop in the number of both domestic and international flights due to the COVID 19 Pandemic and the lock-downs.

**Table 10** presents the consumed fuel for landing/take-off (LTO) cycles and cruise phases. The fuel is allocated between LTO and cruise phases based on detailed data provided by EUROCONTROL. Currently the full time series from 1990 to 2019 of the Landing/Take-Off (LTO) cycles is available due to extrapolation of data for the period 1990 to 1997.

## Activity data

Activity data for sector 1A3a (LTO) are provided by the Ministry of Transport – DG Civil Aviation (the numbers of landings and take-offs at the airports) and for sector 1A3a (CRUISE) are estimated based on Eurostat energy balance, which provides a fuel split between domestic and international aviation and country specific Net Caloric Values (NCV).

**Table 10: Fuel consumption for LTO and cruise for domestic and international aviation**

Year	Aviation gasoline	Jet kerosene			
		Domestic aviation LTO	International aviation LTO	Domestic aviation Cruise	International aviation Cruise
1990	308	525	1297	1066	8679
1995	88	393	1645	798	11009
2000	0	284	436	576	2918
2005	44	171	1026	347	6865
2010	44	199	911	403	6098
2015	44	170	961	346	6435
2016	0	270	1157	547	7744
2017	20	278	1295	564	8668
2018	17	237	1394	480	9327
2019	11	164	1323	312	8857
2020	7	122	758	234	5072

The figure below shows the data for fuel consumed in sector Aviation according to Eurostat balance in TJ.

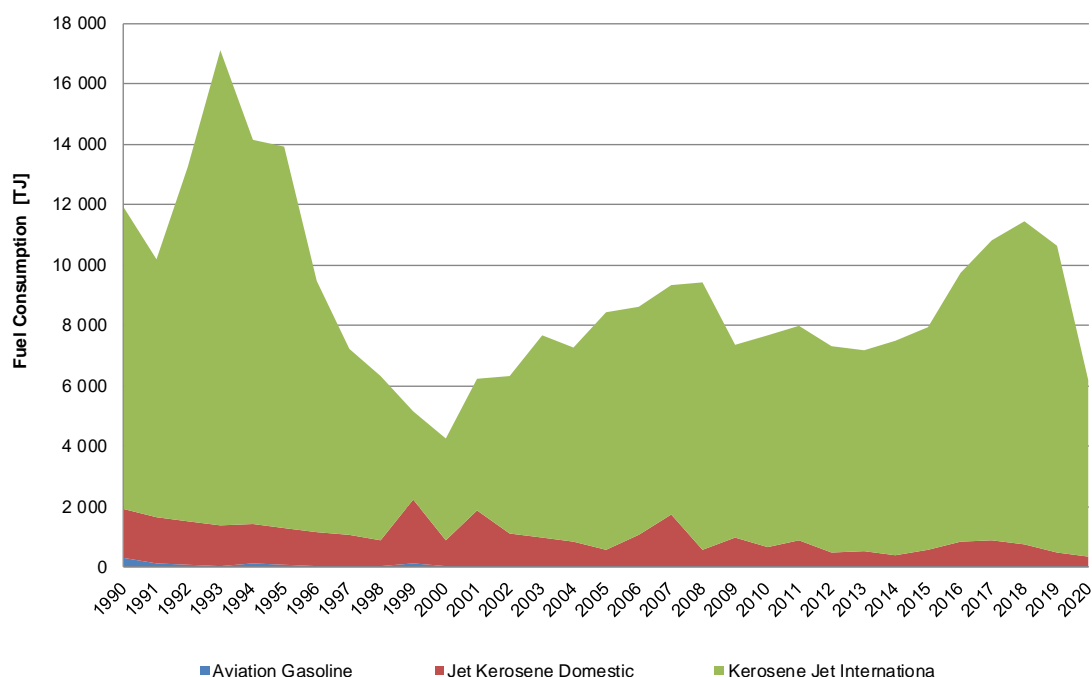


Figure 5: Fuel consumption in TJ for NFR 1.A.3.a Civil aviation (1990-2020)

### Methodological issues

TIER 1 approach has been applied for estimation of emissions from aviation:

$$E_{\text{pollutant}} = AR_{\text{fuel consumption}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  is the annual emission of pollutant for each of the LTO and cruise phases of domestic and international flights;

$AR_{\text{fuel consumption}}$  is the activity rate by fuel consumption for each of the flight phases and flight types; and

$EF_{\text{pollutant}}$  is the emission factor of pollutant for the corresponding flight phase and flight type.

This equation is applied at the national level for estimation of the emissions from aviation.

Based on the provided data from EUROCONTROL on the number of LTOs by aircraft types for the period 1997-2020 have been calculated the average share of fuel consumed for LTOs from the total jet kerosene consumption as reported by the National Statistics Institute. For domestic aviation is applied a fixed share of 33% for the full time series, while for international aviation the LTO share has been estimated as 13%. Aviation gasoline consumption is fully allocated is domestic consumption.

### Emission factors

For estimating the emissions from domestic and international aviation the default emission factors (kg/tonne fuel) from Table 3-3 (Chapter: 1.A.3.a – Aviation, GB 2019) were used. The same approach is used for civil and international cruises (kg/tonne fuel).

PM<sub>2.5</sub> emissions are estimated according to the 2019 Guidelines - Annex 2 Additional comments on emission factors – 0.01 (g/kg fuel). The Guidebook suggests that relationship between PM<sub>2.5</sub>:PM<sub>10</sub> is approximately 1:0 and is basically PM<sub>2.5</sub>(Annex 2).

Lead emissions from aviation gasoline are estimated according to the 2019 Guidelines – Annex 2 Additional comments on emission factors – 0.6 g of lead per litre of gasoline.

### Source specific recalculations

No recalculations were made in this category.

### Source specific planned improvements

Improvements in this category are not planned for the time being.

## ROAD TRANSPORT (NFR 1A3b)

### Source category description

The IPCC source category for road transport includes emissions from all types of vehicles, light-duty vehicles such as automobiles and light trucks, and heavy-duty vehicles such as tractor trailers and buses, and on-road motorcycles (including mopeds, scooters, and three-wheelers).

Special feature of Bulgarian vehicle fleet is its age structure. In 2020 about 69% from the vehicles are above 15 years and about 43% are more than 20 years old.

The total number of registered vehicles in Bulgaria for the period 1988 – 2020 is presented in the next table. Detailed breakdown of vehicle fleet by fuel, engine size and EURO category standards can be found in Annex 4. Vehicle fleet and mileage data for road transport.

**Table 11: Number of vehicles, 1990 – 2020**

	Passenger cars	HDV and LDV	Busses	Motorcycles	Mopeds
<b>1990</b>	1 317 437	227 782	7 468	225 533	281 270
<b>1995</b>	1 647 571	289 430	15 371	233 365	285 901
<b>2000</b>	1 992 748	326 204	17 290	236 327	286 047
<b>2005</b>	2 544 198	393 565	12 584	97 754	48 667
<b>2010</b>	2 602 461	368 195	20 458	70 394	54 983
<b>2015</b>	3 162 037	483 945	21 265	93 869	71 885
<b>2016</b>	3 143 634	496 038	21 302	99 806	74 690
<b>2017</b>	2 775 758	459 927	19 350	106 047	78 114
<b>2018</b>	2 773 401	475 045	19 232	112 387	80 813
<b>2019</b>	2 829 998	490 212	19 189	118 738	83 713
<b>2020</b>	2 866 763	500 757	18 050	124 311	85 503

*Source of information: Ministry of Internal Affairs*

The rapid decrease of the number of the vehicles in 2006 is due to the officially terminated registration of the vehicles, which were not re-registered. The decrease of vehicles in 2017 was due to similar reasons – due to changes in the national legislation, vehicle registration was automatically terminated for vehicles without obligatory civil liability insurance. This led to deregistration of more than 800 000 vehicles, but some of those were subsequently re-registered.

The road transport has the biggest share in total consumption of the fuels in Transport. In 2020 the road transport consumed 98% from the total energy in the sector.

Fuel consumption (liquid, gaseous and biofuels) is obtained from Energy Balance and converted into energy units using country-specific net calorific values. Activity data is illustrated in Figure 6. The emission factors are taken from the EMEP/EEA emission inventory guidebook 2019.

The emission calculations of road transport have been performed with the use of the European computer model COPERT v. 5.5.1, corresponding to Tier 3. Since country-specific technology-based emission factors are not available, default mileage-based or fuel-based emission factors of the new version have been applied instead. In the new version 5.5.1 of COPERT model there are a number of changes regarding emission factors as well as corrected bug fixes.

In the model emissions were calculated through the input of detailed data on average daily trip distance and time, fuel Reid Vapour Pressure (RVP), monthly minimum and maximum temperatures, consumption and fuel specifications, vehicle fleet categorized in sectors, subsectors and technology (standard), vehicle stock and annual mileage, speed and driving shares.

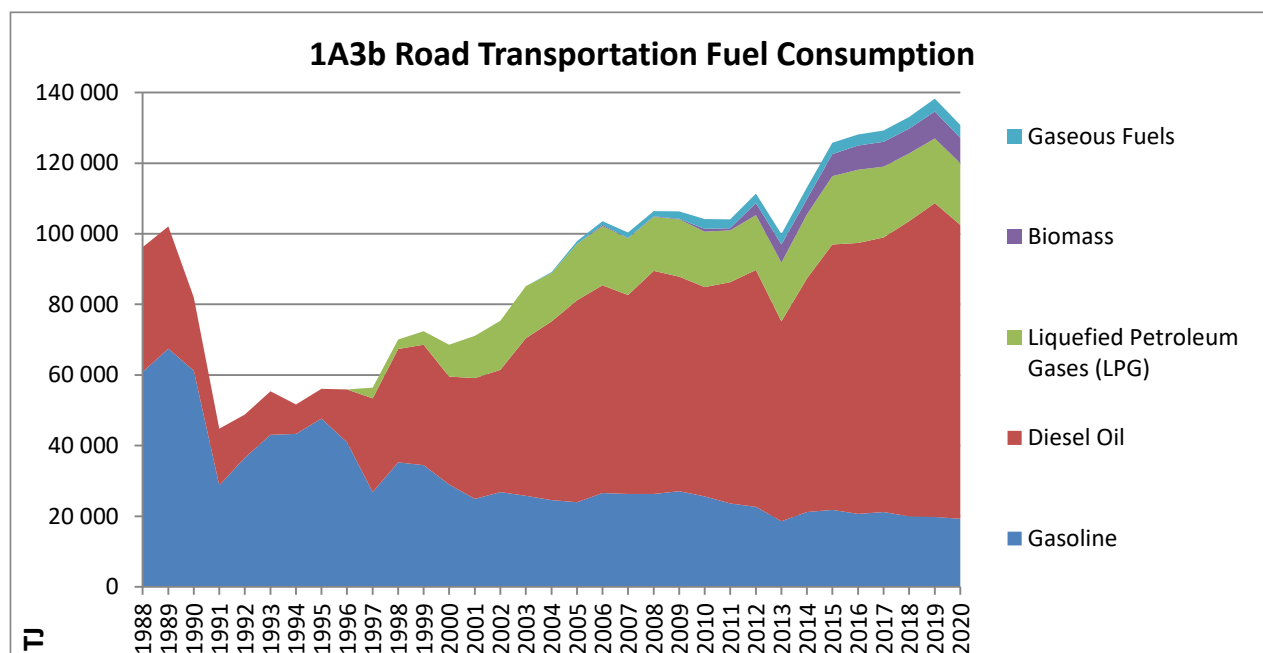


Figure 6: Fuel consumption in TJ, NFR 1.A.3.b Road transport (1990 - 2020)

Fuel consumption (liquid, gaseous and biofuels) is obtained from the Energy balance and converted into energy units using the CS NCV. The total amount of fuels sold is compared to the calculated amount of fuel according to the model, as the difference is used for mileage adjustment to correspond to the fuel quantities from the Energy balance, as explained under “Mileage” below. Biofuels (biodiesel and biogasoline) have been accounted for the emission estimates and the quantities of blended biofuels reported in the energy balance have been entered as a separate parameter in the COPERT model.

Table 12: Fuel consumption (TJ)

Year	Gasoline	Diesel Oil	LPG	CNG	Biomass
1990	61 204	20 769	NO	NO	NO
1995	47 652	8 418	NO	NO	NO
2000	28 996	30 541	9 062	NO	NO
2005	23 915	57 232	16 008	799	NO
2010	25 564	59 374	15 640	2 760	862
2015	21 768	75 223	19 366	3 256	6 258
2016	20 647	76 791	20 746	3 102	6 941
2017	21 142	77 819	20 049	3 141	7 166
2018	19 993	83 601	19 135	3 283	7 117
2019	19 796	88 852	18 360	3 661	7 686
2020	19 227	83 303	17 405	3 608	7 346

The other data, necessary for implementation of model COPERT have been provided by national institutions and companies (National Statistical Institute, National Institute of Meteorology and Hydrology, Ministry of Internal Affairs, Department Traffic police, Lukoil Neftohim–Burgas, State Agency For Metrological And Technical Surveillance). However, in some cases the completeness and quality of the information submitted was not of the required detail. When directly related data was not available, surrogate data from various sources was used to fulfil the missing gaps and ensure the representativeness of the inputs to COPERT model. A degree of expert judgment was necessitating as well.

The following input data is compiled for the emission calculations with the use of COPERT:

#### ***Average daily trip distance***

Average daily trip distance was calculated through [www.bgMaps.com](http://www.bgMaps.com), one of the most popular websites for maps, routes, records and services to find individual addresses, locations and other information on the maps. Analysis of the major cities population and plausible daily journeys was performed and available data lead to an estimation of 15,1km as average daily trip distance. The average European value of 12,4 km (Samaras et al. 2000) is slightly lower, the calculated number seems to be more appropriate for the Bulgarian conditions and driving culture. Time trip duration is estimated at 0,42 hours.

#### ***Minimum and maximum temperatures***

Complete, country-specific data on monthly average minimum and maximum temperatures for the whole period of 1988 to 2020 was compiled by the National Institute of Meteorology and Hydrology.

#### ***Fuel specifications***

Fuel specifications of liquid fuels were taken from Lukoil Neftohim – Burgas, as the major part of the liquid fuels present at the national market are produced by Lukoil, and the State Agency For Metrological And Technical Surveillance (SAMTS). The later organization performs a quality check of the liquid fuels, placed on the market according to the national legislation requirements in an accredited laboratory. Since fuel sold at petrol stations in the country is sampled regularly, it is considered that the quality of the fuels represent the fuel products characteristics delivered to the final customer and utilized in the national fleet. Country specific data for diesel and gasoline for some of the fuel specifications is provided for the years 2005-2020 by Lukoil Neftohim – Burgas and the State Agency For Metrological And Technical Surveillance (SAMTS). Data on LPG, biodiesel and CNG was not obtained. Hence, literature information and regulatory technical requirements were used instead. Whereas appropriate, default values provided by COPERT and extrapolation of the existing numbers were applied to fill the gaps in the available data. It is important to be noted that there has been only unleaded gasoline in Bulgaria (National Program to phase out lead in petrol) since 2004. For the years before, the percentage of leaded and unleaded gasoline varies as in 2003 the leaded gasoline share was only 0,2% (National Statistical Institute). Country-specific values for sulphur content are applied, varying for the time series (see **Table 13**). For gasoline and diesel, the following country-specific values were applied:

- 1998-2004: The values are the maximum sulphur content according to Lukoil refinery fuel specifications.
- 2005-2020: The mean values according to EU Fuel quality monitoring submissions, provided by the Ministry of Environment.

For LPG, values until 2010 are based on the maximum sulphur content according to Lukoil refinery fuel specifications, values from 2011 and 2012 are based on measurements from the refinery. The data for 2013-2020 is also based on measurements, but the refinery consistently reports sulphur content of 1 mg/kg.

**Table 13: Sulphur content mg/kg**

Year	Gasoline	Gas/Diesel Oil	LPG
<b>1990-2003</b>	500	500	50
<b>2004</b>	150	350	50
<b>2005</b>	144.6	246.3	50
<b>2006</b>	144.6	246.3	50
<b>2007</b>	19.0	22.2	50
<b>2008</b>	35.1	63.5	50
<b>2009</b>	8.0	13.1	50
<b>2010</b>	8.1	13.5	50
<b>2011</b>	9.1	9.5	23

Year	Gasoline	Gas/Diesel Oil	LPG
2012	6.9	7.5	20
2013	7.9	8.2	1.0
2014	7.8	7.9	1.0
2015	6.6	7.0	1.0
2016	7.0	7.2	1.0
2017	6.3	7.3	3.7
2018	6.1	7.3	3.5
2019	5.9	7.4	3.6
2020	5.7	6.6	3.7

**Table 14: Lead content mg/kg**

Year	Gasoline	Gas/Diesel Oil
1990 - 2003	200	0.0005
2004	6.6667	0.0005
2005	6.6667	0.0005
2006	6.6667	0.0005
2007	0.0373	0.0005
2008	0.1253	0.0005
2009	0.0016	0.0005
2010	0.0016	0.0005
2011	0.0016	0.0005
2012	0.0016	0.0005
2013	0.0016	0.0005
2014	0.0016	0.0005
2015	0.0016	0.0005
2016	0.0016	0.0005
2017	0.0016	0.0005
2018	0.0016	0.0005
2019	0.0016	0.0005
2020	0.0016	0.0005

Values for fuel volatility (RVP – Reid Vapour Pressure) are available for the period 2006-2020 provided by Lukoil Neftohim – Burgas. For the previous periods a summer and winter range is specified according to the technical requirements. Therefore, RVP data for the years 2000-2005 is estimated based on the available values and the legal requirements. RVP of 62 kPa (summer) and 67 kPa (winter) for the period 1988 -1999 is applied, based on the market average for 1996 (Samaras et al. et al. 2000) and the ratio legal requirements to measured data, submitted for the recent years.

### ***Speed***

Infrastructure and vehicle stock differ significantly from city to city. Vehicle speed varies from big and small cities during the day, being quite low in the rush hours, especially in the densely populated areas. However, detailed data for speed variations is not available for the whole period. Krzywowska et al. (2004) report approximate value of 24km/h for mini buses in the urban region of Sofia. Additionally, a number of studies (André, 2006, Samaras et al. 2002, Coronas Metropolitanas 2006) documenting various average speeds for several European cities and private measurement of passenger cars average speed per day were considered. Further, average urban speed of 36,2km/h was calculated via [www.bgMaps.com](http://www.bgMaps.com), applying the same method as for average daily trip distance calculation. The latter value is preferred for the inventory, in relation to the traffic conditions in urban areas and literature research. A slightly higher value of 37km/h is estimated for the period 1989-2000 regarding the traffic conditions in the past and fluctuation in bus speed.

Considering public transport, buses are the most developed mode of transport in Sofia (MottMacDonald 2009), as that is the case for the other large cities (exp. Plovdiv, Varna). Trams and trolleybuses occupy the second and third place, as trams are disseminated only in the capital and are not subject of road transport category. Bus transport remains the preferred method of public

and for long-distance transportation as well. Average public transport speed for buses in Sofia is 19,4km/h (Krzywkowska 2004), and for trolleybuses – 14,4km/h (MottMacDonald 2009). These numbers vary back in the years as shows (Breshkov, 2005).

**Table 15: Average operational speed (km/h)**

Vehicle type/ Year	2009	2006	2002	1995	1989
Trolleybus	14,4	14	14	14	14
Urban bus	19,4	19,65	18,1	18,1	19,5

Since, bus lines are limited only to some areas, traffic jams frequently impede the free flow not only of private cars, but as well as of buses and trolleys. Nevertheless, the average speed of private cars is expected to be higher and thus making the car one of the most preferred ways of city transport. Speed values for rural and highway roads depend not only on the vehicle type and purpose of the trip, but also on the road quality. In Bulgaria, there are four classes of road classification: Motorway, Class I, II and III, as the latter represents 60% of the total length. Hence, free flow speed variation in relation to the above mentioned classes is the following (AECOM 2010):

**Table 16: Average free flow speed (km/h) per type of road class**

Road Class	Average free flow speed (km/h)
Class I	79
Class II	70
Class III	55
Motorway (Highway)	110

Given these data, for the emission calculations average speed was estimated to be 68km/h for rural areas for all types of vehicles (except for mopeds) and 110km/h for motorway, except for coaches. Whereas inappropriate and/or data was missing, the legal requirement speed limit was applied instead the above mentioned numbers. Moreover, a comparison of road classes for the years 2010-2002 revealed a negligible change in relation to rural speed variation. Therefore, identical value of 68km/h was used for all years.

### ***Driving share***

The density of the Bulgarian road network is similar to the average density for the other EU member states, excluding highways. In terms of high speed roads and motorways the country lags far behind – 3,8 km/1000 sq km compared to Austria - 19 km/1000 sq km in Slovenia - 14 km/1000 sq km, and in Lithuania - 6 km/1000 sq km (MRDPW 2010).

Due to lack of data for Bulgaria on mileage split between urban, rural and highway driving, literature survey of driving cycles (André, 2006) based on information from 80 representative European private cars in France, the UK, Germany and Greece was performed. Additionally, comparison of road statistics for Slovakia and Bulgaria shows a number of similarities related to road classes' ratio, length of network, geography and GDP trends. Taking into account the mentioned surveys, the driving share split for Slovakia was adopted. Where necessary data gaps for some years and categories were filled in by extrapolating the existing values.

### ***Vehicle fleet***

Corresponding to the COPERT methodology, detailed knowledge of the structure of the vehicle fleet is required. Main sources of data on vehicle stock and classifications are National Statistical Institute and Ministry of Internal affairs. However, apart from the total numbers for the main vehicle categories, only partial data considering distribution into fuel, weight and technology classes was provided. Regardless of the data gaps, a country specific vehicle fleet matrix was developed.

Data regarding the total number of vehicle types by age is represented in 6 ranges from: 1 to more than 20 years old vehicles. This data is available for the period 2005 – 2020. Thus, new technology split for each vehicle category is proposed base on the age structure and EURO standard year of entry. This approach is applied to populate the vehicle numbers by sector and technology for the

period 2005-2020. Additionally, data on vehicles by brand and expert judgment was used to estimate the full time series back to 1988.

Regarding the subsector, new split by fuel and engine volume has been introduced. National data on vehicle type per fuel type for the period 2005 – 2020 is applied in a model to generate the required subsector split. There are more than 10 vehicle categories by fuel (including bi-fuel combinations) according to national data, among which hybrids as well. In that case a conservative approach has been applied to apportion the vehicle numbers to the relevant COPERT vehicle groups. The resulting allocation by vehicle category is combined with data on engine volume extracted from TRACCS EU project. Since TRACCS provide data for 2005 to 2010, data gaps for the remaining years were fulfilled by extrapolation and expert judgement. Finally, total numbers for the national vehicle fleet were distributed in accordance with COPERT categories following the previously generated split by fuel, engine and EURO standard.

### ***Mileage***

As only basic information on mileage per urban buses, coaches and heavy duty vehicles (>6t) was obtained from the National Statistics Institute, mileage for 2005 was estimated from the average for 16 European countries that provided such data (Ntziachristos et al. 2008). However, the average EU15 mileage data may lead to overestimations of emissions. A recommendation by Ntziachristos et al. (2008) to adjust the mileage values in order to better match the statistical fuel consumption (actual fuel sold) was followed.

For all other required parameters (e.g. fuel injection, evaporation control, evaporation distribution, slope factor, load factor) were used the default values provided by the COPERT model.

### ***Lubricants***

Emissions from lubricant consumption in 2-stroke and 4-stroke vehicles have been estimated with the COPERT model and reported under CRF category 2D3i. COPERT default lubricant consumption per km and default heavy metal contents have been applied. Total lubricant consumption is estimated based on the provided CO<sub>2</sub> emission estimates from the COPERT model, using a ratio of 3.12 kg CO<sub>2</sub>/kg lubricants (based on Equation 16 from the 2019 EMEP/EEA Guidebook).

### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken.

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors and IEF (time series)
- Ensure time series consistency
- Plausibility checks of dips and jumps (this is due to the Energy balance)
- Documentation and archiving of all information required in NIR,
- Background documentation and archive.

### **Source specific recalculations**

All emissions have been recalculated due to the introduction of an updated version of the COPERT model, including updated EFs for some air pollutants.

### **Source specific planned improvements**

There are no planned improvements for the next submission.

## **ROAD TRANSPORT: Automobile Tyre and Brake Wear (NFR 1A3bvi)**

### **Description**

This category covers the emissions from particulate matter from Automobile tyre and brake wear from different type of vehicles.

### **Activity data**

Activity data used in this category are obtained from COPERT model in calculating the emissions of harmful substances for each type of vehicle.

**Methodological issues**

In order to calculate emissions of TSP, PM<sub>10</sub> or PM<sub>2.5</sub> from brake and tyre wear and road surface wear, equation 2 from Chapter 3.3.1 had been applied, implementing a Tier 2 approach.

For PAHs emissions were used the species profiles provided in Table 3-10. Emissions of benzo(a) pyrene, benzo(b) fluoranthene and benzo(k) fluoranthene we calculated using the calculated amount of TSP, multiplied by the respective shares from Table 3-10.

**Emission factors**

Default emission factors from Table 3-4 and Table 3-6 for PM emissions and Table 3-10 for PAHs (EMEP/EE GB 2019) were used for estimation of the emissions from this category

**Source specific recalculations**

Recalculations are not made.

**Source specific planned improvements**

Improvements in this category are not planned.

**ROAD TRANSPORT: AUTOMOBILE ROAD ABRASION (NFR 1A3bvii)****Description**

This category covers the emissions from particulate matter from Automobile road abrasion from different type of vehicles.

**Activity data**

Activity data used in this category are obtained from COPERT model in calculating the emissions of harmful substances for each type of vehicle. Mileage data are used for each vehicle category.

Table below shows mileage data for each type of vehicle.

**Table 17: Mileage per vehicle type by year - NFR1A3bvii Road transport: Automobile road abrasion (10<sup>6</sup> km)**

<b>Year</b>	<b>Passenger Cars</b>	<b>Light Duty Vehicles</b>	<b>Heavy Duty Vehicles</b>	<b>Buses</b>	<b>Moped s</b>	<b>Motorcycle s</b>
<b>1990</b>	13 212	5 122	1 059	501	980	2 252
<b>1995</b>	11 701	3 478	343	275	593	1 392
<b>2000</b>	13 474	3 194	886	956	282	673
<b>2005</b>	20 166	4 520	1 689	1 308	30	168
<b>2010</b>	26 434	4 185	1 695	843	52	170
<b>2015</b>	32 911	5 523	2 111	828	59	187
<b>2016</b>	33 889	5 658	2 142	807	61	197
<b>2017</b>	34 166	5 856	2 169	793	75	244
<b>2018</b>	34 816	6 325	2 293	816	76	251
<b>2019</b>	36 219	6 756	2 386	840	80	265
<b>2020</b>	34 669	6 486	2 203	731	86	290

**Methodological issues**

In order to calculate emissions of TSP, PM<sub>10</sub> or PM<sub>2.5</sub> from brake and tyre wear and road surface wear, equation 9 from Chapter 3.3.3 had been applied, implementing a Tier 2 approach:

**Emission factors**

Default emission factors from Table 3-8 (EMEP/EE GB 2019) were used for estimation of the emissions from this category

**Source specific recalculations**

Recalculations are not made.

**Source specific planned improvements**

Improvements in this category are not planned.

**RAILWAYS (NFR 1A3c)****Description**

Railways related emissions are quite low in Bulgaria due to the decreased transport of passengers and goods and the fact that most of the locomotives in use are electrically-powered. There is a significant decrease in emissions compared to the base year.

**Activity data**

The activity data for calculation of emissions are collected by NSI. The Eurostat Energy Balance is incorporated in the inventory of sub-Sector 1A4c. The quantities of utilized fuels are used with corresponding net calorific values.

Figure below shows the quantity of used fuel in TJ.

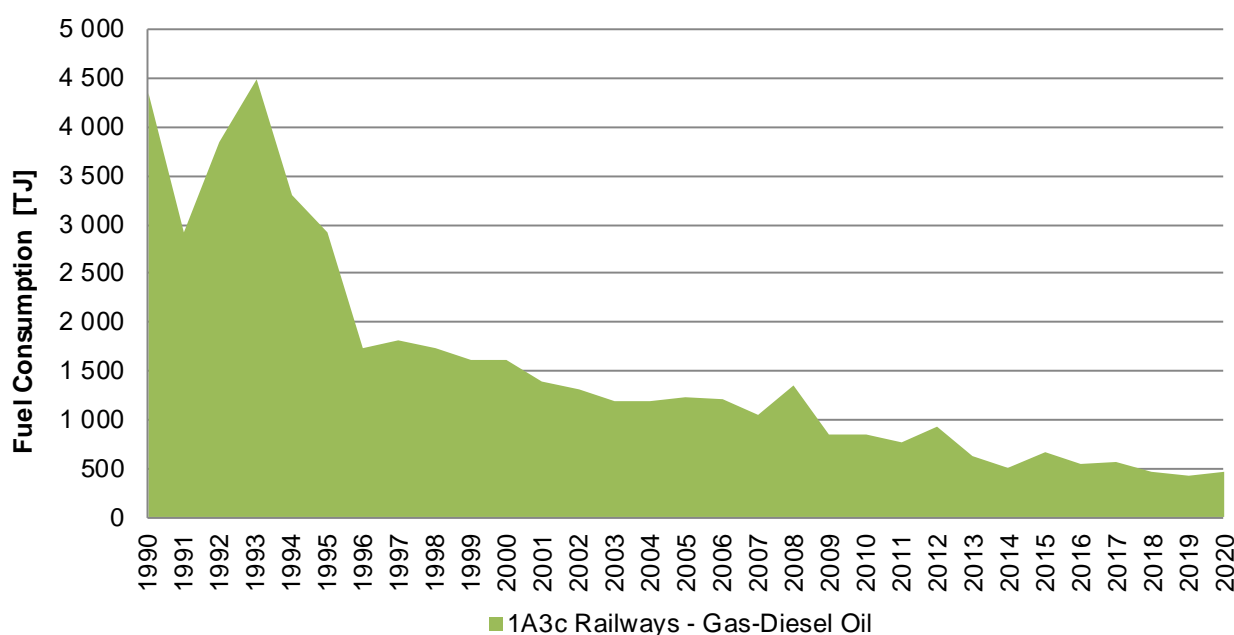


Figure 7: Fuel consumption in TJ for NFR 1A3c Railways (1990-2020)

**Methodological issues**

Tier 1 approach for railways uses the general equation:

$$E_i = \sum_m FC_m \times EF_{i,m}$$

where:

$E_i$  = emissions 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 (tonnes),

$EF_i$  = emission factor of pollutant  $i$  for each unit of fuel type  $m$  used (kg/tonnes),

$m$  = fuel type (diesel, gas oil).

This equation is applied for estimation of the emissions on national level.

**Emission factors**

Default emission factors from table 3-1 (chapter: 1.A.3.c Railways, GB 2019) were used to estimate the emissions from this sub-category.

Sulphur content for gas/diesel oil has been obtained from State Agency For Metrological And Technical Surveillance (SAMTS) annual reports.

**Source specific recalculations**

Recalculations are not made.

**Source specific planned improvements**

Improvements in this category are not planned.

## NAVIGATION (NFR 1A3dii)

### Description

In Bulgaria navigation is used mostly for transportation of goods. However, the consumption patterns are limited since 2000, as it can be observed from the figures below.

The previous assumption regarding residual fuel oil and gas/diesel oil consumed by navigation and marine transport was that it was reported in the industry sector, since there were some discussions regarding erroneously allocated fuel quantities. In addition, in the earlier years NSI reported in the energy balances all amounts of fuels loaded on Bulgarian ships regardless the port the fuel was loaded on. This explains the large quantities reported for the years before 1997. Recently, it was clarified by the NSI that the marine vessels do not load at our ports because of the low fuel quality and higher prices.

Currently cargo is predominantly transported on international routes. Very limited amounts are transported within Bulgaria and this usually happens as part of an international route. Still, there is high uncertainty how the loading of fuel is accounted in this particular scenario – it is assumed that the logistic companies mainly prefer to load outside Bulgaria – either in Romania or on their way to other countries.

### Activity data

Concerning domestic navigation, the amount of fuel consumed is calculated based on the cargo transported inland (domestic transport of goods) for the period 2001-2019. Data on transported cargo inland are obtained from National Statistical Institute (NSI) and Danube commission. Data for the previous years for the fuel consumed were obtained from Eurostat balance.

For international navigation, data about quantities of consumed fuels are obtained from Eurostat balance with corresponding NCV. Currently, the national energy balance aggregates the fuel consumption for categories 1A3di(i) International Maritime Navigation and 1A3di(ii) International Inland Waterways, so it is not possible to provide separate estimates for those categories.

Figure below shows consumed fuels in the sector in TJ.

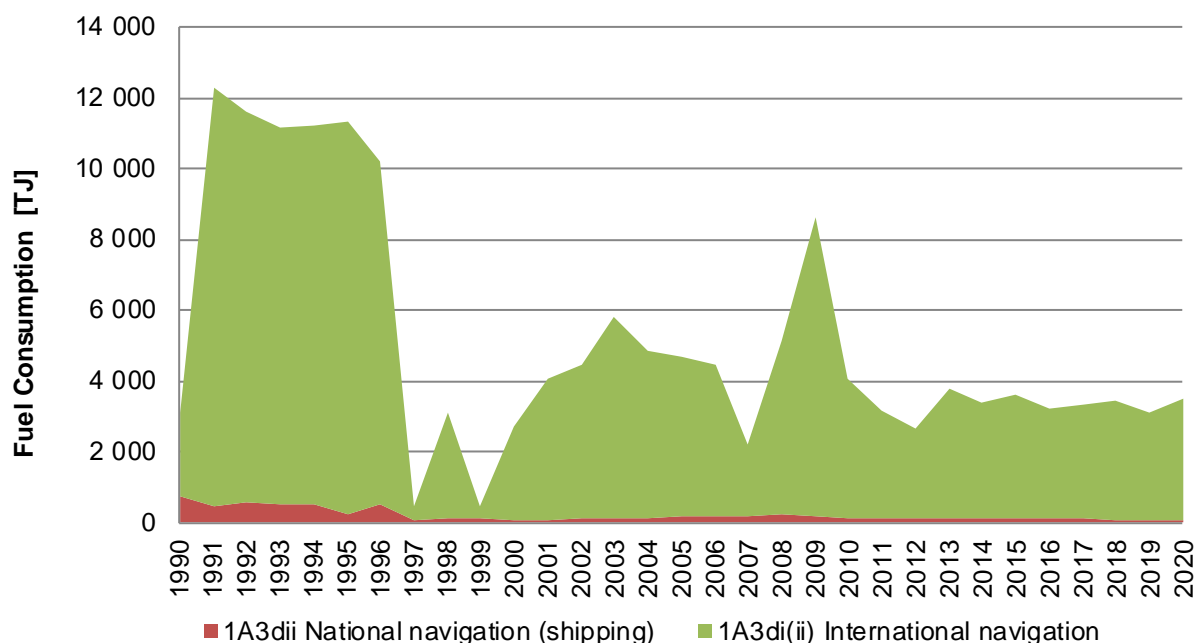


Figure 8: Fuel consumption in TJ for 1A.3.d.ii Navigation (1990-2020)

Table 18: Fuel consumption in t for 1A.3.d.ii Navigation (1990-2020)

Year	1A3dii_domestic_navigation		1A3aii_Inter_navigation	
	Gas-Diesel Oil	Total fuel oil	Gas-Diesel Oil	Total fuel oil
1990	18000.0	0.0	0.0	59000.0
1991	1000.0	10000.0	80000.0	211000.0
1992	2000.0	12000.0	64000.0	208000.0
1993	2000.0	11000.0	56000.0	207000.0
1994	3000.0	9000.0	53000.0	212000.0
1995	3000.0	2000.0	63000.0	212000.0
1996	6000.0	6000.0	55000.0	184000.0
1997	2000.0	0.0	9000.0	0.0
1998	2000.0	1000.0	70000.0	0.0
1999	0.0	3000.0	7000.0	1000.0
2000	2000.0	0.0	62000.0	0.0
2001	1827.7	0.0	93172.3	1000.0
2002	2698.8	0.0	102301.2	0.0
2003	3332.1	0.0	133667.9	0.0
2004	3119.4	0.0	111880.6	0.0
2005	3609.3	0.0	106390.7	0.0
2006	3849.9	0.0	102150.1	0.0
2007	4240.7	0.0	47759.3	0.0
2008	4895.1	0.0	101104.9	16000.0
2009	3588.1	0.0	146411.9	57000.0
2010	2760.4	0.0	49239.6	46000.0
2011	3008.7	0.0	43991.3	29000.0
2012	2708.4	0.0	42291.6	19000.0
2013	2290.7	0.0	57709.3	31000.0
2014	2754.6	0.0	53245.4	26000.0
2015	3262.8	0.0	62737.2	21000.0
2016	2352.3	0.0	56647.7	19000.0
2017	2102.0	0.0	54858.0	23585.0
2018	1636.2	0.0	55727.8	25292.0
2019	2059.70	0.0	58518.0	16807.0
2020	1559.21	0.0	68313.0	15834.0

### Methodological issues

TIER 1 approach is used for estimation of the emissions from navigation:

$$E_i = \sum_m (FC_m \times EF_{i,m})$$

where:

$E_i$  = emission of pollutant  $i$  in kilograms;

$FC_m$  = mass of fuel type  $m$  sold in the country for navigation (tonnes);

$EF_{i,m}$  = fuel consumption-specific emission factor of pollutant  $i$  and fuel type  $m$  [kg/tonne];

$m$  = fuel type (bunker fuel oil, marine diesel oil, marine gas oil, gasoline).

### Emission factors

Default emission factors from tables 3-1 and 3-2 (chapter: 1.A.3.d, Navigation, GB 2019) were used for estimation of the emissions from different pollutants from Navigation.

### Source specific recalculations

The estimated fuel used in Sector 1A3di (ii) has been deducted from international bunker fuels in Sector 1A3dii to avoid double counting of emissions.

### Source specific planned improvements

Improvements in this category are not planned.

**OTHER SECTORS (NFR 1A4)****Source category description**

Sub-sector Other sectors includes the groups:

- Mobile Combustion in manufacturing industries and construction (NFR 1A2gvii)
- Commercial/Institutional (NFR 1A4a);
- Residential (NFR 1A4b);
- Agriculture/Forestry/Fisheries (NFR 1A4c).

These groups include only stationary sources, as the aggregation level is the type of the fuel and the combustion technology in the corresponding group (services, households, agriculture).

**Table 19: Other Sectors (NFR 1A4) for 1990-2020**

NFR 14 code		Sub-source description SNAP 97 items
1A4ai	Commercial /Institutional: Stationary	<b>Commercial and institutional plants</b> 020103 Combustion plants < 50 MW (boilers) 020105 Stationary engines
1A4a ii	Commercial / Institutional: Mobile	
1A4b i	Residential: Stationary plants	<b>Residential plants</b> 020201 Combustion plants >= 50 MW (boilers) 020202 Combustion plants < 50 MW (boilers) 020203 Gas turbines 020204 Stationary engines 020205 Other equipment
1A4b ii	Residential: Household and gardening (mobile)	IE
1A4c i	Agriculture/Forestry/Fishing: Stationary	020302 Combustion plants < 50 MW (boilers) 020304 Stationary engines
1A4c ii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	080600 Agriculture 080601 Exhaust engine, agriculture 080602 Tyre and brake wear abrasion, agriculture 080700 Forestry 080701 Exhaust engine, forestry 080702 Tyre and brake wear abrasion, forestry
1A4c iii	Agriculture/Forestry/Fishing: National fishing	IE

The emission factors for estimation of emissions in Other Sectors NFR 1A4 (excluding described below under categories) are taken from National Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC (see chapter 1.4). The activity data for calculation of emissions are collected by NSI and it is presented in the reporting table.

In 2022 submission, the Eurostat Energy Balance is incorporated in inventory of sub-Sector 1A4bi Residential: Stationary plants. The emission factors are in accordance with EMEP/CORINAIR Emission Inventory Guidebook 2019.

**COMMERCIAL/INSTITUTIONAL: STATIONARY (NFR 1A4ai)****Description**

Category 1A4ai Commercial /Institutional: Stationary, covers emissions from fuel combustion in Commercial /Institutional sector for combustion plants under 50 MW.

**Methodological issues**

To estimate the emissions of Tier 2 approach is chosen. Emissions are estimated using the general Tier 2 equation:

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  - annual emission of pollutant

$EF_{\text{pollutant}}$  - emission factor of pollutant

$AR_{\text{fuel}}$  - consumption activity rate by fuel consumption

When selecting the EF, the relevant technology of the facility.

NSI used EF for individual calculation of emissions after correction in accordance with sulphur and dust content in the fuel.

#### **Activity data**

The activity data are collected by the NSI - as described above.

#### **Emission factors**

For calculate the emissions is used the EFs described in EMEP/EEA Guidebook 2019: chapter 1.A.4.a.i, Table 3.21, Table 3.24, Table 3.27, Table 3.28, Table 3.29, Table 3.30 and Table 3.31 (without SO<sub>2</sub>) - for boilers under 50 MW.

To calculate the EF of sulfur oxides, use the following formula described in the manual, using the specified amounts of sulfur in the fuels from the operators or, if not, the standard ones from the NSI form.

$$EF \text{ SO}_2 = [S] \times 20,000 / CV_{\text{Net}}$$

where:

$EF \text{ SO}_2$  is the SO<sub>2</sub> emission factor (g/GJ)

[S] is sulphur content of the fuel (% w/w)

CVNet is fuel CV (GJ/tonne, net basis).

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

Improvements in this category are not planned.

### **RESIDENTIAL: STATIONARY PLANTS (NFR 1A4bi)**

#### **Description**

Category 1A4bi Residential covers emissions from fuel combustion in residential sector. There is a significant decrease in liquid and solid fuels compared to the base year. The second trend is the increase of the use of biomass – for the last several years the use of biomass in residential sector is higher compared to the base year. The exact amount of the quantities in this subcategories can be defined only by expert judgement. This trend is also complimented by the increasing gasification on the households, although by a much smaller extent. In the gaseous fuels can be defined only by consumption.

#### **Activity data**

The activity data for calculation of emissions are collected by the NSI. The Eurostat Energy Balance is incorporated in inventory of sub-Sector 1A4bi. The quantities of utilized fuels are used with corresponding net calorific values.

Figure below shows the emissions from fuel used in TJ by type of fuel.

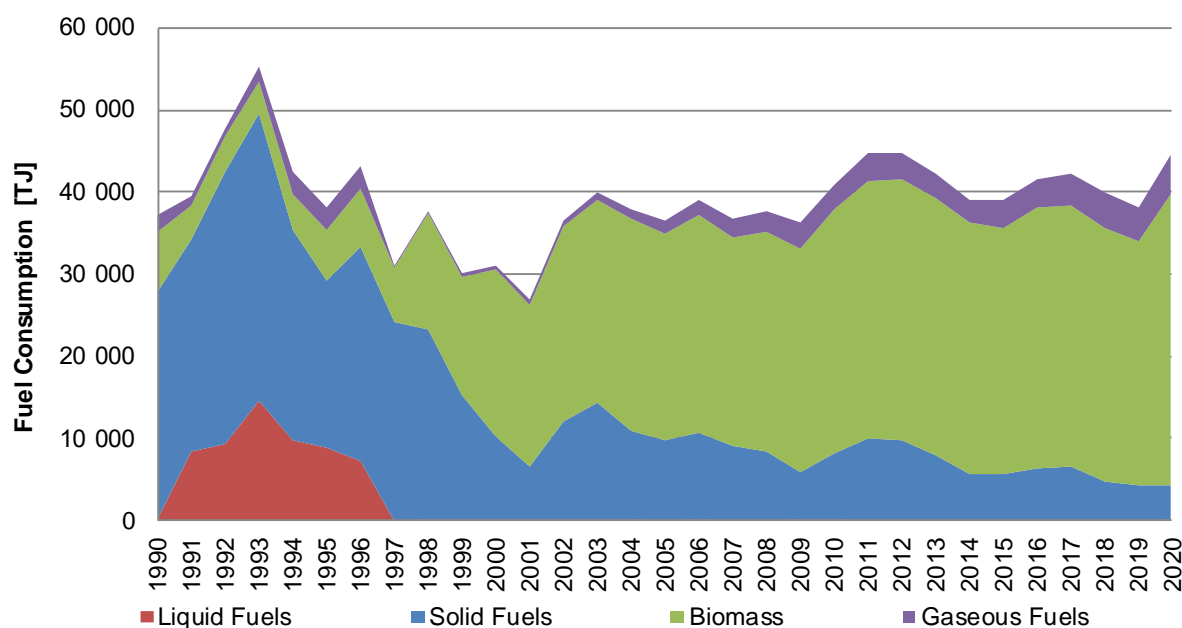


Figure 9: Fuel consumption in NFR 1A4bi Residential plant (1990 - 2020)

### Methodological issues

Tier 1 approach from small combustion installations uses the general equation, which is applied for emission estimation of liquid and gaseous fuels and Tier 2 approach for emission estimation of coal and biomass fuels:

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}} \text{ (Tier 1)}$$

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}} \times TP \text{ (Tier 2)}$$

where:

$E_{\text{pollutant}}$  = the emission of the specified pollutant,

$AR_{\text{fuel consumption}}$  = the activity rate for fuel consumption,

$EF_{\text{pollutant}}$  = the emission factor for this pollutant.

TP = share of fuel type used in combustion units /furnaces/stoves

### Emission factors

Default emission factors from EMEP/CORINAIR Emission Inventory Guidebook 2019 were used for estimation of the emissions from 1A4bi Residential: Stationary plants.

Emission factors from Table 3.14 and Table 3.15 (chapter: 1.A.4, Small combustion, GB 2019) were used for estimation of the emissions from Hard coal and brown coal from residential combustion.

Emission factors from table 3-4 (chapter: 1.A.4, Small combustion, GB 2019) were used for estimation of the emissions from gaseous fuels from residential combustion.

Emission factors from table 3-5 (chapter: 1.A.4, Small combustion, GB 2019) were used for estimation of the emissions from “other” liquid fuels from residential plants.

For estimation of the emissions from biomass combustion, relevant emission factors from Table 3.40, Table 3.43 and Table 3.44 were used (chapter: 1.A.4, Small combustion, GB 2019).

For estimation of emissions by type of combustion installation in this sector are used from Table 3.36, Table 3.37 and Table 3.38 were used (chapter: 1.A.4, Small combustion, GB 2019).

The following table shows the used emission factors used to calculate the emissions from domestic heating.

**Table 20: Emission factors for Residential plants (1A4bi)**

Pollutant	Fuel							Unit
	Liquid	Solid		Gaseous	Biomass			
		Stoves	Small (<=50 kWth) boilers		Conventional stoves	Conventional boilers	Pellet stoves and boilers	
NOx (as NO2)	51	100	158	51	50	80	80	g/GJ
NMVOC	0.69	600	174	1.9	600	350	10	g/GJ
SOx (as SO2)	70	900	900	0.3	11	11	11	g/GJ
NH3	0.0	0	0	0.0	70	74	12	g/GJ
PM2.5	1.9	450	201	1.2	740	470	60	g/GJ
PM10	1.9	450	225	1.2	760	480	60	g/GJ
TSP	1.9	500	261	1.2	800	500	62	g/GJ
BC	0.085	0.064	0.064	0.054	0.1	0.16	0.15	% of PM2.5
CO	57	5000	4787	26	4000	4000	300	g/GJ
Pb	0.0012	100	200	0.0015	27	27	27	mg/GJ
Cd	0.001	1	3	0.00025	13	13	13	mg/GJ
Hg	0.12	5	6	0.68	0.56	0.56	0.56	mg/GJ
As	0.002	1.5	5	0.12	0.19	0.19	0.19	mg/GJ
Cr	0.2	10	15	0.00076	23	23	23	mg/GJ
Cu	0.13	20	30	0.000076	6	6	6	mg/GJ
Ni	0.005	10	20	0.00051	2	2	2	mg/GJ
Se	0.002	2	2	0.011	0.5	0.5	0.5	mg/GJ
Zn	0.42	200	300	0.0015	512	512	512	mg/GJ
PCDD/ PCDF	5.9	1000	500	1.5	800	550	100	ng I-TEQ/GJ
benzo(a) pyrene	80	250	270	0.56	121	121	10	mg/GJ
benzo(b) fluoranthene	40	400	250	0.84	111	111	16	mg/GJ
benzo(k) fluoranthene	70	150	100	0.84	42	42	5	mg/GJ
Indeno (1,2,3-cd) pyrene	160	120	90	0.84	71	71	4	mg/GJ
HCB	0.0	0.62	0.62	0.0	5	5	5	µg/GJ
PCBs	0.0	170	170	0.0	0.06	0.06	0.01	µg/GJ

The following table shows the used appliance type split factors.

**Table 21: Appliance type split (1A4bi)**

Year	Biomass			Solid	
	conventional stoves	conventional boilers	pellet stoves and boilers	Stoves	Small (<=50 kWth) boilers
1990	0.96%	0.04%	0	0.53%	0.47%
1999	0.96%	0.04%	0	0.49%	0.51%
2000	0.96%	0.04%	0	0.48%	0.52%
2010	0.96%	0.04%	*	0.48%	0.52%
2020	0.92%	0.04%	*	0.48%	0.52%

\*the amount of pellets used in this sector is taken from the NSI

### Source specific recalculations

During 2022 submission the recommendations given in 2019 review are followed.

### Source specific planned improvements

There are no special improvements planned.

## MOBILE COMBUSTION IN MANUFACTURING INDUSTRIES AND CONSTRUCTION (NFR 1A2gvii)

### OFF-ROAD VEHICLES AND OTHER MACHINERY USED IN AGRICULTURE/FORESTRY MOBILE MACHINERY (INCLUDING FISHING) (NFR 1A4cii )

**COMMERCIAL/INSTITUTIONAL: MOBILE (NFR 1A4aii)****Description**

These three categories cover the emissions from fuel combustion from vehicles and other machinery used in agriculture/forestry (including National fishing), Commercial/institutional and from manufacturing industries and construction.

**Activity data**

The activity data for calculation of emissions are collected by NSI. The Eurostat Energy Balance is incorporated in the inventory. The quantities of utilized fuels are used with corresponding net calorific values. Figure below shows used fuel for these categories.

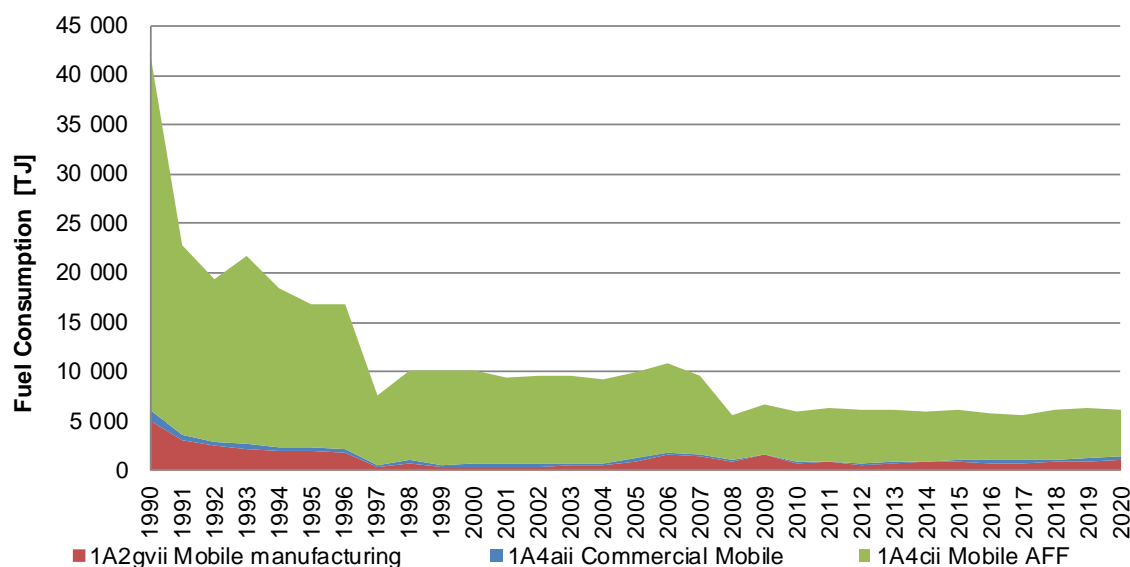


Figure 10: Fuel consumption in TJ (1990 - 2020)

**Methodological issues**

TIER 1 approach is applied for emission estimation:

$$E_{\text{pollutant}} = \sum_{\text{fuel type}} FC_{\text{fuel type}} \times EF_{\text{pollutant fuel type}}$$

Where:

$E_{\text{pollutant}}$  = the emission of the specified pollutant,

$FC_{\text{fuel type}}$  = the fuel consumption for each fuel (diesel, LPG, four-stroke gasoline and two-stroke gasoline) for the source category,

$EF_{\text{pollutant}}$  = the emission factor for this pollutant for each fuel type

**Emission factors**

Default emission factors from Guidebook 2019 were used for estimation of the emissions from **1A4aii**, **1A4cii** and **1A2gvii**.

For estimation of the emissions from sub category **1A4cii** emission factors from table 3-1 (chapter: 1.A.4, Non road mobile machinery, GB 2019) were used in calculations only for agriculture.

For estimation of the emissions from sub category **1A4aii** emission factors from table 3-1 (chapter: 1.A.4, Non road mobile machinery, GB 2019) were used in calculations.

For estimation of the emissions from sub category **1A2gvii** emission factors from table 3-1 (chapter: 1.A.4, Non road mobile machinery, GB 2019) were used in calculations.

**Source specific recalculations**

Recalculations are not made.

**Source specific planned improvements**

Information is currently collected on available agricultural and forestry equipment in the country from Ministry of Agriculture and Forestry for the period 2006-2020 (such as number of tractors,

combines and self-propelled chassis, but without detailed on the engine power in kW). For previous years will be used available data from Statistical Yearbooks – as the available information is aggregated and not detailed enough to apply a Tier 2 approach, some expert judgment will be applied.

### **AGRICULTURE/FORESTRY/FISHING: STATIONARY (NFR 1A4ci)**

Category 1A4ci Agriculture/Forestry/Fishing, covers emissions from fuel combustion in Agriculture, Forestry and Fishing sector for combustion plants under 50 MW.

#### **Methodological issues**

To estimate the emissions of Tier 2 approach is chosen. Emissions are estimated using the general Tier 2 equation:

$$E_{\text{pollutant}} = \sum AR_{\text{fuel consumption}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  - annual emission of pollutant

$EF_{\text{pollutant}}$  - emission factor of pollutant

$AR_{\text{fuel}}$  - consumption activity rate by fuel consumption

When selecting the EF, the relevant technology of the facility.

NSI used EF for individual calculation of emissions after correction in accordance with sulphur and dust content in the fuel.

#### **Activity data**

The activity data are collected by the NSI - as described above.

#### **Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019: chapter 1.A.4.a.i, Table 3.21, Table 3.24, Table 3.27, Table 3.28, Table 3.29, Table 3.30 and Table 3.31 (without SO<sub>2</sub>) - for boilers under 50 MW.

To calculate the EF of sulfur oxides, use the following formula described in the manual, using the specified amounts of sulfur in the fuels from the operators or, if not, the standard ones from the NSI form.

$$EF_{SO_2} = [S] \times 20,000 / CV_{Net}$$

where:

$EF_{SO_2}$  is the SO<sub>2</sub> emission factor (g/GJ)

[S] is sulphur content of the fuel (% w/w)

CV<sub>Net</sub> is fuel CV (GJ/tonne, net basis).

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

Improvements in this category are not planned.

### **FUGITIVE EMISSIONS (NFR 1B)**

#### **Source category description**

- Coal Mining (NRF 1B1);
- Extraction, Transportation and Distribution of Petrol Products and Natural Gas (NFR 1B2).

**Table 22: Fugitive emissions for 1990-2020**

NFR 14 code		Sub-source description SNAP 97 items
1B1a	Fugitive emission from solid fuels: Coal mining and handling	050101 Open cast mining 050102 Underground mining 050103 Storage of solid fuel
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	NO
1B1c	Other fugitive emissions from solid fuels	NO
1B2a i	Fugitive emissions oil: Exploration, production, transport	050201 Land-based activities
1B2a iv	Fugitive emissions oil: Refining / storage	040101 Petroleum products processing 040102 Fluid catalytic cracking - CO boiler 040103 Sulphur recovery plants 040104 Storage and handling of petroleum production in refinery
1B2a v	Distribution of oil products	050501 Refinery dispatch station 050502 Transport and depots 050503 Service stations
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	050302 Land-based activities 050303 Off-shore activities 050601 Pipelines
1B2c	Venting and flaring (oil, gas, combined oil and gas)	090203 Flaring in oil refinery
1B2d	Other fugitive emissions from energy production	NO

**Activity data**

The activity data for estimation of emissions are collected by NSI and are presented in the reporting table.

**Emission factors**

The emission factors for estimation of emissions in NFR 1B are taken from National Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC (see chapter 1.4).

**Recalculations**

Recalculations are made for the whole time series.

**Source-specific planned improvements**

No improvements are planned.

**Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in Energy (NFR sector 1).

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series);
- Time series consistency;
- Plausibility checks of dips and jumps;
- Documentation and archiving of all information required in IIR.

**FUGITIVE EMISSIONS FROM FUELS (NFR 1B)**

This category contains emission estimates for the following categories:

- 1B1a Fugitive emission from solid fuels: Coal mining and handling
- 1B2ai Fugitive emissions oil: Exploration, production, transport
- 1B2aiv Fugitive emissions oil: Refining and storage
- 1B2av Distribution of oil products

- 1B2b Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)
- 1B2c Venting and flaring (oil, gas, combined oil and gas)

**Methodology**

For fugitive emissions from all categories is applied Tier 1 methodology.

**Activity data**

Activity data is provided by National Statistics Institute.

**Emission factors**

Default emission factors from 2019 Emission Inventory Guidebook have been applied.

**Detailed description for each subcategory is provided below.**

**COAL MINING AND HANDLING (NFR 1B1a)****Description**

This category includes fugitive emissions of NMVOC and PM from coal mining and handling activities in underground and surface mines. The coal mining in Bulgaria is being carried out by both surface mining and underground mining. The main domestic solid fuels are lignite and sub-bituminous coal and they are mined mostly by surface mining in the Maritza Iztok mining complex. At the beginning of the time series the quantities of coal produced through underground mining were significant, but since many of the mines were subsequently closed down, the quantities dropped down.

**Activity data**

The activity data for calculation of emissions are collected by NSI. Eurostat Energy Balance is incorporated in inventory of sub-Sector 1B1a.

Table below shows activity data from underground and surface mines.

**Table 23: Fugitive emissions for 1990-2020 (kT)**

<b>Year</b>	<b>Underground Mines</b>	<b>Surface Mines</b>
<b>1990</b>	3848	27827
<b>1991</b>	3159	25231
<b>1992</b>	3589	26735
<b>1993</b>	3682	25350
<b>1994</b>	3328	25429
<b>1995</b>	3381	27449
<b>1996</b>	3198	28104
<b>1997</b>	2779	26929
<b>1998</b>	1970	28141
<b>1999</b>	1458	23840
<b>2000</b>	1621	24811
<b>2001</b>	1248	25363
<b>2002</b>	1354	24664
<b>2003</b>	1560	25739
<b>2004</b>	383	26102
<b>2005</b>	585	24110
<b>2006</b>	161	25517
<b>2007</b>	475	27978
<b>2008</b>	556	28233
<b>2009</b>	698	26488
<b>2010</b>	744	28649
<b>2011</b>	872	36250
<b>2012</b>	688	32732
<b>2013</b>	550	28071
<b>2014</b>	472	30796
<b>2015</b>	447	35412
<b>2016</b>	270	30961

Year	Underground Mines	Surface Mines
2017	134	34143
2018	51	30212
2019	0	28001
2020	0	22299

**Methodological issues**

TIER 2 method is used for estimation of emissions from this category.

$$E_{\text{pollutant}} = AR_{\text{production}} \times EF_{\text{technology pollutant}}$$

Where:

$E_{\text{pollutant}}$  = the emission of specifies pollutant

$AR_{\text{production}}$  = the activity rate for coal mining

$EF_{\text{pollutant}}$  = the emission factor for this pollutant

**Emission factors**

Emission Factors from table 3-2 and 3-3 (chapter: 1B1a Fugitive emissions from solid fuels – Coal mining and handling, GB 2019) are applied for calculation of the emissions from open and underground mining.

Emissions from particulate matter are not calculated for underground mines due to the lack of corresponding number of hole drillings.

**Source specific recalculations**

Recalculations are not made. During the 2022 submission preparation a technical mistake was found for the year 1994 and the activity data and emissions were revised.

**Source specific planned improvements**

Improvements in this category are not planned.

**FUGITIVE EMISSIONS OIL: REFINING/STORAGE (NFR 1B2aiv)****Description**

The petroleum refinery industry employs a wide variety of processes. The types of processes operating at one facility depend on a variety of economic and logistic considerations such as the quality of the crude oil feedstock, the accessibility and cost of crude (and alternative feedstock), the availability and cost of equipment and utilities, and refined product demand.

Unlike the unburdened coal mining emissions, oil processing emissions and product storage are much more complex due to different sources and different types of activities. Emission estimates for this category cover organized and non-organized emissions of harmful substances (particulate matter, heavy metals, non-methane hydrocarbons, sulphur and nitrogen oxides, etc.) from production and processing, refining and storage.

**Activity data**

The activity data for calculation of emissions are collected by NSI. Eurostat Energy Balance is incorporated in inventory of sub-Sector 1B2aiv.

**Methodological issues**

The Tier 1 approach for the refining industry uses the general equation:

$$E_{\text{pollutant}} = AR_{\text{production}} \times EF_{\text{pollutant}}$$

Where:

$E_{\text{pollutant}}$  = the emission of specifies pollutant

$AR_{\text{production}}$  = the amount of crude oil processed

$EF_{\text{pollutant}}$  = the emission factor for this pollutant

This equation is applied at the national level, using the crude oil as production statistics.

**Emission factors**

Emission Factors from table 3-1(chapter: 1B1aiv Fugitive emissions oil: Refining / storage, GB 2019) are applied for calculation of the emissions from the processing of crude oil.

**Source specific recalculations**

Recalculations are not made.

**Source specific planned improvements**

Improvements in this category are not planned.

**DISTRIBUTION OF OIL PRODUCTS (NFR 1B2av)**

**VENTING AND FLARING (OIL, GAS, COMBINED OIL AND GAS) (NFR 1B2c)**

The intention is to use the Tier 1 EFs from Table 3-2 (Chapter 3.2) of EMEP/CORINAIR Emission Inventory Guidebook 2019. These EFS are presented in the table below:

<b>Pollutant</b>	<b>EF</b> g/m3 refinery feed
NMVOC	2

Considering the comment on the lack of estimations of the emissions of NH<sub>3</sub> for NFR 1B2c we clarify that no EFs for this pollutant were found in the EMEP/CORINAIR Emission Inventory Guidebook 2019 (neither for Tier 1 nor for Tier 2, the respective tables 3-2 and 3-4 note that these are not estimated). Additionally no EFs were found in the Best Available Techniques Reference Document Refining of Mineral Oil and Gas.

**Source specific recalculations**

A recalculation was performed for the entire time period.

**Source specific planned improvements**

Improvements in this category are not planned.

## CHAPTER 4. INDUSTRIAL PROCESSES AND PRODUCT USE (NFR SECTOR 2)

### OVERVIEW

This chapter includes information on and descriptions of methodologies used for estimating emissions as well as references for activity data and emission factors reported under NFR Category 2 Industrial Processes and Product use for the period from 1990 to 2020 in the NFR.

Emissions from this category comprise emissions from the following sub categories:

- 2A Mineral Products;
- 2B Chemical Industry;
- 2 C Metal Production;
- 2D, 2G Other solvent and product use.

This sector deals with emissions from the production process, including emissions from burned fuels, which cannot be divided into pure process and pure fuel. These mixed emissions have been removed from the Energy sector (under NFR 1A2 Fuel Combustion - Manufacturing Industries and Construction) and have been reported in the Industry sector to avoid double counting of emissions and errors in completing the NFR table.

Some categories in this sector are not occurring (NO) in Bulgaria as there is no such production. For some categories emissions have not been estimated (NE) or are included elsewhere (IE). In Chapter 1.7 a general and specific description regarding completeness is given.

The emissions of air pollutants in Industrial processes and product use (NFR sector 2) for 2020 are calculated based on the activity data, collected by NSI and emission factors. The latter are set in the national common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC (see point 1.4 and the EMEP/EEA Guidebook is used).

As it is written above for UNECE/CLRTAP inventory the National Statistical Institute continue to have the main responsibility for estimation of emissions in NFR sector 2 Industrial processes and product use. NSI uses up-to-date statistical methods and procedures for data collection, summarizing and structuring which are harmonized with EUROSTAT.

NSI has two level hierarchical structures - National office and Regional offices. The primary statistical questionnaires are collected at the regional statistical offices, examined for consistency of the data and processes. The National office receives the primary information and the processed information from the regional offices and develops the National totals and balances.

The further plan of the BGNIS is the same team, which is dealing with GHG inventory to be also responsible for preparation of CLRTAP inventory. Thus differences with UNFCCC report will be eliminated. For estimation of emissions in GHGs inventory the activity data are taken mainly from PROTCOM, EU-ETS and EPRTR data bases. The data, provided by Branch business associations are also taken into account.

The activity data for Industrial processes and product use (NFR sector 2) are presented in the reporting table.

**Table 24: Industrial processes for 1990-2020**

NFR 14 code		Sub-source description SNAP items
2A1	Cement Production	040612 Cement (decarbonizing)
2A2	Lime Production	040614 Lime (decarbonizing)
2A3	Glass production	040613 Glass (decarbonizing)
2A5a	Quarrying and mining of minerals other than coal	040616 Extraction of mineral ores (NA)
2A5b	Construction and demolition	040624 Public works and building sites (NA)
2A5c	Storage, handling and transport of mineral products	040900 Storage, handling and transport of mineral products (NA)
2B1	Ammonia Production	040403 Ammonia
2B2	Nitric Acid Production	040402 Nitric acid

NFR 14 code		Sub-source description SNAP items
2B3	Adipic Acid Production	NA
2B5	Carbide Production	040412 Calcium carbide production
2B6	Titanium dioxide production	NO
2B7	Soda Ash Production	040619 Soda ash production and use
2B10a	Other chemical industry	040401 Sulphuric acid 040404 Ammonium sulphate 040405 Ammonium nitrate 040406 Ammonium phosphate 040407 NPK fertilisers 040413 Chlorine production 040414 Phosphate fertilizers 040415 Storage and handling of inorganic chemical prod 040501 Ethylene 040502 Propylene 040507 Polyethylene High Density 040509 Polypropylene 040511 Polystyrene 040514 Styrene-butadiene rubber (SBR) 040515 Acrylonitrile Butadiene Styrene (ABS) resins 040517 Formaldehyde 040519 Phthalic anhydride 040520 Acrylonitrile
2C	Metal Production	
2C1	Iron and Steel Production	040202 Blast furnace charging 040203 Pig iron tapping 040206 Basic oxygen furnace steel plant 040207 Electric furnace steel plant
2C2	Ferroalloys Production	040302 Ferro alloys
2C3	Aluminium Production	Including in 1A2b
2C4	Magnesium production	Including in 1A2b
2C5	Lead Production	Including in 1A2b
2C6	Zinc Production	Including in 1A2b
2C7a	Copper Production	Including in 1A2b
2C7b	Nickel Production	NO
2C7c	Other metal production	NO
2C7d	Storage, handling and transport of metal products	NE
2D3a	Domestic solvent use including fungicides	NA
2D3b	Road Paving with Asphalt	040611 Road paving with asphalt
2D3c	Asphalt Roofing	040610 Roof covering with asphalt materials
2D3d	Coating applications	060100 Paint application 060101 Paint application: manufacture of automobiles 060102 Paint application: car repairing 060103 Paint application: construction and buildings (except item 06 01 07) 060104 Paint application: domestic use (except 06.01.07) 060105 Paint application: coil coating 060106 Paint application: boat building 060107 Paint application: wood 060108 Other industrial paint application 060109 Other non-industrial paint application
2D3e	Degreasing	060200 Degreasing, dry cleaning and electronics

NFR 14 code		Sub-source description SNAP items
		060201 Metal degreasing 060203 Electronic components manufacturing 060204 Other industrial cleaning
2D3f	Dry cleaning	060202 Dry cleaning
2D3g	Chemical products	060300 Chemical products manufacturing or processing 060301 Polyester processing 060302 Polyvinylchloride processing 060303 Polyurethane processing 060304 Polystyrene foam processing (c) 060305 Rubber processing 060306 Pharmaceutical products manufacturing 060307 Paints manufacturing 060308 Inks manufacturing 060309 Glues manufacturing 060310 Asphalt blowing 060311 Adhesive, magnetic tapes, films and photographs manufacturing 060312 Textile finishing 060313 Leather tanning 060314 Other
2D3h	Printing	060403 Printing industry
2D3i	Other solvent use (please specify in the IIR)	NA
2G	Other product use (please specify in the IIR)	060404 Fat, edible and non edible oil extraction 060405 Application of glues and adhesives 060406 Preservation of wood 060407 Underseal treatment and conservation of vehicles
2H1	Pulp and Paper Industry	040602 Paper pulp (kraft process) 040603 Paper pulp (acid sulfite process) 040604 Paper pulp (Neutral Sulphite Semi-Chemical process)
2H2	Food and Drink	040605 Bread 040606 Wine 040607 Beer 040608 Spirits
2I	Wood processing	NA
2J	Production of POPs	NA
2K	Consumption of POPs and Heavy Metals (e.g. electrical and scientific equipment)	NA
2L	Other	NA

**MINERAL PRODUCTS (NFR 2A)****CEMENT PRODUCTION (NFR 2A1)****Source category description**

Since 1997 there were 5 existing/operational cement plants in Bulgaria (respectively, 2 within HOLCIM Group, 2 within ITALCEMENTI Group and 1 within TITAN CEMENT Group). All 5 plants are covered by the EU ETS and the IPPC Directive and have been modernized accordingly during the last 10 years. In addition all plant sites are certified at present according to ISO 9001 and 14 001 standards. One more (6th) installation was operational from 1988 till 1996 and decommissioned finally during that last year. One of the 5 installations reduced substantially its production during 2010. In 2011 this factory completely ceased operation and all equipment is decommissioned. In 2013 one more installation ceased operation and all equipment is decommissioned. At present there are only 3 operating plants.

During 2016 cement produced 99.5% are Portland cement, i.e. the other types of cement are only 0.5% from the total annual national production. All types of produced cements are according to BSS EN 197-1.

Additional information on the above installations (operators) may be obtained through the Bulgarian Association of Cement Industry (BACI) at [www.bacibg.org](http://www.bacibg.org) and/or their own internet sites.

**Trend description**

The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation.

There is a general reduction of the total emissions in the sector. As explained above this is due to the changes in the sector resulting in production decrease for one of the installations and the following ceased operation of two of the five cement plants. At present there are only 3 operating plants.

**Methodological issues**

Emissions are calculated based on Tier 1 approach for process emissions from cement production sector. The general equation used is:

$$E = AR \times EF$$

where:

- E - pollutant is the emission of a pollutant (kg)
- AR - production is the annual production of cement (in Mg)
- EF - pollutant is the emission factor of the relevant pollutant (in kg pollutant/Mg cement produced)

This equation is applied at the national level, using annual national total cement production data.

The aggregated national cement production data are provided by the NSI.

**Activity data**

The activity data are collected by the NSI - as described above.

**Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.1 Tier 1 emission factors for source category 2.A.1 Cement production.

Table 3-24 Tier 2 emission factors for source category 1.A.2.f.i, Cement production.

**Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Cement production (NFR sector 2A1).

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,

- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

- Apply of higher tier method for estimation of emissions,
- Incorporation of EU-ETS and EPRTTR data bases,
- Incorporation of data, provided by Branch business associations,
- To improve the accuracy of the estimates in Industrial processes (NFR sector 2),
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

### **LIME PRODUCTION (NFR 2A2)**

#### **Source category description**

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.

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. This chapter only covers the process emissions. Emissions from combustion activities are addressed in chapter 1.A.2.f Manufacturing Industries and Construction (Combustion) — Other.

Currently there are 5 lime producing plants in Bulgaria which fall under IPPC and EU ETS. They produce high calcium quicklime. After the largest metallurgic plants ceases operation in 2008 there is virtually no production of dolomitic lime. In 2012 letters were sent to all quicklime producing plants (including the ones producing quicklimes for their own needs) and all of them declared that they do not produce dolomitic lime.

#### **Trend description**

The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation.

There is increase of the total emission in the sector in 2011 compared to 2010. This is mainly due to that the biggest producer increases the lime production with 15% in 2010. This lead to increase of the quicklime production which for the whole sector is about 15%.

The reduction in 2009 is due to the ceased operation (in November 2008) of one of the lime producers (integrated steel making plant), reduction in the construction works and other quicklime consuming production processes and world economic crisis.

#### **Methodological issues**

Emissions are calculated based on Tier 2 approach for process emissions from lime uses the general equation:

$$E = AR \times EF$$

where:

- E - pollutant is the emission of a pollutant (kg)
  - AR - production is the annual production of lime (in Mg)
  - EF - pollutant is the emission factor of the relevant pollutant (in kg pollutant/Mg lime produced)
- This equation is applied at the national level, using annual national total lime production data. The aggregated national lime production data are provided by the NSI.

**Activity data**

The activity data are collected by the NSI - as described above.

**Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.2 Tier 2 emission factors for source category 2.A.2 Lime production.

Table 3-23 Tier 2 emission factors for source category 1.A.2.f.i, Lime production

**Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Lime production (NFR sector 2A2).

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

**Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

**Source specific planned improvements**

- Apply of higher tier method for estimation of emissions,
- Incorporation of EU-ETS and EPRTR data bases,
- Incorporation of data, provided by Branch business associations,
- To improve the accuracy of the estimates,
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

**GLASS PRODUCTION (NFR 2A3)****Source category description**

Currently there are six glass plants in Bulgaria mainly producing flat, container and domestic glass. All of them fall under the IPPCD and the EU ETS.

According to the information given in the Reference Document on Best Available Techniques in the Glass Manufacturing Industry, December 2001, the general description of the main types of glass produced in the country are:

**Container glass**

The forming process is carried out in two stages, the initial forming of the blank either by pressing with a plunger, or by blowing with compressed air, and the final moulding operation by blowing to obtain the finished hollow shape. These two processes are thus respectively termed "press and blow" and "blow and blow". Container production is almost exclusively by IS (Individual Section) machines.

**Flat glass**

Flat glass is produced almost exclusively with cross-fired regenerative furnaces. The basic principle of the float process is to pour the molten glass onto a bath of molten tin, and to form a ribbon with the upper and lower surfaces becoming parallel under the influence of gravity and surface tension. From the exit of the float bath the glass ribbon is passed through the annealing lehr, gradually cooling the glass to reduce residual stresses. On-line coatings can be applied to improve the performance of the product (e.g. low emissivity glazing).

## Domestic glass

Domestic glass is a diverse sector involving a wide range of products and processes. Ranging from intricate handmade lead crystal, to high volume, mechanised methods used for mass produced tableware.

The forming processes are automatic processing, hand made or semi-automatic processing, and following production the basic items can be subjected to cold finishing operations (e.g. lead crystal is often cut and polished).

## Trend description

The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation.

One of the glass producing plants is new and has started working in the period 2005/2006. Another one had reduced capacity, operational time, during 2008 – 2009 and had stopped in 2010.

## Methodological issues

Emissions are calculated based on Tier 2 approach for process emissions from lime uses the general equation:

$$E = AR \times EF$$

where:

- E - pollutant is the emission of a pollutant (kg)
- AR - production is the annual production of lime (in Mg)
- EF - pollutant is the emission factor of the relevant pollutant (in kg pollutant/Mg glass produced)

This equation is applied at the national level, using annual national total lime production data.

The aggregated national lime production data are provided by the NSI.

## Activity data

The activity data are collected by the NSI - as described above.

## Emission factors

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.2 Tier 2 emission factors for source category 2.A.3 Glass production, flat glass.

Table 3.3 Tier 2 emission factors for source category 2.A.3 Glass production, container glass.

Table 3.5 Tier 2 emission factors for source category 2.A.3 Glass production, glass wool.

Table 3.6 Tier 2 emission factors for source category 2.A.3 Glass production, other glass, lead crystal glass.

Table 3-2 to Table 3-5 Tier 1 emission factors for 1.A.2 combustion in industry.

## Source specific QA/QC and verification

All activities regarding QC as described in QA/QC System have been undertaken in category Glass production (NFR sector 2A3).

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

## Source specific recalculations

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

## Source specific planned improvements

Improvements in this category are not planned.

## CONSTRUCTION AND DEMOLITION (2A5b)

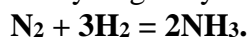
During 2019 review the TERT made a comment that notation keys 'NA'/'NE'/'NR' are reported for PM2.5 while a Tier 1 method exists in 2019 EMEP/EEA Guidebook.

In this regard a survey will be conducted on the possibility to estimate emissions from this sector based on the availability of primary data.

## CHEMICAL INDUSTRY (NFR 2B) AMMONIA PRODUCTION (NFR 2B1)

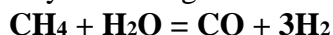
### Source category description

Ammonia is synthesised from nitrogen and hydrogen by the following reaction:



The technological process for Ammonia production in both of the currently operating plants is similar. Ammonia (NH<sub>3</sub>) is produced by catalytic steam reforming of natural gas. The feedstock is reformed with steam in a heated primary reformer and subsequently with air in a second reformer in order to produce the synthesis gas.

The reaction taking place during primary reforming is:



The main objective of secondary reforming is to add the nitrogen required for the synthesis and to complete the conversion of the hydrocarbon feed.

The synthesis gas then undergoes processes of heat and CO<sub>2</sub> removal and reaction of methanation due to the fact that small amounts of CO and CO<sub>2</sub>, remaining in the synthesis gas, are poisonous for the ammonia synthesis catalyst. The synthesis gas is then compressed in a compressor to the required pressure for Ammonia synthesis.

Currently ammonia is produced in two plants in Bulgaria. Both plants are falling under the IPPC Directive and EU ETS. Until the year of 2002 there were four plants operating.

### Trend description

The periods around 1992/1993 and 1998/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation, which is the case in 1999/2000 and 2002 when two of the ammonia producing plants stopped working.

There is increase by 33% of the ammonia production in 2011 compared to 2010. This is mainly due to the recovery of the market after the world economic crisis in 2009 which lead to a reduction of the production processes rates.

### Methodological issues

Emissions are calculated based on Tier 1 approach uses the general equation:

$$E = AR \times EF$$

where:

E - the emission of the specified pollutant

AR - the activity rate for the ammonia production

EF - is the emission factor of the relevant pollutant

This equation is applied at the national level, using annual national total ammonia production data.

The aggregated national data are provided by the NSI.

Default emission factors from tables 3-7 (chapter: 2.B Chemical industry, GB 2019) were used for estimation of the emissions from ammonia production - using steam reforming technology.

### Source specific QA/QC and verification

All activities regarding QC as described in QA/QC System have been undertaken in category Ammonia production (NFR sector 2B1). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### **Source specific recalculations**

Recalculations are not made.

#### **Source specific planned improvements**

Improvements in this category are not planned.

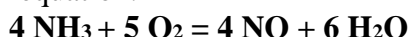
### **NITRIC ACID PRODUCTION (NFR 2B2)**

#### **Source category description**

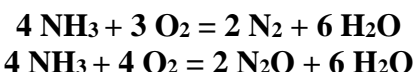
The nitric acid is produced by following general technological steps:

Oxidation of  $\text{NH}_3$

$\text{NH}_3$  is reacted with air on a catalyst in the oxidation section. Nitric oxide and water are formed in this process according to the main equation:



Nitrous oxide, nitrogen and water are formed simultaneously in accordance with the following equations:



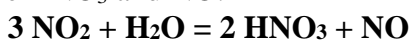
The reaction is carried out in the presence of a catalyst.

Oxidation of NO and absorption in  $\text{H}_2\text{O}$

Nitric oxide is oxidised to nitrogen dioxide as the combustion gases are cooled, according to the equation:



For this purpose, secondary air is added to the gas mixture obtained from the ammonia oxidation. Demineralised water, steam condensate or process condensate is added at the top of the absorption column. The weak acid solution (approximately 43 %) produced in the cooler condenser is also added to the absorption column. The  $\text{NO}_2$  in the absorption column is contacted counter currently with flowing  $\text{H}_2\text{O}$ , reacting to give  $\text{HNO}_3$  and NO:



The oxidation, absorption of the nitrogen dioxide and its reaction to nitric acid and nitric oxide take place simultaneously in the gaseous and liquid phases. Both reactions (oxidation and  $\text{HNO}_3$  formation) depend on pressure and temperature and are favoured by higher pressure and lower temperature.

The most common treatment techniques for tail gases from nitric acid plants are:

SCR (Selective Catalytic Reduction, for  $\text{NO}_x$  abatement)

NSCR (Selective Non-Catalytic Reduction, for  $\text{NO}_x$  and  $\text{N}_2\text{O}$  abatement)

Currently nitric acid is produced in two plants in Bulgaria. Both plants are falling under the IPPC Directive and ETS. Until 1999/2000 there were three plants operating.

One of the currently operating plants has two installations producing nitric acid. In one of the installations both reactions of oxidation and absorption are conducted at normal pressure and in the second installation – at medium and high pressure respectively. The other plant conducts the oxidation and absorption at normal pressure.

The applied abatement technologies are NSCR in one of the plants and extended absorption in the other.

### **Trend description**

The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation, which is the case around 1999/2000 with one of the nitric acid producing plants.

### **Emissions**

The main air pollutants from nitric acid production process are nitrogen oxides (NO<sub>x</sub>, N<sub>2</sub>O).

### **Methodology**

During the 2018 review of national air pollution emission inventory data the TERT recommended emissions of NO<sub>x</sub> from nitric acid production to be calculated using a Tier 2 methodology if possible.

Emissions are calculated based on Tier 2 approach using the general equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - the activity rate for the nitric acid production
- EF - is the emission factor of the relevant pollutant

The aggregated national data are provided by the NSI.

Recalculation has been made during the review in 2019. Specifically for 2005 the recalculation used plant specific EFs derived from the operators of the two plants producing nitric acid and representing the current at that stage state of the technique. One of the plants submitted officially to the MoEW information extracted from the corresponding technical regulations for operation (for the production of nitric acid, 9.72 kg of NO are released in the production of each tonne nitric acid. Recalculated as NO<sub>x</sub>, an emission factor of 14.97 kg/t is obtained), the other plant presented extract from the material balance of the installation which is prepared annually (according to the material balance for the production of nitric acid (100% per tonne of acid) for 2005, the emission factor for NO<sub>x</sub> was 37.52 kg/t.). TERT accepted the emission factors presented by the operators and the estimated NO<sub>x</sub> emissions.

In 2005 was adopted Ordinance №1 on the emission limit values for harmful substances (pollutants) emitted into the atmosphere from sites and activities with stationary sources of emissions (State gazette №64/2005). Since 2006 the operators of both installations comply with the emission limit values according to the requirements of Ordinance №1.

The emission factors for estimation of emissions in nitric acid production for the years 2006-2020 are taken from 2019 EMEP/EEA Guidebook.

**Table 25:** Emission factors of Nitric acid production

Year	Plant A	Plant B
	EF (g/t nitric acid)	EF (g/t nitric acid)
<b>1990-2005</b>	37 520	14 970
<b>2006</b>	900	400
<b>2007</b>	900	400
<b>2008</b>	900	400
<b>2009</b>	900	400
<b>2010</b>	900	400
<b>2011</b>	900	400
<b>2012</b>	900	400
<b>2013</b>	900	400
<b>2014</b>	900	400
<b>2015</b>	900	400
<b>2016</b>	900	400

<b>2017</b>	900	400
<b>2018</b>	900	400
<b>2019</b>	900	400
<b>2020</b>	900	400

**Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Nitric acid production (NFR sector 2B2). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

**Source specific recalculations**

Emissions of NO<sub>x</sub> are estimated using new emission factors as explained above. Further assessment of the whole time series recalculation is considered for the next submission, as described in the improvement plan.

**Source specific planned improvements**

- assessment of the whole time series recalculation using the newly applied technology-specific emission factors.
- Incorporation of EU-ETS and EPRTTR data bases,
- Incorporation of data, provided by Branch business associations,
- To improve the accuracy of the estimates,
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

**Source specific recalculations.**

No recalculations were made.

**Source specific planned improvements.**

Improvements in this category are not planned.

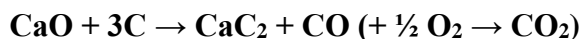
## CARBIDE PRODUCTION (NFR 2B5)

### Source category description

Carbide production

There is one carbide producing plant in Bulgaria. It reports under EU ETS and has IPPC permit. The process which is used to produce carbide in it is as follows:

Calcium carbide ( $\text{CaC}_2$ ) is made by reducing calcium oxide  $\text{CaO}$  with carbon e.g., anthracite coal, in electric arc furnaces. The reaction is:



The  $\text{CaO}$  used for carbide production is produced by the same plant from limestone.

### Trend description

The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation.

There is insignificant decrease in calcium carbide production, which leads to decrease in emissions with approximately 3%.

### Methodological issues

Emissions are calculated based on Tier 1 approach uses the general equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - the activity rate for the carbide production
- EF - is the emission factor of the relevant pollutant

This equation is applied at the national level, using annual national total carbide production data.

The aggregated national data are provided by the NSI.

The emission factors for estimation of emissions in carbide production are described in EMEP/EEA Guidebook 2019: chapter 2.B Chemical industry, Table 3.17.

### Source specific QA/QC and verification

All activities regarding QC as described in QA/QC System have been undertaken in category carbide production (NFR sector 2B4). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

### Source specific recalculations

No source specific recalculation has been made.

### Source specific planned improvements

- Apply of higher tier method for estimation of emissions,
- Incorporation of EU-ETS and EPRTTR data bases,
- Incorporation of data, provided by Branch business associations,
- To improve the accuracy of the estimates in Industrial processes (NFR sector 2),
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

**SODA ASH PRODUCTION (NFR 2B7)****Source category description**

Soda ash production and consumption (including sodium carbonate,  $\text{Na}_2\text{CO}_3$ ) results in the release of pollutants. The main pollutant is carbon dioxide ( $\text{CO}_2$ ). There is one soda ash producing plant in Bulgaria. It applies Solvay process which is  $\text{CO}_2$ -neutral except for coke used for calcination of limestone.

**Trend description**

The periods around 1992/1993 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production.

**Methodological issues**

Emissions are calculated based on Tier 1 approach uses the general equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - the activity rate for the soda ash production
- EF - is the emission factor of the relevant pollutant

This equation is applied at the national level, using annual national total soda ash production data.

The aggregated national data are provided by the NSI.

The emission factors for estimation of emissions in Soda Ash Production are described in EMEP/EEA Guidebook 2019: chapter 2.B.7 Soda ash production, Table 3.1.

**Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Soda ash production (NFR sector 2B7). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

**Source specific recalculations**

No source-specific recalculations are to be performed.

**Source specific planned improvements**

- Apply of higher tier method for estimation of emissions,
- Incorporation of EU-ETS and EPRTR data bases,
- Incorporation of data, provided by Branch business associations,
- To improve the accuracy of the estimates,
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

**CHEMICAL INDUSTRY: OTHER (2B10a)****Source category description**

This sector is included in the present report for the first time following a recommendation made during the 2018 review of national air pollution emission inventory data by the TERT asking for a confirmation of the existence of activities in Bulgaria and further information on the methodology, the AD and the EFs used.

The sector includes a variety of products from which in Bulgaria Sulfuric acid, Phosphate fertilizers, Phtalic anhydride and Polypropylene are produced. Currently three plants produce sulphuric acid and the rest of the products are produced each in one plant respectively.

During 2019 review a question was raised about the emissions of Hg from chlorine production (reported as NA) considering that there is an EMEP/EEA Guidebook 2016 methodology and a default emission factor for Hg. We clarify that currently chlorine is not produced in Bulgaria. The then applied technology for chlorine production was diaphragm cell process. For this type of production process EMEP/EEA Guidebook 2016 does not suggest EFs for Hg neither for Tier 1 nor for Tier 2 approach of emissions estimation. That is why no emissions are estimated for the period chlorine was produced in the country but we present the AD available in the table below.

**Table 26: Chlorine production for the period 1990 – 2010**

<b>Year</b>	<b>Chlorine production, (tones)</b>
1990	63240
1991	49769
1992	50584
1993	36099
1994	54593
1995	49705
1996	56745
1997	60529
1998	43226
1999	42441
2000	26964
2001	12063
2002	17632
2003	19764
2004	26897
2005	41094
2006	53856
2007	59609
2008	35719
2009	4676
2010	118

### **Emissions**

The expected emissions from the production of the abovementioned products include respectively SO<sub>2</sub>, PM<sub>2.5</sub> and NMVOC.

So far the emissions were estimated using emission factors from National Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC. For the current inventory the EMEP/CORINAIR Emission Inventory Guidebook 2019 application is considered. In this regard an assessment was conducted, the results from which are as follows:

- SO<sub>2</sub> from the production of sulphuric acid - further analysis is needed in order to choose the correct technology-specific EF as described in Tier 2 method (Tables 3.21 - 3.25, section 3.3.2) since no EF is suggested for Tier 1 method (Table 3.6, section 3.2.2);
- PM<sub>2.5</sub> from phosphate fertilizers production - the currently used EF is the same as the one suggested as average for the Tier 2 method in EMEP/CORINAIR Emission Inventory Guidebook 2019;
- NMVOC from polypropylene production - the EF used so far is within the proposed range for Tier 2 method in EMEP/CORINAIR Emission Inventory Guidebook 2019.
- NMVOC from Phtalic anhydride - the guidebook suggest 2 different technology-specific EF – for when using o-xylene or naphthalene as feed. The operating in Bulgaria installation uses o-xylene as feed. The currently used EF to estimate NMVOC emissions from this activity is the same as the suggested average EF for this technology in EMEP/CORINAIR Emission Inventory Guidebook 2019.

Based on the results from the above analysis in the current inventory the emissions from 2B10a are not recalculated. As a source specific improvement only an analysis for SO<sub>2</sub> from sulphuric acid production to choose the correct technology-specific EF as described in Tier 2 method is planned. The EFs for PM<sub>2.5</sub> and NMVOC from the rest of the activities remain unchanged.

### **Methodology**

The emissions from 2B10A are estimated using the general equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - the production activity rate
- EF - the emission factor of the relevant pollutant

This equation is applied at the national level, using annual national production data.

### **Activity data**

The aggregated national data are provided by the NSI.

### **Emission factors**

The EFs are from the National Common methodology for emissions inventory under UNECE/CLRTAR and UNFCCC.

### **Source specific recalculations**

No recalculations have been made.

### **Source specific planned improvements**

- SO<sub>2</sub> from sulphuric acid production - analysis to choose the correct technology-specific EF as described in Tier 2 method.

## METAL PRODUCTION (NFR 2C)

During the 2018 review, a comment was made by the TERT concerning the estimation of emissions of SO<sub>2</sub>, NO<sub>x</sub> and PM<sub>2.5</sub> and more specifically the split of process and combustion emissions for metal production (2C3, 2C4, 2C5, 2C6 and 2C7a) and change of notation key for 2C4.

Currently, there is no primary production information for these codes. A survey on the availability of primary data that can be used to calculate inventory emissions.

## IRON AND STEEL PRODUCTION (NFR 2C1)

### Source category description

According to the information given in Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001, p. 16, four routes are currently used for the production of steel: the classic blast furnace/basic-oxygen furnace route, direct melting of scrap (electric arc furnace), smelting reduction and direct reduction. At present (1998), EU (15) steel production is based on the blast furnace/ basic-oxygen route (approximately 65%) and the electric arc furnace (EAF) route (approximately 35%).

The following steel making processes are present in Bulgaria:

#### *Basic oxygen steelmaking*

The objective in oxygen steelmaking is to burn (i.e., oxidise) the undesirable impurities contained in the metallic feedstock. The main elements thus converted into oxides are carbon, silicon, manganese, phosphorus, and sulphur. The purpose of this oxidation process, therefore, is:

- to reduce the carbon content to a specified level (from approximately 4% to less than 1%, but often lower)
- to adjust the contents of desirable foreign elements
- to remove undesirable impurities to the greatest possible extent

The production of steel by the basic oxygen furnace (BOF) process is a discontinuous process which involves the following steps:

- transfer and storage of hot metal
- pre-treatment of hot metal (desulphurisation)
- oxidation in the BOF (decarburisation and oxidation of impurities)
- secondary metallurgical treatment
- casting (continuous or/and ingot)

#### *Electric steelmaking*

The direct smelting of iron-containing materials, such as scrap is usually performed in electric arc furnaces (EAF). The major feed stock for the EAF is ferrous scrap, which may comprise of scrap from inside the steelworks (e.g. offcuts), cut-offs from steel product manufacturers (e.g. vehicle builders) and capital or post-consumer scrap (e.g. end of life products).

With respect to the end-products distinction has to be made between production of ordinary, so called carbon steel as well as low alloyed steel and high alloyed steels/stainless steels. In the EU about 85% of steel production is carbon or low alloyed steel [EC Study, 1996]. For the production of carbon steel and low alloyed steels, following main operations are performed:

- raw material handling and storage
- furnace charging with/without scrap preheating
- EAF scrap melting
- steel and slag tapping
- ladle furnace treatments for quality adjustment
- slag handling
- continuous casting

For high alloyed and special steels, the operation sequence is more complex and tailor-made for the end-products. In addition to the mentioned operations for carbon steels various ladle treatments (secondary metallurgy) are carried out like:

- desulphurisation
- degassing for the elimination of dissolved gases like nitrogen and hydrogen
- decarburisation (AOD=Argon-Oxygen-Decarburisation or VOD=Vacuum-Oxygen-Decarburisation)

The steel making plant which produced sinter, pig iron and steel (BOF) ceased operation in November 2008.

Currently in Bulgaria steel is produced only in EAF.

#### **Trend description**

The periods around 1991/1992 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation.

There is general reduction of the total emission in the sector in 2009 compared to 2008. This is mainly due to the world economic crisis in 2009 which lead to a reduction of the production processes rates. The total reduction in the sector production is about 45%.

Another factor leading to this reduction is that the biggest plant from this sector (which share in the steel production before 2008 was more than 50%) ceased operation of its pig iron and the following steel making in BOF in November 2008.

#### **Methodological issues**

Emissions are calculated based on Tier 2 approach to the various processes in the iron and steel industry use the equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - the production rate within the source category, using this specific technology
- EF - the emission factor for this technology and this pollutant

The aggregated national data are provided by the NSI and World Steel Organization (<https://worldsteel.org/steel-by-topic/statistics/steel-statistical-yearbook/>).

Default emission factors from tables 3-6 to 3-22 (chapter: 2.C.1 Iron and steel production, GB 2019) were used for estimation of the emissions from different production in the steel industry - EAF, OHF, BOF, Sinter (agglomerate), Blast furnace (Pig Iron) and Hot Rolled Products.

#### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Iron and Steel production (NFR sector 2C1). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### **Source specific recalculations**

Recalculations are not made.

#### **Source specific planned improvements**

Improvements in this category are not planned.

### **FERROALLOYS PRODUCTION (NFR 2C2)**

#### **Source category description**

Ferroalloys production involves a metallurgical reduction process. There is one ferroalloys producer in Bulgaria.

#### **Trend description**

The periods around 1989/1991 and 1997/1999 represent the economic crisis time after which stabilization and increase in the production rates begins. After 1996 a process of privatization begins which leads to decrease in the plants' production. This process is followed by restructuring and modernization of the production while at the same time some of the enterprises cease operation. There is a significant decrease of the total emission in the sector in 2012 compared to 2011. This is due to the fact that a steel making plant which produced sinter, pig iron and steel ceased operation in November 2008.

#### Activity data

The aggregated national data are provided by the NSI.

#### Emissions

Emissions are calculated based on Tier 1 approach to the ferroalloys produced use the equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - ferroalloys produced (tonnes/yr)
- EF - the emission factor for this pollutant

The aggregated national data are provided by the NSI.

#### Emission factors

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019: Table 3.1 Tier 1 emission factors for source category 2.C.2 Ferroalloys production. The EFs are presented in the table below.

Pollutant	EF g/Mg alloy produced
TPM	1000
PM10	850
PM2.5	600

#### Source specific QA/QC and verification

All activities regarding QC as described in QA/QC System have been undertaken in category Ferroalloys production (NFR sector 2C2). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### Source specific recalculations

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### Source specific planned improvements

Improvements in this category are not planned.

### ALUMINIUM PRODUCTION (NFR 2C3)

#### Source category description

In Bulgaria primary production of aluminium does not occur. There is secondary production.

#### Methodological issues

Emissions are calculated based on Tier 1 and Tier 2 approach to the ferroalloys produced use the equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - ferroalloys produced (tonnes/yr)
- EF - the emission factor for this pollutant

The aggregated national data are provided by the NSI.

#### **Activity data**

The aggregated national data are provided by the NSI.

#### **Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3-18 Tier 2 emission factors for source category 1.A.2.b, Secondary aluminium production

Table 3-3 Tier 1 emission factors for 1.A.2 combustion in industry using gaseous fuels

Table 3-4 Tier 1 emission factors for 1.A.2 combustion in industry using liquid fuels

#### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Aluminium production (NFR sector 2C3). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

Improvements in this category are not planned.

### **LEAD PRODUCTION (NFR 2C5)**

#### **Source category description**

Now there is only one plant for primary lead production in Bulgaria. The production is based on application of modern technology of autogenic melting of lead raw materials to black lead with following scarfing refining.

Until 2011 in Bulgaria there has been two enterprises for primary lead production (from ore). After 2011 one of these enterprises ceases its activity as it is impossible to face the modern requirements in the environmental legislation.

There are also several enterprises for processing lead from secondary raw materials.

#### **Trend description**

As it is in other productions in the country, here are also periods of economic crisis, privatization processes and ceased productions as a consequence of the necessity of large investments for meeting the ecological requirements and not in the last place the influence of the world market.

#### **Methodological issues**

Emissions are calculated based on Tier 1 and Tier 2 approach to the ferroalloys produced use the equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - ferroalloys produced (tonnes/yr)
- EF - the emission factor for this pollutant

The aggregated national data are provided by the NSI.

#### **Activity data**

The aggregated national data are provided by the NSI.

### **Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.2 Tier 2 emission factors for source category 2.C.5 Lead production, primary lead production, unabated.

Table 3.3 Tier 2 emission factors for source category 2.C.5 Lead production, primary lead production assuming average technology in the EU-28.

Table 3.4 Tier 2 emission factors for source category 2.C.5 Lead production, secondary lead production; unabated.

Table 3.5 Tier 2 emission factors for source category 2.C.5 Lead production, secondary lead.

Table 3-3 Tier 1 emission factors for 1.A.2 combustion in industry using gaseous fuels.

Table 3-4 Tier 1 emission factors for 1.A.2 combustion in industry using liquid fuels.

### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Lead production (NFR sector 2C5). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

### **Source specific planned improvements**

Improvements in this category are not planned.

## **ZINC PRODUCTION (NFR 2C6)**

### **Source category description**

Now in Bulgaria there is only one plant for primary zinc production. The production is based on the application of different metallurgical processes, such as roasting, electrolysis and others.

Until 2011 in Bulgaria there has been two enterprises for primary zinc production (from ore). After 2011 one of these enterprises ceases its activity as it is impossible to face the modern requirements in the environmental legislation.

There are also several enterprises for processing lead from secondary raw materials.

### **Trend description**

As it is in other productions in the country, here are also observed periods of economic crisis, privatization processes and ceased productions as a consequence of the necessity of large investments for meeting the ecological requirements and not in the last place the influence of the world market.

### **Methodological issues**

Emissions are calculated based on Tier 1 and Tier 2 approach to the ferroalloys produced use the equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - ferroalloys produced (tonnes/yr)
- EF - the emission factor for this pollutant

The aggregated national data are provided by the NSI.

### **Activity data**

The aggregated national data are provided by the NSI.

### **Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.2 Tier 2 emission factors for source category 2.C.6 Zinc production, primary zinc production, unabated.

Table 3.3 Tier 2 emission factors for source category 2.C.6 Zinc production, primary zinc production assuming average technology in the EU-28.

Table 3.4 Tier 2 emission factors for source category 2.C.6 Zinc production, secondary zinc production, unabated.

Table 3.5 Tier 2 emission factors for source category 2.C.5 Lead production, secondary lead

Table 3-3 Tier 1 emission factors for 1.A.2 combustion in industry using gaseous fuels.

Table 3-4 Tier 1 emission factors for 1.A.2 combustion in industry using liquid fuels.

### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Zinc production (NFR sector 2C6). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

### **Source specific planned improvements**

Improvements in this category are not planned.

## **COPPER PRODUCTION (NFR 2C7a)**

### **Source category description**

In Bulgaria there is one enterprise for processing copper from ores and several for processing metal products from waste copper alloys.

### **Trend description**

As it is in other productions in the country, here are also observed periods of economic crisis, privatization processes and ceased productions as a consequence of the necessity of large investments for meeting the ecological requirements and not in the last place the influence of the world market.

### **Methodological issues**

Emissions are calculated based on Tier 1 and Tier 2 approach to the ferroalloys produced use the equation:

$$E = AR \times EF$$

where:

- E - the emission of the specified pollutant
- AR - ferroalloys produced (tonnes/yr)
- EF - the emission factor for this pollutant

The aggregated national data are provided by the NSI.

### **Activity data**

The aggregated national data are provided by the NSI.

### **Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.2 Tier 2 emission factors for source category 2.C.7.a Copper production, primary copper.

Table 3.3 Tier 2 emission factors for source category 2.C.7.a Copper production, secondary copper.

Table 3-3 Tier 1 emission factors for 1.A.2 combustion in industry using gaseous fuels.

Table 3-4 Tier 1 emission factors for 1.A.2 combustion in industry using liquid fuels.

#### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in category Copper production (NFR sector 2C7a). The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

Improvements in this category are not planned.

**OTHER SOLVENT AND PRODUCT USE (NFR 2.D-2.L)****SOURCE CATEGORY DESCRIPTION**

This chapter describes the methodology used for calculating NMVOC emissions from solvent use in Bulgaria, which is also basis for calculating GHG emissions from Solvent use.

The activity data are provided by the NSI.

Source category 2D3 comprises mainly NMVOC emissions from about 40 different solvent applications within source categories as follows:

- 2D3a Domestic solvent use including fungicides,
- 2D3b Road paving with asphalt,
- 2D3c Asphalt roofing,
- 2D3d Coating applications,
- 2D3e Degreasing,
- 2D3f Dry cleaning,
- 2D3g Chemical products,
- 2D3h Printing and
- 2D3i Other solvent use.

Source category 2G Other product use includes several sources releasing NMVOC as: use of spray cans in industry; application of glues and adhesives; use of concrete additives; car underbody sealant; de-icing of airplanes; impregnating of glass and mineral wool; use of cooling and other lubricants; use of pesticides; house cleaning industry/craft/services; hairdressers; cosmetic institutions; use of tobacco products; wood preservation; medical practitioners; other health care institutions; other use of gases; use of fireworks; renovation of corrosion inhibiting coatings.

The activity data for estimation of emissions in categories NFR 2.D-2.L are provided by the NSI.

The possibilities for using of activity data in National Register under the Industrial Emissions Directive 2010/75/EU (CHAPTER V SPECIAL PROVISIONS FOR INSTALLATIONS AND ACTIVITIES USING ORGANIC SOLVENTS) are also checked.

Due to lack of data, the activity data for the period 1990 – 1991 are taken the same as first available year.

**Methodological issues**

Within source categories 2D, 2G Other solvent and product use the major NMVOC emission sources are 2D3a Domestic solvent use including fungicides and 2D3d Coating applications.

**DOMESTIC SOLVENT USE INCLUDING FUNGICIDES (NFR 2D3a)**

This category deals with the following activities:

- Domestic solvent use (other than paint application) (SNAP activity 060408)
- Domestic use of pharmaceutical products (SNAP activity 060411)

It comprises mainly the application of cleaning agents and solvents in private households for building and furniture cleaning and personal hygiene.

**Activity data**

All emissions related to domestic use of solvents and pharmaceuticals are calculated proportional to the Bulgarian population.

**Table 27: Activity data of 2D3a Domestic solvent use including fungicides in 1990-2020**

Years	Inhabitants, 1000 person	NMVOCs emissions, Gg
1990	8669,269	10,403
1991	8595,465	10,314

1992	8484,863	10,182
1993	8459,763	10,152
1994	8427,418	10,113
1995	8384,715	10,062
1996	8340,936	10,009
1997	8283,2	9,940
1998	8230,371	9,876
1999	8190,876	9,829
2000	8149,468	9,779
2001	7891,095	9,469
2002	7845,841	9,415
2003	7801,273	9,361
2004	7761,049	9,313
2005	7718,750	9,263
2006	7679,29	9,215
2007	7640,238	9,168
2008	7606,551	9,128
2009	7563,71	9,076
2010	7504,868	9,006
2011	7327,224	8,793
2012	7284,552	8,742
2013	7245,677	8,695
2014	7202,198	8,643
2015	7153,784	8,585
2016	7101,859	8,522
2017	7050,034	8,460
2018	7000,039	8,400
2019	6951,482	8,342
2020	6916,548	8,300

**Emission Factor**

Default emission factors from tables 3-1 (chapter: 2.D.3.a Domestic solvent use including fungicides, GB 2019) were used for estimation of NMVOC emissions from this category - 1.2 kg/capita, and emission factors for Hg - 5,6 mg/capita (GB 2016).

Recalculations, QA/QC activities and planned improvements

Improvements in this category are not planned.

**Source specific recalculations**

No recalculations were made.

**Source specific planned improvements**

Improvements in this category are not planned for the moment.

**ROAD PAVING WITH ASPHALT (NFR 2D3b)****Source category description**

Asphalt is commonly referred to as bitumen, asphalt cement, asphalt concrete or road oil and is mainly produced in petroleum refineries. Asphalt surfaces and pavements are composed of compacted aggregate and an asphalt binder. The asphalt binder may consist of heated asphalt cement (hot mix) or liquefied asphalts (cutback or emulsified). This section covers emissions from asphalt paving operations as well as subsequent releases from the paved surfaces.

**Methodological issues**

The Tier 2 approach for emissions from road paving with asphalt uses the general equation:

$$E = AR \times EF$$

Where:

E = the emission of the specified pollutant  
 AR = the activity rate for the road paving with asphalt  
 EF = the emission factor for this pollutant

### **Activity data**

This equation is applied at the national level, using annual national total production of the road paving with asphalt.

The aggregated national data are provided by the NSI.

During the 2022 submission for the first time consumed fuels are reported, in the previous years the consumed fuels were reported in the Energy sector. The NSI has to make recalculations for the whole time series.

### **Emission factors**

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.3 Tier 2 emission factors for source category 2.D.3.b Road paving with asphalt, drum mix hot mix asphalt plant.

Table 3-25 Tier 2 emission factors for source category 1.A.2.f.i, Roadstone coating (asphalt) plants

### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

### **Source specific planned improvements**

Improvements in this category are not planned.

## **ASPHALT ROOFING (NFR 2D3c)**

### **Source category description**

The present chapter covers emissions from the asphalt roofing industry. The industry manufactures saturated felt, roofing and siding shingles, and roll roofing and sidings. Most of these products are used in roofing and other building applications. This source category covers emissions of non-methane volatile organic compounds (NMVOC), carbon monoxide (CO) and particulate material from all related facilities.

Combustion emissions of e.g. sulphur oxides (SO<sub>x</sub>) and nitrogen oxides (NO<sub>x</sub>) occurring during the asphalt roofing processes are inventoried under source category 1.A.2.f.i.

### **Methodological issues**

The Tier 1 approach for emissions from asphalt roofing uses the general equation:

$$E = AR \times EF$$

Where:

E = the emission of the specified pollutant

AR = the activity rate for the asphalt roofing

EF = the emission factor for this pollutant

This equation is applied at the national level, using annual national total production of the asphalt roofing industry.

The aggregated national data are provided by the NSI.

The emission factors for estimation of emissions in Asphalt roofing are taken from EMEP/EEA Guidebook 2019 after the suggestion from TERT in 2021.

In 2019 there was a suggestion for Technical correction. TERT proposed improvement, Bulgaria made a suggestion and it was accepted. According to it the AD for the period till 2019 is revised in accordance with the proposed emission estimation. For 2020 the AD is taken from the NSI and the recommended calculation model was used.

### **Source specific recalculations**

Recalculations were made after the suggestion from TERT.

#### Source specific planned improvements

Improvements in this category are not planned.

### COATING APPLICATIONS (2D3d)

#### Source category description

This sector deals with the use of paints within the industrial and domestic sectors.

Decorative coating application, which includes:

- Paint application: construction and buildings (SNAP activity 060103)
- Paint application: domestic use (SNAP activity 060104)
- Industrial coating application, which includes:
  - Paint application: manufacture of automobiles (SNAP activity 060101)
  - Paint application: car repairing (SNAP activity 060102)
  - Paint application: coil coating (SNAP activity 060105)
  - Paint application: boat building (SNAP activity 060106)
  - Paint application: wood (SNAP activity 060107)
- Other industrial paint application (SNAP activity 060108)
- Other coating application, which includes:
  - Other non-industrial paint application (SNAP activity 060109)

#### Methodological issues

TIER 1 method is applied due to absence of detailed activity data (such as amount of paint used for wood preservation, number of cars, busses, trucks and boats painted, mass of wire coated, etc.).

TIER1 EFs provided in the EMEP/EEA 2019 Guidebook are used for NMVOC.

**Table 28: Emission factors of Coating applications (2D3d)**

SNAP activity	Name of activity	Emission factor	Unit	Reference
<b>Paint application</b>				
060101	Manufacture of automobiles	500	g/kg of paint	EMEP/EEA guidebook 2019
060102	Car repairing	720	g/kg of paint	EMEP/EEA guidebook 2019
060103	Construction and buildings (except 060107)	230	g/kg of paint	EMEP/EEA guidebook 2019
060104	Domestic use (except 060107)	230	g/kg of paint	EMEP/EEA guidebook 2019
060105	Coil coating	480	g/kg of paint	EMEP/EEA guidebook 2019
060106	Boat building	750	g/kg of paint	EMEP/EEA guidebook 2019
060107	Wood	800	g/kg of paint	EMEP/EEA guidebook 2019
060108	Other industrial paint application	750	g/kg of paint	EMEP/EEA guidebook 2019
060109	Other non-industrial paint application	740	g/kg of paint	EMEP/EEA guidebook 2019

The activity data correspond to the annual consumption of paints.

#### Source specific recalculations

No recalculations were made.

#### Source specific planned improvements

Improvements in this category are not planned.

**DEGREASING (NFR 2D3e)****Source category description**

Degreasing is a process of cleaning products from water-insoluble substances such as grease, fats, oils, waxes, carbon deposits, fluxes and tars. In most cases the process is applied to metal products, but also plastic, fibreglass, printed circuit boards and other products are treated by the same process. This category deals with the following activities:

- Metal degreasing (SNAP activity 060201)
- Electronic components manufacturing (SNAP activity 060203)
- Other industrial cleaning (SNAP activity 060204)

**Methodological issues**

TIER 1 method is applied and TIER1 EFs provided in the EMEP/EEA 2013 Guidebook are used for NMVOC.

**Table 29: Emission factors of Degreasing (NFR 2D3e)**

SNAP activity	Name of activity	Emission factor	Unit	Reference
<b>Degreasing</b>				
060201	Metal degreasing	710	kg/Mg solvent use	EMEP/EEA guidebook 2019
060203	Electronic components manufacturing	740	kg/Mg wafer	EMEP/EEA guidebook 2019

**Source specific recalculations**

No recalculations were made.

**Source specific planned improvements**

Improvements in this category are not planned.

**DRY CLEANING (NFR 2D3f)****Source category description**

Dry cleaning – refers to any process to remove contamination from furs, leather, down leathers, textiles or other objects made of fibres using organic solvents.

This category deals with the following activity Dry cleaning (SNAP activity 060202).

**Methodological issues**

TIER 1 method is applied and TIER1 EFs provided in the EMEP/EEA 2019 Guidebook are used for NMVOC.

**Table 30: Emission factors of Dry cleaning (NFR 2D3f)**

SNAP activity	Name of activity	Emission factor	Unit	Reference
<b>Dry cleaning</b>				
060202	Dry cleaning	1000	kg/Mg solvent use	EMEP/EEA guidebook 2019
060202	Dry cleaning - Open-circuit machine	177	g/kg textiles cleaned	EMEP/EEA guidebook 2019
060202	Dry cleaning – closed -circuit machine (abatement n=89%)	19.47	g/kg textiles cleaned	EMEP/EEA guidebook 2019

**Source specific recalculations**

No recalculations were made.

**Source specific planned improvements**

Improvements in this category are not planned.

**CHEMICAL PRODUCTS (2D3g)****Source category description**

This sector covers the emissions from the use of chemical products.

- Polyester processing (SNAP activity 060301)
- Polyvinylchloride processing (SNAP activity 060302)
- Polyurethane foam processing (SNAP activity 060303)
- Polystyrene foam processing (SNAP activity 060304)
- Rubber processing (SNAP activity 060305)
- Pharmaceutical products manufacturing (SNAP activity 060306)
- Paints manufacturing (SNAP activity 060307)
- Inks manufacturing (SNAP activity 060308)
- Glues manufacturing (SNAP activity 060309)
- Asphalt blowing (SNAP activity 060310)
- Adhesive, magnetic tapes, films and photographs manufacturing (SNAP activity 060311)
- Textile finishing (SNAP activity 060312)
- Leather tanning (SNAP activity 060313)
- Other (SNAP activity 060314)

**Methodological issues**

TIER 1 method is applied and TIER1 EFs provided in the EMEP/EEA 2013/2019 Guidebook are used for NMVOC.

**Table 31: Emission factors of Chemical products (2D3g) - NMVOC**

SNAP activity	Name of activity	Emission factor	Unit	Reference
<b>Chemical products</b>				
060301	Polyester processing	50	g/kg monomer used	EMEP/EEA guidebook 2019
060302	Polyvinylchloride processing	10	g/kg product	EMEP/EEA guidebook 2019
060303	Polyurethane foam processing	120	g/kg foam processed	EMEP/EEA guidebook 2019
060304	Polystyrene foam processing	60	g/kg foam processed	EMEP/EEA guidebook 2019
060305	Rubber processing	8	g/kg rubber produced	EMEP/EEA guidebook 2019
060306	Pharmaceutical products manufacturing	300	g/kg solvents used	EMEP/EEA guidebook 2019
060307	Paints manufacturing	11	g/kg product	EMEP/EEA guidebook 2019
060308	Inks manufacturing	11	g/kg product	EMEP/EEA guidebook 2019
060309	Glues manufacturing	11	g/kg product	EMEP/EEA guidebook 2019
060310	Asphalt blowing	1710	g/Mg asphalt	EMEP/EEA guidebook 2019

TIER 1 method is applied with default EFs provided in the EMEP/EEA 2019 Guidebook are used for other pollutants for activity Asphalt blowing.

For the calculation of total dust emissions, heavy metals (Cd, As, Cr, Ni and As) and Benzo (a) pyrene in the production of Asphalt blowing, are used the EF of Table 3-10 by chapter 2D3g of EMEP/EEA air pollutant emission inventory guidebook 2019.

**Table 32: Emission factors of category Chemical products (2D3g) - Asphalt blowing**

Pollutant	Value	Unit	Reference
<b>TSP</b>	12000	g/Mg asphalt	EMEP/EEA guidebook 2019
<b>Cd</b>	0.0001	g/Mg asphalt	EMEP/EEA guidebook 2019
<b>As</b>	0.0005	g/Mg asphalt	EMEP/EEA guidebook 2019
<b>Cr</b>	0.006	g/Mg asphalt	EMEP/EEA guidebook 2019
<b>Ni</b>	0.05	g/Mg asphalt	EMEP/EEA guidebook 2019
<b>Se</b>	0.0005	g/Mg asphalt	EMEP/EEA guidebook 2019
<b>Benzo(a)pyrene</b>	4000	g/Mg asphalt	EMEP/EEA guidebook 2019

From the abovementioned activities currently in Bulgaria there are plants processing rubber, manufacturing paints and glues as well as such conducting asphalt blowing. The main source of emissions in 2D3g category is the asphalt blowing. There was only one plant with such activity which ceased operation in 2017.

During the 2020 review a correction estimate was offered by TERT. Bulgaria did not accept it and proposed different one, which was accepted by TERT. The revised data is reported in submission 2021.

#### Source specific recalculations

No recalculations were made during 2022 submission.

#### Source specific planned improvements

Improvements in this category are not planned, because the installation is not operating.

## PRINTING (2D3h)

#### Source category description

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
- rotogravure and flexography

Printing industry (SNAP activity 060403)

#### Methodological issues

TIER 2 method is applied and TIER1 EFs provided in the EMEP/EEA 2019 Guidebook are used for NMVOC.

**Table 33: Emission factors of Printing (2D3h)**

SNAP activity	Name of activity	Emission factor	Unit	Reference
<b>Other product use*</b>				
060403	Printing industry	730	g/kg ink	EMEP/EEA guidebook 2019

#### Source specific recalculations

No recalculations were made.

#### Source specific planned improvements

Improvements in this category are not planned.

**OTHER SOLVENT USE (2D3i)****Description**

This category covers the emissions from SO<sub>x</sub> and heavy metals contained in lubricants used in 2-stroke mopeds and motorcycles.

**Methodological issues and activity data****Activity data**

Activity data used in this category is obtained from national statistics (fuel consumption and vehicle numbers), based on which is calculated the average annual mileage per vehicle category using the COPERT model (see **Table 17**). Lubricants consumption is also automatically calculated based on the provided values from 2019 Guidelines.

**Methodological issues**

Emission estimates are calculated and reported directly from COPERT model, implementing a Tier 3 approach.

**Emission factors**

Default emission factors from table 3-31 (chapter: 1.A.3.b.iv-Mopeds and motorcycles, GB 2019) were used for estimation of the emissions from this category.

**Source specific recalculations**

Estimates for this category have been reported for the first time in the 2020 submission.

**Source specific planned improvements**

Improvements in this category are not planned.

**OTHER PRODUCT USE (NFR2G)****Source category description**

This category deals with the following activities:

- Fat, edible and non-edible oil extraction (SNAP activity 060404)
- Application of glues and adhesives (SNAP activity 060405)
- Preservation of wood (SNAP activity 060406)
- Use of Fireworks (SNAP activity 060601)
- Tobacco combustion (SNAP activity 060602)

**Methodological issues**

The Tier 2 default approach has been implemented. The general equation is:

$$E_{\text{pollutant}} = AR_{\text{production}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  = the emission of the specified pollutant,

$AR_{\text{production}}$  = the activity rate (consumption of paint, chemical production data, solvent consumption, tobacco and fireworks used)

$EF_{\text{pollutant}}$  = the emission factor for this pollutant.

There is no firework production in Bulgaria and there is a significant decrease in cigarettes production. The quantities of fireworks and tobacco used are calculated from production and imports, subtracting the exports.

This equation is applied at the national level, using annual national total figures for the activity data. TIER 2 EFs provided in the EMEP/EEA 2019 Guidebook are used for NMVOC and other pollutants.

**Table 34: Emission factors used for Other product use (NFR 2G) - NMVOC**

SNAP activity	Name of activity	Emission factor	Unit	Reference
Other product use*				

060404	Fat, edible and non-edible oil extraction	1.57	g/kg seed	EMEP/EEA guidebook 2019
060405	Application of glues and adhesives	522	g/kg adhesives	EMEP/EEA guidebook 2019
060406	Preservation of wood: Creosote preservative type Waterborne preservative	945 105 0,5	g/kg preservative	EMEP/EEA guidebook 2019

\* The other SNAP activities under 3.D Other product use are not estimated due to lack of activity data.

**Table 35: Emission factors used for Other product use (NFR 2G) – Other pollutants**

Activity	Pollutant	Value	Unit	Reference
060404 - Fat, edible and non-edible oil extraction	TSP	1.1	g/kg seed	EMEP/EEA guidebook 2019
	PM 10	0.9	g/kg seed	EMEP/EEA guidebook 2019
	PM 2.5	0.6	g/kg seed	EMEP/EEA guidebook 2019
060406 - Preservation of wood	Benzo(a)pyrene	1.05	mg/kg creosote	EMEP/EEA guidebook 2019
	Benzo(b)fluoranthene	0.53	mg/kg creosote	EMEP/EEA guidebook 2019
	Benzo(k)fluoranthene	0.53	mg/kg creosote	EMEP/EEA guidebook 2019
	Indeno(1,2,3-cd)pyrene	0.53	mg/kg creosote	EMEP/EEA guidebook 2019
060601 - Use of Fireworks	NOx	260	g/t product	EMEP/EEA guidebook 2019
	SO2	3020	g/t product	EMEP/EEA guidebook 2019
	PM2.5	51.94	g/t product	EMEP/EEA guidebook 2019
	PM10	99.92	g/t product	EMEP/EEA guidebook 2019
	TSP	109.83	g/t product	EMEP/EEA guidebook 2019
	CO	7150	g/t product	EMEP/EEA guidebook 2019
	Pb	784	g/t product	EMEP/EEA guidebook 2019
	Cd	1.48	g/t product	EMEP/EEA guidebook 2019
	Hg	0.057	g/t product	EMEP/EEA guidebook 2019
	As	1.33	g/t product	EMEP/EEA guidebook 2019
	Cr	15.6	g/t product	EMEP/EEA guidebook 2019
	Cu	444	g/t product	EMEP/EEA guidebook 2019
	Ni	30	g/t product	EMEP/EEA guidebook 2019
	Zn	260	g/t product	EMEP/EEA guidebook 2019
060602- Tobacco combustion	NOx	1.8	kg/Mg tobacco	EMEP/EEA guidebook 2019
	NM VOC	4.84	kg/Mg tobacco	EMEP/EEA guidebook 2019
	NH3	4.15	kg/Mg tobacco	EMEP/EEA guidebook 2019
	PM2.5	27	mg/cigarette	EMEP/EEA guidebook 2019
	PM10	27	mg/cigarette	EMEP/EEA guidebook 2019
	TSP	27	mg/cigarette	EMEP/EEA guidebook 2019
	BC	0.45	% of PM2.5 emission	
	CO	55.1	kg/Mg tobacco	EMEP/EEA guidebook 2019
	Cd	5.4	µg/cigarette	EMEP/EEA guidebook 2019
	Cu	5.4	µg/cigarette	EMEP/EEA guidebook 2019
	Ni	2.4	µg/cigarette	EMEP/EEA guidebook 2019
	Zn	2.7	µg/cigarette	EMEP/EEA guidebook 2019
	PCDD/ PCDF(dioxins/furans)	0.1	µg I-TEQ/Mg tobacco	EMEP/EEA guidebook 2019
	benzo(a) pyrene	0.111	g/Mg tobacco	EMEP/EEA guidebook 2019
	benzo(b) fluoranthene	0.045	g/Mg tobacco	EMEP/EEA guidebook 2019
	benzo(k) fluoranthene	0.045	g/Mg tobacco	EMEP/EEA guidebook 2019
	Indeno (1,2,3-cd) pyrene	0.045	g/Mg tobacco	EMEP/EEA guidebook 2019

### Recalculations, QA/QC activities and planned improvements

No recalculations were made in this category.

Improvements in this category are not planned.

## OTHER (NFR 2H)

Source category 2H Other comprises process emissions from the production of pulp and paper, including chipboard, fibreboard and cellulose production, from the production of food and beverage, from Claus units and blasting and shooting operations.

### PULP AND PAPER INDUSTRY (2H1)

#### Source category description

The present chapter covers emissions from pulp and paper production. This chapter discusses three different chemical pulping processes:

- Kraft (sulphate) pulping is the most widely used pulping process and is typically used to produce strong paper products.
- Sulphite pulping (acid sulphite process) involves chemically pulping the wood using sulphur dioxide (SO<sub>2</sub>) adsorbed in a base solution.
- Neutral sulphite semi-chemical pulping (NSSC) is one of the chemical pulping processes that can be used. It involves partial delignification of wood feedstock using a buffered sodium sulphite solution, with completion of the pulping process by mechanical means.

#### Methodological issues

Emissions from paper and pulp production include non-methane volatile organic compounds (NMVOC), sulphur oxides (SO<sub>x</sub>), particulates, nitrogen oxides (NO<sub>x</sub>) and carbon monoxide (CO). Not all emissions from pulping or one of the related processes are reported in source category 2.H.1. Chipboard - SNAP 040601

Paper pulp (Kraft process) - SNAP 040602

Paper pulp (acid sulphite process) - SNAP 040603

Paper pulp (neutral sulphite semi-chemical process) - SNAP 040604

#### METHODOLOGICAL ISSUES

The Tier 2 default approach has been implemented. The general equation is:

$$E_{\text{pollutant}} = AR_{\text{production}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  = the emission of the specified pollutant,

$AR_{\text{production}}$  = the activity rate

$EF_{\text{pollutant}}$  = the emission factor for this pollutant.

This equation is applied at the national level, using annual national total figures for the activity data. TIER 2 EFs provided in the EMEP/EEA 2019 Guidebook are used for NMVOC.

#### Activity data

The activity data are collected by the NSI - as described above.

#### Emission factors

For calculating the emissions is used the EFs described in EMEP/EEA Guidebook 2019:

Table 3.2 Tier 2 emission factors for source category 2.H.1 Pulp and paper industry, Kraft process.

Table 3.3 Tier 2 emission factors for source category 2.H.1 Pulp and paper industry, acid sulphite process.

Table 3.4 Tier 2 emission factors for source category 2.H.1 Pulp and paper industry, neutral sulphite semi-chemical process (NSCC).

#### Source specific QA/QC and verification

All activities regarding QC as described in QA/QC.

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),

- Time series consistency,
- Plausibility checks of dips and jumps,
- Documentation and archiving of all information required in IIR.

#### **Source specific recalculations**

Emissions have been recalculated throughout the period 1990-2018 using EF from the EMEP/EEA Guidebook 2019.

#### **Source specific planned improvements**

Improvements in this category are not planned.

## **FOOD AND BEVERAGES INDUSTRY (2H2)**

### **Source category description**

NMVOC emissions from food and beverages manufacturing, except emissions from vegetable oil extraction (it is good practice to report emissions from this activity in source category 3.D.3). Emissions from food manufacturing include all processes in the food production chain which occur after the slaughtering of animals and the harvesting of crops. Emissions from drink manufacturing include the production of alcoholic beverages, especially wine, beer and spirits. Emissions from the production of other alcoholic drinks are not covered in this edition. It is good practice to include emissions from the distribution of alcoholic beverages.

Bread – SNAP 040605

Wine – SNAP 040606

Beer – SNAP 040607

Spirits – SNAP 040608

Sugar production – SNAP 040625

Flour production – SNAP 040626

Meat, fish etc. frying / curing – SNAP 040627

### **Methodological issues**

The emissions expected from the sector are of NMVOC.

- **Bread production** – the mentioned guidebook suggest different EFs related to the type of bread produced. Since currently there are no country specific data on the different bread types produced, the Tier 2 EF for the typical bread (European) was chosen to estimate the emissions of NMVOC. This EF is taken from Table 3-11, section 3.3.2. This EF differs (slightly lower) from the one used so far and the NMVOC emissions were recalculated.
- **Wine, Beer and Spirits production** – the currently used EFs are the same as the Tier 2 default ones suggested in EMEP/CORINAIR Emission Inventory Guidebook 2019 (Table 3-24 – Wine, unspecified color, Table 3-27 - Beer (including de-alcoholized), and Table 3-28 - Spirits unspecified sort, Section 3.3.2). That is why the emissions did not need recalculation.

The estimate the NMVOC emissions from sector 2H2 Tier 2 technology-specific approach has been implemented. The general equation is:

$$E_{\text{pollutant}} = AR_{\text{production}} \times EF_{\text{pollutant}}$$

where:

$E_{\text{pollutant}}$  = the emission of the specified pollutant,

$AR_{\text{production}}$  = the activity rate

$EF_{\text{pollutant}}$  = the emission factor for this pollutant.

### **Activity data**

The above equation is applied at the national level, using annual national total figures for the activity data provided by NSI.

### **Emission factors**

As mentioned in the above section Tier 2 technology-specific EFs from EMEP/CORINAIR Emission Inventory Guidebook 2016 are used for NMVOC. The EFs are presented in the following table.

<b>Product</b>	<b>EF</b>
Bread	4.5 kg/Mg bread
Wine	0.08 kg/ hl wine
Beer	0.035 kg/ hl beer
Spirits	15 kg/ hl alcohol

#### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in NFR sector Other solvent and product use.

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series)
- Time series consistency
- Plausibility checks of dips and jumps
- Documentation and archiving of all information required in IIR,
- Background documentation and archive.

#### **Source-specific recalculation**

There are no source specific recalculations for this category.

#### **Source-specific planned improvements**

Improvements in this category are not planned.

## CHAPTER 5. AGRICULTURE (NFR SECTOR 3)

### OVERVIEW OF SECTOR

This chapter gives information about the estimation of harmful substances from Sector Agriculture. The Agricultural sector consists the following categories:

**Table 36: Agriculture Categories**

NFR Code	Category	Pollutants	Calculations
3.B	Manure Management	NH <sub>3</sub> , NO <sub>x</sub> , NMOVCs, TSP, PM <sub>10</sub> , PM <sub>2.5</sub>	✓
3.D Crop production and agricultural soils			
3Da1	Inorganic N fertilisers (includes urea)	NH <sub>3</sub> , NO <sub>x</sub>	✓
3Da2b	Sewage sludge applied to soils	NH <sub>3</sub> , NO <sub>x</sub>	✓
3Da2a & 3Da3	Livestock manure applied or deposited to soil	NH <sub>3</sub> , NO <sub>x</sub>	✓
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	TSP, PM <sub>10</sub> , PM <sub>2.5</sub>	✓
3De	Cultivated crops	NMOVCs	✓
3.D.f- 3.I	Agriculture other including use of pesticides	3.D.f- 3.I, table3-1 2019 EMEP/EEA GL	NO
3.F	Field burning of agricultural residues	3.F table3-1 2019 EMEP/EEA GL	✓

The “✓” indicates that emissions from this category have been estimated.

#### MANURE MANGEMENT (NFR 3B)

The section describes the estimation of emissions from ammonia (NH<sub>3</sub>), Nitric oxide (as NO<sub>2</sub>), Non-methane volatile organic compounds (NMVOCs) and Particulate matter (PM, TSP) from Manure Management.

**Table 37: Manure management subcategories (NFR sector 3B)**

3.B Manure Management		
NFR Code	Description	Pollutants/Tier
3B1a	Dairy cows	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B1b	Other cattle	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM /T1/ T2
3B2	Sheep	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B3	Swine	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
	Fattening pigs	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM/T1/T2
	Sows	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
	Weaners	PM /T1/T2
3B4a	Buffalo	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B4d	Goats	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B4e	Horses	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B4f	Mules and asses	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B4gi	Laying hens	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM /T1/ T2
3B4gii	Broilers	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2

3.B Manure Management		
NFR Code	Description	Pollutants/Tier
3B4giii	Turkeys	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2
3B4giv	Ducks	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM/T1/T2
3B4giv	Geese and other	NH <sub>3</sub> ,NO <sub>2</sub> , NMVOCs, PM / T1/T2

#### Methodological issues

The emissions in 3.B Manure Management (NMVOCs-excluding dairy cattle and other cattle, PM, TSP) are estimated using Tier 1 approach with default Efs from EMEP/EEA Air pollutant emission inventory Guidebook 2019. The following formula has been used ( EMEP/EEA GB 2019, 3.B Manure Management equation(1)):

$$\text{Epollutant\_animal} = \text{AAPanimal} \times \text{EFpollutant\_animal}$$

where AAPanimal is the number of animals of a particular category that are present, on average, within the year.

The emissions in 3.B Manure Management (NH<sub>3</sub> and, NO<sub>2</sub>) are estimated using Tier 2 approach according EMEP/EEA Air pollution emission inventory Guidebook 2019 and N-flow tool.

The default emission factors used for estimation of the emissions in Manure Management are listed in following tables.

**Table 38: Default Tier 1 EFs for NMVOCs.**

(EMEP/EEA GB 2019, 3.B Manure Management table3.4).

3.B Manure Management			
NFR Code	Description	Silage feeding	EFs (NMVOCs, kg AAP-1 a-1)
3B2	Sheep	Without silage feeding	0.169
3B3	Swine		
	Fattening pigs	Without silage feeding	0.551
	Sows	Without silage feeding	1.704
	Weaners	Without silage feeding	NA
3B4a	Buffalo	Without silage feeding	4.253
3B4d	Goats	Without silage feeding	0.542
3B4e	Horses	Without silage feeding	4.275
3B4f	Mules and asses	Without silage feeding	1.470
3B4gi	Laying hens	Without silage feeding	0.165
3B4gii	Broilers	Without silage feeding	0.108
3B4giii	Turkeys	Without silage feeding	0.489
3B4giv	Ducks	Without silage feeding	0.489
3B4giv	Geese and other	Without silage feeding	0.489

**Table 39: Default Tier 1 estimates of EFs for particle emissions from livestock husbandry (housing)** (EMEP/EEA GB 2019, 3.B Manure Management table3.5).

3.B Manure Management				
NFR Code	Description	EFs TSP (kg AAP-1 a-1)	EFs PM10 (kg AAP-1 a-1)	EFs PM2.5 (kg AAP-1 a-1)
3B1a	Dairy cows	1.38	0.63	0.41
3B1b	Other cattle	0.59	0.27	0.18
3B2	Sheep	0.14	0.06	0.02
3B3	Swine			
	Fattening pigs	1.05	0.14	0.006
	Sows	0.27	0.05	0.002
	Weaners	0.62	0.17	0.01

3.B Manure Management				
NFR Code	Description	EFs TSP (kg AAP-1 a-1)	EFs PM10 (kg AAP-1 a-1)	EFs PM2.5 (kg AAP-1 a-1)
3B4a	Buffalo	1.45	0.67	0.44
3B4d	Goats	0.14	0.06	0.02
3B4e	Horses	0.48	0.22	0.14
3B4f	Mules and asses	0.34	0.16	0.10
3B4gi	Laying hens	0.19	0.04	0.0003
3B4gii	Broilers	0.04	0.02	0.002
3B4giii	Turkeys	0.11	0.11	0.02
3B4giv	Ducks	0.14	0.14	0.02
3B4giv	Geese and other	0.24	0.24	0.03

#### Activity data

The activity data have been obtained from the Agrostatistical department of Ministry of agriculture, food and forestry.

**Table 40: Livestock population in 1990-2020 (I)**

Year	Livestock population [1000 number]									
	Dairy Cows	Other <sup>1</sup> Cattle	Sheeps	Swine <sup>2</sup>			Buffalo	Goats	Horses	Mules and asses
				Fattening pigs	Sows	Weaners				
1990	619.14	974.97	8369.65	3789.80	435.43	794.63	23.27	434.28	120.45	351.51
1995	384.11	310.21	3580.41	1819.68	209.08	381.54	15.46	735.93	123.11	305.86
2000	392.02	265.28	2229.23	1144.89	131.54	240.06	9.67	893.82	137.20	230.12
2005	358.24	288.45	1647.38	841.34	95.86	176.60	8.09	663.27	130.66	110.00
2010	302.46	239.18	1384.12	628.22	68.68	127.25	8.78	358.58	134.39	56.52
2015	285.77	265.74	1333.59	519.93	56.66	135.45	10.20	284.78	67.78	35.33
2016	273.75	280.29	1345.99	546.92	61.33	125.29	11.56	253.23	58.62	25.53
2017	261.69	287.00	1338.44	541.46	63.33	127.19	12.54	247.26	60.70	13.89
2018	243.06	290.25	1333.41	557.78	66.07	142.85	14.22	264.35	62.52	18.89
2019	224.64	293.84	1315.51	512.76	60.42	122.16	16.18	250.11	61.55	25.82
2020	221.51	318.09	1 294.38	483.64	58.31	111.43	18.46	240.95	51.92	26.96
Trend 1990-2020	-64.22%	-67.37%	-84.53%	-86.98%			-20.67%	-44.52%	-56.89%	-92.33%

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1 The Calves cattles are included in Other cattle for NH<sub>3</sub>, NO and NMVOCs emissions. They are separated from Other cattles for PM<sub>2.5</sub>, PM<sub>10</sub> and TSP estimations

2 Weaners pigs are included in Fattening pigs for NH<sub>3</sub>, NO and NMVOCs estimations. And they are separated from fattening pigs for PM<sub>2.5</sub>, PM<sub>10</sub> and TSP estimations.

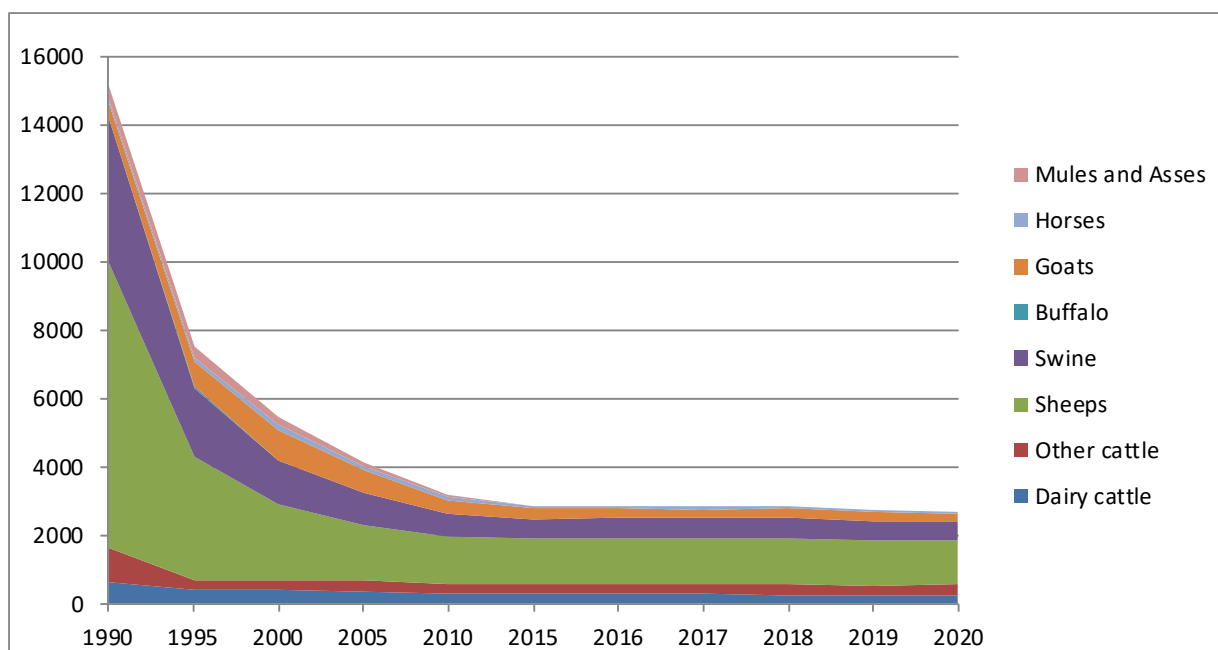


Figure 11: Trend of Livestock populations (I)

Table 41: Livestock population in 1990-2020 (II)

Year	Poultry population [1000 number]				
	Laying hens	Broilers	Turkeys	Ducks	Geese and others
1990	18660.53	15862.96	1571.06	2154.23	822.62
1995	13404.35	3091.51	750.68	1029.32	393.06
2000	8600.25	4940.38	616.19	844.92	322.65
2005	9757.30	7424.90	511.60	1559.30	260.45
2010	8289.00	6743.50	202.50	1326.00	106.5
2015	6897.50	6716.50	36.50	1373.00	81.00
2016	7069.00	6284.00	30.00	1178.50	88.50
2017	7028.00	5628.00	31.00	1397.00	144.00
2018	6924.50	6443.50	32.50	1537.00	200.00
2019	7029.00	6778.00	29.00	1490.50	215.50
2020	7084.50	5992.00	22.00	1466.50	125.70
Trend 1990-2020	-62.03%	-62.23%	-98.60%	-31.92%	-84.72%

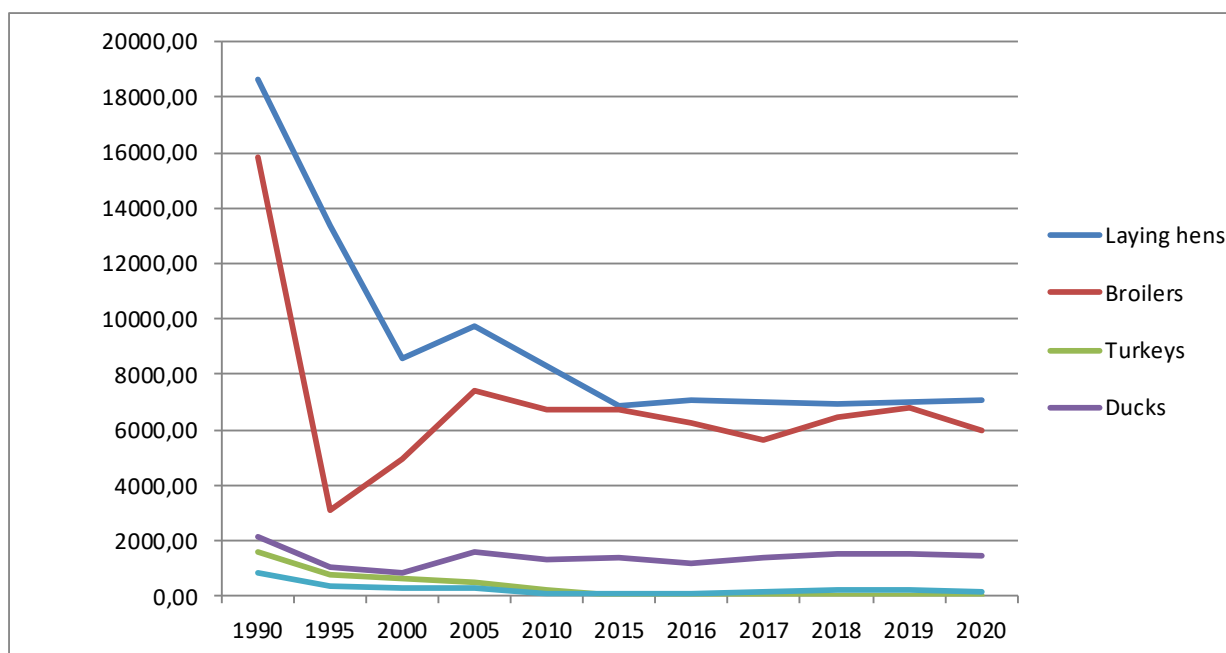


Figure 12: Trend of Livestock populations (II)

## EMISSIONS

### NH<sub>3</sub> emissions

The NH<sub>3</sub> emissions in Manure management are estimated using Tier 2 approach and N-flow Manure management tool according EMEP/EEA Air pollution emission inventory Guidebook 2019. NH<sub>3</sub> emissions are calculated on the basis of the amount of total ammoniacal nitrogen (TAN).

A survey conducted with the Agricultural University of Plovdiv, provided data about the distribution of AWMS. (see Bulgaria's National Inventory Report Chapter Agriculture/Manure Management). The emissions of NH<sub>3</sub> in Manure management are listed in following tables.

Table 42: NH<sub>3</sub> emissions from 3.B Manure Management (I)

Year	NH <sub>3</sub> emissions from manure management [kt]								
	Dairy cows	Other cattle	Sheeps	Swine		Buffalo	Goats	Horses	Mules and asses
				Finishing pigs	Sows				
1990	5.18	6.03	1.73	10.28	3.55	0.02	0.04	0.21	0.16
1995	3.18	1.96	0.74	5.82	1.99	0.01	0.08	0.21	0.14
2000	3.16	1.67	0.47	4.59	1.55	0.01	0.09	0.24	0.10
2005	2.96	1.85	0.34	2.93	0.99	0.01	0.07	0.23	0.05
2010	2.57	1.53	0.28	1.87	0.61	0.01	0.04	0.23	0.03
2015	2.45	1.74	0.27	1.41	0.46	0.01	0.03	0.12	0.02
2016	2.34	1.81	0.28	1.49	0.50	0.01	0.03	0.10	0.01
2017	2.24	1.89	0.28	1.47	0.52	0.01	0.03	0.10	0.01
2018	2.08	1.93	0.28	1.52	0.54	0.01	0.03	0.11	0.01
2019	1.92	1.96	0.28	1.39	0.49	0.01	0.03	0.11	0.01
2020	1.90	2.16	0.28	1.31	0.48	0.01	0.02	0.09	0.01

**Table 43: NH<sub>3</sub> emissions from 3.B Manure Management (II)**

Year	NH <sub>3</sub> emissions from manure management [kt]				
	Laying hens	Broilers	Turkeys	Ducks	Geese and other
1990	2.31	3.73	0.93	1.20	0.69
1995	1.66	0.73	0.44	0.57	0.33
2000	1.07	1.16	0.37	0.47	0.27
2005	1.21	1.75	0.30	0.86	0.22
2010	1.03	1.59	0.12	0.74	0.09
2015	0.85	1.58	0.02	0.76	0.07
2016	0.88	1.48	0.02	0.67	0.08
2017	0.87	1.32	0.02	0.73	0.11
2018	0.86	1.52	0.02	0.82	0.16
2019	0.87	1.60	0.02	0.77	0.17
2020	0.88	1.41	0.01	0.76	0.10

**Table 44: Total NH<sub>3</sub> emissions from 3.B Manure Management**

Total NH <sub>3</sub> emissions from manure management [kt]											
Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Total	36.07	17.86	15.21	13.77	10.73	9.79	9.68	9.60	9.87	9.63	9.42

In 2020 the emissions of NH<sub>3</sub> from Manure Management have decreased by 73.29% compared to 1990. The decrease for the year 2020 is 2.2% compared to year 2019.

#### NO<sub>2</sub> emissions

The NO<sub>2</sub> emissions in Manure management are estimated with Tier 2 approach, excluding the emissions from Mules and asses. The calculations make use of the mass-flow approach based on the concept of a flow of TAN through the manure management system.

The emissions of NO<sub>2</sub> in Manure management are listed in following tables.

**Table 45: NO<sub>2</sub> emissions from 3.B Manure Management (I)**

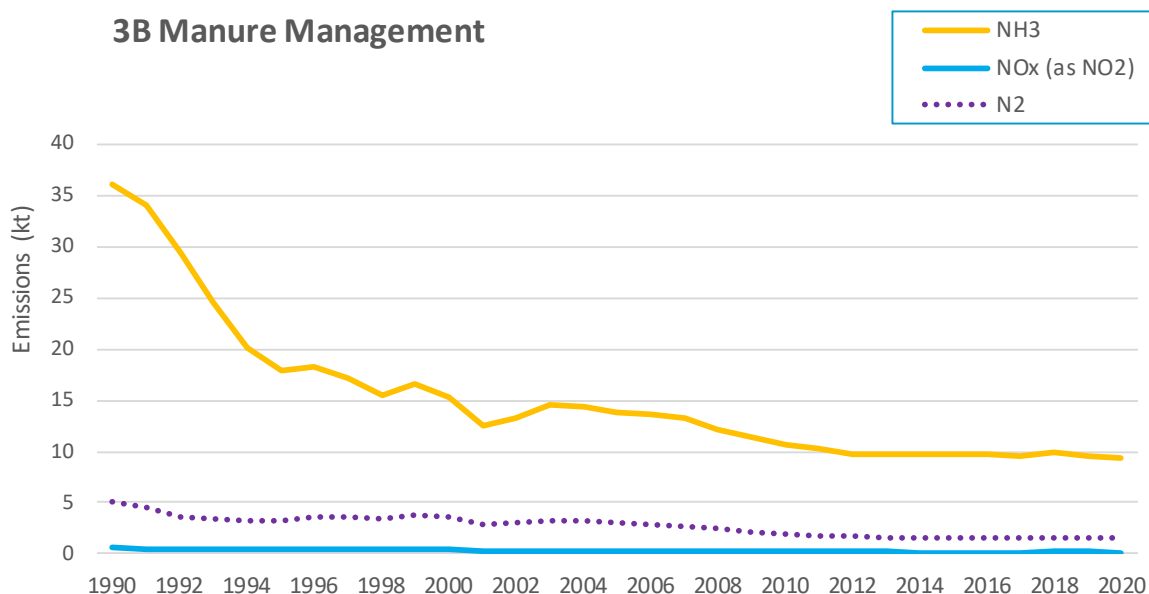
Year	NO <sub>2</sub> emissions from manure management [kt]								
	Dairy cows	Other cattle	Sheeps	Swine		Buffalo	Goats	Horses	Mules and asses
				Finishing pigs	Sows				
1990	0.03	0.10	0.01	0.06	0.02	0.00	0.00	0.00	0.09
1995	0.02	0.03	0.01	0.11	0.04	0.00	0.00	0.00	0.08
2000	0.02	0.03	0.00	0.16	0.05	0.00	0.00	0.00	0.06
2005	0.02	0.04	0.00	0.07	0.02	0.00	0.00	0.00	0.03
2010	0.01	0.02	0.00	0.03	0.01	0.00	0.00	0.00	0.01
2015	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01
2016	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01
2017	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2018	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2019	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01
2020	0.01	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01

**Table 46: NO<sub>2</sub> emissions from 3.B Manure Management (II)**

Year	NO <sub>2</sub> emissions from manure management [kt]				
	Laying hens	Broilers	Turkeys	Ducks	Geese and other
1990	0.11	0.12	0.03	0.06	0.01
1995	0.08	0.02	0.02	0.03	0.01
2000	0.05	0.04	0.01	0.02	0.00
2005	0.06	0.06	0.01	0.04	0.00
2010	0.05	0.05	0.00	0.04	0.00
2015	0.04	0.05	0.00	0.04	0.00
2016	0.04	0.05	0.00	0.03	0.00
2017	0.04	0.04	0.00	0.04	0.00
2018	0.04	0.05	0.00	0.04	0.00
2019	0.04	0.05	0.00	0.04	0.00
2020	0.04	0.05	0.00	0.04	0.00

**Table 47: Total NHO<sub>2</sub> emissions from 3.B Manure Management**

Total NO <sub>2</sub> emissions from manure management [kt]											
Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Total	0.55	0.36	0.40	0.33	0.22	0.18	0.17	0.17	0.18	0.18	0.17

*Figure 13: Trend of NO<sub>2</sub>, NH<sub>3</sub> and N<sub>2</sub> emissions from 3.B Manure Management*

In 2020 the emissions of NO<sub>2</sub> from Manure Management have decreased by 69.1% compared to 1990. The decrease of NO<sub>2</sub> for the year 2020 is 5.6% compared to year 2019.

#### NMVOCs emissions

The NMVOCs emissions in Manure management are estimated with Tier 2 approach in subcategory 3B1a Dairy cattle and 3B1b Non-dairy cattle. The following formula has been used (EMEP/EEA GB 2019, 3.B Manure Management equation(48)):

$$\text{ENMVOC} = \text{AAP}_{\text{Animal}} \times (\text{ENMVOC}_{\text{silage\_store}} + \text{ENMVOC}_{\text{silage\_feeding}} + \text{ENMVOC}_{\text{housing}} + \text{ENMVOC}_{\text{store}} + \text{ENMVOC}_{\text{appl}} + \text{ENMVOC}_{\text{gra}})$$

The other subcategories (Sheep, Swine, Buffalo, Goats, Horses, Mules and asses, Laying hens, Broilers, Turkeys and Other poultry) the NMVOCs emissions are estimated with Tier 1 approached, using default EFs from EMEP/EEA GB 2019.

The emissions of NMVOCs in Manure management are listed in following tables

**Table 48: NMVOCs emissions from 3.B Manure Management (I)**

Year	NMVOCs emissions from manure management [kt]							
	Dairy cows	Other cattle	Sheeps	Swine	Buffalo	Goats	Horses	Mules and asses
			Without silage					
1990	9.84	7.55	1.41	2.83	0.10	0.24	0.51	0.52
1995	5.80	2.35	0.61	1.36	0.07	0.40	0.53	0.45
2000	6.22	1.96	0.38	0.85	0.04	0.48	0.59	0.34
2005	5.81	2.32	0.28	0.62	0.03	0.36	0.56	0.16
2010	5.05	1.98	0.23	0.47	0.04	0.19	0.57	0.08
2015	4.80	2.52	0.23	0.39	0.04	0.15	0.29	0.05
2016	4.65	2.59	0.23	0.40	0.05	0.14	0.25	0.04
2017	4.45	2.76	0.23	0.41	0.05	0.13	0.26	0.02
2018	4.13	2.83	0.23	0.42	0.06	0.14	0.27	0.03
2019	3.81	2.88	0.22	0.39	0.07	0.14	0.26	0.04
2020	3.88	3.20	0.22	0.37	0.08	0.13	0.22	0.04

**Table 49: NMVOCs emissions from 3.B Manure Management (II)**

	Laying hens	Broilers	Turkeys	Ducks	Geese and other
1990	3.08	1.71	0.77	1.05	0.40
1995	2.21	0.33	0.37	0.50	0.19
2000	1.42	0.53	0.30	0.41	0.16
2005	1.61	0.80	0.25	0.76	0.13
2010	1.37	0.73	0.10	0.65	0.05
2015	1.14	0.73	0.02	0.67	0.04
2016	1.17	0.68	0.01	0.58	0.04
2017	1.16	0.61	0.02	0.68	0.07
2018	1.14	0.70	0.02	0.75	0.10
2019	1.16	0.73	0.01	0.73	0.11
2020	1.17	0.65	0.01	0.72	0.06

**Table 50: Total NMVOCs emissions from 3.B Manure Management**

Total NMVOCs emissions from manure management [kt]											
Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Total	30.01	24.40	22.89	22.95	21.86	21.12	20.97	21.02	21.23	21.24	21.04

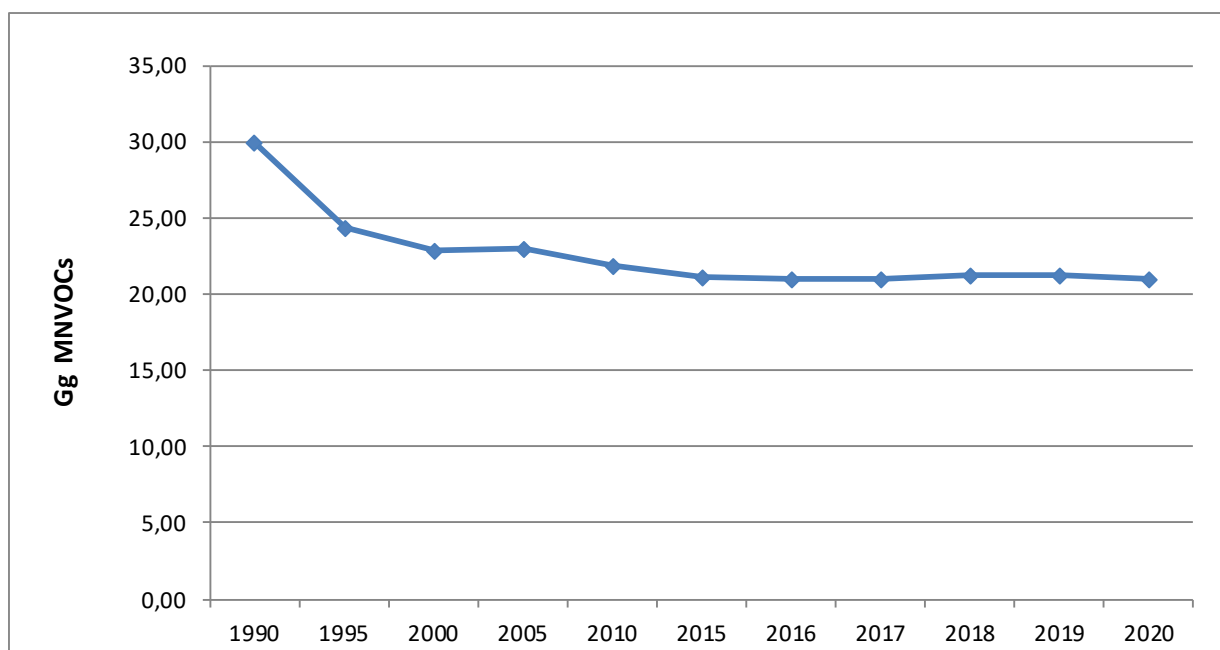


Figure 14: Trend of NMVOCs emissions from 3.B Manure Management

In 2020 the emissions of NMVOCs from Manure Management have decreased by 29.9% compared to 1990. The decrease of NMVOCs for the year 2020 is 0.94% compared to year 2019. Particle (TSP, PM10, PM2.5) emissions

The Particle emissions in Manure management are estimated with Tier1 approach with default EFs from EMEP/EEA GB 2019.

For the calculation of the Particle emissions is necessary the length of the housing period. The data for the distribution of the housing period for Cattle, Sheep, Swine and Poultry are provided from a survey conducted with the Agricultural University of Plovdiv. For the other categories (Buffalos, Goats, Horses, etc.) the default values for length of housing period are used (EMEP/EEA GB 2019, 3.B Manure Management table 3.7), converted into percentages.

Table 51: Livestock housing period

Year	Livestock housing period, [%]						
	Cattle	Sheep	Swine	Poultry	Buffalos	Goats	Horses etc.
1990	80.50	35.00	8.00	100.00	61.64	8.22	49.32
1995	78.40		32.00				
2000	74.80		73.00				
2005	82.90		46.00				
2010	82.80		21.00				
2015	86.50		8.00				
2016	86.50		8.00				
2017	86.50		8.00				
2018	86.50		8.00				
2019	86.50		8.00				
2020	86.50		8.00				

**Table 52: TSP emissions from 3.B Manure Management (I)**

Year	TSP emissions from manure management [kt]							
	Dairy cows	Other cattle	Sheeps	Swine	Buffalo	Goats	Horses	Mules and asses
1990	0.69	0.34	0.41	0.29	0.02	0.00	0.03	0.06
1995	0.42	0.10	0.18	0.56	0.01	0.01	0.03	0.05
2000	0.40	0.08	0.11	0.80	0.01	0.01	0.03	0.04
2005	0.41	0.10	0.08	0.37	0.01	0.01	0.03	0.02
2010	0.35	0.09	0.07	0.13	0.01	0.00	0.03	0.01
2015	0.34	0.11	0.07	0.04	0.01	0.00	0.02	0.01
2016	0.33	0.12	0.07	0.04	0.01	0.00	0.01	0.00
2017	0.31	0.12	0.07	0.04	0.01	0.00	0.01	0.00
2018	0.29	0.13	0.07	0.04	0.01	0.00	0.01	0.00
2019	0.27	0.13	0.06	0.04	0.01	0.00	0.01	0.00
2020	0.26	0.14	0.06	0.04	0.02	0.00	0.01	0.00

**Table 53: TSP emissions from 3.B Manure Management (II)**

Year	TSP emissions from manure management [kt]				
	Laying hens	Broilers	Turkeys	Ducks	Geese and other
1990	3.55	0.63	0.17	0.30	0.20
1995	2.55	0.12	0.08	0.14	0.09
2000	1.63	0.20	0.07	0.12	0.08
2005	1.85	0.30	0.06	0.22	0.06
2010	1.57	0.27	0.02	0.19	0.03
2015	1.31	0.27	0.00	0.19	0.02
2016	1.34	0.25	0.00	0.16	0.02
2017	1.34	0.23	0.00	0.20	0.03
2018	1.32	0.26	0.00	0.22	0.05
2019	1.34	0.27	0.00	0.21	0.05
2020	1.35	0.24	0.00	0.21	0.03

**Table 54: PM10 emissions from 3.B Manure Management (I)**

Year	PM10 emissions from manure management [kt]							
	Dairy cows	Other cattle	Sheeps	Swine	Buffalo	Goats	Horses	Mules and asses
1990	0.31	0.15	0.18	0.04	0.01	0.00	0.01	0.03
1995	0.19	0.05	0.08	0.08	0.01	0.00	0.01	0.02
2000	0.18	0.04	0.05	0.12	0.00	0.00	0.01	0.02
2005	0.19	0.05	0.03	0.05	0.00	0.00	0.01	0.02
2010	0.16	0.04	0.03	0.02	0.00	0.00	0.01	0.00
2015	0.16	0.05	0.03	0.01	0.00	0.00	0.01	0.00
2016	0.15	0.05	0.03	0.01	0.00	0.00	0.01	0.00
2017	0.14	0.06	0.03	0.01	0.01	0.00	0.01	0.00
2018	0.13	0.05	0.03	0.01	0.01	0.00	0.01	0.00
2019	0.12	0.05	0.03	0.01	0.01	0.00	0.01	0.00
2020	0.12	0.06	0.03	0.01	0.01	0.00	0.01	0.00

**Table 55: PM10 emissions from 3.B Manure Management (II)**

Year	PM10 emissions from manure management [kt]				
	Laying hens	Broilers	Turkeys	Ducks	Geese and other
1990	0.75	0.32	0.17	0.30	0.20
1995	0.54	0.06	0.08	0.14	0.09
2000	0.34	0.10	0.07	0.12	0.08
2005	0.39	0.15	0.06	0.22	0.06
2010	0.33	0.13	0.02	0.19	0.03
2015	0.28	0.13	0.00	0.19	0.02
2016	0.28	0.13	0.00	0.16	0.02
2017	0.28	0.11	0.00	0.20	0.03
2018	0.28	0.13	0.00	0.22	0.05
2019	0.28	0.14	0.00	0.21	0.05
2020	0.28	0.12	0.00	0.21	0.03

**Table 56: PM2.5 emissions from 3.B Manure Management (II)**

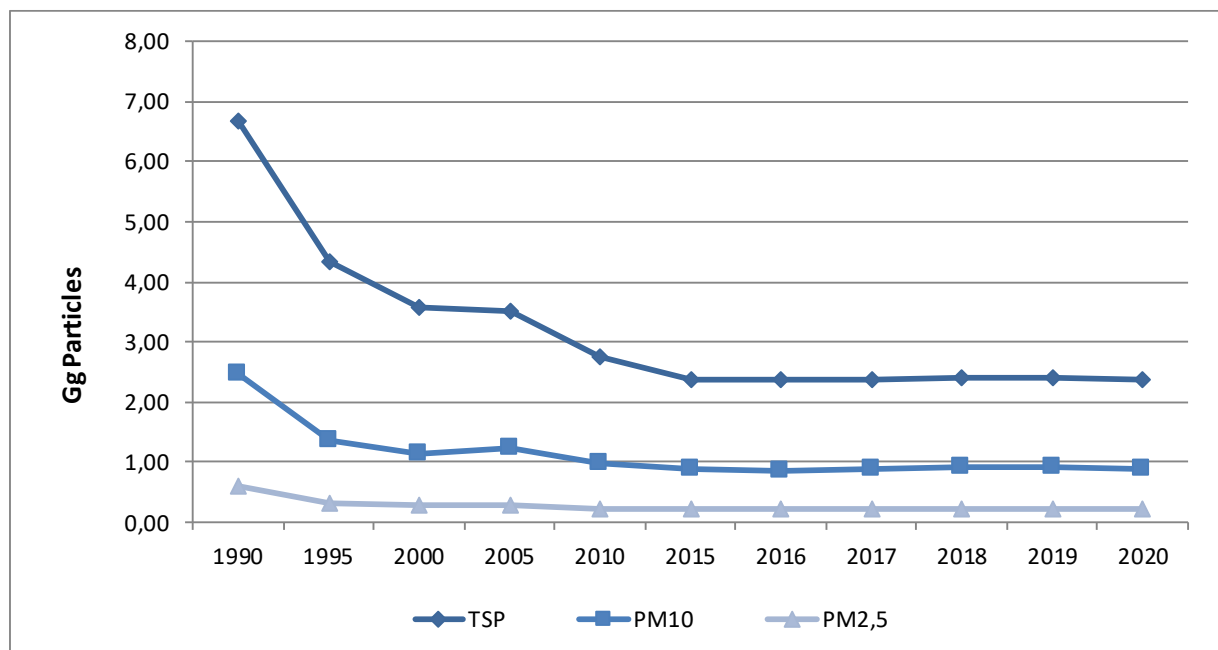
Year	PM2.5 emissions from manure management [kt]							
	Dairy cows	Other cattle	Sheeps	Swine	Buffalo	Goats	Horses	Mules and asses
1990	0.20	0.10	0.06	0.00	0.01	0.00	0.01	0.02
1995	0.12	0.03	0.03	0.00	0.00	0.00	0.01	0.02
2000	0.12	0.02	0.02	0.01	0.00	0.00	0.01	0.01
2005	0.12	0.03	0.01	0.00	0.00	0.00	0.01	0.01
2010	0.10	0.03	0.01	0.00	0.00	0.00	0.01	0.00
2015	0.10	0.03	0.01	0.00	0.00	0.00	0.00	0.00
2016	0.10	0.04	0.01	0.00	0.00	0.00	0.00	0.00
2017	0.09	0.04	0.01	0.00	0.00	0.00	0.00	0.00
2018	0.09	0.04	0.01	0.00	0.00	0.00	0.00	0.00
2019	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00
2020	0.08	0.04	0.01	0.00	0.01	0.00	0.00	0.00

**Table 57: PM2.5 emissions from 3.B Manure Management (II)**

Year	PM2.5 emissions from manure management [kt]				
	Laying hens	Broilers	Turkeys	Ducks	Geese and other
1990	0.06	0.03	0.03	0.04	0.02
1995	0.04	0.01	0.02	0.02	0.01
2000	0.03	0.01	0.01	0.02	0.01
2005	0.03	0.01	0.01	0.03	0.01
2010	0.02	0.01	0.00	0.03	0.00
2015	0.02	0.01	0.00	0.03	0.00
2016	0.02	0.01	0.00	0.02	0.00
2017	0.02	0.01	0.00	0.03	0.00
2018	0.02	0.01	0.00	0.03	0.01
2019	0.02	0.01	0.00	0.03	0.01
2020	0.02	0.01	0.00	0.03	0.00

**Table 58: Total Particle emissions from 3.B Manure Management**

Total Particle emissions from manure management [kt]											
Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Total TSP	6.69	4.35	3.58	3.52	2.76	2.39	2.37	2.37	2.40	2.41	2.37
Total PM10	2.47	2.36	1.13	1.23	0.97	0.88	0.85	0.87	0.91	0.91	0.88
Total PM2.5	0.58	0.31	0.27	0.28	0.23	0.22	0.21	0.21	0.21	0.21	0.21

*Figure 15: Trend of Particle emissions from 3.B Manure Management*

In 2020 the Particle emissions from Manure Management have decreased respectively with 64.6% for TSP, 64.4% for PM10 and 63.8% for PM2.5 compared to 1990. The decrease for 2020 is 1.7% compared to previous year for TSP. Emissions for PM10 and PM2.5 have decrease respectively with 3.3% and 1.1% compared with 2019.

The rapid decrease in the period 1990-1995 is consequence of a reform in agricultural holdings during this period. The overall reduction is caused by a decrease in total numbers of animals.

#### **Source specific QA/QC and verification**

All activities regarding QC as described in QA/QC System have been undertaken in Agriculture (NFR sector 3).

The following sector specific QA/QC procedures have been carried out:

Check of methodology, emissions, emission factors (time series)

Time series consistency

Plausibility checks of dips and jumps

Documentation and archiving of all information required in IIR,

Background documentation and archive

#### **Source specific recalculations**

1. NH<sub>3</sub> and NO<sub>2</sub> emissions in Manure management are estimated for the whole time series using Tier 2 approach and N-flow Manure management tool according EMEP/EEA Air pollution emission inventory Guidebook 2019. NH<sub>3</sub> and NO<sub>2</sub> emissions are calculated on

the basis of the amount of total ammoniacal nitrogen (TAN). During the 2021 and 2020 reviews TERT noted that Bulgaria utilises a Tier 1 method, which is not best practice, and could result in over-estimate of emissions that is above the threshold of significance. The TERT agreed with the revised estimate provided by Bulgaria during the 2021 review.

2. The emissions of NMVOCs in Manure management for categories 3B1a and 3B1b was recalculated for the whole timeseries, using Tier 2 methodology. The revised estimated utilizes the values for MJ feed intake reported in the NIR and CRF of the greenhouse gas inventory (Eq. 10.16/IPCC GB) and the emission factors presented in Table 3.11 Chapter 3B of the 2019 EMEP/EEA GB

#### Source specific planned improvements

- To improve the accuracy of the estimates in Agriculture (NFR sector 3).
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

### CROP PRODUCTION AND AGRICULTURAL SOILS (NFR 3D)

This section describes the estimations of emissions from NH<sub>3</sub>, NO, NMVOCs and PM from crop production and agricultural soils.

#### Methodological issues

The emissions NH<sub>3</sub> in subsector 3Da N fertilisers (includes urea) are estimated with Tier 2 due to EMEP/EEA GB 2019 (please see Table 3.2 EMEP/EEA GB 2019). The NO<sub>2</sub> emissions from Inorganic N fertilisers (includes urea) are estimated with Tier 1 approach with default EFs from EMEP/EEA GB 2019.

The emissions NH<sub>3</sub> and NO<sub>2</sub> in subsectors 3Da2a and 3Da3 (Animal manure applied to soils and Urine and dung deposited by grazing animals) are estimated using Tier 2 approach according EMEP/EEA GB 2019 and the calculations are basis of the amount of total ammoniacal nitrogen (TAN).

The emissions NMVOCs and PM are estimated with Tier 1 approach with default Efs from EMEP/EEA Air pollutant emission inventory Guidebook 2019. The following formula has been used (EMEP/EEA GB 2019, 3.D Crop production and agricultural soils (2)):

$E_{\text{pollutant}} = A_{\text{area}} \times EF_{\text{pollutant}}$

Where  $E_{\text{pollutant}}$  is the amount of pollutant emitted (in kg a<sup>-1</sup>);  $A_{\text{area}}$  is the area covered by crop (in ha); and  $EF_{\text{pollutant}}$  is the EF of pollutant (in kg ha<sup>-1</sup> a<sup>-1</sup>).

### Inorganic N fertilisers (includes urea) (NFR 3Da1)

#### Activity data

Have been provided every year with official letters by Bulgarian Food Safety agency (1990-2016). Since 2017-present it's provided with official letter by Ministry of Agriculture, Food and Forestry.

The DATA are available in Eurostat (please follow the link): [https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=aei\\_fm\\_usefert&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=aei_fm_usefert&lang=en)

**Table 59: Amount of N applied in fertilizer**

Amount of N applied in fertilizer [kt N/year]											
Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Amount of N	395.94	129.55	144.93	159.51	199.08	341.61	365.91	351.12	339.32	352.49	364.34

## Emissions factors

The emission factor used for estimation the emissions in Inorganic N fertilisers (includes urea) is listed in following table.

Table 60: Default EF for NH<sub>3</sub> and NO

NFR	Description	EFs	
3Da1	Inorganic N fertilisers (includes urea)	NH <sub>3</sub> (Tier 2)	Table 3.2 EMEP/EEA GB 2019
		NO (Tier 1)	0.04

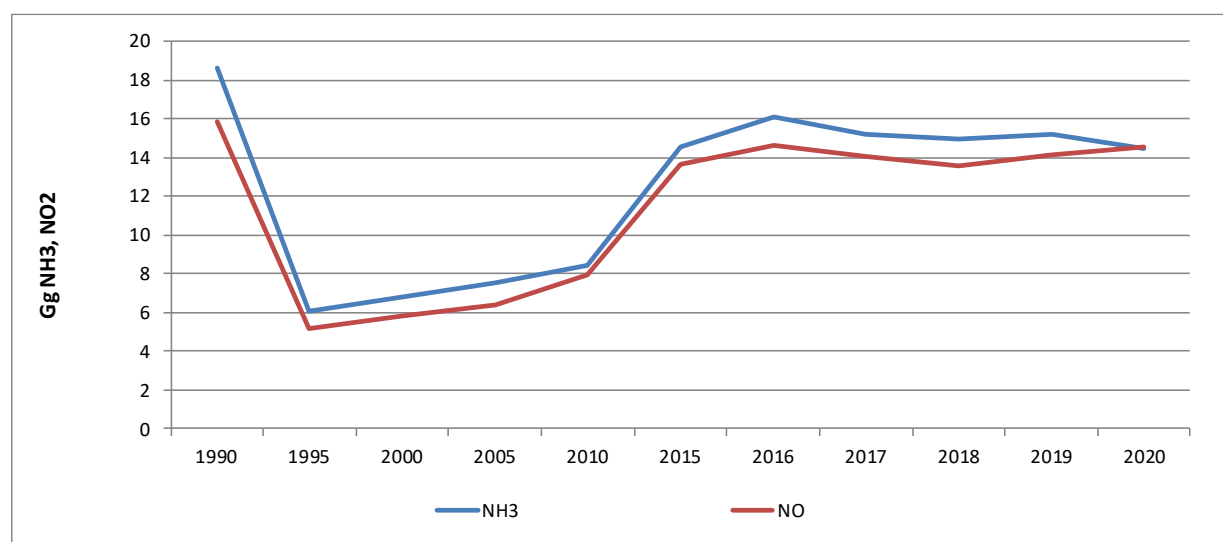
## Emissions

The NH<sub>3</sub> emissions from Inorganic N fertilisers (includes urea) are estimated with Tier 2. The NO emissions from Inorganic N fertilisers (includes urea) are estimated with Tier1 approach with default EFs from EMEP/EEA GB 2019.

The emissions of NH<sub>3</sub> and NO from Inorganic N fertilisers (includes urea) are listed in following table:

Table 61: NH<sub>3</sub> and NO emissions from 3Da1 Inorganic N fertilisers (includes urea)

Year	NH <sub>3</sub> [kt](Tier 2)	NO[kt](Tier 1)
1990	18.62	15.85
1995	6.09	5.18
2000	6.81	5.80
2005	7.50	6.38
2010	8.45	7.96
2015	14.56	13.66
2016	16.06	14.63
2017	15.21	14.04
2018	14.97	13.57
2019	15.18	14.10
2020	14.49	14.57

Figure 16: Trend NH<sub>3</sub> and NO from 3Da1 Inorganic N fertilisers

In 2020 the NH<sub>3</sub> and NO emissions from 3Da1 Inorganic N fertilisers (includes urea) have decreased with 30.21% compared to 1990 and decreased with 1.18% compared to 2019.

## NH<sub>3</sub> and NO<sub>2</sub> emissions from livestock manure applied or deposited to soil (NFR 3Da2a&3Da3)

NH<sub>3</sub> and NO<sub>2</sub> emissions were calculated using the Manure Management N-flow tool provided to the EMEP/EEA Guidebook (EEA, 2019), similarly, to the calculation of emissions from housing, storage and yards.

**Table 62: NH<sub>3</sub> and NO emissions from 3Da2a Animal manure applied to soils**

Year	NH <sub>3</sub> [kt]	NO[kt]
1990	32.45	5.34
1995	14.72	2.57
2000	10.12	1.91
2005	9.95	1.78
2010	8.83	1.51
2015	8.64	1.41
2016	8.78	1.42
2017	8.80	1.41
2018	8.77	1.40
2019	8.48	1.35
2020	9.94	1.59

**Table 63: NH<sub>3</sub> and NO emissions from 3Da3 Urine and dung deposited by grazing animals**

Year	NH <sub>3</sub> [kt]	NO[kt]
1990	10.88	6.07
1995	5.09	2.68
2000	4.13	1.97
2005	3.69	1.67
2010	3.22	1.41
2015	2.94	1.38
2016	2.91	1.38
2017	2.91	1.38
2018	2.89	1.37
2019	2.84	1.35
2020	3.16	1.55

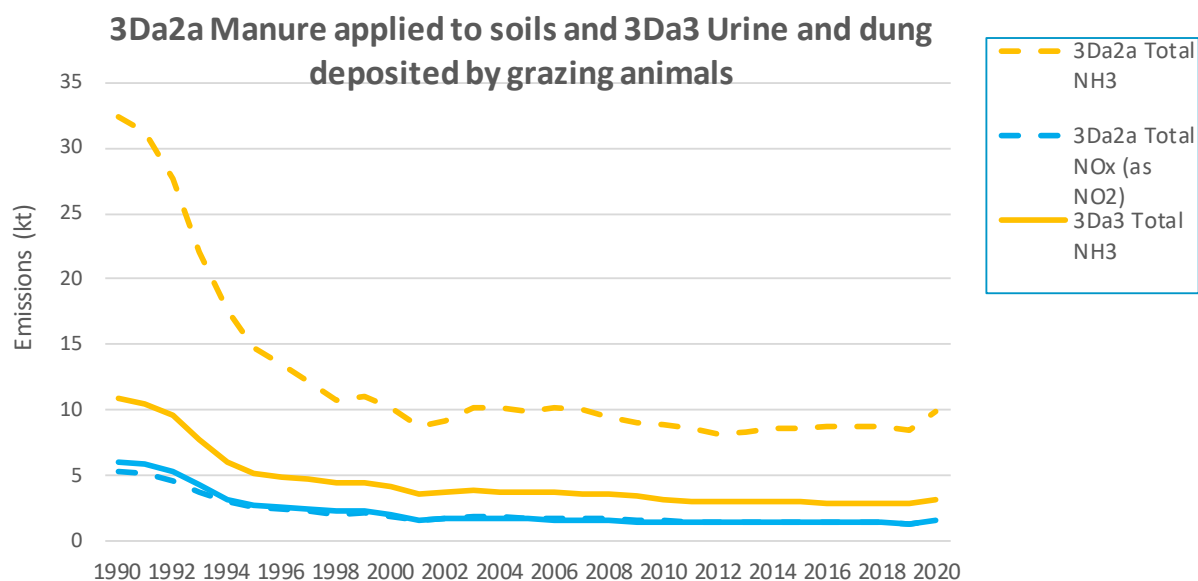


Figure 17: Trend NH<sub>3</sub> and NO<sub>x</sub> from subsectors 3Da2a and 3Da3

## Sewage sludge spreading (NFR 3Da2b)

### Activity data

At the national level the data on the sludge are collecting according several regulations and orders.

Each year waste wastewater treatment plants have provided in the Executive Environment Agency (ExEA) annual reports for the previous year. Also ExEA receive data from Basin Directorates for the new wastewater treatment plants and information about the technology that they use for wastewater treatment.

ExEA summarizing the information and every year published official report on the use of sewage sludge in agriculture - <https://eea.government.bg/bg/nsmos/waste/dokladi> (available only on Bulgarian).

Annual amount of sewage sludge applied to soil in Bulgaria have been calculated since 2006 year. Before 2006 that activity did not occur in the country due to available local legalisation.

**Table 64: Amount Sewage Sludge applied to soil**

Year	Amount Sewage Sludge applied to soil [kt]
2006	11.10
2007	5.91
2008	10.90
2009	16.64
2010	13.64
2011	17.56
2012	21.24
2013	16.68
2014	16.36
2015	30.44
2016	26.23
2017	22.52
2018	29.79
2019	25.67
2020	25.99

**Table 65: Amount of N in Sewage Sludge applied to soil**

Year	Amount of N in Sewage Sludge applied to soil [kg]
2006	432726
2007	230518
2008	425150
2009	649123
2010	532116
2011	684879
2012	828399
2013	650520
2014	638157
2015	1187332
2016	1022949
2017	878326
2018	1162083
2019	1000938
2020	1013782

Emissions factors

**Table 66: Default EF for Sewage Sludge applied to soil** (3.D Crop production and agricultural soils, page 12, Table 3.1(NH<sub>3</sub>) and page 29, Annex 2 (NO<sub>2</sub>) EMEP/EEA GB 2019).

Pollutant	EF
NH <sub>3</sub> from Sewage sludge	0.13 kgNH <sub>3</sub> (kg N applied)-1
NO from Sewage sludge	0.04 kgNO <sub>2</sub> (kg N applied)-1

Emissions

The NH<sub>3</sub> and NO<sub>2</sub> emissions from Sewage sludge are estimated with Tier1 approach with default EFs from EMEP/EEA GB 2019.

The emissions of NH<sub>3</sub> and NO<sub>2</sub> from Sewage sludge are listed in following table.

**Table 67: NH<sub>3</sub> and NO<sub>2</sub> in Sewage sludge**

Year	NH <sub>3</sub> and NO <sub>2</sub> in Sewage sludge [kt]	
	NH <sub>3</sub>	NO <sub>2</sub>
2006	0.06	0.02
2007	0.03	0.01
2008	0.06	0.02
2009	0.08	0.03
2010	0.07	0.02
2011	0.09	0.03
2012	0.11	0.03
2013	0.08	0.03
2014	0.08	0.03
2015	0.15	0.05
2016	0.13	0.04
2017	0.11	0.04
2018	0.15	0.05
2019	0.13	0.04
2020	0.13	0.04

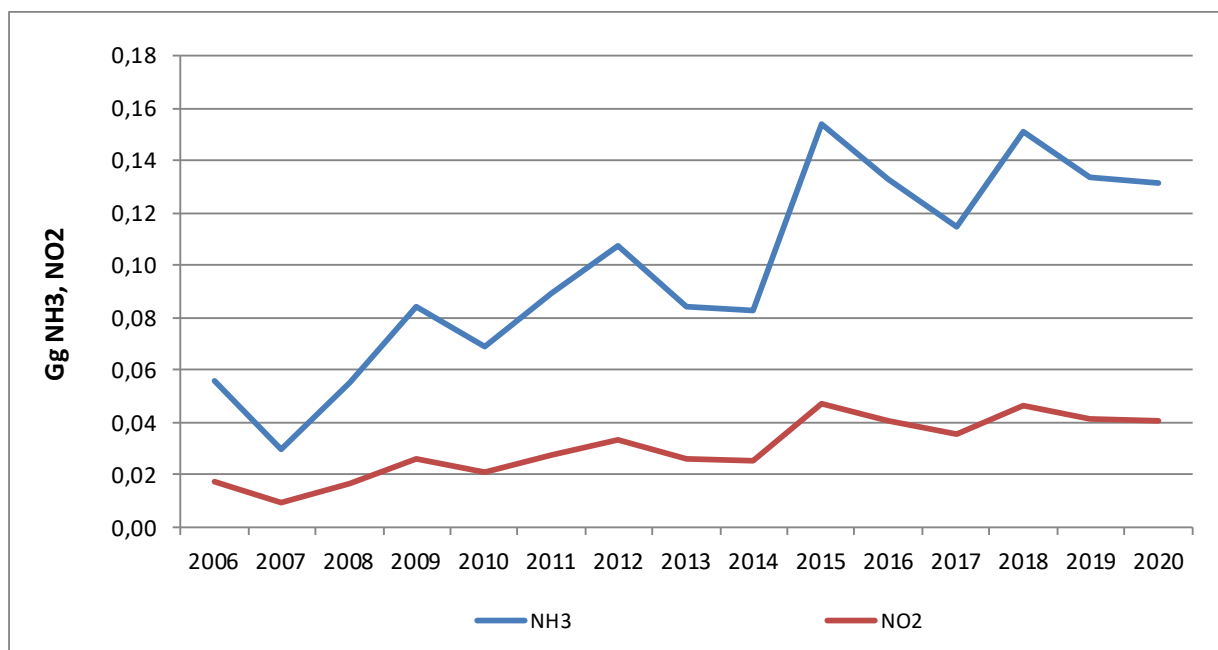


Figure 18: Trend of NH3 and NO2 emissions from Sewage sludge

## CULTIVATED CROPS (NFR 3DE)

### Activity data

The data have been obtained from Ministry from agriculture, food and forestry and from the CRF table 4.B.1 chapter LULUCF (for more information please see Bulgaria's National Inventory Report chapter LULUCF).

**Table 68: Area covered by crop**

Year	Area covered by crop [kha]
1990	5947.95
1995	5917.13
2000	5582.58
2005	5526.31
2010	6033.52
2015	5653.63
2016	5676.06
2017	5678.54
2018	5709.16
2019	5717.21
2020	5736.10

For category 3De, pollutant NMVOC for all years, we used the EF value for wheat, rye, rape and grass based on the average annual temperature of Bulgaria according Table 3.3 EMEP GB 2019. The emissions of NMVOC from remaining crop types are estimating using a Tier 1 approach.

**Table 69: Default EF for NMVOCs for 3De cultivated crops***(3.D Crop production and agricultural soils, table 3.1 EMEP/EEA GB 2019).*

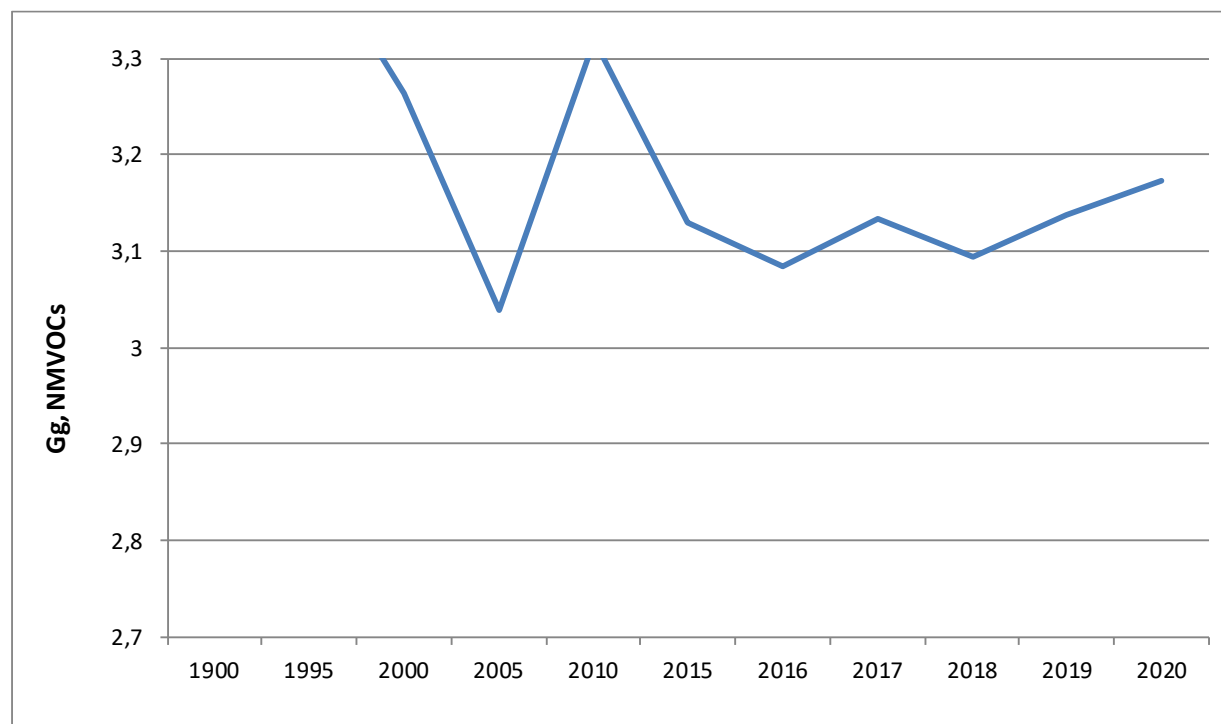
NFR	Description	EF[kg ha <sup>-1</sup> ]
3De	Cultivated crops	0.86

## Emissions

The NMVOCs emissions from Cultivated crops are listed in following table.

**Table 70: Emissions NMVOCs from 3De cultivated crops**

Year	Emissions NMVOCs from 3De cultivated crops [kt]
1990	3.55
1995	3.42
2000	3.26
2005	3.04
2010	3.32
2015	3.13
2016	3.08
2017	3.13
2018	3.09
2019	3.14
2020	3.17

*Figure 19: Trend of NMVOCs emissions from Cultivated crops*

The trend of the NMVOCs emissions in this section is due to the trend of cropland area.

## FARM-LEVEL AGRICULTURAL OPERATIONS INCLUDING STORAGE, HANDLING AND TRANSPORT OF AGRICULTURAL PRODUCTS (NFR 3DC).

Emissions factors

**Table 71: Default EF for TSP, PM10 and PM2.5 for 3Dc Agricultural operations**

(3.D Crop production and agricultural soils, table 3.1 EMEP/EEA GB 2019).

NFR	Description	EF[kg ha-1]
3Dc	Agricultural operations	TSP-1.56
		PM10-1.56
		PM2.5-0.06

Emissions

The TSP, PM10 and PM2.5 emissions from Agricultural operations are estimated with Tier1 approach with default EFs from EMEP/EEA GB 2019.

The TSP, PM10 and PM2.5 emissions from Agricultural operations are listed in following table.

**Table 72: TSP, PM10 and PM2.5 emissions from Agricultural operations.**

Year	PM2.5 emissions from Agricultural operations [Kt]	PM10 emissions from Agricultural operations [Kt]	TSP emissions from Agricultural operations [Kt]
1990	0.25	6.61	6.61
1995	0.24	6.18	6.18
2000	0.23	5.94	5.94
2005	0.21	5.41	5.41
2010	0.20	5.27	5.27
2015	0.20	5.24	5.24
2016	0.20	5.23	5.23
2017	0.20	5.23	5.23
2018	0.20	5.22	5.22
2019	0.20	5.27	5.27
2020	0.20	5.27	5.27

The emissions PM10 and TSP are the exact same due to the same EFs.

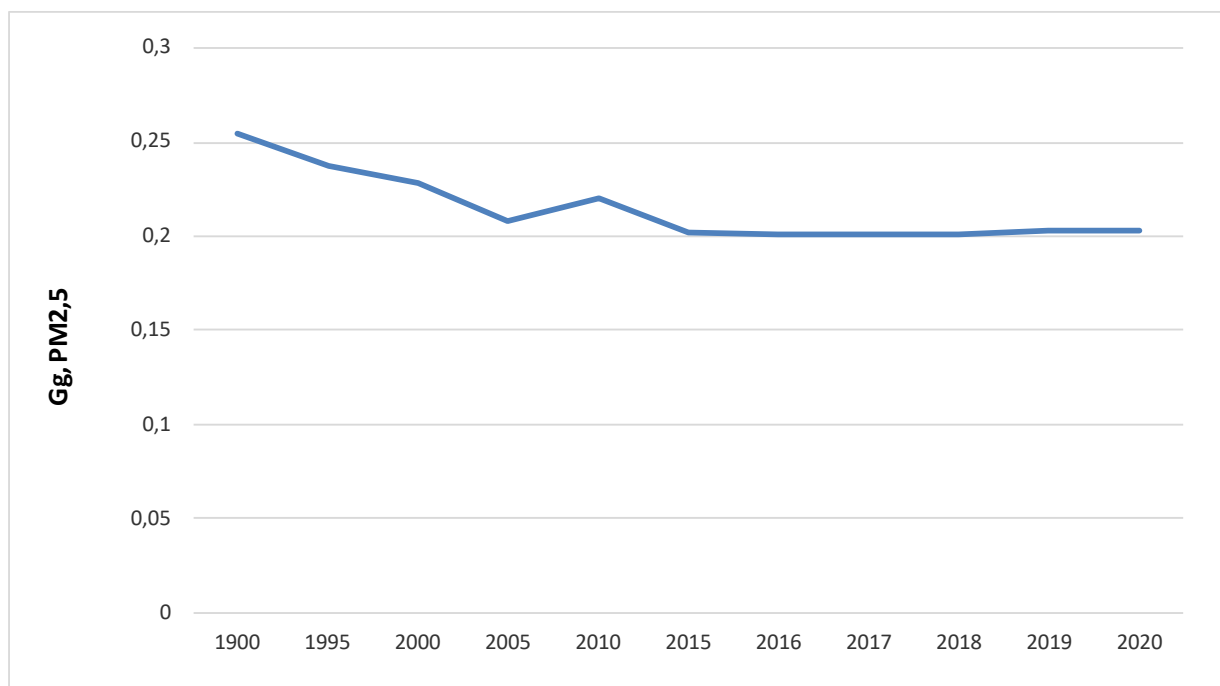


Figure 20: Trend of PM2.5 emissions from Agricultural operations

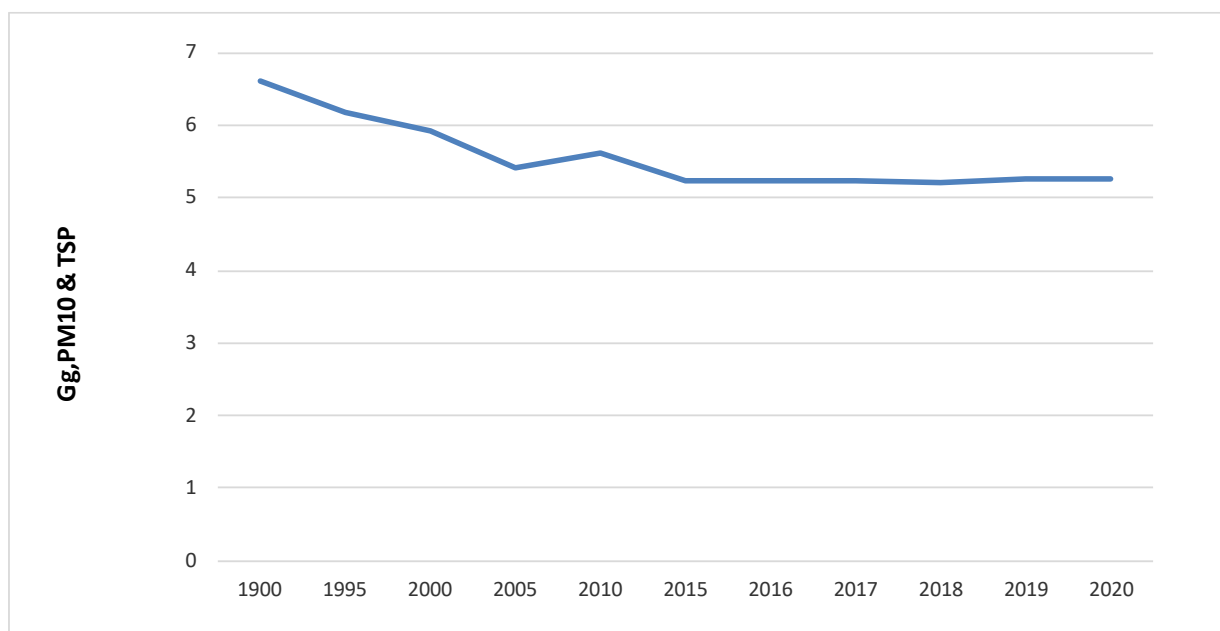


Figure 21: Trend of PM10 & TSP emissions from Agricultural operations

#### Source specific QA/QC and verification

- All activities regarding QC as described in QA/QC System have been undertaken in Agriculture (NFR sector 3).
- The following sector specific QA/QC procedures have been carried out:
- Check of methodology, emissions, emission factors (time series)
- Time series consistency
- Plausibility checks of dips and jumps
- Documentation and archiving of all information required in IIR,
- Background documentation and archive

**Source specific recalculations**

- In submission 2022 the emissions of NH<sub>3</sub> and NO<sub>2</sub> from subsectors 3Da2a and 3Da3 have been estimated using Tier 2;
- For 2019 the activity data for amount of sewage sludge have been revised;
- The activity data for cropland area in subsector 3Dc have been revised for the whole time series (please see CRF table 4B)
- Bulgaria provides a revised estimate for category 3De, pollutant NMVOC for all years, in which we used the EF's value for grass at 15 degrees Celsius (Table 3.3 EMEP GB 2019), based on the average annual temperature of Bulgaria. The activity data for cropland area are also revised.

**Source specific planned improvements**

- To improve the accuracy of the estimates in Agriculture (NFR sector 3).
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

**FIELD BURNING AND AGRICULTURAL RESIDUES (3F)**

Burning of crop residues leads to the emission of a number of atmospheric pollutants listed in Table 763.

**Methodological issues**

The emissions from Field burning are estimated with Tier 1 approach with default emission factors from EMEP/EEA Air pollutant emission inventory Guidebook 2019. The following formula has been used ( EMEP/EEA GB 2019, 3.F Field burning and agricultural residues equation(1)):

$$E_{\text{pollutant}} = AR_{\text{residue\_burnt}} \cdot EF_{\text{pollutant}}$$

Where:

$E_{\text{pollutant}}$  = emission (E) of pollutant (kg),

$AR_{\text{residue\_burnt}}$  = activity rate (AR), mass of residue burnt (kg dry matter),

$EF_{\text{pollutant}}$  = emission factor (EF) for pollutant (kg kg<sup>-1</sup> dry matter).

**Activity data**

According to EMEP/EEA GB 2019 activity data should include estimates of land areas for each crop type, which are then used to estimate residues that are commonly burned, the fraction of residue burned and the dry matter content of residue. Expressed formally, the mass of crop residue burned can be calculated with the following equation:

$$AR_{\text{residue\_burnt}} = A \cdot Y \cdot s \cdot d \cdot pb \cdot Cf$$

Where A (ha) is the area of land on which crops are grown whose residues are burned, Y (kg ha<sup>-1</sup> fresh weight) is the average yield of those crops (e.g. grain), s is the ratio between the mass of crop residues and the crop yield, d is the dry matter content of that yield, pb is proportion of those residues that are burned (as opposed to being incorporated in the soil, consumed by livestock on the field or removed from the field for use elsewhere) and Cf is the combustion factor (proportion of the fuel present at the time of the fire that is actually burned).

Despite field burning is prohibited by the Bulgarian law, this “tradition” continues. The estimations are based on the expert judgement that 3% of the vegetal residues, left on the fields after yielding the crops, are burned.

**Table 73: Area of cropped land (ha)**

	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Wheat	1162775	1181115	978575	1101807	1131565	1105916	1192589	1144519	1212012	1198682	1200175
Barley	359950	369211	251962	264519	245328	175957	159830	128365	103570	112029	130757
Maize	424428	475256	466475	298713	327525	498644	406942	398152	444623	560911	581532
Oats	35225	35715	40600	30571	24353	11076	15323	13266	11339	12153	13397
Rye	24499	14183	21200	8782	10795	6304	7468	8237	8316	6097	5352
Rice	10590	1380	3571	4501	11977	12410	11988	10434	11004	11822	12349
Maize for silage	424317	64081	57758	32211	20314	26555	31102	29930	27242	27500	30439
Bean	39381	42747	30762	8552	1410	3314	2410	2749	1809	1396	2254
Peas	38138	6723	5500	1402	1981	8758	18286	766	479	919	870
Soya	16816	15113	3000	272	725	34468	14162	11530	2315	3862	4510
Chick peas	4600	3794	2500	593	911	2466	4722	22564	59841	11373	4076
Lentils	7720	2301	3500	2064	2879	1449	3853	4471	3179	1273	1432
Potatoes	41000	56000	53000	23999	13805	11017	8376	12806	14096	9291	9946
Sugar beet	36479	9378	2210	1294	0	0	0	0	0	0	0
Cotton	8995	11482	9260	1119	558	2171	4490	4805	3157	3461	3280
Feet beet	310000	286000	341000	87302	337313	117853	140679	172723	183218	165052	138988
Peanuts	11738	12167	600	1094,3	519	222	222	443	605	471	636
Sunflower	280203	586009	511015	635003	729889	810841	817511	898844	788656	815561	821922
Tobacco	52897	14254	28523	40869	24518	13360	9963	7721	5812	3536	3186
Alfalfa	399576	172818	150741	64851	74832	64802	84685	88182	91592	69361	92075

**Table 74: Area of land on which crops are grown whose residues are burned (A) (ha)**

	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020
Wheat	34883	35433	29357	33054	33947	33177	35778	34336	36360	35960	36005
Barley	10799	11076	7559	7936	7360	5279	4795	3851	3107	3361	3923
Maize	12733	14258	13994	8961	9826	14959	12208	11945	13339	16827	17446
Oats	1057	1071	1218	917	731	332	460	398	340	365	402
Rye	735	425	636	263	324	189	224	247	249	183	161
Rice	318	41	107	135	359	372	360	313	330	355	370
Maize for silage	12730	1922	1733	966	609	797	933	898	817	825	913
Bean	1181	1282	923	257	42	99	72	82	54	42	68
Peas	1144	202	165	42	59	263	549	23	14	28	26
Soya	504	453	90	8	22	1034	425	346	69	116	135
Chick peas	138	114	75	18	27	74	142	677	1795	341	122
Lentils	232	69	105	62	86	43	116	134	95	38	43
Potatoes	1230	1680	1590	720	414	331	251	384	423	279	298
Sugar beet	1094	281	66	39	0	0	0	0	0	0	0
Cotton	270	344	278	34	17	65	135	144	95	104	98
Feet beet	9300	8580	10230	2619	10119	3536	4220	5182	5497	4952	4170
Peanuts	352	365	18	33	16	7	7	13	18	14	19
Sunflower	8406	17580	15330	19050	21897	24325	24525	26965	23660	24467	24658
Tobacco	1587	428	856	1226	736	401	299	232	174	106	96
Alfalfa	11987	5185	4522	1946	2245	1944	2541	2645	2748	2081	2762

Default values for s, d, Y, Cf, d and pb are used. d=0.85 pb=1, for wheat: Y=3.6, Cf=0.9; for maize: Y=11.8, Cf=0.8; for rice: Y=4.6, Cf=0.8.

**Table 75: Default values Ratio of residue mass to crop yield (s)**

Crop	Ratio of residue mass to crop yield (s)
Wheat	1.3
Barley	1.2
Maize	1.0
Oats	1.3
Rye	1.6
Rice	1.4
Peas	1.5
Beans	2.1
Soya	2.1

For crops other than wheat, maize and rice the default values are used.

**Table 76: Activity rate (AR), mass of residue burnt (Total for all crops) (kg dry matter)**

Activity AR (kg dry matter)	
1990	512223,5
1995	434240,4
2000	389121,9
2005	323287,1
2010	363328,8
2015	384086,7
2016	374473,3
2017	376064,1
2018	383303,4
2019	402389,4
2020	409915,1

To estimation the emissions from Field burning of agricultural wastes the default emissions factors presented in EMEP/EEA GB 2019 table 3-1 3F Field burning of agricultural wastes are used.

**Table 77: Default emission factors for 3F Field burning of agricultural wastes**

Pollutant	Value	Unit
NO <sub>x</sub>	0,0023	kg kg-1 dry matter
CO	0.0667	kg kg-1 dry matter
NMVOCs	0,0005	kg kg-1 dry matter
SO <sub>x</sub>	0,0005	kg kg-1 dry matter
NH <sub>3</sub>	0,0024	kg kg-1 dry matter
TSP	0,0058	kg kg-1 dry matter
PM <sub>10</sub>	0,0057	kg kg-1 dry matter
PM <sub>2.5</sub>	0.0054	kg kg-1 dry matter
BC	500	mg kg-1 dry matter
Pb	0,11	mg kg-1 dry matter
Cd	0,88	mg kg-1 dry matter
Hg	0,14	mg kg-1 dry matter
As	0,0064	mg kg-1 dry matter
Cr	0,08	mg kg-1 dry matter
Cu	0,073	mg kg-1 dry matter
Ni	0,052	mg kg-1 dry matter
Se	0,02	mg kg-1 dry matter
Zn	0,56	mg kg-1 dry matter
PCDD/F	0,500	µg I-TEQ t-1
Benzo(a)pyrene	0,393	mg kg-1 dry matter
Benzo(b)fluoranthene	1,097	mg kg-1 dry matter
Benzo(k)fluoranthene	0.468	mg kg-1 dry matter
Indeno(1,2,3-cd)pyrene	0.336	mg kg-1 dry matter

**Table 78: Emissions from 3F Field burning of agricultural wastes**

Pollutant/Year	1990	1995	2000	2005	2010	2015	2016	2017	2018	2019	2020	Unit
NO <sub>x</sub>	0,0012	0,0010	0,0009	0,0007	0,0008	0,0009	0,0009	0,0009	0,0009	0.00093	0.0009	kt
NMVOCs	0,0003	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0.00020	0.0002	kt
SO <sub>x</sub>	0,0003	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0.00020	0.0002	kt
NH <sub>3</sub>	0,0012	0,0010	0,0009	0,0008	0,0009	0,0009	0,0009	0,0009	0,0009	0.00097	0.0010	kt
PM <sub>2.5</sub>	0,0028	0,0023	0,0021	0,0017	0,0020	0,0021	0,0020	0,0020	0,0020	0.00217	0.00221	kt
PM <sub>10</sub>	0,0029	0,0025	0,0022	0,0018	0,0021	0,0022	0,0021	0,0021	0,0022	0.00229	0.002	kt
TSP	0,0030	0,0025	0,0023	0,0019	0,0021	0,0022	0,0022	0,0022	0,0022	0.00233	0.002	kt
BC	0,0003	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0.00020	0.0002	kt
CO	0,0342	0,0290	0,0260	0,0216	0,0242	0,0256	0,0250	0,0251	0,0256	0.02684	0.03	kt
Pb	0,0001	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0.00004	0.00	t
Cd	0,0005	0,0004	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0.00035	0.00	t
Hg	0,0001	0,0001	0,0001	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0.00006	0.00	t
As	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0.00000	0.00	t
Cr	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0.00003	0.00	t
Cu	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0.00003	0.00	t
Ni	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0.00002	0.00	t
Se	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0.00001	0.00	t
Zn	0,0003	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0.00023	0.00	t
PCDD/F	0,2561	0,2171	0,1946	0,1616	0,1817	0,1920	0,1872	0,1880	0.1917	0.20119	0.20	g I-TEQ
Benzo(a)pyrene	0.0002	0.0002	0.0002	0.0001	0.0001	0.0002	0.0001	0.0001	0.0002	0.00016	0.00	t
Benzo(b)fluoranthene	0.0006	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.00044	0.00	t
Benzo(k)fluoranthene	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.00019	0.00	t
Indeno(1,2,3-cd)pyrene	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00014	0.00	t

#### Source specific QA/QC and verification

All activities regarding QC as described in QA/QC System have been undertaken in Agriculture (NFR sector 3).

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series)
- Time series consistency
- Plausibility checks of dips and jumps
- Documentation and archiving of all information required in IIR,
- Background documentation and archive

#### **Source specific recalculations**

No source-specific recalculations were made.

#### **Source specific planned improvements**

- To improve the accuracy of the estimates in Agriculture (NFR sector 3).
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

## CHAPTER 6. WASTE (NFR SECTOR 5)

### OVERVIEW OF SECTOR

This Chapter includes information on the estimating emissions of NEC gases, CO, heavy metals, persistent organic pollutants and particulate matter, as well as references of activity data and emissions factors concerning waste management and treatment activities reported under NFR Category 5 Waste.

The following categories are included in this sector:

- Biological treatment of waste - Solid waste disposal on land (NFR 5A);
- Biological treatment of waste – Composting (NFR 5B1)
- Biological treatment of waste – Anaerobic digestion at biogas facilities (NFR 5B2)
- Municipal waste incineration (5C1a)
- Industrial waste incineration (NFR 5C1bi)
- Hazardous waste incineration (NFR 5C1bii)
- Clinical waste incineration (NFR 5C1biii)
- Sewage sludge incineration (5C1biv)
- Cremation (NFR 5C1bv)
- Other waste incineration (5C1bvi)
- Open burning of waste (5C2)
- Domestic wastewater handling (NFR 5D1)
- Industrial wastewater handling (NFR 5D2)
- Other wastewater handling (NFR 5D3)
- Other waste (NFR 5E)

### SOURCE SPECIFIC QA/QC AND VERIFICATION

All activities regarding QC as described in QA/QC System have been undertaken in Waste (NFR sector 5).

The following sector specific QA/QC procedures have been carried out:

- Check of methodology, emissions, emission factors (time series),
- Time series consistency,
- Plausibility checks of dips and jumps,
- Improvement of the accuracy of the estimates in Waste (NFR sector 5),
- Improvement of transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory,
- Documentation and archiving of all information required in IIR,
- Background documentation and archive.

**Table 79: Waste (NFR SECTOR 5)**

NFR code	Category	Pollutant	Calculations
5A	Solid waste disposal on land	NMVOC; PM <sub>2.5</sub> ; PM <sub>10</sub> ; TSP	√
5B1	Biological treatment of waste-Composting	NH <sub>3</sub> ; CO	√

NFR code	Category	Pollutant	Calculations
5B2	Biological treatment of waste-anaerobic digestion at biogas facilities		NE
5C1a	Municipal waste incineration		NO
5C1bi	Industrial waste incineration	NO <sub>x</sub> ; NMVOC; SO <sub>x</sub> ; PM <sub>2.5</sub> ; PM <sub>10</sub> ; TSP; BC; CO; Pb; Cd; Hg; As; Ni; PCDD/F; PAHs; HCB	√
5C1bii	Hazardous waste incineration		IE
5C1biii	Clinical waste incineration	NO <sub>x</sub> ; NMVOC; SO <sub>2</sub> ; TSP; BC; CO; Pb; Cd; Hg; As; Cr; Cu; Ni; PCDD/F; PAHs; HCB; PCB	√
5C1biv	Sewage sludge incineration		IE
5C1bv	Cremation	NO <sub>x</sub> ; NMVOC; SO <sub>2</sub> ; PM <sub>2.5</sub> ; PM <sub>10</sub> ; TSP; CO; Pb; Cd; Hg; As; Cr; Cu; Ni; Se; Zn; PCDD/F; ; PAHs; HCB; PCB	√
5C1bvi	Other waste incineration		NO
5C2	Open burning of waste		NO
5D1	Domestic wastewater handling	NMVOC; NH <sub>3</sub>	√
5D2	Industrial wastewater handling	NMVOC	IE
5D3	Other wastewater handling	NH <sub>3</sub>	IE
5E	Other waste	PM <sub>2.5</sub> ; PM <sub>10</sub> ; TSP; Pb; Cd; Hg; As; Cr; Cu; PCDD/F	√

## BIOLOGICAL TREATMENT OF WASTE - SOLID WASTE DISPOSAL ON LAND (NFR 5A)

Data for sector Solid waste disposal on land (NFR 5A) are preliminary because the activity data are not updated in time for the emission inventory calculations and submission.

### Description

In comparison with base year emissions from solid waste disposal on land have stable declining character due to the different legislative measures aimed to decrease the emissions from landfills. The closure of old landfills, which do not meet the criteria of EU Directive 1999/31/ EC has made a significant contribution for reducing the emissions. Since 2000, with the adoption of Directive 1999/31/EC, landfills have met the criteria of the Directive and together with increased collection and recycling of different waste streams as well as the use of composting as method for reducing the share of biodegradable waste, sent to landfills, emissions of different pollutants continue to decrease.

### Methodological issues and activity data

The source of activity data is the National Statistical Institute. Emissions factors of TIER 1 from EMEP/EEA Guidebook 2019 (Table 3-1, Chapter 5.A-Biological treatment of waste-Solid waste disposal on land) have been used for the calculations of emissions of respective pollutants.

**Table 80: Emissions factors – landfill**

Pollutants	Value	Unit
NMVOC	1.56	kg/Mg
TSP	0.463	g/Mg
PM <sub>2.5</sub>	0.033	g/Mg
PM <sub>10</sub>	0.219	g/Mg

**Completeness**

All pollutants are estimated and reported.

**Source specific recalculations**

The emissions of NMVOCs, PM<sub>2.5</sub>, PM<sub>10</sub> and TSP have been recalculated for the whole time series. The recalculation is due to new activity data provided by NSI.

**Source specific planned improvements**

No specific improvements are planned.

**BIOLOGICAL TREATMENT OF WASTE – COMPOSTING (NFR 5B1)**

Composting is a waste management practice for reducing the volume of land filled organic waste and reducing CH<sub>4</sub> emissions respectively. This activity was not well developed in the country until 2011. With adoption of new Waste management law in 2012 composting is regulated as a practice for reducing the share of biodegradable waste sent to SWDS. In this period three composting facilities have been built.

Emissions from composting are decreasing in 2014 due to decreasing amount of waste composted. The reason for the small amount of composted waste is the quality of incoming raw materials for compost production. After biological treatment of waste, organic fraction gets a very low quality and it has been used in landfills as a soil covering material.

Increased emissions from composting in 2015 are result of the contribution of increased quantity of biologically treated green wastes (garden and park wastes) from municipalities which is in line with national legislation (Waste management law and Ordinance for separate collection of biowaste and treatment of biodegradable waste).

**Methodological issues and activity data**

The source of activity data is the National Statistical Institute. TIER 2 methodology is applied for estimation of the emissions from composting activities with respective emission factors (Table 3-2, Chapter 5.B.1-Biological treatment of waste-Composting) from EMEP/EEA Guidebook 2019.

**Table 81: Emissions from composting activities**

Year	AD (kt)	NH3 (kt)	CO (kt)
2011	83.7	0.055	0.047
2012	81.2	0.061	0.052
2013	106.5	0.070	0.060
2014	58.6	0.039	0.033
2015	311.0	0.205	0.174
2016	263.0	0.174	0.147
2017	238.0	0.157	0.133
2018	95.5	0.063	0.054
2019	186.5	0.123	0.105
2020	173.4	0.114	0.097

**Completeness**

All pollutants are estimated and reported.

**Source specific recalculations**

The emissions of NH<sub>3</sub> and CO have been recalculated due to new activity data provided by NSI.

#### **Source specific planned improvements**

No specific improvements are planned.

### **BIOLOGICAL TREATMENT OF WASTE – ANAEROBIC DIGESTION AT BIOGAS FACILITIES (NFR 5B2)**

There is one modern facility for anaerobic digestion, located in Sofia and functioning since 2014 with biogas production. The emissions from biogas combustion are reported in the energy sector. Emissions from waste storage for anaerobic treatment, biogas generation, separation and treatment of sludge from methane have not been calculated. Bulgaria did not include emissions of NH<sub>3</sub> from sector 5B2 due to the lack of activity data for proportions of x\_biogas (slurry / solid) in sectors 3B, 3Da2a and 3Da3. Bulgaria made an effort to estimate the NH<sub>3</sub> emissions using the N-Flow tool in order to improve the transparency. As no data is available the notation key 'NE' is used.

#### **Source specific planned improvements**

In order to implement the TERT recommendation (BG-5B2-2019-0001) for treatment of biodegradable waste in anaerobic (biogas) facilities, must be collected country-specific data on the exact waste type treated anaerobically in the facilities (food waste, garden and park waste, or some kind of mixed municipal waste). There is no information available if there is a pre-storage of the waste or it is sent directly to the biogas facilities and what type of anaerobic biogas facilities is using our country (continuous or semi-continuous bioreactors). We have to gather information whether the specific waste sent to the biogas facilities was pre-treated or not (removal of recyclable and compostable fraction, purification of the waste from contaminants, what kind of microorganisms or bacterial cultures are used in the biogas facilities, because they are responsible for the process that decompose waste in the bioreactor, set the operating temperatures etc.). The add on abatement technologies (for example biofilter) that are aimed for reducing the emissions from the biological activities is important as well.

For the next submission, we will try to collect the above mentioned country-specific data in order to improve the transparency and to include NH<sub>3</sub> estimates from biogas facilities (covering the various steps of the process) using a TIER 1 approach proposed in the 2019 EMEP/EEA Guidebook or a higher Tier methodology,

### **MUNICIPAL WASTE INCINERATION (NFR 5C1a)**

Notation key used here is “NO” because Bulgaria does not incinerates municipal wastes.

### **INDUSTRIAL WASTE INCINERATION (NFR 5C1bi)**

**Data for sector NFR 5C1bi are preliminary because the activity data are not updated in time for the emission inventory calculations and submission.**

#### **Description**

In the installation of Lukoil Neftochim are incinerated hazardous waste, mainly sludge and other waste contaminated with oil.

#### **Methodological issues**

For estimation of the emissions from hazardous waste incineration, TIER 1 method with default emission factors from EMEP/EEA Guidebook 2019 (Table 3-1, Chapter 5.C.1.b-Industrial waste incineration including hazardous waste and sewage sludge) is used for calculations.

#### **Activity data**

Concerning activity data, the source of information is ExEA through national legislation - Ordinance No 1 on the Procedures and forms for providing information about waste management activities and the procedure for keeping public records (published in State Gazette No 51 from 20.06.2014, last amendment on 1.10.2021). The operators of installations are obliged to report on annual basis. In the reporting formats under the ordinance the quantities of treated waste are included.

### **Completeness**

All pollutants are estimated and reported.

### **Source specific recalculations**

The emissions of all sector's pollutants for 2019 have been recalculated due to new activity data.

### **Source specific planned improvements**

No specific improvements are planned.

### **HAZARDOUS WASTE INCINERATION (NFR 5C1bii)**

After TERT recommendation for pollutants NH<sub>3</sub>, BaP and PAHs is used notation key 'NE' for the whole time series. This recommendation is in accordance with the EMEP/EEA Guidebook 2019. For the other pollutants is used notation key 'IE' - Bulgaria does not incinerates municipal waste.

### **CLINICAL WASTE INCINERATION (NFR 5C1biii)**

#### **Description**

Currently waste incineration is a practice to manage clinical waste. There are two modern facilities for incineration of clinical waste at the EMEPA and Medicom, located in Sofia.

#### **Methodological issues**

For these two plants, which meet the criteria of the Directive 2010/75/EU, TIER 2 method with respective emission factors from EMEP/EEA Guidebook 2019 (Table 3-2, Chapter 5.C.1.b.iii-Clinical waste incineration) are used for estimation of the emissions of the different pollutants. Abatement efficiency for PCDD/F is 99% (Table 3-5, Chapter 5.C.1.b.iii-Clinical waste incineration). Activity data are shown in Table 82 below for controlled air incineration.

For the period 1990-2011 considerable number of furnaces for clinical waste incineration, located on the territory of the hospitals throughout the country, were operating. They didn't met the criteria of the Directive 2010/75/EU. For estimation of the emissions from these furnaces, TIER 1 method with default emission factors from EMEP/EEA Guidebook 2019 (Table 3-1, Chapter 5.C.1.b.iii-Clinical waste incineration) for uncontrolled rotary kiln incineration was used (because of the lack of the EF in EMEP/EEA Guidebook 2019 for grate type incineration as it is in our case). Activity data are shown in Table 83 for uncontrolled rotary kiln incineration.

Following the adoptions of more stringent requirements of Directive 2010/75/EU transposed into Regulation No 6/28.04.2004 that has led to the closure of the operation of all this type of furnaces and emissions reduction respectively

#### **Activity data**

Concerning activity data, the source of information is ExEA through national legislation - Ordinance №1 on the Procedures and forms for providing information about waste management activities and the procedure for keeping public records (published in State Gazette No 51 from 20.06.2014, last amendment on 1.10.2021). The operators of installations are obliged to report on

annual basis. In the reporting formats under the ordinance the quantities of treated waste are included.

**Table 82: Activity data for CIWI (controlled air incineration)**

Year	AD (kt)
2003	0.339
2004	0.598
2005	0.871
2010	0.743
2015	0.751
2016	0.715
2017	0.788
2018	0.626
2019	0.542
2020	0.652

**Table 83: Activity data for CIWI (uncontrolled rotary kiln incineration)**

Year	AD (kt)
1990	0.841
1995	0.854
2000	0.886
2005	0.974
2010	0.441
2011	0.466

### **Completeness**

All pollutants are estimated and reported.

### **Source specific recalculations**

The emissions of all sector's pollutants for 2019 have been recalculated due to new activity data.

### **Source specific planned improvements**

No specific improvements are planned.

## **SEWAGE SLUDGE INCINERATION (NFR 5C1biv)**

Notation key "IE" is used after a TERT recommendation (BG-5C1biv-2021-0001), because the emissions of 5C1biv (Sewage sludge incineration) are included in NFR 5C1bi.

## **CREMATION ( NFR 5C1bv)**

### **Description**

This sector comprises the atmospheric emissions from incineration of human bodies in a crematorium. Incineration of animal carcass is not included.

There are three modern crematoriums (Sofia, Plovdiv, Varna) operating on the territory of the country for cremation of human bodies.

### **Methodological issues and activity data**

Activity data, used for calculations are obtained directly from crematorium. TIER 1 method with default EF from EMEP/EEA Guidebook 2019 (Table 3-1, Chapter 5.C.1.b.v-Cremation)) is used for emissions estimation.

### **Completeness**

All pollutants are estimated and reported.

#### **Source specific recalculations**

Recalculations are not made.

#### **Source specific planned improvements**

No specific improvements are planned.

#### **OTHER WASTE INCINERATION (5C1bvi)**

Notation key “NO” is used.

#### **OPEN BURNING WASTE (5C2)**

Notation key “NO” is used. Open burning of waste is prohibited by the Bulgarian legislation.

#### **DOMESTIC WASTEWATER HANDLING (NFR 5D1)**

##### **Description**

According to the NSI data in 2020, 66.7% of the populations is connected to centralized aerobic treatment plants, 76.25% is connected to the public sewerage, the population of the country without treatment use septic systems and latrines – 9.60%.

##### **Methodological issues and activity data**

Activity data for 5D1 and 5D2 is the National Statistical Institute. TIER 1 method with respective emission factors for NMVOC (Table 3-1, Chapter 5.D-Wastewater handling, EMEP/EEA Guidebook 2019) is used for estimation of the emissions from wastewater handling.

#### **INDUSTRIAL WASTEWATER HANDLING (NFR 5D2)**

Untreated industrial wastewater, along with domestic feces wastewater from industry are discharged into urban sewer system for further treatment in urban wastewater treatment plants. Notation key used here is “IE”. Emissions from industrial wastewater handling are included in 5D1- Domestic wastewater handling.

#### **OTHER WASTEWATER HANDLING (NFR 5D3)**

##### **Emissions from latrines**

Principle of calculation consisted of determining the percentage of use of dry toilets in Bulgarian household. This percentage is multiplied by population for the reporting period. This parameter have been multiplied with emissions factors form EMEP/EEA Guidebook 2019 (Table 3-2; Chapter 5.D-Wastewater handling). Thus Ammonia emissions were calculated from usage of dry toilets. For calculation TIER 2 methodology is applied. The emissions are included in Sector 5D1, the notation key ‘IE’ is used.

The source of activity data is the National Statistical Institute.

**Table 84: Emissions and activity data for 5D3 wastewater handling**

Year	NH <sub>3</sub> (kt)	Population (inhabitants)	Usage of dry toilets (%)	Total population with wastewater treatment (%)
1990	4.580	8 669 269	33 %	67%
1995	4.214	8 384 715	31 %	69%
2000	3.886	8 149 468	30 %	70%
2005	3.483	7 718 750	28 %	72%

Year	NH <sub>3</sub> (kt)	Population (inhabitants)	Usage of dry toilets (%)	Total population with wastewater treatment (%)
2010	2.745	7 504 868	23 %	77%
2015	1.511	7 153 784	13 %	87%
2016	1.426	7 101 859	13 %	87%
2017	1.422	7 050 034	13 %	87%
2018	1.374	7 000 039	12%	88%
2019	1.314	6 951 482	12%	88%
2020	1.062	6 916 548	10%	90%

### Completeness

All pollutants are recorded and reported.

### Source specific recalculations

Recalculations are not made.

### Source specific planned improvements

No specific improvements are planned.

## OTHER WASTE (NFR 5E)

### Description

This chapter covers emissions from:

- ✓ Car fires
- ✓ Detached/undetached house fires
- ✓ Industrial building fires
- ✓ Apartment building fires

### Methodological issues and activity data

Activity data for estimation of emissions from different pollutants are taken from General Directorate for Fire Safety and Protection of the Population (<https://www.mvr.bg/gdpbzn/>), available only in Bulgarian.

Due to the lack of detail statistics about detached, undetached and apartment building fires separately, the fires for all these buildings are united and are given in table below.

Emission factors used are consistent with EMEP/EEA Guidebook 2019 (Table 3-2; 3-3; 3-4; 3-5 and 3-6, Chapter 5.E-Other waste). Emissions from fires were calculated as multiplying of activity data – number of fires with emission factor from EMEP/EEA Guidebook 2019. For estimation of emissions from car fires, detached, undetached and apartment buildings an average EF for each pollutant is used (Table 87, column Average)

**Table 85: Activity data for fires**

Year	Car fire (No of fires)	Detached/undetached/apartment buildings (No of fire)	Industrial building (No of fires)
1990	2368	4583	1619
1995	1855	3590	1269

2000	2840	5499	1942
2005	1906	3732	1096
2010	1958	3321	2133
2015	2278	3987	1594
2016	2353	4085	1483
2017	2427	4310	1304
2018	2229	3882	1193
2019	2166	4053	1171
2020	1822	3795	1108

**Table 86: Emission factors for car fires**

Pollutant	EF	Unit
TSP	2.3	kg/fire
PM10	2.3	kg/fire
PM2.5	2.3	kg/fire
PCDD/F	0.048	kg/fire

**Table 87: Emission factors for detached, undetached house and apartment buildings fire**

Pollutant	EF detached house fire	EF undetached house fire	EF apartment building fire	Average
TSP	143.82	61.62	43.78	83.073
PM10	143.82	61.62	43.78	83.073
PM2.5	143.82	61.62	43.78	83.073
Pb	0.42	0.18	0.13	0.24
Cd	0.85	0.36	0.26	0.49
Hg	0.85	0.36	0.26	0.49
As	1.35	0.58	0.41	0.78
Cr	1.29	0.55	0.39	0.74
Cu	2.99	1.28	0.91	1.73
PCDD/F	1.44	0.62	0.44	0.83

**Table 88: Emission factors for industrial building fires**

Pollutant	EF	Unit
TSP	27.23	kg/fire
PM10	27.23	kg/fire
PM2.5	27.23	kg/fire
Pb	0.08	g/fire
Cd	0.16	g/fire
Hg	0.16	g/fire
As	0.25	g/fire
Cr	0.24	g/fire
Cu	0.57	g/fire
PCDD/F	0.27	mg/fire

**Completeness**

All pollutants are estimated and reported.

**Source specific recalculations**

Recalculations are not made.

**Source specific planned improvements**

No specific improvements are planned.

## **CHAPTER 8. RECALCULATIONS AND IMPROVEMENTS**

### **RECALCULATIONS**

For 2022 submission a recalculations for 2020 were made for the following categories and sectors: 1A1a, 1A1b, 1A1c, 1A2a, 1a2b, 1A2d, 1A2d, 1A2f, 1A2gii, 1A3bvi, 1A4ai, 1A4Ci, 1B, 2A3, 2C2, 2C3, 2C5, 2C6, 2C7a, 2D3c, 2H1, 3B, 3De, 5B, 5C .

### **IMPROVEMENTS**

Planned improvements:

- Apply of higher tier method for estimation of emissions where needed,
- Incorporation of ETS and EPRTR data bases into emission inventory in NFR sector 1 Energy and NFR sector 2 Industrial processes and other solvents and product use,
- Incorporation of data, provided by Branch business associations,
- To improve transparency, completeness, consistency, including recalculations and time-series and comparability of national emission inventory.

## **CHAPTER 9. PROJECTIONS**

Bulgaria will report projections in the next submission (2023), according to the requirements of the Directive (EU) 2016/2284 and art.44 of the Guidelines for reporting emissions and projections data under the CLRTAP (ECE/EB.AIR.125).

## **CHAPTER 10: REPORTING OF GRIDDED EMISSIONS AND LPS**

Bulgaria will report gridded emissions and LPS in 2025, according to the requirements of the Directive (EU) 2016/2284 and art.47 of the Guidelines for reporting emissions and projections data under the CLRTAP (ECE/EB.AIR.125).

## **CHAPTER 11: ADJUSTMENTS**

## **PART 2: ANNEXES TO THE INFORMATIVE INVENTORY REPORT**

**Annex 1: KEY CATEGORY ANALYSIS****Approach 1 analysis — level assessment of NOx**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total [%]</b>
1A3bi	Road transport: Passenger cars	16,1141	17,592%	17,59%
3Da1	Inorganic N-fertilizers (includes also urea application)	14,5734	15,910%	33,50%
1A3biii	Road transport: Heavy duty vehicles and buses	12,8379	14,016%	47,52%
1A1a	Public electricity and heat production	12,1072	13,218%	60,74%
1A3bii	Road transport: Light duty vehicles	6,8865	7,518%	68,25%
1A3di(ii)	International inland waterways	6,6182	7,225%	75,48%
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	3,8498	4,203%	79,68%
1A4bi	Residential: Stationary	2,5880	2,825%	82,51%

**Approach 1 analysis — level assessment of NMVOC**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
1A4bi	Residential: Stationary	20,7740	28,440%	28,44%
2D3a	Domestic solvent use including fungicides	8,2999	11,363%	39,80%
2H2	Food and beverages industry	5,5871	7,649%	47,45%
1B1a	Fugitive emission from solid fuels: Coal mining and handling	4,4597	6,105%	53,56%
3B1a	Manure management - Dairy cattle	3,8790	5,310%	58,87%
1A3bi	Road transport: Passenger cars	3,8177	5,226%	64,09%
3B1b	Manure management - Non-dairy cattle	3,1971	4,377%	68,47%
3De	Cultivated crops	3,1737	4,345%	72,82%
2D3d	Coating applications	2,9505	4,039%	76,85%
2G	Other product use (please specify in the IIR)	1,5857	2,171%	79,03%
1A3bv	Road transport: Gasoline evaporation	1,5684	2,147%	81,17%

**Approach 1 analysis — level assessment of SOx**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
1A1a	Public electricity and heat production	26,8811	38,623%	38,62%
2B10a	Chemical industry: Other (please specify in the IIR)	24,5217	35,233%	73,86%
1A4bi	Residential: Stationary	4,1258	5,928%	79,78%
2C7a	Copper production	3,4875	5,011%	84,79%

**Approach 1 analysis — level assessment of NH3**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
3Da1	Inorganic N-fertilizers (includes also urea application)	14,4857	33,922%	33,92%
3Da2a	Animal manure applied to soils	9,9439	23,286%	57,21%

3Da3	Urine and dung deposited by grazing animals	3,1646	7,411%	64,62%
1A4bi	Residential: Stationary	2,3013	5,389%	70,01%
3B1b	Manure management - Non-dairy cattle	2,1568	5,051%	75,06%
3B1a	Manure management - Dairy cattle	1,8972	4,443%	79,50%
3B3	Manure management - Swine	1,7906	4,193%	83,69%

**Approach 1 analysis — level assessment of PM2.5**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A4bi	Residential: Stationary	25,1361	79,241%	79,24%
2D3b	Road paving with asphalt	1,3084	4,125%	83,37%

**Approach 1 analysis — level assessment of PM10**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A4bi	Residential: Stationary	25,8249	57,695%	57,69%
2D3b	Road paving with asphalt	5,6076	12,528%	70,22%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	5,2668	11,766%	81,99%

**Approach 1 analysis — level assessment of TSP**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A4bi	Residential: Stationary	27,2796	39,076%	39,08%
2D3b	Road paving with asphalt	24,2997	34,807%	73,88%
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	5,2668	7,544%	81,43%

**Approach 1 analysis — level assessment of CO**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A4bi	Residential: Stationary	151,0434	60,470%	60,47%
1A3bi	Road transport: Passenger cars	34,8054	13,934%	74,40%
1A3ai(i)	International aviation LTO (civil)	21,0909	8,444%	82,85%

**Approach 1 analysis — level assessment of Pb**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A1a	Public electricity and heat production	2,3217	22,070%	22,07%
2A3	Glass production	2,2222	21,123%	43,19%
1A4bi	Residential: Stationary	1,5543	14,775%	57,97%

2C1	Iron and steel production	1,3467	<b>12,801%</b>	<b>70,77%</b>
1A3bvi	Road transport: Automobile tyre and brake wear	1,1562	<b>10,990%</b>	<b>81,76%</b>

**Approach 1 analysis — level assessment of Cd**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
1A4bi	Residential: Stationary	0,4523	<b>31,570%</b>	<b>31,57%</b>
1A1a	Public electricity and heat production	0,2799	<b>19,536%</b>	<b>51,11%</b>
2C7a	Copper production	0,2624	<b>18,312%</b>	<b>69,42%</b>
2A3	Glass production	0,1133	<b>7,911%</b>	<b>77,33%</b>
2C1	Iron and steel production	0,1036	<b>7,231%</b>	<b>84,56%</b>

**Approach 1 analysis — level assessment of Hg**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
1A1a	Public electricity and heat production	0,4414	<b>64,748%</b>	<b>64,75%</b>
1A4bi	Residential: Stationary	0,0454	<b>6,659%</b>	<b>71,41%</b>
2C6	Zinc production	0,0386	<b>5,661%</b>	<b>77,07%</b>
5C1biii	Clinical waste incineration	0,0352	<b>5,165%</b>	<b>82,23%</b>

**Approach 1 analysis — level assessment of As**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
1A1a	Public electricity and heat production	2,1644	<b>80,362%</b>	<b>80,36%</b>

**Approach 1 analysis — level assessment of Cr**

<b>NFR category code</b>	<b>NFR category</b>	<b>Latest year estimate (Lx,t)</b>	<b>Level Assessment Lx,t</b>	<b>Cumulative total</b>
1A1a	Public electricity and heat production	1,3961	<b>35,968%</b>	<b>35,97%</b>
1A4bi	Residential: Stationary	0,8376	<b>21,580%</b>	<b>57,55%</b>
1A3bvi	Road transport: Automobile tyre and brake wear	0,4274	<b>11,012%</b>	<b>68,56%</b>
2C7a	Copper production	0,3525	<b>9,082%</b>	<b>77,64%</b>
2A3	Glass production	0,2956	<b>7,615%</b>	<b>85,26%</b>

**Approach 1 analysis — level assessment of Cu**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A3bvi	Road transport: Automobile tyre and brake wear	9,3502	53,709%	53,71%
2D3i	Other solvent use (please specify in the IIR)	5,2233	30,003%	83,71%

**Approach 1 analysis — level assessment of Ni**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A1a	Public electricity and heat production	1,6177	41,582%	41,58%
1A3di(ii)	International inland waterways	0,5750	14,780%	56,36%
2A3	Glass production	0,4777	12,278%	68,64%
2C7a	Copper production	0,3196	8,215%	76,85%
2D3i	Other solvent use (please specify in the IIR)	0,2141	5,503%	82,36%

**Approach 1 analysis — level assessment of Se**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A1a	Public electricity and heat production	6,7253	82,144%	82,14%

**Approach 1 analysis — level assessment of Zn**

NFR category code	NFR category	Latest year estimate (Lx,t)	Level Assessment Lx,t	Cumulative total
1A4bi	Residential: Stationary	18,5277	54,678%	54,68%
1A3bvi	Road transport: Automobile tyre and brake wear	3,7509	11,069%	65,75%
2D3i	Other solvent use (please specify in the IIR)	3,0225	8,920%	74,67%
1A2a	Stationary combustion in manufacturing industries and construction: Iron and steel	2,4070	7,103%	81,77%

**Approach 1 analysis — level assessment of DIOX (PCDD/PCDF)**

NFR category code	NFR category	Latest year	Level Assessment Lx,t	Cumulative total
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		estimate (L <sub>x,t</sub> )		
1A4bi	Residential: Stationary	28,9266	58,795%	58,79%
2C7a	Copper production	4,7120	9,577%	68,37%
5E	Other waste (please specify in IIR)	3,5491	7,214%	75,59%
1A1a	Public electricity and heat production	2,3910	4,860%	80,45%
5C1bi	Industrial waste incineration	2,2881	4,651%	85,10%

**Approach 1 analysis — level assessment of PAH**

NFR category code	NFR category	Latest year estimate (L <sub>x,t</sub> )	Level Assessment L <sub>x,t</sub>	Comulative total
1A4bi	Residential: Stationary	14,6819	97,973%	97,97%

**Approach 1 analysis — level assessment of HCB**

NFR category code	NFR category	Latest year estimate (L <sub>x,t</sub> )	Level Assessment L <sub>x,t</sub>	Comulative total
1A4bi	Residential: Stationary	0,1733	62,750%	62,75%

**Approach 1 analysis — level assessment of PCB**

NFR category code	NFR category	Latest year estimate (L <sub>x,t</sub> )	Level Assessment L <sub>x,t</sub>	Comulative total
2C1	Iron and steel production	1,2949	53,776%	53,78%
1A4bi	Residential: Stationary	0,7095	29,464%	83,24%

**Annex 2: Tracking implementation of NECD Review findings****Table 89: Table for tracking implementation of NECD Review findings**

<b>EMRT-NECD Observation</b>	<b>Improvement made/planned</b>	<b>Reference into IIR</b>
Recommendations from the NECD Review 2021		
BG-0A-2020-0001	Implemented	Please see section GENERAL UNCERTAINTY EVALUATION in BG IIR, sub 2022
BG-1A1a-2021-0001	Recalculation for the years 1990 – 2018.	Please see CHAPTER3
BG-1A1b-2021-0001	Recalculations have been made for the whole time period – only for PM10	Please see CHAPTER3
BG-1A1b-2017-0002	Emissions have been recalculated with the available primary data	Please see CHAPTER3
BG-1A1b-2021-0003	Emissions have been recalculated with the available primary data	Please see CHAPTER3
BG-1A1b-2018-0005	Emissions have been recalculated with the available primary data	Please see CHAPTER3
BG-1A1c-2021-0001	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A1c-2021-0002	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A2a-2021-0001	No recalculations were made back in time	
BG-1A2a-2021-0003	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A2b-2021-0001	The data are included in another category	Please see CHAPTER4
BG-1A2b-2021-0003	The data are included in another category	Please see CHAPTER4
BG-1A2b-2020-0001	The data are included in another category	Please see CHAPTER4
BG-1A2d-2021-0001	Recalculations have been made for the whole time period – only for PM10	Please see CHAPTER3
BG-1A2f-2020-0001	See IIR	Please see CHAPTER3
BG-1A2f-2019-0001	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A2gvii-2021-0001	Implemented	Please see CHAPTER3
BG-1A3ai(i)-2021-0001	Not implemented. In the 2019 Guidebook EF for PM10 is not given.	
BG-1A3aii(i)-2021-0001	Not implemented. In the 2019 Guidebook EF for PM10 is not given.	
BG-1A3bvi-2019-0001	Implemented.	Methodology had not been described in IIR, will be added in IIR 2022. Calculations performed following TERT recommendations.
BG-1A4ai-2021-0003	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A4ai-2018-0001	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A4ai-2017-0001	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A4aii-2021-0001	Not implemented.	
BG-1A4bi-2021-0003	Not implemented	
BG-1A4ci-2021-0001	No recalculations were made back in time	Please see CHAPTER3
BG-1A4ci-2021-0003	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A4ci-2017-0001	Recalculations have been made for the whole time period	Please see CHAPTER3
BG-1A4cii-2019-0001	Not implemented.	
BG-1A5b-2021-0001		Please see CHAPTER3
BG-1B-2017-0002	Implemented	A recalculation for the whole time series has been performed. Please see CHAPTER3.
BG-2A3-2021-0001	Recalculations have been made for the whole time period – only for PM10	Please see CHAPTER4

BG-2A3-2021-0002	No recalculations were made back in time	
BG-2A3-2019-0001	Recalculations have been made for the whole time period	Please see CHAPTER4
BG-2A5b-2021-0001	No recalculations were made back in time - no such data are collected	
BG-2C2-2021-0001	Recalculations have been made for the whole time period – without BC	Please see CHAPTER4
BG-2C3-2021-0001	Recalculations have been made for the whole time period	Please see CHAPTER4
BG-2C5-2021-0001	Recalculations have been made for the whole time period	Please see CHAPTER4
BG-2C6-2021-0001	Recalculations have been made for the whole time period	Please see CHAPTER4
BG-2C7a-2021-0001	Recalculations have been made for the whole time period	Please see CHAPTER4
BG-2D3a-2017-0002	Not implemented, we need a different approach in collecting data.	
BG-2D3c	Recalculation for the period 1990 – 2018.	Road paving with asphalt (NFR 2D3b)
BG-2D3c-2021-0001	Implemented	Please see CHAPTER4
BG-2H1-2021-0001	Recalculations have been made for the whole time period	Please see CHAPTER4
BG-2H2-2019-0001	It is not possible to verify data for so many years back in time.	
BG-3B-2021-0001	Implemented	Tier 2 approach is used. Bulgaria has included the revised estimate in its 2022 NFR and IIR submission.
BG-3B-2019-0002	Implemented	Bulgaria has included the revised estimate in its 2022 NFR and IIR submission.
BG-3B4gi-2021-0001	Implemented	Please see NFR sub 15 February 2022 and BG IIR Table: NH3 emissions from 3.B Manure Management (II)
BG-3De-2021-0001	Implemented	Please see NFR sub 15 February 2022 and table: Emissions NMVOCs from 3De cultivated crops in BG IIR SUB 2022
BG-3Da1-2021-0001	Implemented	Please see NFR sub 15 February 2022 and BG IIR Table: NH3 and NO emissions from 3Da1 Inorganic N fertilisers (includes urea)
BG-3Df-2021-0001	Not implemented, an improvement is planned	
BG-5B2-2019-0001	Not implemented, an improvement is planned.	Notation key 'NE' is used. Bulgaria will try to collect country-specific data in order to improve the transparency and to include NH3 estimates from biogas facilities.
BG-5C1bi-2019-0001	Implemented	It is addressed in Chapter Industrial waste incineration in IIR 2022.
BG-5C1biv-2021-0001	Implemented	Notation key "IE" is used

## Annex 4. Vehicle fleet and mileage data for road transport

Table 90: Vehicle fleet data for Road transport (number of vehicles) 1988-2003

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PC Gasoline Small	PRE ECE	527486	555663	525315	488467	446732	433523	415328	388541	356030	314911	286702	267748	247929	229590	214437	209367
PC Gasoline Small	ECE 15/00-01	0	0	23493	48846	74918	81284	82671	81874	79171	73638	70217	68368	65658	62676	59912	59356
PC Gasoline Small	ECE 15/02	0	0	11746	24423	37459	54189	72553	91062	108840	123008	140858	147072	136211	124408	112562	103932
PC Gasoline Small	ECE 15/03	0	0	9789	20353	31216	45158	60461	75885	90700	102507	117381	136178	155079	175154	182903	172318
PC Gasoline Small	ECE 15/04	0	0	8443	17554	26924	38949	52148	65451	78228	88412	101242	117453	133756	151071	170900	200904
PC Gasoline Small	Euro 1	0	0	0	0	8470	18380	29531	41183	52739	62584	74320	88685	103289	118821	136485	162530
PC Gasoline Small	Euro 2	0	0	0	0	0	0	0	0	10006	19790	30216	42066	54437	67632	82395	102790
PC Gasoline Small	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	11369	23540	36873	53667
PC Gasoline Small	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Small	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Small	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Small	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Medium	PRE ECE	565259	582380	538517	489805	438193	415987	389876	356824	319887	276824	246579	225305	204123	184944	169008	161448
PC Gasoline Medium	ECE 15/00-01	0	0	24083	48980	73486	77996	77605	75190	71134	64732	60390	57530	54057	50488	47220	45771
PC Gasoline Medium	ECE 15/02	0	0	12042	24490	36743	51997	68107	83628	97791	108130	121146	123758	112144	100216	88715	80145
PC Gasoline Medium	ECE 15/03	0	0	10035	20408	30619	43331	56756	69690	81492	90109	100955	114591	127679	141094	144155	132878
PC Gasoline Medium	ECE 15/04	0	0	8655	17602	26409	37373	48952	60108	70287	77719	87073	98835	110123	121693	134695	154922
PC Gasoline Medium	Euro 1	0	0	0	0	8309	17637	27721	37821	47385	55015	63920	74626	85039	95715	107570	125331
PC Gasoline Medium	Euro 2	0	0	0	0	0	0	0	0	8990	17397	25988	35397	44818	54480	64939	79264
PC Gasoline Medium	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	9360	18963	29061	41384
PC Gasoline Medium	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Medium	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Large	PRE ECE	128039	131915	121978	110943	99251	94220	88305	80817	72451	62696	55846	51026	46228	41884	38275	36562
PC Gasoline Large	ECE 15/00-01	0	0	5455	11094	16645	17666	17577	17030	16111	14661	13677	13029	12243	11434	10694	10365
PC Gasoline Large	ECE 15/02	0	0	2727	5547	8322	11777	15426	18941	22148	24490	27437	28028	25398	22696	20091	18150
PC Gasoline Large	ECE 15/03	0	0	2273	4623	6935	9814	12855	15784	18457	20408	22864	25952	28916	31953	32646	30092
PC Gasoline Large	ECE 15/04	0	0	1960	3987	5982	8465	11087	13614	15919	17602	19720	22384	24940	27560	30504	35084
PC Gasoline Large	Euro 1	0	0	0	0	1882	3995	6279	8566	10732	12460	14477	16901	19259	21676	24361	28383
PC Gasoline Large	Euro 2	0	0	0	0	0	0	0	0	2036	3940	5886	8017	10150	12338	14707	17950
PC Gasoline Large	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	2120	4294	6581	9372
PC Gasoline Large	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Large	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Large	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Large	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Hybrid Medium	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Hybrid Medium	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PC Gasoline Hybrid Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Gasoline Hybrid Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Small	Conventional	0	0	3103	6239	9279	12260	15180	18042	20582	23021	25376	27576	29206	30675	31839	32466
PC Diesel Small	Euro 1	0	0	0	0	127	345	656	1057	1522	2051	2633	3319	4084	4906	5867	7074
PC Diesel Small	Euro 2	0	0	0	0	0	0	0	0	289	649	1070	1574	2152	2793	3542	4474
PC Diesel Small	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	450	972	1585	2336
PC Diesel Small	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Small	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Small	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Small	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Medium	Conventional	0	0	4775	9598	14274	18859	23349	27749	31654	35403	39022	42402	44905	47162	48948	49909
PC Diesel Medium	Euro 1	0	0	0	0	196	531	1009	1626	2341	3154	4048	5104	6280	7543	9019	10875
PC Diesel Medium	Euro 2	0	0	0	0	0	0	0	0	444	997	1646	2421	3309	4294	5445	6878
PC Diesel Medium	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	691	1494	2437	3591
PC Diesel Medium	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Medium	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Large	Conventional	0	0	3049	6017	8785	11393	13843	16142	18065	19818	21422	22824	23695	24390	24805	24778
PC Diesel Large	Euro 1	0	0	0	0	121	321	598	946	1336	1766	2222	2747	3313	3901	4571	5399
PC Diesel Large	Euro 2	0	0	0	0	0	0	0	0	254	558	904	1303	1746	2220	2759	3415
PC Diesel Large	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	365	773	1235	1783
PC Diesel Large	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Large	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Large	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC Diesel Large	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC LPG Medium	Conventional	0	0	0	0	0	0	0	0	0	10792	21043	30720	39244	47000	53775	59116
PC LPG Medium	Euro 1	0	0	0	0	0	0	0	0	0	961	2183	3697	5488	7517	9909	12882
PC LPG Medium	Euro 2	0	0	0	0	0	0	0	0	0	304	888	1754	2892	4279	5982	8147
PC LPG Medium	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	604	1489	2677	4253
PC LPG Medium	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC LPG Medium	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC LPG Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC LPG Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC CNG Medium	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC CNG Medium	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC CNG Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PC CNG Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV Gasoline <3,5 t	Conventional	135352	142020	149053	159989	166819	176241	179613	180343	175061	166798	164525	165167	161589	159309	159730	162111
LCV Gasoline <3,5 t	Euro 1	0	0	0	0	4430	9677	15310	21240	26741	31770	38047	39815	40490	41575	43507	46194
LCV Gasoline <3,5 t	Euro 2	0	0	0	0	0	0	0	0	4160	8237	12682	17696	22599	27975	29411	30992
LCV Gasoline <3,5 t	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	4222	8711	13738	19539

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Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
LCV Gasoline <3,5 t	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV Gasoline <3,5 t	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV Gasoline <3,5 t	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV Diesel <3,5 t	Conventional	51685	53074	54498	55957	55968	55919	55806	55624	54253	52849	51410	51212	50030	48779	48402	47993
LCV Diesel <3,5 t	Euro 1	0	0	0	0	1486	3070	4757	6551	8287	10066	11889	12345	12536	12730	13184	13676
LCV Diesel <3,5 t	Euro 2	0	0	0	0	0	0	0	0	1289	2610	3963	5487	6997	8566	8912	9175
LCV Diesel <3,5 t	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	1307	2667	4163	5785
LCV Diesel <3,5 t	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV Diesel <3,5 t	Euro 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LCV Diesel <3,5 t	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Gasoline >3,5 t	Conventional	2762	2898	3042	3265	3495	3794	3978	4114	4203	4220	4393	4544	4671	4848	5028	5282
HDV Diesel Rigid <=7,5 t	Conventional	6093	6083	6069	6053	5878	5698	5515	5328	5033	4746	4466	4300	4058	3818	3653	3489
HDV Diesel Rigid <=7,5 t	Euro I	0	0	0	0	156	313	470	627	769	904	1033	1037	1017	996	995	994
HDV Diesel Rigid <=7,5 t	Euro II	0	0	0	0	0	0	0	0	120	234	344	461	567	670	673	667
HDV Diesel Rigid <=7,5 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	106	209	314	421
HDV Diesel Rigid <=7,5 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid <=7,5 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid <=7,5 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 7,5 - 12 t	Conventional	2585	2611	2636	2662	2618	2571	2523	2472	2370	2269	2169	2123	2038	1952	1902	1853
HDV Diesel Rigid 7,5 - 12 t	Euro I	0	0	0	0	70	141	215	291	362	432	502	512	511	509	518	528
HDV Diesel Rigid 7,5 - 12 t	Euro II	0	0	0	0	0	0	0	0	56	112	167	227	285	343	350	354
HDV Diesel Rigid 7,5 - 12 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	53	107	164	223
HDV Diesel Rigid 7,5 - 12 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 7,5 - 12 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 7,5 - 12 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 12 - 14 t	Conventional	855	859	862	865	846	826	805	784	746	710	674	655	624	593	573	554
HDV Diesel Rigid 12 - 14 t	Euro I	0	0	0	0	22	45	69	92	114	135	156	158	156	155	156	158
HDV Diesel Rigid 12 - 14 t	Euro II	0	0	0	0	0	0	0	0	18	35	52	70	87	104	106	106
HDV Diesel Rigid 12 - 14 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	16	32	49	67
HDV Diesel Rigid 12 - 14 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 12 - 14 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 12 - 14 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 14 - 20 t	Conventional	2800	2809	2817	2824	2757	2689	2618	2545	2420	2298	2178	2113	2009	1907	1840	1774
HDV Diesel Rigid 14 - 20 t	Euro I	0	0	0	0	73	148	223	300	370	438	504	509	503	498	501	506
HDV Diesel Rigid 14 - 20 t	Euro II	0	0	0	0	0	0	0	0	58	113	168	226	281	335	339	339
HDV Diesel Rigid 14 - 20 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	53	104	158	214
HDV Diesel Rigid 14 - 20 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 14 - 20 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 14 - 20 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 20 - 26 t	Conventional	2455	2456	2456	2455	2389	2322	2253	2182	2068	1955	1846	1783	1689	1595	1532	1469
HDV Diesel Rigid 20 - 26 t	Euro I	0	0	0	0	63	127	192	257	316	372	427	430	423	416	417	419
HDV Diesel Rigid 20 - 26 t	Euro II	0	0	0	0	0	0	0	0	49	97	142	191	236	280	282	281

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Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HDV Diesel Rigid 20 - 26 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	44	87	132	177
HDV Diesel Rigid 20 - 26 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 20 - 26 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 20 - 26 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 26 - 28 t	Conventional	369	378	386	394	393	391	388	385	374	363	351	348	339	329	325	321
HDV Diesel Rigid 26 - 28 t	Euro I	0	0	0	0	10	21	33	45	57	69	81	84	85	86	89	91
HDV Diesel Rigid 26 - 28 t	Euro II	0	0	0	0	0	0	0	0	9	18	27	37	47	58	60	61
HDV Diesel Rigid 26 - 28 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	9	18	28	39
HDV Diesel Rigid 26 - 28 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 26 - 28 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 26 - 28 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 28 - 32 t	Conventional	280	290	301	313	316	319	321	323	318	313	307	309	304	299	299	299
HDV Diesel Rigid 28 - 32 t	Euro I	0	0	0	0	8	18	27	38	49	60	71	74	76	78	82	85
HDV Diesel Rigid 28 - 32 t	Euro II	0	0	0	0	0	0	0	0	8	15	24	33	43	53	55	57
HDV Diesel Rigid 28 - 32 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	8	16	26	36
HDV Diesel Rigid 28 - 32 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 28 - 32 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid 28 - 32 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid >32 t	Conventional	199	203	206	210	209	207	205	202	196	189	183	180	175	169	167	164
HDV Diesel Rigid >32 t	Euro I	0	0	0	0	6	11	17	24	30	36	42	43	44	44	45	47
HDV Diesel Rigid >32 t	Euro II	0	0	0	0	0	0	0	0	5	9	14	19	24	30	31	31
HDV Diesel Rigid >32 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	5	9	14	20
HDV Diesel Rigid >32 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid >32 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Rigid >32 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 14 - 20 t	Conventional	81	99	117	136	152	168	183	198	207	216	224	236	244	250	260	270
HDV Diesel Articulated 14 - 20 t	Euro I	0	0	0	0	4	9	16	23	32	41	52	57	61	65	71	77
HDV Diesel Articulated 14 - 20 t	Euro II	0	0	0	0	0	0	0	0	5	11	17	25	34	44	48	52
HDV Diesel Articulated 14 - 20 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	6	14	22	33
HDV Diesel Articulated 14 - 20 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 14 - 20 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 14 - 20 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 20 - 28 t	Conventional	274	279	283	288	285	282	278	275	265	256	246	243	235	226	222	218
HDV Diesel Articulated 20 - 28 t	Euro I	0	0	0	0	8	15	24	32	40	49	57	58	59	59	61	62
HDV Diesel Articulated 20 - 28 t	Euro II	0	0	0	0	0	0	0	0	6	13	19	26	33	40	41	42
HDV Diesel Articulated 20 - 28 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	6	12	19	26
HDV Diesel Articulated 20 - 28 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 20 - 28 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 20 - 28 t	Euro VI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 28 - 34 t	Conventional	431	427	424	420	404	389	374	358	335	313	291	277	259	240	227	214
HDV Diesel Articulated 28 - 34 t	Euro I	0	0	0	0	11	21	32	42	51	60	67	67	65	63	62	61
HDV Diesel Articulated 28 - 34 t	Euro II	0	0	0	0	0	0	0	0	8	15	22	30	36	42	42	41

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Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HDV Diesel Articulated 28 - 34 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	7	13	20	26
HDV Diesel Articulated 28 - 34 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 28 - 34 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 28 - 34 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 34 - 40 t	Conventional	2588	2566	2542	2516	2423	2329	2233	2137	1998	1863	1733	1648	1534	1423	1341	1259
HDV Diesel Articulated 34 - 40 t	Euro I	0	0	0	0	64	128	190	252	305	355	401	397	384	371	365	359
HDV Diesel Articulated 34 - 40 t	Euro II	0	0	0	0	0	0	0	0	47	92	134	177	215	250	247	241
HDV Diesel Articulated 34 - 40 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	40	78	115	152
HDV Diesel Articulated 34 - 40 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 34 - 40 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 34 - 40 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 40 - 50 t	Conventional	1953	1996	2041	2086	2078	2067	2054	2039	1980	1921	1861	1846	1796	1744	1724	1702
HDV Diesel Articulated 40 - 50 t	Euro I	0	0	0	0	55	113	175	240	302	366	430	445	450	455	469	485
HDV Diesel Articulated 40 - 50 t	Euro II	0	0	0	0	0	0	0	0	47	95	143	198	251	306	317	325
HDV Diesel Articulated 40 - 50 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	47	95	148	205
HDV Diesel Articulated 40 - 50 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 40 - 50 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 40 - 50 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 50 - 60 t	Conventional	43	46	49	52	54	56	58	59	60	60	60	61	61	61	62	63
HDV Diesel Articulated 50 - 60 t	Euro I	0	0	0	0	1	3	5	7	9	11	14	15	15	16	17	18
HDV Diesel Articulated 50 - 60 t	Euro II	0	0	0	0	0	0	0	0	1	3	5	7	9	11	11	12
HDV Diesel Articulated 50 - 60 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	2	3	5	8
HDV Diesel Articulated 50 - 60 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 50 - 60 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HDV Diesel Articulated 50 - 60 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Midi <=15 t	Conventional	563	667	774	979	1128	1336	1448	1466	1396	1309	1348	1366	1353	1354	1358	1381
BUS Diesel Urban Midi <=15 t	Euro I	0	0	0	0	30	73	122	170	210	244	304	319	315	314	314	318
BUS Diesel Urban Midi <=15 t	Euro II	0	0	0	0	0	0	0	0	33	63	101	142	182	228	238	242
BUS Diesel Urban Midi <=15 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	36	76	118	168
BUS Diesel Urban Midi <=15 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Midi <=15 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Midi <=15 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Standard 15 - 18 t	Conventional	1126	1334	1549	1959	2256	2672	2897	2931	2792	2617	2696	2733	2706	2708	2716	2763
BUS Diesel Urban Standard 15 - 18 t	Euro I	0	0	0	0	60	146	245	341	419	488	607	639	631	629	628	637
BUS Diesel Urban Standard 15 - 18 t	Euro II	0	0	0	0	0	0	0	0	65	126	202	284	365	456	476	484
BUS Diesel Urban Standard 15 - 18 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	73	151	237	335
BUS Diesel Urban Standard 15 - 18 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Standard 15 - 18 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Standard 15 - 18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Articulated >18 t	Conventional	188	222	258	326	376	445	483	489	465	436	449	455	451	451	453	460
BUS Diesel Urban Articulated >18 t	Euro I	0	0	0	0	10	24	41	57	70	81	101	106	105	105	105	106
BUS Diesel Urban Articulated >18 t	Euro II	0	0	0	0	0	0	0	0	11	21	34	47	61	76	79	81

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Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
BUS Diesel Urban Articulated >18 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	12	25	39	56
BUS Diesel Urban Articulated >18 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Articulated >18 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Urban Articulated >18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Coach Standard <=18 t	Conventional	3574	4200	4838	6070	6934	8148	8763	8797	8313	7731	7901	7947	7808	7752	7714	7786
BUS Diesel Coach Standard <=18 t	Euro I	0	0	0	0	184	445	740	1022	1248	1441	1780	1857	1819	1800	1785	1794
BUS Diesel Coach Standard <=18 t	Euro II	0	0	0	0	0	0	0	0	194	374	593	825	1053	1305	1353	1365
BUS Diesel Coach Standard <=18 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	209	433	673	945
BUS Diesel Coach Standard <=18 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Coach Standard <=18 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Coach Standard <=18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Coach Articulated >18 t	Conventional	36	42	49	61	70	82	89	89	84	78	80	80	79	78	78	79
BUS Diesel Coach Articulated >18 t	Euro I	0	0	0	0	2	4	7	10	13	15	18	19	18	18	18	18
BUS Diesel Coach Articulated >18 t	Euro II	0	0	0	0	0	0	0	0	2	4	6	8	11	13	14	14
BUS Diesel Coach Articulated >18 t	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	2	4	7	10
BUS Diesel Coach Articulated >18 t	Euro IV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Coach Articulated >18 t	Euro V	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS Diesel Coach Articulated >18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS CNG Urban	Euro I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS CNG Urban	Euro II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS CNG Urban	Euro III	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BUS CNG Urban	EEV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Conventional	276901	279077	281270	282137	282792	283963	284571	285901	286760	288690	281749	284031	282436	280919	279343	273219
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 1	0	0	0	0	0	0	0	0	0	0	0	0	3611	7371	11288	15125
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4883
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Conventional	44998	45124	45235	44769	44324	44027	43612	43043	42578	42053	40888	40344	39277	38249	37283	35838
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 1	0	0	0	0	0	0	0	0	0	0	0	0	502	1004	1507	1984
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	641
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Conventional	51709	52888	54089	54625	55203	55982	56632	57097	57712	58262	57919	58451	58220	58028	57912	57018
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 1	0	0	0	0	0	0	0	0	0	0	0	0	744	1523	2340	3156
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1019
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Conventional	86181	88146	90149	91042	92005	93304	94387	95161	96186	97103	96532	97418	97033	96714	96520	95030
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 1	0	0	0	0	0	0	0	0	0	0	0	0	1241	2538	3900	5261
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1699
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Conventional	34472	35258	36060	36417	36802	37322	37755	38064	38474	38841	38613	38967	38813	38686	38608	38012
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 1	0	0	0	0	0	0	0	0	0	0	0	0	496	1015	1560	2104
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	679
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

**Table 91: Vehicle fleet data for Road transport (number of vehicles) 2004-2020**

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PC Gasoline Small	PRE ECE	203484	194412	107714	107944	107212	98395	88623	79490	72686	66201	59525	54632	46519	35110	30441	27023	21860
PC Gasoline Small	ECE 15/00-01	57930	54864	29640	26567	22126	15136	7621	0	0	0	0	0	0	0	0	0	0
PC Gasoline Small	ECE 15/02	92354	76668	33874	33517	32293	28080	23186	18147	13334	8264	2990	0	0	0	0	0	0
PC Gasoline Small	ECE 15/03	157536	136545	64926	68265	70832	67577	62911	57934	53960	49582	41861	32632	18477	7260	2449	0	0
PC Gasoline Small	ECE 15/04	233898	266502	165084	181536	197781	199037	196497	193106	193388	192819	188374	182741	150894	101642	85701	72614	53255
PC Gasoline Small	Euro 1	191325	220091	146072	174573	205969	223774	237858	240742	222105	201713	187715	176214	153973	111323	102841	98548	86222
PC Gasoline Small	Euro 2	125655	149136	101620	124207	149419	165110	178141	190550	206981	223162	248528	254158	229125	173679	150773	140041	126796
PC Gasoline Small	Euro 3	72894	93436	67525	86465	108016	123149	136411	149229	165275	181242	180227	202650	226335	221354	224779	225629	196547
PC Gasoline Small	Euro 4	0	11220	13901	23362	34589	44364	53609	62720	73280	83947	93365	103136	113232	122213	141402	156194	139866
PC Gasoline Small	Euro 5	0	0	0	0	0	0	5393	10816	16587	22520	25287	37098	43978	45044	42586	42358	54489
PC Gasoline Small	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	5002	9921	15705	17408	19539	19357
PC Gasoline Small	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5803	13026	17999
PC Gasoline Medium	PRE ECE	153521	141447	77914	77931	74068	66642	58022	51425	45993	40970	36027	32334	26922	19867	16840	14614	11555
PC Gasoline Medium	ECE 15/00-01	43706	39917	21440	19180	15286	10251	4989	0	0	0	0	0	0	0	0	0	0
PC Gasoline Medium	ECE 15/02	69678	55781	24503	24198	22309	19019	15180	11740	8437	5114	1810	0	0	0	0	0	0
PC Gasoline Medium	ECE 15/03	118854	99345	46963	49285	48934	45769	41188	37480	34144	30685	25336	19314	10693	4108	1355	0	0
PC Gasoline Medium	ECE 15/04	176467	193897	119411	131061	136638	134806	128649	124928	122370	119330	114011	108157	87328	57514	47410	39268	28150
PC Gasoline Medium	Euro 1	144347	160129	105660	126034	142295	151561	155728	155745	140541	124834	113612	104294	89110	62992	56892	53293	45576
PC Gasoline Medium	Euro 2	94802	108506	73505	89672	103227	111828	116631	123274	130971	138108	150419	150427	132602	98276	83408	75732	67023
PC Gasoline Medium	Euro 3	54995	67981	48844	62424	74623	83408	89309	96542	104581	112165	109080	119941	130988	125254	124348	122016	103893
PC Gasoline Medium	Euro 4	0	8163	10055	16866	23896	30048	35099	40576	46370	51953	56508	61042	65531	69154	78224	84467	73932
PC Gasoline Medium	Euro 5	0	0	0	0	0	0	3531	6997	10495	13937	15305	21957	25452	25488	23558	22906	28803
PC Gasoline Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	2961	5742	8887	9630	10567	10232
PC Gasoline Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3210	7044	9514
PC Gasoline Large	PRE ECE	34766	31919	17656	17703	16859	15013	13131	11644	10414	9276	8157	7321	6095	4498	3812	3308	2616
PC Gasoline Large	ECE 15/00-01	9897	9008	4859	4357	3479	2309	1129	0	0	0	0	0	0	0	0	0	0
PC Gasoline Large	ECE 15/02	15779	12587	5553	5497	5078	4284	3436	2658	1910	1158	410	0	0	0	0	0	0
PC Gasoline Large	ECE 15/03	26916	22418	10642	11196	11138	10311	9321	8486	7731	6948	5736	4373	2421	930	307	0	0
PC Gasoline Large	ECE 15/04	39962	43755	27060	29772	31101	30368	29115	28287	27707	27018	25814	24487	19771	13021	10733	8890	6372
PC Gasoline Large	Euro 1	32689	36135	23944	28630	32389	34143	35243	35265	31822	28265	25723	23613	20175	14261	12880	12065	10317
PC Gasoline Large	Euro 2	21469	24485	16657	20370	23496	25192	26395	27913	29655	31270	34057	34058	30021	22249	18883	17145	15173

## Bulgaria's Informative Inventory Report (IIR) 2022– Submission under the CLRTAP

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PC Gasoline Large	Euro 3	12454	15340	11069	14180	16986	18790	20212	21860	23679	25396	24697	27155	29656	28357	28151	27623	23519
PC Gasoline Large	Euro 4	0	1842	2279	3831	5439	6769	7943	9187	10499	11763	12794	13820	14836	15656	17709	19122	16737
PC Gasoline Large	Euro 5	0	0	0	0	0	0	799	1584	2376	3156	3465	4971	5762	5770	5333	5186	6520
PC Gasoline Large	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	670	1300	2012	2180	2392	2316
PC Gasoline Large	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	727	1595	2154
PC Gasoline Hybrid Medium	Euro 4	0	0	0	0	0	6	46	102	267	422	704	893	1340	2264	3633	5189	6315
PC Gasoline Hybrid Medium	Euro 5	0	0	0	0	0	0	5	18	60	113	191	321	520	835	1094	1407	2460
PC Gasoline Hybrid Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	43	117	291	447	649	874
PC Gasoline Hybrid Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	149	433	813
PC Diesel Small	Conventional	32761	32509	49057	65343	77983	82357	83893	85024	89515	92767	94261	94618	86372	65147	58031	52339	45383
PC Diesel Small	Euro 1	8411	9815	17860	27301	37332	45145	52673	58704	59639	59054	60441	61751	61601	50359	50324	51766	52093
PC Diesel Small	Euro 2	5524	6651	12425	19424	27083	33310	39449	46465	55578	65334	80022	89065	91667	78567	73779	73562	76608
PC Diesel Small	Euro 3	3205	4167	8256	13522	19578	24845	30208	36389	44379	53061	58030	71015	90551	100134	109993	118521	118750
PC Diesel Small	Euro 4	0	500	1700	3653	6269	8950	11872	15294	19677	24577	30062	36142	45302	55286	69194	82047	84504
PC Diesel Small	Euro 5	0	0	0	0	0	0	1194	2637	4454	6593	8142	13000	17595	20376	20839	22250	32921
PC Diesel Small	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	1753	3969	7104	8518	10264	11695
PC Diesel Small	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2839	6842	10874
PC Diesel Medium	Conventional	50359	49938	75413	100492	119886	126537	128868	130643	137537	142525	144813	145353	132679	100069	89134	80386	69699
PC Diesel Medium	Euro 1	12929	15077	27454	41986	57393	69363	80911	90202	91634	90730	92856	94862	94627	77354	77296	79507	80005
PC Diesel Medium	Euro 2	8491	10216	19099	29873	41635	51179	60598	71396	85394	100377	122938	136822	140813	120683	113322	112983	117655
PC Diesel Medium	Euro 3	4926	6401	12691	20796	30098	38172	46402	55914	68187	81522	89152	109094	139098	153811	168946	182034	182377
PC Diesel Medium	Euro 4	0	769	2613	5619	9638	13752	18236	23500	30233	37759	46184	55522	69589	84921	106279	126015	129782
PC Diesel Medium	Euro 5	0	0	0	0	0	0	1835	4053	6843	10129	12509	19971	27028	31299	32008	34174	50561
PC Diesel Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	2693	6097	10913	13084	15764	17961
PC Diesel Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4361	10509	16701
PC Diesel Large	Conventional	24487	23509	35365	46349	53604	55108	54768	54537	56112	56809	56375	55245	49216	36214	31457	27655	23364
PC Diesel Large	Euro 1	6287	7098	12875	19365	25662	30208	34387	37655	37384	36164	36148	36055	35101	27993	27279	27352	26818
PC Diesel Large	Euro 2	4129	4810	8957	13778	18616	22289	25753	29804	34839	40010	47859	52003	52233	43674	39993	38869	39439
PC Diesel Large	Euro 3	2395	3013	5952	9591	13458	16624	19721	23341	27819	32494	34706	41464	51597	55662	59624	62624	61134
PC Diesel Large	Euro 4	0	362	1225	2591	4309	5989	7750	9810	12334	15050	17979	21102	25813	30732	37508	43352	43504
PC Diesel Large	Euro 5	0	0	0	0	0	0	780	1692	2792	4037	4869	7591	10026	11327	11296	11756	16948
PC Diesel Large	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	1024	2262	3949	4618	5423	6021
PC Diesel Large	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1539	3615	5598
PC LPG Medium	Conventional	56540	53258	48960	46168	43242	40289	37112	34706	37765	40134	46839	47305	41222	29985	27012	24357	34091
PC LPG Medium	Euro 1	14516	16079	17824	19289	20701	22085	23301	23963	25161	25549	30033	30873	29400	23178	23425	24091	39132
PC LPG Medium	Euro 2	9534	10895	12400	13724	15018	16295	17451	18967	23448	28266	39763	44529	43749	36161	34343	34235	57547
PC LPG Medium	Euro 3	5531	6826	8240	9554	10856	12154	13363	14854	18723	22956	28835	35505	43217	46088	51200	55157	89204
PC LPG Medium	Euro 4	0	820	1696	2581	3476	4378	5252	6243	8302	10633	14938	18070	21621	25446	32209	38183	63479
PC LPG Medium	Euro 5	0	0	0	0	0	0	528	1077	1879	2852	4046	6500	8397	9378	9700	10355	24730
PC LPG Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	876	1894	3270	3965	4777	8785
PC LPG Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1322	3184	8169
PC CNG Medium	Euro 4	2979	5958	8882	11892	14883	17860	20692	19337	19248	19098	19834	20942	20862	20084	21916	23699	26133

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PC CNG Medium	Euro 5	0	0	0	0	0	0	113	211	319	427	500	772	978	1171	1264	1394	2280
PC CNG Medium	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	0	104	221	408	517	643	810
PC CNG Medium	Euro 6 d-temp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	172	429	753
LCV Gasoline <3,5 t	Conventional	163491	160845	52019	44691	38302	33936	30418	27048	24145	21579	18841	16452	11544	7051	5670	4604	3777
LCV Gasoline <3,5 t	Euro 1	48863	50567	17258	16569	16994	16568	15136	13290	12973	13053	13299	13460	10495	7208	6615	6248	6115
LCV Gasoline <3,5 t	Euro 2	32531	33402	11309	12145	12992	13719	13151	12824	12342	12152	12616	12787	11825	9275	8918	8879	8993
LCV Gasoline <3,5 t	Euro 3	25958	32388	12957	13166	12753	11694	12732	13525	14287	14456	14067	14414	13593	12130	11966	11728	12259
LCV Gasoline <3,5 t	Euro 4	0	8062	5529	9051	9904	9051	7604	7085	7948	8726	8206	7946	7416	7551	8253	7928	7357
LCV Gasoline <3,5 t	Euro 5	0	0	0	0	3301	6034	7863	9166	9773	11331	12826	14055	12877	11134	10971	12403	13460
LCV Gasoline <3,5 t	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	1839	4228	6051	7723	10242	11684	12829
LCV Diesel <3,5 t	Conventional	47472	45458	64419	72921	77175	78023	79164	79087	77566	74622	69920	65562	55093	37916	31489	26249	21667
LCV Diesel <3,5 t	Euro 1	14188	14291	21372	27036	34242	38092	39392	38858	41677	45139	49354	53641	50085	38759	36737	35624	35080
LCV Diesel <3,5 t	Euro 2	9446	9440	14005	19816	26178	31541	34225	37496	39648	42021	46818	50960	56432	49872	49532	50624	51588
LCV Diesel <3,5 t	Euro 3	7537	9153	16046	21482	25696	26885	33135	39544	45899	49991	52204	57442	64869	65225	66458	66866	70324
LCV Diesel <3,5 t	Euro 4	0	2279	6847	14769	19956	20810	19788	20715	25533	30174	30452	31667	35393	40603	45835	45201	42205
LCV Diesel <3,5 t	Euro 5	0	0	0	0	6652	13873	20465	26801	31395	39183	47597	56010	61451	59873	60933	70713	77218
LCV Diesel <3,5 t	Euro 6 a/b/c	0	0	0	0	0	0	0	0	0	0	6824	16849	28878	41528	56884	66614	73596
HDV Gasoline >3,5 t	Conventional	5527	5822	2022	1951	1923	1857	1774	1693	1663	1659	1667	1701	1506	1267	1278	1295	1322
HDV Diesel Rigid <=7,5 t	Conventional	3322	3200	4070	4360	4489	4358	4492	4087	3814	3485	3095	2743	2173	1406	1094	851	653
HDV Diesel Rigid <=7,5 t	Euro I	993	1006	1350	1616	1992	2127	2235	2008	2049	2108	2184	2244	1976	1437	1276	1155	1057
HDV Diesel Rigid <=7,5 t	Euro II	661	665	885	1185	1523	1762	1942	1938	1950	1963	2072	2132	2226	1849	1721	1641	1554
HDV Diesel Rigid <=7,5 t	Euro III	527	644	1014	1284	1495	1502	1880	2043	2257	2335	2311	2403	2559	2419	2309	2168	2119
HDV Diesel Rigid <=7,5 t	Euro IV	0	160	433	883	1161	1162	1123	1070	1256	1409	1348	1325	1396	1506	1592	1466	1272
HDV Diesel Rigid <=7,5 t	Euro V	0	0	0	0	387	775	1161	1385	1544	1830	2107	2344	2424	2220	2117	2293	2327
HDV Diesel Rigid <=7,5 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	302	705	1139	1540	1976	2160	2218
HDV Diesel Rigid 7,5 - 12 t	Conventional	1800	1696	2383	2581	2720	2650	2733	2633	2533	2391	2197	2020	1664	1123	914	746	603
HDV Diesel Rigid 7,5 - 12 t	Euro I	538	533	790	957	1207	1294	1360	1294	1361	1446	1551	1653	1513	1147	1066	1013	977
HDV Diesel Rigid 7,5 - 12 t	Euro II	358	352	518	701	922	1071	1181	1248	1295	1346	1471	1570	1704	1476	1437	1439	1437
HDV Diesel Rigid 7,5 - 12 t	Euro III	286	342	593	760	905	913	1144	1317	1499	1602	1640	1770	1959	1931	1928	1901	1958
HDV Diesel Rigid 7,5 - 12 t	Euro IV	0	85	253	523	703	707	683	690	834	967	957	976	1069	1202	1330	1285	1175
HDV Diesel Rigid 7,5 - 12 t	Euro V	0	0	0	0	234	471	706	892	1025	1255	1495	1726	1856	1773	1768	2010	2150
HDV Diesel Rigid 7,5 - 12 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	214	519	872	1229	1650	1894	2050
HDV Diesel Rigid 12 - 14 t	Conventional	533	498	695	742	773	761	758	728	693	646	587	532	433	288	231	186	148
HDV Diesel Rigid 12 - 14 t	Euro I	159	156	230	275	343	371	377	358	372	391	414	436	393	294	269	252	239
HDV Diesel Rigid 12 - 14 t	Euro II	106	103	151	202	262	308	328	345	354	364	393	414	443	379	363	358	352
HDV Diesel Rigid 12 - 14 t	Euro III	85	100	173	219	257	262	317	364	410	433	438	467	510	495	487	473	480
HDV Diesel Rigid 12 - 14 t	Euro IV	0	25	74	150	200	203	189	191	228	261	255	257	278	308	336	320	288
HDV Diesel Rigid 12 - 14 t	Euro V	0	0	0	0	67	135	196	247	280	339	399	455	483	455	447	501	527
HDV Diesel Rigid 12 - 14 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	57	137	227	315	417	472	502
HDV Diesel Rigid 14 - 20 t	Conventional	1705	1580	2191	2400	2464	2408	2365	2290	2172	2020	1827	1653	1339	887	709	568	450
HDV Diesel Rigid 14 - 20 t	Euro I	510	497	727	890	1093	1175	1177	1125	1167	1222	1290	1353	1217	907	827	771	728
HDV Diesel Rigid 14 - 20 t	Euro II	339	328	476	652	836	973	1023	1086	1110	1137	1224	1285	1372	1167	1115	1095	1071

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
HDV Diesel Rigid 14 - 20 t	Euro III	271	318	546	707	820	830	990	1145	1286	1353	1364	1448	1577	1527	1496	1446	1460
HDV Diesel Rigid 14 - 20 t	Euro IV	0	79	233	486	637	642	591	600	715	817	796	799	860	950	1032	978	876
HDV Diesel Rigid 14 - 20 t	Euro V	0	0	0	0	212	428	611	776	879	1061	1244	1412	1494	1401	1372	1530	1603
HDV Diesel Rigid 14 - 20 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	178	425	702	972	1281	1441	1528
HDV Diesel Rigid 20 - 26 t	Conventional	1405	1279	1793	1989	1957	1895	1886	1799	1692	1559	1397	1251	1002	656	517	408	319
HDV Diesel Rigid 20 - 26 t	Euro I	420	402	595	737	868	925	938	884	909	943	986	1023	911	671	603	554	516
HDV Diesel Rigid 20 - 26 t	Euro II	280	266	390	540	664	766	815	853	865	878	936	972	1026	863	814	788	758
HDV Diesel Rigid 20 - 26 t	Euro III	223	258	447	586	652	653	789	900	1001	1045	1043	1096	1180	1128	1092	1040	1034
HDV Diesel Rigid 20 - 26 t	Euro IV	0	64	191	403	506	505	471	471	557	631	608	604	644	702	753	703	621
HDV Diesel Rigid 20 - 26 t	Euro V	0	0	0	0	169	337	487	610	685	819	951	1069	1117	1036	1001	1100	1135
HDV Diesel Rigid 20 - 26 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	136	321	525	718	934	1036	1082
HDV Diesel Rigid 26 - 28 t	Conventional	316	293	428	493	512	512	502	512	500	479	447	418	350	240	198	165	135
HDV Diesel Rigid 26 - 28 t	Euro I	94	92	142	183	227	250	250	251	269	290	316	342	318	245	231	224	219
HDV Diesel Rigid 26 - 28 t	Euro II	63	61	93	134	174	207	217	243	256	270	299	325	358	315	312	318	323
HDV Diesel Rigid 26 - 28 t	Euro III	50	59	107	145	170	177	210	256	296	321	334	366	412	412	419	420	440
HDV Diesel Rigid 26 - 28 t	Euro IV	0	15	45	100	132	137	125	134	165	194	195	202	225	257	289	284	264
HDV Diesel Rigid 26 - 28 t	Euro V	0	0	0	0	44	91	130	173	202	252	304	357	390	379	384	444	483
HDV Diesel Rigid 26 - 28 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	44	107	183	263	358	418	460
HDV Diesel Rigid 28 - 32 t	Conventional	299	284	409	483	504	506	516	524	517	501	473	446	377	261	218	183	152
HDV Diesel Rigid 28 - 32 t	Euro I	89	89	136	179	224	247	257	257	278	303	334	365	343	267	255	249	246
HDV Diesel Rigid 28 - 32 t	Euro II	59	59	89	131	171	205	223	248	264	282	316	347	386	344	343	353	362
HDV Diesel Rigid 28 - 32 t	Euro III	47	57	102	142	168	174	216	262	306	336	353	391	444	449	461	466	494
HDV Diesel Rigid 28 - 32 t	Euro IV	0	14	43	98	130	135	129	137	170	203	206	215	242	280	318	315	296
HDV Diesel Rigid 28 - 32 t	Euro V	0	0	0	0	43	90	133	178	209	263	322	381	421	413	423	493	542
HDV Diesel Rigid 28 - 32 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	46	115	198	286	394	465	517
HDV Diesel Rigid >32 t	Conventional	161	150	216	243	258	254	252	254	247	236	219	204	170	116	96	79	65
HDV Diesel Rigid >32 t	Euro I	48	47	72	90	115	124	125	125	133	143	155	167	155	119	112	108	105
HDV Diesel Rigid >32 t	Euro II	32	31	47	66	88	103	109	120	126	133	147	159	174	153	151	153	155
HDV Diesel Rigid >32 t	Euro III	26	30	54	72	86	88	105	127	146	158	164	179	201	200	202	202	211
HDV Diesel Rigid >32 t	Euro IV	0	8	23	49	67	68	63	66	81	95	96	99	109	125	140	137	127
HDV Diesel Rigid >32 t	Euro V	0	0	0	0	22	45	65	86	100	124	149	174	190	184	186	214	232
HDV Diesel Rigid >32 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	21	52	89	127	173	201	221
HDV Diesel Articulated 14 - 20 t	Conventional	279	282	403	460	555	560	563	594	600	594	572	551	475	335	285	243	205
HDV Diesel Articulated 14 - 20 t	Euro I	83	89	134	170	246	274	280	292	323	359	404	451	431	342	332	329	332
HDV Diesel Articulated 14 - 20 t	Euro II	55	58	88	125	188	226	243	282	307	335	383	428	486	440	448	468	488
HDV Diesel Articulated 14 - 20 t	Euro III	44	57	100	135	185	193	236	297	355	398	427	483	559	576	601	618	665
HDV Diesel Articulated 14 - 20 t	Euro IV	0	14	43	93	143	149	141	156	198	240	249	266	305	358	414	418	399
HDV Diesel Articulated 14 - 20 t	Euro V	0	0	0	0	48	100	146	201	243	312	389	470	529	529	551	654	730
HDV Diesel Articulated 14 - 20 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	56	142	249	367	514	616	696
HDV Diesel Articulated 20 - 28 t	Conventional	214	204	278	322	339	329	336	332	322	307	285	264	220	150	123	102	83
HDV Diesel Articulated 20 - 28 t	Euro I	64	64	92	120	151	161	167	163	173	186	201	216	200	153	144	138	134
HDV Diesel Articulated 20 - 28 t	Euro II	43	42	60	88	115	133	145	157	165	173	191	205	225	197	194	196	198

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Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
HDV Diesel Articulated 20 - 28 t	Euro III	34	41	69	95	113	113	141	166	191	206	212	231	259	258	260	259	269
HDV Diesel Articulated 20 - 28 t	Euro IV	0	10	30	65	88	88	84	87	106	124	124	128	141	160	179	175	162
HDV Diesel Articulated 20 - 28 t	Euro V	0	0	0	0	29	59	87	112	130	161	194	226	245	236	238	274	296
HDV Diesel Articulated 20 - 28 t	Euro VI	0	0	0	0	0	0	0	0	0	0	28	68	115	164	222	258	282
HDV Diesel Articulated 28 - 34 t	Conventional	200	180	238	270	251	230	233	209	188	165	140	118	88	53	37	26	17
HDV Diesel Articulated 28 - 34 t	Euro I	60	57	79	100	111	112	116	103	101	100	99	96	80	54	44	35	28
HDV Diesel Articulated 28 - 34 t	Euro II	40	37	52	73	85	93	101	99	96	93	94	92	90	69	59	50	41
HDV Diesel Articulated 28 - 34 t	Euro III	32	36	59	79	84	79	97	104	111	111	105	103	103	91	79	66	56
HDV Diesel Articulated 28 - 34 t	Euro IV	0	9	25	55	65	61	58	55	62	67	61	57	56	56	54	45	33
HDV Diesel Articulated 28 - 34 t	Euro V	0	0	0	0	22	41	60	71	76	87	95	101	98	83	72	70	61
HDV Diesel Articulated 28 - 34 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	14	30	46	58	68	66	58
HDV Diesel Articulated 34 - 40 t	Conventional	1177	1021	1414	1617	1493	1336	1289	1197	1072	934	785	652	478	282	195	131	82
HDV Diesel Articulated 34 - 40 t	Euro I	352	321	469	600	663	652	641	588	576	565	554	533	435	288	228	177	132
HDV Diesel Articulated 34 - 40 t	Euro II	234	212	308	439	507	540	557	567	548	526	525	507	490	371	307	252	194
HDV Diesel Articulated 34 - 40 t	Euro III	187	206	352	476	497	460	539	598	634	625	586	571	563	485	412	333	265
HDV Diesel Articulated 34 - 40 t	Euro IV	0	51	150	328	386	356	322	314	353	378	342	315	307	302	284	225	159
HDV Diesel Articulated 34 - 40 t	Euro V	0	0	0	0	129	238	333	406	434	490	534	557	534	445	378	352	291
HDV Diesel Articulated 34 - 40 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	77	168	251	309	353	331	277
HDV Diesel Articulated 40 - 50 t	Conventional	1677	1596	2239	2526	2722	2817	2632	2720	2658	2547	2378	2222	1860	1276	1056	877	721
HDV Diesel Articulated 40 - 50 t	Euro I	501	502	743	936	1208	1375	1310	1336	1428	1541	1679	1818	1691	1304	1232	1190	1168
HDV Diesel Articulated 40 - 50 t	Euro II	334	331	487	686	923	1139	1138	1290	1359	1435	1592	1727	1905	1678	1661	1691	1717
HDV Diesel Articulated 40 - 50 t	Euro III	266	321	558	744	906	971	1102	1360	1573	1707	1776	1947	2190	2194	2228	2234	2341
HDV Diesel Articulated 40 - 50 t	Euro IV	0	80	238	512	704	751	658	712	875	1030	1036	1073	1195	1366	1537	1510	1405
HDV Diesel Articulated 40 - 50 t	Euro V	0	0	0	0	235	501	680	922	1076	1338	1619	1898	2075	2014	2043	2362	2571
HDV Diesel Articulated 40 - 50 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	232	571	975	1397	1907	2225	2450
HDV Diesel Articulated 50 - 60 t	Conventional	63	62	88	105	112	116	117	120	120	118	112	107	91	64	54	45	38
HDV Diesel Articulated 50 - 60 t	Euro I	19	19	29	39	50	56	58	59	65	71	79	87	83	65	62	61	61
HDV Diesel Articulated 50 - 60 t	Euro II	13	13	19	28	38	47	51	57	61	66	75	83	93	84	84	87	90
HDV Diesel Articulated 50 - 60 t	Euro III	10	12	22	31	37	40	49	60	71	79	84	93	107	109	113	115	123
HDV Diesel Articulated 50 - 60 t	Euro IV	0	3	9	21	29	31	29	32	40	48	49	51	58	68	78	78	74
HDV Diesel Articulated 50 - 60 t	Euro V	0	0	0	0	10	21	30	41	49	62	76	91	101	100	104	122	135
HDV Diesel Articulated 50 - 60 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	11	27	48	70	97	115	129
BUS Diesel Urban Midi <=15 t	Conventional	815	853	1037	1026	1028	984	921	848	768	699	613	536	426	292	237	191	143
BUS Diesel Urban Midi <=15 t	Euro I	187	195	236	276	327	354	354	329	350	381	418	438	387	298	276	259	231
BUS Diesel Urban Midi <=15 t	Euro II	143	149	181	220	243	272	280	300	307	313	351	382	423	386	371	369	340
BUS Diesel Urban Midi <=15 t	Euro III	129	170	254	285	307	295	338	366	392	403	380	437	490	492	494	448	458
BUS Diesel Urban Midi <=15 t	Euro IV	0	45	115	200	263	260	217	207	257	297	295	257	262	291	339	337	274
BUS Diesel Urban Midi <=15 t	Euro V	0	0	0	0	88	173	225	238	212	226	290	337	361	306	275	347	370
BUS Diesel Urban Midi <=15 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	23	53	109	172	232	270	276
BUS Diesel Urban Standard 15 - 18 t	Conventional	1631	1707	2074	2051	2055	1968	1842	1697	1536	1397	1225	1072	852	584	473	382	286
BUS Diesel Urban Standard 15 - 18 t	Euro I	374	390	471	551	653	708	708	658	700	761	835	877	775	597	552	519	463
BUS Diesel Urban Standard 15 - 18 t	Euro II	286	298	362	440	485	544	561	599	615	626	702	763	846	773	743	737	681

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BUS Diesel Urban Standard 15 - 18 t	Euro III	259	341	508	570	615	590	677	733	784	806	760	873	979	983	987	896	916
BUS Diesel Urban Standard 15 - 18 t	Euro IV	0	90	230	401	525	520	434	414	514	595	590	514	524	582	677	674	547
BUS Diesel Urban Standard 15 - 18 t	Euro V	0	0	0	0	175	347	450	476	423	452	579	675	721	612	551	695	740
BUS Diesel Urban Standard 15 - 18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	46	106	218	344	464	540	552
BUS Diesel Urban Articulated >18 t	Conventional	272	284	346	342	343	328	307	283	256	233	204	179	142	97	79	64	48
BUS Diesel Urban Articulated >18 t	Euro I	62	65	79	92	109	118	118	110	117	127	139	146	129	99	92	86	77
BUS Diesel Urban Articulated >18 t	Euro II	48	50	60	73	81	91	93	100	102	104	117	127	141	129	124	123	113
BUS Diesel Urban Articulated >18 t	Euro III	43	57	85	95	102	98	113	122	131	134	127	146	163	164	165	149	153
BUS Diesel Urban Articulated >18 t	Euro IV	0	15	38	67	88	87	72	69	86	99	98	86	87	97	113	112	91
BUS Diesel Urban Articulated >18 t	Euro V	0	0	0	0	29	58	75	79	71	75	97	112	120	102	92	116	123
BUS Diesel Urban Articulated >18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	8	18	36	57	77	90	92
BUS Diesel Coach Standard <=18 t	Conventional	4560	4675	5659	5761	5644	5247	4868	4495	4036	3644	3171	2754	2173	1476	1189	952	707
BUS Diesel Coach Standard <=18 t	Euro I	1046	1068	1286	1548	1795	1888	1871	1743	1839	1986	2162	2253	1975	1509	1387	1292	1144
BUS Diesel Coach Standard <=18 t	Euro II	798	818	989	1235	1332	1451	1482	1587	1616	1633	1817	1961	2157	1955	1865	1837	1683
BUS Diesel Coach Standard <=18 t	Euro III	724	933	1385	1601	1688	1573	1789	1940	2061	2102	1968	2243	2496	2487	2479	2233	2265
BUS Diesel Coach Standard <=18 t	Euro IV	0	246	627	1125	1443	1387	1148	1097	1350	1551	1527	1322	1336	1473	1700	1679	1353
BUS Diesel Coach Standard <=18 t	Euro V	0	0	0	0	481	924	1190	1260	1113	1180	1500	1733	1839	1549	1383	1731	1830
BUS Diesel Coach Standard <=18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	120	272	556	870	1165	1345	1366
BUS Diesel Coach Articulated >18 t	Conventional	46	47	57	58	57	53	49	45	41	37	32	28	22	15	12	10	7
BUS Diesel Coach Articulated >18 t	Euro I	11	11	13	16	18	19	19	18	19	20	22	23	20	15	14	13	12
BUS Diesel Coach Articulated >18 t	Euro II	8	8	10	12	13	15	15	16	16	16	18	20	22	20	19	19	17
BUS Diesel Coach Articulated >18 t	Euro III	7	9	14	16	17	16	18	20	21	21	20	23	25	25	25	23	23
BUS Diesel Coach Articulated >18 t	Euro IV	0	2	6	11	15	14	12	11	14	16	15	13	13	15	17	17	14
BUS Diesel Coach Articulated >18 t	Euro V	0	0	0	0	5	9	12	13	11	12	15	18	19	16	14	17	18
BUS Diesel Coach Articulated >18 t	Euro VI A/B/C	0	0	0	0	0	0	0	0	0	0	1	3	6	9	12	14	14
BUS CNG Urban	Euro I	22	42	59	73	84	97	108	127	140	153	173	187	149	121	124	123	111
BUS CNG Urban	Euro II	3	6	8	12	15	20	24	32	38	44	59	73	78	79	90	100	101
BUS CNG Urban	Euro III	3	7	12	16	19	21	29	40	49	57	64	84	90	101	119	122	136
BUS CNG Urban	EEV	0	2	5	11	22	31	38	48	59	74	102	124	134	157	204	260	274
MOP Gasoline 2-stroke <50 cm³	Conventional	40334	42519	27593	30636	33607	35465	36394	36590	37137	37472	38351	38667	38283	38012	37375	37563	35648
MOP Gasoline 2-stroke <50 cm³	Euro 1	2870	3736	2913	3703	4261	4199	5043	6227	7235	7393	7202	7635	8556	9185	9348	9188	11311
MOP Gasoline 2-stroke <50 cm³	Euro 2	1483	2412	2150	3037	4426	4560	4250	4562	5733	7059	7374	7290	7807	8884	9960	9746	9327
MOP Gasoline 2-stroke <50 cm³	Euro 3	0	0	716	2024	4507	7042	9296	10639	11735	13555	16056	18292	20043	21186	22453	24574	25785
MOP Gasoline 2-stroke <50 cm³	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	847	1677	2642	3431
MOT Gasoline 2-stroke >50 cm³	Conventional	13084	12775	5363	5819	6256	6178	6403	6183	6070	5966	6028	6056	5971	5857	5732	5703	5381
MOT Gasoline 2-stroke >50 cm³	Euro 1	931	1123	566	703	793	731	887	1052	1182	1177	1132	1196	1334	1415	1434	1395	1707
MOT Gasoline 2-stroke >50 cm³	Euro 2	481	725	418	577	824	794	748	771	937	1124	1159	1142	1218	1369	1527	1480	1408
MOT Gasoline 2-stroke >50 cm³	Euro 3	0	0	139	384	839	1227	1635	1798	1918	2158	2524	2865	3126	3264	3443	3731	3892
MOT Gasoline 2-stroke >50 cm³	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	131	257	401	518
MOT Gasoline 4-stroke <250 cm³	Conventional	21330	21789	9027	10133	11073	11914	12057	12109	12227	12371	12874	13331	13556	13724	13874	14273	13934
MOT Gasoline 4-stroke <250 cm³	Euro 1	1518	1914	953	1225	1404	1411	1671	2061	2382	2441	2418	2632	3030	3316	3470	3491	4421
MOT Gasoline 4-stroke <250 cm³	Euro 2	784	1236	703	1004	1458	1532	1408	1510	1888	2330	2475	2513	2764	3207	3697	3703	3646

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 3	0	0	234	669	1485	2366	3080	3521	3863	4475	5390	6306	7097	7649	8335	9337	10079
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	306	622	1004	1341
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Conventional	35550	36314	15044	16888	18455	19856	20096	20181	20378	20618	21457	22218	22593	22874	23123	23788	23224
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 1	2530	3191	1588	2041	2340	2351	2785	3435	3970	4068	4030	4387	5049	5527	5783	5819	7369
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 2	1307	2060	1172	1674	2430	2553	2347	2516	3146	3884	4126	4189	4607	5346	6162	6172	6076
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 3	0	0	391	1116	2475	3943	5133	5868	6439	7458	8983	10511	11829	12749	13891	15562	16798
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	510	1037	1673	2235
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Conventional	14220	14526	6018	6755	7382	7942	8038	8072	8151	8247	8583	8887	9037	9149	9249	9515	9290
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 1	1012	1276	635	817	936	940	1114	1374	1588	1627	1612	1755	2020	2211	2313	2327	2948
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 2	523	824	469	670	972	1021	939	1007	1258	1554	1650	1676	1843	2138	2465	2469	2431
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 3	0	0	156	446	990	1577	2053	2347	2576	2983	3593	4204	4731	5100	5556	6225	6719
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 4	0	0	0	0	0	0	0	0	0	0	0	0	0	204	415	669	894

**Table 92: Mileage data for Road transport (average km/year/vehicle) 1988-2003**

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PC Gasoline Small	PRE ECE	9797	10472	9158	4111	4980	5440	5187	5448	4456	2846	3565	3306	2587	2086	2135	1887
PC Gasoline Small	ECE 15/00-01	11801	12614	11031	4952	5998	6553	6247	6562	5367	3428	4294	3982	3116	2513	2571	2272
PC Gasoline Small	ECE 15/02	11950	12773	11170	5014	6074	6636	6326	6645	5435	3471	4348	4033	3155	2545	2604	2301
PC Gasoline Small	ECE 15/03	14082	15053	13164	5909	7158	7820	7455	7831	6404	4091	5124	4752	3718	2999	3068	2712
PC Gasoline Small	ECE 15/04	18918	20221	17684	7938	9616	10505	10016	10520	8604	5496	6884	6384	4995	4029	4122	3643
PC Gasoline Small	Euro 1	22774	24343	21288	9556	11576	12647	12057	12665	10357	6616	8287	7685	6013	4850	4962	4386
PC Gasoline Small	Euro 2	26388	28206	24667	11073	13413	14654	13970	14675	12001	7666	9602	8905	6967	5620	5749	5082
PC Gasoline Small	Euro 3	30448	32546	28462	12776	15477	16908	16120	16932	13847	8845	11079	10275	8039	6484	6634	5863
PC Gasoline Small	Euro 4	32256	34478	30151	13535	16396	17912	17077	17937	14669	9370	11737	10885	8516	6869	7028	6211
PC Gasoline Small	Euro 5	35102	37521	32813	14729	17843	19493	18584	19520	15964	10197	12773	11845	9268	7476	7648	6760
PC Gasoline Small	Euro 6 a/b/c	38158	40787	35669	16011	19396	21190	20202	21220	17354	11085	13885	12877	10075	8126	8314	7348
PC Gasoline Small	Euro 6 d-temp	41214	44053	38525	17294	20949	22886	21819	22919	18743	11972	14997	13908	10881	8777	8980	7937
PC Gasoline Medium	PRE ECE	10500	11223	9815	4406	5337	5831	5559	5839	4775	3050	3821	3543	2772	2236	2288	2022
PC Gasoline Medium	ECE 15/00-01	12571	13437	11751	5275	6390	6981	6655	6991	5717	3652	4574	4242	3319	2677	2739	2421
PC Gasoline Medium	ECE 15/02	13189	14097	12328	5534	6704	7324	6982	7334	5998	3831	4799	4451	3482	2809	2874	2540
PC Gasoline Medium	ECE 15/03	15117	16158	14131	6343	7684	8394	8003	8406	6875	4391	5501	5101	3991	3219	3294	2911
PC Gasoline Medium	ECE 15/04	20330	21730	19004	8531	10334	11289	10763	11305	9246	5906	7397	6860	5367	4330	4429	3915
PC Gasoline Medium	Euro 1	25158	26891	23517	10557	12788	13970	13319	13990	11441	7308	9154	8490	6642	5358	5481	4845
PC Gasoline Medium	Euro 2	28370	30325	26520	11904	14421	15754	15020	15777	12902	8241	10323	9574	7490	6042	6181	5463
PC Gasoline Medium	Euro 3	32737	34992	30601	13737	16640	18179	17331	18205	14888	9510	11912	11047	8643	6972	7133	6304
PC Gasoline Medium	Euro 4	34520	36898	32268	14485	17547	19169	18276	19197	15699	10028	12561	11649	9114	7352	7521	6648
PC Gasoline Medium	Euro 5	37803	40408	35337	15862	19216	20992	20014	21022	17192	10982	13756	12757	9981	8051	8236	7280
PC Gasoline Medium	Euro 6 a/b/c	41086	43917	38406	17240	20884	22815	21752	22848	18685	11935	14950	13865	10848	8750	8952	7912
PC Gasoline Medium	Euro 6 d-temp	44369	47426	41475	18618	22553	24639	23490	24674	20178	12889	16145	14973	11714	9449	9667	8544

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PC Gasoline Large	PRE ECE	11042	11803	10322	4633	5613	6132	5846	6141	5022	3208	4018	3726	2915	2352	2406	2126
PC Gasoline Large	ECE 15/00-01	13210	14120	12348	5543	6715	7335	6993	7346	6008	3837	4807	4458	3488	2813	2878	2544
PC Gasoline Large	ECE 15/02	13440	14366	12563	5640	6832	7463	7115	7474	6112	3904	4890	4535	3548	2862	2928	2588
PC Gasoline Large	ECE 15/03	15941	17039	14901	6689	8103	8852	8439	8865	7250	4631	5801	5379	4209	3395	3473	3070
PC Gasoline Large	ECE 15/04	21149	22606	19769	8874	10750	11744	11197	11761	9618	6144	7696	7137	5584	4504	4608	4073
PC Gasoline Large	Euro 1	25775	27550	24093	10815	13101	14313	13646	14333	11722	7487	9379	8698	6805	5489	5616	4963
PC Gasoline Large	Euro 2	30280	32366	28305	12706	15392	16815	16031	16839	13771	8796	11018	10218	7995	6449	6597	5831
PC Gasoline Large	Euro 3	33712	36034	31513	14146	17136	18720	17847	18747	15331	9793	12267	11376	8901	7179	7345	6492
PC Gasoline Large	Euro 4	37898	40509	35426	15902	19264	21045	20064	21075	17235	11009	13790	12789	10006	8071	8257	7298
PC Gasoline Large	Euro 5	40198	42967	37575	16867	20433	22322	21281	22354	18281	11677	14627	13565	10613	8561	8758	7741
PC Gasoline Large	Euro 6 a/b/c	43738	46752	40885	18353	22232	24288	23156	24323	19891	12706	15915	14760	11548	9315	9530	8423
PC Gasoline Large	Euro 6 d-temp	47279	50536	44195	19839	24032	26254	25030	26292	21502	13734	17204	15954	12483	10069	10301	9105
PC Gasoline Hybrid Medium	Euro 4	39572	42299	36991	16605	20115	21975	20950	22006	17997	11496	14399	13354	10448	8427	8622	7620
PC Gasoline Hybrid Medium	Euro 5	40288	43064	37660	16905	20479	22372	21329	22404	18322	11704	14660	13595	10637	8580	8778	7758
PC Gasoline Hybrid Medium	Euro 6 a/b/c	46957	50192	43894	19703	23868	26075	24860	26113	21355	13641	17086	15846	12398	10000	10231	9042
PC Gasoline Hybrid Medium	Euro 6 d-temp	49657	53078	46418	20836	25241	27575	26289	27614	22583	14425	18069	16757	13110	10575	10819	9562
PC Diesel Small	Conventional	47866	44482	24523	16848	11748	10626	6630	6408	11001	19220	21900	22288	18899	20155	19690	24354
PC Diesel Small	Euro 1	53925	50112	27627	18980	13235	11971	7469	7219	12394	21653	24672	25109	21291	22706	22182	27436
PC Diesel Small	Euro 2	63515	59024	32540	22356	15588	14100	8797	8503	14598	25504	29060	29574	25078	26744	26127	32315
PC Diesel Small	Euro 3	72070	66974	36923	25367	17688	15999	9982	9648	16564	28939	32974	33557	28456	30346	29646	36668
PC Diesel Small	Euro 4	72706	67565	37249	25591	17844	16140	10070	9733	16710	29194	33265	33853	28707	30614	29907	36991
PC Diesel Small	Euro 5	82364	76540	42197	28990	20214	18284	11408	11026	18930	33072	37684	38350	32520	34680	33880	41905
PC Diesel Small	Euro 6 a/b/c	89146	82842	45672	31378	21879	19790	12347	11934	20489	35795	40787	41508	35198	37536	36670	45356
PC Diesel Small	Euro 6 d-temp	95928	89145	49146	33765	23543	21296	13287	12842	22048	38519	43890	44666	37876	40392	39460	48807
PC Diesel Medium	Conventional	47866	44482	24523	16848	11748	10626	6630	6408	11001	19220	21900	22288	18899	20155	19690	24354
PC Diesel Medium	Euro 1	53925	50112	27627	18980	13235	11971	7469	7219	12394	21653	24672	25109	21291	22706	22182	27436
PC Diesel Medium	Euro 2	63515	59024	32540	22356	15588	14100	8797	8503	14598	25504	29060	29574	25078	26744	26127	32315
PC Diesel Medium	Euro 3	72070	66974	36923	25367	17688	15999	9982	9648	16564	28939	32974	33557	28456	30346	29646	36668
PC Diesel Medium	Euro 4	72706	67565	37249	25591	17844	16140	10070	9733	16710	29194	33265	33853	28707	30614	29907	36991
PC Diesel Medium	Euro 5	82364	76540	42197	28990	20214	18284	11408	11026	18930	33072	37684	38350	32520	34680	33880	41905
PC Diesel Medium	Euro 6 a/b/c	89146	82842	45672	31378	21879	19790	12347	11934	20489	35795	40787	41508	35198	37536	36670	45356
PC Diesel Medium	Euro 6 d-temp	95928	89145	49146	33765	23543	21296	13287	12842	22048	38519	43890	44666	37876	40392	39460	48807
PC Diesel Large	Conventional	52860	49122	27081	18606	12973	11735	7321	7076	12149	21225	24185	24613	20871	22257	21744	26894
PC Diesel Large	Euro 1	59887	55652	30682	21079	14698	13295	8295	8017	13764	24047	27400	27885	23646	25216	24634	30470
PC Diesel Large	Euro 2	67325	62565	34492	23697	16524	14946	9325	9013	15474	27034	30804	31348	26582	28348	27694	34254
PC Diesel Large	Euro 3	78704	73139	40322	27702	19316	17472	10901	10536	18089	31602	36010	36646	31075	33139	32375	40043
PC Diesel Large	Euro 4	81433	75675	41720	28663	19986	18078	11279	10902	18716	32698	37258	37917	32153	34288	33498	41432
PC Diesel Large	Euro 5	90831	84408	46535	31971	22293	20164	12581	12160	20876	36472	41558	42293	35863	38246	37363	46213
PC Diesel Large	Euro 6 a/b/c	98428	91468	50427	34645	24157	21851	13633	13177	22622	39522	45034	45830	38863	41444	40488	50078
PC Diesel Large	Euro 6 d-temp	106024	98527	54319	37318	26021	23537	14685	14194	24368	42572	48509	49367	41862	44643	43613	53943
PC LPG Medium	Conventional	27172	27172	27172	27172	27172	27172	27172	27172	27172	93763	41952	39369	69642	73468	70463	64097
PC LPG Medium	Euro 1	30842	30842	30842	30842	30842	30842	30842	30842	30842	106427	47619	44686	79048	83391	79980	72754

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PC LPG Medium	Euro 2	32745	32745	32745	32745	32745	32745	32745	32745	32745	112996	50558	47444	83927	88538	84916	77244
PC LPG Medium	Euro 3	34325	34325	34325	34325	34325	34325	34325	34325	34325	118446	52996	49733	87975	92809	89012	80971
PC LPG Medium	Euro 4	33555	33555	33555	33555	33555	33555	33555	33555	33555	115790	51808	48617	86002	90727	87016	79155
PC LPG Medium	Euro 5	36603	36603	36603	36603	36603	36603	36603	36603	36603	126307	56513	53033	93813	98967	94919	86344
PC LPG Medium	Euro 6 a/b/c	38228	38228	38228	38228	38228	38228	38228	38228	38228	131914	59022	55387	97978	103361	99133	90177
PC LPG Medium	Euro 6 d-temp	39853	39853	39853	39853	39853	39853	39853	39853	39853	137521	61531	57742	102143	107755	103347	94010
PC CNG Medium	Euro 4	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555	33555
PC CNG Medium	Euro 5	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603	36603
PC CNG Medium	Euro 6 a/b/c	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228	38228
PC CNG Medium	Euro 6 d-temp	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853	39853
LCV Gasoline <3,5 t	Conventional	26880	28732	25127	11279	13663	14927	14231	14948	12224	7808	9781	9071	7097	5724	5857	5176
LCV Gasoline <3,5 t	Euro 1	30938	33069	28920	12982	15726	17180	16379	17204	14070	8987	11257	10440	8168	6589	6741	5958
LCV Gasoline <3,5 t	Euro 2	34607	36992	32350	14522	17591	19218	18322	19245	15739	10053	12593	11678	9137	7370	7540	6664
LCV Gasoline <3,5 t	Euro 3	39260	41964	36699	16474	19956	21801	20785	21832	17855	11405	14286	13248	10365	8361	8554	7560
LCV Gasoline <3,5 t	Euro 4	44392	47451	41496	18627	22565	24651	23502	24687	20189	12896	16153	14980	11720	9454	9672	8549
LCV Gasoline <3,5 t	Euro 5	48219	51541	45074	20233	24510	26777	25528	26815	21929	14007	17546	16272	12731	10269	10506	9286
LCV Gasoline <3,5 t	Euro 6 a/b/c	52554	56175	49126	22052	26714	29184	27823	29225	23901	15267	19123	17735	13875	11192	11450	10120
LCV Diesel <3,5 t	Conventional	49295	45810	25255	17351	12098	10943	6828	6599	11330	19794	22554	22953	19464	20756	20278	25081
LCV Diesel <3,5 t	Euro 1	57188	53144	29299	20129	14035	12696	7921	7656	13144	22963	26165	26628	22580	24080	23524	29096
LCV Diesel <3,5 t	Euro 2	62910	58462	32230	22143	15440	13966	8714	8422	14459	25261	28783	29292	24839	26489	25878	32008
LCV Diesel <3,5 t	Euro 3	68639	63785	35165	24159	16846	15238	9507	9189	15776	27561	31404	31960	27101	28901	28234	34922
LCV Diesel <3,5 t	Euro 4	79143	73547	40547	27857	19424	17570	10962	10595	18190	31779	36210	36851	31248	33324	32555	40267
LCV Diesel <3,5 t	Euro 5	84779	78784	43434	29840	20807	18821	11743	11350	19485	34042	38789	39475	33474	35697	34874	43134
LCV Diesel <3,5 t	Euro 6 a/b/c	91893	85396	47079	32345	22553	20400	12728	12302	21120	36898	42044	42788	36283	38693	37800	46754
HDV Gasoline >3,5 t	Conventional	35364	37800	33057	14839	17976	19638	18722	19666	16083	10273	12868	11934	9337	7531	7705	6810
HDV Diesel Rigid <=7,5 t	Conventional	71364	66318	36562	25119	17515	15843	9885	9554	16402	28655	32651	33229	28177	30049	29356	36309
HDV Diesel Rigid <=7,5 t	Euro I	83674	77757	42868	29452	20536	18575	11590	11202	19231	33598	38284	38961	33037	35232	34419	42572
HDV Diesel Rigid <=7,5 t	Euro II	98582	91611	50506	34699	24195	21885	13654	13198	22657	39584	45104	45902	38924	41509	40552	50157
HDV Diesel Rigid <=7,5 t	Euro III	115359	107202	59101	40604	28312	25609	15978	15443	26513	46321	52780	53714	45548	48573	47453	58693
HDV Diesel Rigid <=7,5 t	Euro IV	124744	115923	63909	43907	30616	27693	17278	16700	28670	50089	57074	58084	49253	52525	51313	63468
HDV Diesel Rigid <=7,5 t	Euro V	140278	130359	71868	49375	34428	31141	19430	18779	32241	56327	64182	65317	55387	59066	57703	71371
HDV Diesel Rigid <=7,5 t	Euro VI A/B/C	154122	143224	78960	54248	37826	34215	21347	20633	35422	61886	70516	71763	60853	64895	63398	78415
HDV Diesel Rigid 7,5 - 12 t	Conventional	73413	68222	37611	25840	18018	16298	10168	9828	16873	29478	33589	34183	28986	30912	30199	37352
HDV Diesel Rigid 7,5 - 12 t	Euro I	92191	85672	47232	32449	22626	20466	12769	12342	21189	37018	42180	42926	36400	38818	37923	46906
HDV Diesel Rigid 7,5 - 12 t	Euro II	108276	100620	55472	38111	26574	24037	14997	14495	24885	43477	49540	50416	42751	45591	44539	55089
HDV Diesel Rigid 7,5 - 12 t	Euro III	128049	118995	65603	45071	31427	28427	17736	17142	29430	51416	58587	59623	50558	53917	52673	65149
HDV Diesel Rigid 7,5 - 12 t	Euro IV	139787	129902	71616	49202	34308	31032	19362	18714	32128	56129	63957	65088	55193	58859	57501	71121
HDV Diesel Rigid 7,5 - 12 t	Euro V	158925	147687	81421	55938	39005	35281	22012	21276	36526	63814	72713	73999	62749	66917	65374	80858
HDV Diesel Rigid 7,5 - 12 t	Euro VI A/B/C	175785	163355	90059	61873	43143	39024	24348	23533	40401	70584	80427	81850	69406	74016	72309	89437
HDV Diesel Rigid 12 - 14 t	Conventional	64021	59494	32800	22534	15713	14213	8867	8571	14714	25707	29292	29810	25278	26957	26335	32573
HDV Diesel Rigid 12 - 14 t	Euro I	83621	77708	42841	29433	20523	18564	11582	11195	19219	33577	38259	38936	33016	35209	34397	42545
HDV Diesel Rigid 12 - 14 t	Euro II	99965	92897	51215	35186	24534	22192	13846	13383	22975	40140	45737	46546	39470	42092	41121	50861

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HDV Diesel Rigid 12 - 14 t	Euro III	124720	115901	63897	43899	30610	27688	17275	16697	28665	50080	57063	58073	49244	52515	51304	63456
HDV Diesel Rigid 12 - 14 t	Euro IV	128624	119529	65897	45273	31568	28554	17816	17219	29562	51647	58850	59890	50785	54159	52910	65442
HDV Diesel Rigid 12 - 14 t	Euro V	151282	140585	77506	53248	37129	33584	20954	20253	34770	60745	69216	70440	59732	63699	62230	76970
HDV Diesel Rigid 12 - 14 t	Euro VI A/B/C	168313	156411	86231	59243	41309	37365	23313	22533	38684	67584	77008	78370	66456	70870	69235	85635
HDV Diesel Rigid 14 - 20 t	Conventional	80574	74877	41280	28361	19775	17887	11160	10787	18519	32354	36865	37517	31814	33927	33144	40995
HDV Diesel Rigid 14 - 20 t	Euro I	101036	93892	51763	35563	24797	22430	13994	13526	23221	40570	46227	47045	39893	42542	41561	51405
HDV Diesel Rigid 14 - 20 t	Euro II	116434	108201	59652	40982	28576	25848	16127	15587	26760	46752	53272	54214	45972	49026	47895	59240
HDV Diesel Rigid 14 - 20 t	Euro III	134995	125449	69161	47515	33132	29969	18698	18072	31026	54205	61765	62857	53301	56841	55530	68683
HDV Diesel Rigid 14 - 20 t	Euro IV	137953	128198	70677	48557	33858	30625	19108	18468	31706	55393	63118	64234	54469	58087	56747	70188
HDV Diesel Rigid 14 - 20 t	Euro V	158814	147584	81364	55899	38977	35256	21997	21261	36501	63769	72662	73947	62705	66870	65328	80802
HDV Diesel Rigid 14 - 20 t	Euro VI A/B/C	173685	161404	88983	61134	42627	38558	24057	23252	39919	69741	79466	80872	68577	73132	71445	88368
HDV Diesel Rigid 20 - 26 t	Conventional	80694	74988	41341	28403	19805	17914	11177	10803	18546	32401	36920	37573	31861	33977	33193	41056
HDV Diesel Rigid 20 - 26 t	Euro I	102382	95142	52453	36036	25127	22728	14181	13706	23531	41110	46843	47671	40424	43109	42115	52090
HDV Diesel Rigid 20 - 26 t	Euro II	117402	109101	60148	41323	28814	26063	16261	15717	26983	47141	53715	54665	46355	49434	48293	59732
HDV Diesel Rigid 20 - 26 t	Euro III	139435	129575	71436	49078	34221	30954	19313	18667	32047	55988	63796	64924	55054	58710	57356	70942
HDV Diesel Rigid 20 - 26 t	Euro IV	127032	118050	65082	44713	31177	28201	17595	17006	29196	51008	58121	59149	50157	53488	52255	64632
HDV Diesel Rigid 20 - 26 t	Euro V	152308	141538	78031	53609	37381	33812	21096	20390	35005	61157	69686	70918	60136	64131	62652	77492
HDV Diesel Rigid 20 - 26 t	Euro VI A/B/C	165281	153594	84677	58175	40564	36692	22893	22127	37987	66366	75621	76958	65259	69593	67988	84092
HDV Diesel Rigid 26 - 28 t	Conventional	80372	74689	41177	28289	19726	17842	11132	10760	18472	32272	36773	37423	31734	33842	33061	40892
HDV Diesel Rigid 26 - 28 t	Euro I	98926	91931	50682	34820	24279	21961	13702	13244	22737	39722	45262	46062	39060	41654	40693	50332
HDV Diesel Rigid 26 - 28 t	Euro II	113725	105684	58264	40029	27911	25247	15752	15225	26138	45665	52033	52953	44903	47885	46781	57862
HDV Diesel Rigid 26 - 28 t	Euro III	133635	124185	68464	47037	32798	29667	18510	17890	30714	53659	61142	62223	52764	56268	54971	67991
HDV Diesel Rigid 26 - 28 t	Euro IV	137254	127549	70318	48311	33686	30470	19011	18375	31546	55112	62798	63909	54193	57792	56459	69833
HDV Diesel Rigid 26 - 28 t	Euro V	157324	146200	80601	55375	38612	34925	21791	21061	36158	63171	71981	73254	62117	66243	64715	80044
HDV Diesel Rigid 26 - 28 t	Euro VI A/B/C	172171	159997	88207	60601	42256	38222	23847	23049	39571	69133	78774	80167	67979	72495	70822	87598
HDV Diesel Rigid 28 - 32 t	Conventional	80555	74859	41270	28354	19771	17883	11158	10784	18514	32346	36857	37508	31806	33919	33136	40985
HDV Diesel Rigid 28 - 32 t	Euro I	100219	93133	51345	35275	24597	22248	13881	13417	23034	40242	45854	46664	39570	42198	41225	50990
HDV Diesel Rigid 28 - 32 t	Euro II	115313	107159	59078	40588	28301	25599	15972	15437	26503	46302	52759	53692	45530	48554	47434	58669
HDV Diesel Rigid 28 - 32 t	Euro III	136923	127241	70149	48194	33605	30397	18965	18330	31470	54980	62647	63755	54062	57653	56323	69664
HDV Diesel Rigid 28 - 32 t	Euro IV	129066	119939	66123	45428	31676	28652	17877	17278	29664	51824	59052	60096	50960	54345	53091	65667
HDV Diesel Rigid 28 - 32 t	Euro V	152533	141747	78146	53688	37436	33862	21127	20420	35057	61247	69789	71023	60225	64226	62744	77606
HDV Diesel Rigid 28 - 32 t	Euro VI A/B/C	165905	154174	84997	58395	40718	36831	22979	22210	38131	66617	75907	77249	65505	69856	68245	84410
HDV Diesel Rigid >32 t	Conventional	99250	92232	50848	34934	24359	22033	13747	13287	22811	39852	45410	46213	39187	41790	40826	50497
HDV Diesel Rigid >32 t	Euro I	109513	101770	56106	38546	26878	24312	15169	14661	25170	43974	50106	50992	43240	46112	45048	55719
HDV Diesel Rigid >32 t	Euro II	134380	124878	68846	47299	32981	29832	18613	17990	30885	53958	61483	62570	53058	56582	55277	68370
HDV Diesel Rigid >32 t	Euro III	154775	143831	79295	54478	37986	34360	21438	20720	35573	62148	70814	72067	61111	65170	63667	78747
HDV Diesel Rigid >32 t	Euro IV	141783	131757	72639	49905	34797	31475	19638	18981	32586	56931	64870	66017	55981	59699	58322	72137
HDV Diesel Rigid >32 t	Euro V	167038	155227	85578	58794	40996	37082	23136	22362	38391	67072	76425	77777	65953	70333	68711	84986
HDV Diesel Rigid >32 t	Euro VI A/B/C	180071	167338	92255	63381	44194	39975	24941	24107	41386	72305	82388	83845	71099	75821	74072	91617
HDV Diesel Articulated 14 - 20 t	Conventional	104949	97528	53768	36940	25757	23298	14536	14050	24121	42141	48017	48867	41438	44190	43171	53396
HDV Diesel Articulated 14 - 20 t	Euro I	126822	117854	64974	44639	31126	28154	17566	16978	29148	50924	58025	59051	50074	53400	52168	64525
HDV Diesel Articulated 14 - 20 t	Euro II	151737	141008	77739	53408	37240	33685	21017	20314	34874	60928	69425	70652	59911	63891	62417	77201

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Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
HDV Diesel Articulated 14 - 20 t	Euro III	189188	175811	96926	66590	46432	41999	26204	25327	43482	75966	86560	88090	74698	79660	77822	96256
HDV Diesel Articulated 14 - 20 t	Euro IV	200822	186622	102886	70685	49287	44582	27816	26885	46156	80637	91883	93507	79292	84558	82608	102175
HDV Diesel Articulated 14 - 20 t	Euro V	230938	214608	118315	81285	56678	51268	31987	30916	53077	92730	105661	107530	91182	97239	94996	117497
HDV Diesel Articulated 14 - 20 t	Euro VI A/B/C	256349	238222	131334	90230	62915	56909	35506	34318	58918	102933	117288	119362	101216	107939	105449	130426
HDV Diesel Articulated 20 - 28 t	Conventional	116367	108139	59618	40959	28560	25833	16118	15578	26745	46726	53242	54183	45946	48998	47868	59206
HDV Diesel Articulated 20 - 28 t	Euro I	138240	128465	70824	48658	33928	30689	19147	18507	31772	55508	63249	64368	54582	58208	56865	70334
HDV Diesel Articulated 20 - 28 t	Euro II	165532	153827	84806	58264	40626	36748	22928	22160	38045	66467	75736	77075	65358	69699	68091	84220
HDV Diesel Articulated 20 - 28 t	Euro III	200607	186422	102776	70609	49234	44534	27786	26856	46106	80551	91784	93407	79207	84468	82519	102066
HDV Diesel Articulated 20 - 28 t	Euro IV	200822	186622	102886	70685	49287	44582	27816	26885	46156	80637	91883	93507	79292	84558	82608	102175
HDV Diesel Articulated 20 - 28 t	Euro V	233697	217172	119728	82256	57356	51880	32369	31286	53711	93838	106924	108814	92272	98401	96131	118901
HDV Diesel Articulated 20 - 28 t	Euro VI	256824	238664	131577	90397	63032	57014	35572	34382	59027	103124	117505	119583	101403	108139	105644	130668
HDV Diesel Articulated 28 - 34 t	Conventional	124931	116097	64005	43973	30661	27734	17304	16725	28713	50164	57160	58171	49327	52604	51390	63563
HDV Diesel Articulated 28 - 34 t	Euro I	146596	136230	75105	51599	35979	32544	20305	19625	33693	58864	67073	68259	57881	61726	60302	74586
HDV Diesel Articulated 28 - 34 t	Euro II	175333	162935	89827	61714	43032	38923	24285	23472	40297	70402	80220	81639	69228	73826	72123	89207
HDV Diesel Articulated 28 - 34 t	Euro III	211456	196504	108334	74428	51897	46943	29288	28308	48600	84907	96748	98459	83490	89036	86982	107586
HDV Diesel Articulated 28 - 34 t	Euro IV	230223	213944	117949	81034	56503	51109	31888	30821	52913	92443	105334	107197	90900	96938	94702	117134
HDV Diesel Articulated 28 - 34 t	Euro V	260341	241932	133379	91635	63895	57795	36059	34853	59835	104536	119114	121221	102792	109620	107091	132457
HDV Diesel Articulated 28 - 34 t	Euro VI A/B/C	287885	267529	147491	101330	70655	63910	39874	38540	66166	115596	131717	134046	113667	121217	118421	146471
HDV Diesel Articulated 34 - 40 t	Conventional	119136	110712	61036	41933	29239	26448	16501	15949	27381	47837	54508	55472	47039	50164	49006	60614
HDV Diesel Articulated 34 - 40 t	Euro I	153160	142330	78468	53909	37590	34001	21214	20504	35201	61499	70076	71315	60473	64490	63002	77926
HDV Diesel Articulated 34 - 40 t	Euro II	181661	168816	93069	63941	44585	40328	25162	24320	41752	72943	83116	84586	71726	76490	74726	92426
HDV Diesel Articulated 34 - 40 t	Euro III	219328	203819	112367	77199	53829	48690	30379	29362	50409	88068	100350	102124	86599	92351	90220	111591
HDV Diesel Articulated 34 - 40 t	Euro IV	232503	216062	119117	81836	57063	51615	32204	31126	53437	93358	106377	108259	91800	97898	95640	118294
HDV Diesel Articulated 34 - 40 t	Euro V	269028	250005	137830	94692	66027	59723	37263	36016	61832	108024	123089	125266	106222	113277	110664	136877
HDV Diesel Articulated 34 - 40 t	Euro VI A/B/C	298318	277224	152836	105002	73216	66226	41320	39937	68564	119785	136490	138904	117787	125610	122713	151780
HDV Diesel Articulated 40 - 50 t	Conventional	137541	127815	70465	48412	33756	30534	19051	18413	31612	55228	62929	64042	54306	57913	56577	69979
HDV Diesel Articulated 40 - 50 t	Euro I	168714	156784	86436	59384	41407	37454	23368	22586	38776	67745	77192	78557	66614	71039	69400	85839
HDV Diesel Articulated 40 - 50 t	Euro II	207596	192917	106356	73070	50950	46086	28754	27792	47713	83357	94982	96661	81966	87411	85394	105622
HDV Diesel Articulated 40 - 50 t	Euro III	247911	230381	127011	87260	60844	55036	34338	33189	56978	99545	113427	115433	97884	104386	101978	126133
HDV Diesel Articulated 40 - 50 t	Euro IV	232503	216062	119117	81836	57063	51615	32204	31126	53437	93358	106377	108259	91800	97898	95640	118294
HDV Diesel Articulated 40 - 50 t	Euro V	279590	259819	143240	98410	68619	62068	38725	37430	64259	112265	127921	130183	110392	117724	115009	142251
HDV Diesel Articulated 40 - 50 t	Euro VI A/B/C	306502	284829	157028	107882	75224	68042	42453	41032	70444	123071	140234	142714	121018	129056	126079	155943
HDV Diesel Articulated 50 - 60 t	Conventional	126487	117543	64802	44521	31043	28080	17520	16933	29071	50789	57872	58895	49942	53259	52030	64355
HDV Diesel Articulated 50 - 60 t	Euro I	150227	139604	76965	52877	36870	33350	20808	20111	34527	60322	68734	69949	59315	63255	61796	76433
HDV Diesel Articulated 50 - 60 t	Euro II	181895	169033	93189	64023	44642	40380	25194	24351	41806	73037	83223	84694	71819	76589	74822	92545
HDV Diesel Articulated 50 - 60 t	Euro III	221630	205958	113546	78009	54394	49201	30698	29670	50938	88992	101403	103196	87507	93320	91167	112762
HDV Diesel Articulated 50 - 60 t	Euro IV	232503	216062	119117	81836	57063	51615	32204	31126	53437	93358	106377	108259	91800	97898	95640	118294
HDV Diesel Articulated 50 - 60 t	Euro V	267579	248658	137087	94182	65671	59402	37062	35822	61499	107442	122426	124591	105649	112667	110068	136140
HDV Diesel Articulated 50 - 60 t	Euro VI A/B/C	295922	274997	151608	104158	72627	65694	40988	39616	68013	118823	135394	137788	116840	124601	121727	150560
BUS Diesel Urban Midi <=15 t	Conventional	127587	118565	65366	44908	31313	28324	17672	17080	29324	51231	58375	59407	50376	53722	52483	64914
BUS Diesel Urban Midi <=15 t	Euro I	157087	145979	80479	55291	38553	34873	21758	21030	36104	63076	71872	73143	62023	66143	64617	79923
BUS Diesel Urban Midi <=15 t	Euro II	167667	155811	85900	59015	41150	37222	23223	22446	38535	67324	76713	78070	66201	70598	68970	85306

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
BUS Diesel Urban Midi <=15 t	Euro III	178852	166205	91630	62952	43895	39705	24772	23944	41106	71815	81831	83278	70617	75308	73571	90997
BUS Diesel Urban Midi <=15 t	Euro IV	168959	157012	86562	59470	41467	37508	23402	22619	38832	67843	77304	78671	66711	71142	69501	85964
BUS Diesel Urban Midi <=15 t	Euro V	191383	177850	98050	67363	46971	42487	26508	25621	43986	76847	87564	89112	75565	80584	78725	97373
BUS Diesel Urban Midi <=15 t	Euro VI A/B/C	201834	187562	103405	71042	49536	44807	27956	27020	46388	81044	92346	93979	79691	84985	83024	102690
BUS Diesel Urban Standard 15 - 18 t	Conventional	135097	125544	69213	47551	33157	29991	18712	18086	31050	54246	61811	62904	53341	56884	55572	68735
BUS Diesel Urban Standard 15 - 18 t	Euro I	164192	152582	84119	57792	40297	36450	22742	21981	37737	65929	75123	76452	64829	69135	67540	83538
BUS Diesel Urban Standard 15 - 18 t	Euro II	183014	170073	93762	64417	44917	40629	25349	24501	42063	73487	83735	85215	72260	77060	75282	93114
BUS Diesel Urban Standard 15 - 18 t	Euro III	195164	181364	99987	68694	47899	43326	27032	26127	44855	78365	89294	90873	77058	82176	80280	99296
BUS Diesel Urban Standard 15 - 18 t	Euro IV	188960	175599	96809	66510	46376	41949	26173	25297	43429	75874	86455	87984	74608	79564	77729	96140
BUS Diesel Urban Standard 15 - 18 t	Euro V	214895	199699	110096	75639	52741	47706	29765	28769	49390	86288	98321	100060	84848	90484	88397	109335
BUS Diesel Urban Standard 15 - 18 t	Euro VI A/B/C	228765	212588	117202	80520	56145	50785	31686	30625	52578	91857	104667	106518	90324	96324	94102	116392
BUS Diesel Urban Articulated >18 t	Conventional	129421	120270	66306	45554	31764	28731	17926	17326	29745	51967	59214	60262	51100	54494	53237	65848
BUS Diesel Urban Articulated >18 t	Euro I	165112	153437	84591	58116	40523	36654	22869	22104	37948	66298	75544	76880	65192	69522	67919	84006
BUS Diesel Urban Articulated >18 t	Euro II	185978	172828	95281	65461	45644	41287	25760	24898	42744	74677	85091	86596	73431	78308	76502	94623
BUS Diesel Urban Articulated >18 t	Euro III	197385	183428	101125	69475	48444	43819	27339	26425	45366	79257	90310	91907	77935	83111	81194	100426
BUS Diesel Urban Articulated >18 t	Euro IV	187402	174150	96010	65962	45994	41603	25957	25088	43071	75248	85742	87259	73993	78908	77088	95347
BUS Diesel Urban Articulated >18 t	Euro V	217530	202148	111446	76566	53388	48291	30130	29121	49996	87346	99527	101287	85888	91593	89481	110676
BUS Diesel Urban Articulated >18 t	Euro VI A/B/C	232353	215923	119040	81784	57026	51582	32183	31106	53403	93298	106309	108189	91741	97835	95578	118218
BUS Diesel Coach Standard <=18 t	Conventional	130179	120974	66694	45820	31950	28899	18031	17428	29920	52272	59561	60614	51399	54813	53549	66233
BUS Diesel Coach Standard <=18 t	Euro I	152211	141448	77981	53575	37357	33790	21082	20377	34983	61118	69641	70873	60098	64090	62612	77442
BUS Diesel Coach Standard <=18 t	Euro II	167807	155941	85971	59064	41184	37253	23243	22465	38568	67380	76777	78135	66256	70657	69027	85377
BUS Diesel Coach Standard <=18 t	Euro III	181644	168800	93061	63935	44580	40324	25159	24317	41748	72937	83108	84578	71719	76483	74719	92418
BUS Diesel Coach Standard <=18 t	Euro IV	190018	176581	97351	66882	46636	42183	26319	25438	43672	76299	86939	88477	75026	80009	78164	96678
BUS Diesel Coach Standard <=18 t	Euro V	209105	194319	107129	73600	51320	46421	28963	27993	48059	83963	95672	97364	82562	88046	86015	106389
BUS Diesel Coach Standard <=18 t	Euro VI A/B/C	224016	208175	114768	78849	54980	49731	31028	29990	51486	89950	102494	104307	88449	94324	92149	113975
BUS Diesel Coach Articulated >18 t	Conventional	128836	119726	66006	45348	31620	28601	17845	17248	29611	51732	58947	59989	50869	54248	52997	65550
BUS Diesel Coach Articulated >18 t	Euro I	155321	144338	79575	54670	38120	34481	21513	20793	35698	62367	71064	72321	61326	65400	63891	79025
BUS Diesel Coach Articulated >18 t	Euro II	177419	164873	90896	62448	43544	39386	24574	23752	40777	71240	81175	82610	70051	74704	72981	90268
BUS Diesel Coach Articulated >18 t	Euro III	188053	174756	96344	66191	46153	41747	26047	25175	43221	75510	86040	87562	74250	79182	77355	95678
BUS Diesel Coach Articulated >18 t	Euro IV	187864	174580	96247	66124	46107	41705	26021	25150	43178	75434	85954	87474	74176	79102	77278	95582
BUS Diesel Coach Articulated >18 t	Euro V	212735	197693	108989	74878	52211	47227	29466	28480	48894	85421	97333	99054	83995	89575	87508	108236
BUS Diesel Coach Articulated >18 t	Euro VI A/B/C	227814	211705	116715	80186	55912	50574	31554	30498	52359	91475	104232	106075	89949	95924	93711	115908
BUS CNG Urban	Euro I	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582	57582
BUS CNG Urban	Euro II	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182	64182
BUS CNG Urban	Euro III	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444	68444
BUS CNG Urban	EEV	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227	80227
MOP Gasoline 2-stroke <50 cm³	Conventional	3728	3985	3485	1564	1895	2070	1974	2073	1696	1083	1357	1258	984	794	812	718
MOP Gasoline 2-stroke <50 cm³	Euro 1	4457	4764	4166	1870	2266	2475	2360	2479	2027	1295	1622	1504	1177	949	971	858
MOP Gasoline 2-stroke <50 cm³	Euro 2	5699	6091	5327	2391	2897	3165	3017	3169	2592	1655	2074	1923	1505	1214	1242	1097
MOP Gasoline 2-stroke <50 cm³	Euro 3	6007	6421	5615	2521	3054	3336	3180	3341	2732	1745	2186	2027	1586	1279	1309	1157
MOP Gasoline 2-stroke <50 cm³	Euro 4	6993	7474	6536	2934	3554	3883	3702	3889	3180	2031	2544	2360	1846	1489	1524	1347
MOT Gasoline 2-stroke >50 cm³	Conventional	8475	9059	7923	3556	4308	4706	4487	4713	3854	2462	3084	2860	2238	1805	1847	1632

Subsector	Technology	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 1	8839	9448	8263	3709	4493	4909	4680	4916	4020	2568	3216	2983	2334	1882	1926	1702
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 2	10013	10703	9360	4202	5090	5560	5301	5568	4554	2909	3644	3379	2644	2132	2182	1928
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 3	10263	10970	9594	4306	5217	5699	5433	5707	4667	2981	3734	3463	2710	2186	2236	1976
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 4	11032	11792	10312	4629	5608	6126	5841	6135	5017	3205	4014	3723	2913	2349	2404	2124
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Conventional	10979	11735	10263	4607	5581	6097	5812	6105	4993	3189	3995	3705	2899	2338	2392	2114
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 1	12210	13051	11414	5123	6206	6780	6464	6790	5553	3547	4443	4120	3224	2600	2660	2351
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 2	10815	11560	10109	4538	5497	6005	5725	6014	4918	3142	3935	3649	2855	2303	2356	2083
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 3	11550	12346	10797	4847	5871	6414	6115	6423	5253	3355	4203	3898	3050	2460	2517	2224
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 4	11468	12258	10720	4812	5829	6368	6071	6377	5216	3331	4173	3870	3028	2442	2499	2208
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Conventional	11297	12075	10560	4740	5742	6273	5981	6282	5138	3282	4111	3812	2983	2406	2461	2175
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 1	12709	13585	11880	5333	6460	7058	6729	7068	5780	3692	4625	4289	3356	2707	2769	2447
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 2	11389	12173	10646	4779	5789	6324	6029	6333	5179	3308	4144	3843	3007	2425	2481	2193
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 3	11550	12346	10797	4847	5871	6414	6115	6423	5253	3355	4203	3898	3050	2460	2517	2224
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 4	11596	12395	10840	4866	5894	6439	6139	6449	5274	3369	4220	3913	3062	2470	2527	2233
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Conventional	11468	12258	10720	4812	5829	6368	6071	6377	5216	3331	4173	3870	3028	2442	2499	2208
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 1	13070	13971	12218	5484	6644	7258	6920	7268	5944	3797	4756	4411	3451	2784	2848	2517
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 2	11686	12491	10924	4904	5940	6489	6187	6499	5315	3395	4252	3944	3085	2489	2546	2250
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 3	11550	12346	10797	4847	5871	6414	6115	6423	5253	3355	4203	3898	3050	2460	2517	2224
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 4	11659	12463	10899	4892	5927	6475	6173	6484	5302	3387	4243	3934	3078	2483	2540	2245

Table 93: Mileage data for Road transport (average km/year/vehicle) 2004-2020

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PC Gasoline Small	PRE ECE	1714	1541	3034	2634	2369	2336	2142	1926	1806	1479	1702	1747	1726	2008	1945	1939	2020
PC Gasoline Small	ECE 15/00-01	2064	1856	3654	3173	2854	2814	2580	2320	2175	1782	2050	2105	2079	2418	2343	2335	2433
PC Gasoline Small	ECE 15/02	2090	1879	3700	3213	2890	2850	2613	2350	2202	1804	2076	2131	2105	2449	2373	2365	2464
PC Gasoline Small	ECE 15/03	2463	2215	4361	3787	3405	3358	3079	2769	2595	2126	2446	2512	2481	2886	2796	2787	2903
PC Gasoline Small	ECE 15/04	3309	2975	5858	5087	4575	4512	4136	3720	3487	2856	3286	3374	3332	3877	3756	3744	3900
PC Gasoline Small	Euro 1	3983	3581	7052	6124	5507	5431	4979	4478	4197	3439	3956	4062	4012	4667	4522	4507	4695
PC Gasoline Small	Euro 2	4615	4150	8171	7096	6381	6293	5769	5189	4863	3984	4583	4707	4648	5408	5239	5222	5441
PC Gasoline Small	Euro 3	5325	4788	9428	8188	7363	7261	6657	5987	5612	4597	5288	5431	5363	6240	6045	6026	6277
PC Gasoline Small	Euro 4	5642	5072	9988	8674	7800	7692	7052	6342	5945	4870	5602	5753	5682	6611	6404	6383	6650
PC Gasoline Small	Euro 5	6140	5520	10869	9439	8488	8371	7675	6902	6469	5300	6097	6261	6183	7194	6969	6947	7237
PC Gasoline Small	Euro 6 a/b/c	6674	6001	11815	10261	9227	9100	8343	7503	7033	5761	6628	6806	6722	7820	7576	7552	7867
PC Gasoline Small	Euro 6 d-temp	7208	6481	12762	11083	9966	9829	9011	8104	7596	6223	7158	7351	7260	8447	8183	8156	8497
PC Gasoline Medium	PRE ECE	1836	1651	3251	2823	2539	2504	2296	2065	1935	1585	1824	1873	1850	2152	2085	2078	2165
PC Gasoline Medium	ECE 15/00-01	2199	1977	3893	3380	3040	2998	2748	2472	2317	1898	2183	2242	2214	2576	2496	2488	2592
PC Gasoline Medium	ECE 15/02	2307	2074	4084	3546	3189	3145	2883	2593	2431	1991	2291	2352	2323	2703	2619	2610	2719
PC Gasoline Medium	ECE 15/03	2644	2377	4681	4065	3655	3605	3305	2972	2786	2282	2626	2696	2663	3098	3001	2992	3117
PC Gasoline Medium	ECE 15/04	3556	3197	6295	5467	4916	4848	4445	3997	3747	3070	3531	3626	3581	4166	4036	4023	4191

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PC Gasoline Medium	Euro 1	4400	3956	7790	6765	6084	6000	5500	4947	4637	3799	4370	4487	4432	5156	4995	4979	5187
PC Gasoline Medium	Euro 2	4962	4461	8785	7629	6860	6766	6203	5578	5229	4284	4928	5060	4997	5814	5633	5615	5849
PC Gasoline Medium	Euro 3	5726	5148	10137	8803	7916	7807	7157	6437	6033	4943	5686	5839	5767	6709	6500	6479	6749
PC Gasoline Medium	Euro 4	6038	5428	10689	9283	8348	8232	7547	6788	6362	5212	5996	6157	6081	7075	6854	6832	7117
PC Gasoline Medium	Euro 5	6612	5945	11706	10165	9141	9015	8265	7433	6967	5708	6566	6742	6659	7748	7506	7481	7794
PC Gasoline Medium	Euro 6 a/b/c	7186	6461	12722	11048	9935	9798	8983	8079	7572	6203	7136	7328	7237	8420	8157	8131	8471
PC Gasoline Medium	Euro 6 d-temp	7760	6977	13739	11931	10729	10581	9701	8724	8177	6699	7706	7913	7816	9093	8809	8781	9148
PC Gasoline Large	PRE ECE	1931	1736	3419	2969	2670	2633	2414	2171	2035	1667	1918	1969	1945	2263	2192	2185	2277
PC Gasoline Large	ECE 15/00-01	2310	2077	4090	3552	3194	3150	2888	2597	2435	1994	2294	2356	2327	2707	2623	2614	2723
PC Gasoline Large	ECE 15/02	2351	2114	4162	3614	3250	3205	2938	2643	2477	2029	2334	2397	2367	2754	2668	2660	2771
PC Gasoline Large	ECE 15/03	2788	2507	4936	4287	3855	3802	3485	3134	2938	2407	2769	2843	2808	3267	3165	3155	3287
PC Gasoline Large	ECE 15/04	3699	3326	6549	5687	5114	5044	4624	4158	3898	3193	3673	3772	3725	4334	4199	4185	4360
PC Gasoline Large	Euro 1	4508	4053	7981	6931	6233	6147	5635	5068	4750	3892	4477	4597	4540	5282	5117	5101	5314
PC Gasoline Large	Euro 2	5296	4762	9376	8142	7322	7221	6620	5954	5581	4572	5259	5401	5334	6206	6012	5993	6243
PC Gasoline Large	Euro 3	5896	5301	10439	9065	8152	8040	7370	6629	6213	5090	5855	6013	5938	6909	6693	6672	6950
PC Gasoline Large	Euro 4	6629	5960	11735	10191	9164	9038	8286	7452	6985	5722	6583	6759	6676	7767	7524	7500	7813
PC Gasoline Large	Euro 5	7031	6321	12447	10809	9721	9586	8788	7904	7408	6069	6982	7169	7081	8238	7981	7955	8288
PC Gasoline Large	Euro 6 a/b/c	7650	6878	13543	11761	10577	10431	9563	8600	8061	6604	7597	7801	7705	8964	8684	8656	9018
PC Gasoline Large	Euro 6 d-temp	8269	7435	14640	12714	11433	11275	10337	9296	8713	7139	8212	8432	8328	9690	9387	9357	9748
PC Gasoline Hybrid Medium	Euro 4	6921	6223	12253	10641	9569	9437	8652	7781	7293	5975	6873	7058	6971	8110	7857	7831	8159
PC Gasoline Hybrid Medium	Euro 5	7047	6336	12475	10834	9742	9608	8808	7922	7425	6083	6998	7186	7097	8257	7999	7973	8306
PC Gasoline Hybrid Medium	Euro 6 a/b/c	8213	7384	14540	12627	11355	11198	10266	9233	8654	7090	8156	8375	8271	9623	9323	9293	9681
PC Gasoline Hybrid Medium	Euro 6 d-temp	8685	7809	15376	13353	12008	11842	10857	9764	9152	7498	8625	8857	8747	10177	9859	9827	10238
PC Diesel Small	Conventional	31885	33866	23192	17011	15438	13387	12198	11846	12171	9811	10277	10683	10180	10749	10980	11130	10200
PC Diesel Small	Euro 1	35921	38152	26127	19164	17392	15082	13742	13345	13712	11053	11578	12035	11469	12110	12370	12538	11491
PC Diesel Small	Euro 2	42309	44938	30774	22572	20485	17764	16186	15719	16150	13018	13637	14176	13509	14264	14569	14768	13534
PC Diesel Small	Euro 3	48008	50991	34919	25612	23244	20157	18366	17836	18326	14772	15474	16085	15328	16185	16532	16758	15357
PC Diesel Small	Euro 4	48431	51440	35227	25838	23449	20334	18528	17993	18487	14902	15610	16227	15463	16327	16678	16905	15493
PC Diesel Small	Euro 5	54865	58273	39906	29270	26564	23036	20989	20383	20943	16882	17684	18382	17517	18496	18893	19151	17550
PC Diesel Small	Euro 6 a/b/c	59383	63072	43192	31680	28752	24933	22717	22062	22668	18272	19140	19896	18960	20020	20449	20728	18996
PC Diesel Small	Euro 6 d-temp	63901	67871	46479	34091	30939	26830	24445	23740	24392	19662	20596	21410	20402	21543	22005	22305	20441
PC Diesel Medium	Conventional	31885	33866	23192	17011	15438	13387	12198	11846	12171	9811	10277	10683	10180	10749	10980	11130	10200
PC Diesel Medium	Euro 1	35921	38152	26127	19164	17392	15082	13742	13345	13712	11053	11578	12035	11469	12110	12370	12538	11491
PC Diesel Medium	Euro 2	42309	44938	30774	22572	20485	17764	16186	15719	16150	13018	13637	14176	13509	14264	14569	14768	13534
PC Diesel Medium	Euro 3	48008	50991	34919	25612	23244	20157	18366	17836	18326	14772	15474	16085	15328	16185	16532	16758	15357
PC Diesel Medium	Euro 4	48431	51440	35227	25838	23449	20334	18528	17993	18487	14902	15610	16227	15463	16327	16678	16905	15493
PC Diesel Medium	Euro 5	54865	58273	39906	29270	26564	23036	20989	20383	20943	16882	17684	18382	17517	18496	18893	19151	17550
PC Diesel Medium	Euro 6 a/b/c	59383	63072	43192	31680	28752	24933	22717	22062	22668	18272	19140	19896	18960	20020	20449	20728	18996
PC Diesel Medium	Euro 6 d-temp	63901	67871	46479	34091	30939	26830	24445	23740	24392	19662	20596	21410	20402	21543	22005	22305	20441
PC Diesel Large	Conventional	35211	37399	25611	18785	17048	14784	13470	13082	13441	10834	11349	11797	11242	11871	12125	12291	11264
PC Diesel Large	Euro 1	39892	42371	29016	21282	19315	16749	15261	14821	15228	12275	12858	13366	12737	13449	13737	13925	12761
PC Diesel Large	Euro 2	44847	47634	32620	23926	21714	18830	17157	16662	17119	13799	14455	15026	14319	15119	15443	15654	14346

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
PC Diesel Large	Euro 3	52427	55684	38133	27970	25384	22012	20056	19478	20013	16132	16898	17566	16739	17675	18054	18300	16771
PC Diesel Large	Euro 4	54245	57615	39455	28940	26264	22775	20752	20153	20707	16691	17484	18175	17319	18287	18680	18935	17352
PC Diesel Large	Euro 5	60505	64265	44009	32279	29295	25404	23147	22479	23096	18617	19502	20272	19318	20398	20835	21120	19355
PC Diesel Large	Euro 6 a/b/c	65565	69639	47689	34979	31745	27529	25082	24359	25028	20174	21133	21968	20934	22104	22578	22886	20974
PC Diesel Large	Euro 6 d-temp	70626	75014	51370	37679	34195	29653	27018	26239	26960	21731	22764	23663	22549	23810	24320	24652	22592
PC LPG Medium	Conventional	57975	65849	67509	62900	58358	60481	56825	51332	46969	44440	38288	36311	37334	38898	34993	31531	17732
PC LPG Medium	Euro 1	65806	74742	76627	71395	66240	68649	64500	58265	53313	50442	43460	41215	42376	44151	39719	35790	20127
PC LPG Medium	Euro 2	69867	79355	81356	75802	70328	72887	68481	61861	56603	53556	46142	43758	44992	46876	42170	37999	21369
PC LPG Medium	Euro 3	73237	83183	85281	79458	73721	76402	71784	64846	59334	56139	48368	45869	47162	49138	44205	39832	22400
PC LPG Medium	Euro 4	71595	81318	83368	77677	72067	74689	70175	63391	58003	54880	47283	44841	46104	48036	43213	38938	21898
PC LPG Medium	Euro 5	78097	88703	90940	84731	78613	81473	76548	69149	63271	59865	51577	48913	50292	52398	47138	42475	23887
PC LPG Medium	Euro 6 a/b/c	81565	92641	94977	88493	82103	85089	79946	72219	66080	62522	53867	51085	52524	54725	49231	44361	24947
PC LPG Medium	Euro 6 d-temp	85032	96579	99015	92255	85593	88706	83345	75288	68889	65180	56157	53256	54757	57051	51323	46246	26008
PC CNG Medium	Euro 4	25655	42029	37384	41017	31016	36180	41597	39014	40530	43166	44303	39882	37983	38699	36088	36400	32136
PC CNG Medium	Euro 5	27986	45846	40779	44743	33833	39466	45374	42558	44211	47087	48326	43504	41432	42213	39366	39706	35055
PC CNG Medium	Euro 6 a/b/c	29228	47881	42590	46729	35335	41218	47389	44447	46174	49177	50472	45435	43272	44087	41114	41469	36611
PC CNG Medium	Euro 6 d-temp	30470	49917	44400	48715	36837	42971	49403	46336	48137	51268	52617	47367	45111	45961	42861	43232	38167
LCV Gasoline <3,5 t	Conventional	4701	4227	8323	7228	6500	6410	5877	5285	4954	4059	4669	4794	4735	5509	5337	5320	5542
LCV Gasoline <3,5 t	Euro 1	5411	4865	9580	8319	7481	7378	6764	6083	5702	4671	5374	5518	5450	6340	6143	6123	6378
LCV Gasoline <3,5 t	Euro 2	6053	5442	10716	9306	8369	8253	7566	6805	6378	5225	6011	6172	6096	7093	6871	6849	7135
LCV Gasoline <3,5 t	Euro 3	6867	6174	12157	10557	9494	9363	8583	7719	7236	5928	6819	7002	6916	8046	7795	7770	8094
LCV Gasoline <3,5 t	Euro 4	7764	6981	13746	11937	10735	10587	9706	8729	8181	6703	7710	7918	7820	9098	8814	8785	9152
LCV Gasoline <3,5 t	Euro 5	8434	7583	14931	12966	11660	11499	10542	9481	8887	7280	8375	8600	8494	9882	9574	9543	9941
LCV Gasoline <3,5 t	Euro 6 a/b/c	9192	8264	16273	14132	12709	12533	11490	10334	9686	7935	9128	9373	9257	10771	10434	10401	10835
LCV Diesel <3,5 t	Conventional	32837	34877	23884	17518	15899	13787	12562	12200	12535	10104	10584	11002	10484	11070	11308	11462	10504
LCV Diesel <3,5 t	Euro 1	38094	40461	27708	20323	18444	15994	14573	14153	14542	11722	12278	12763	12163	12843	13118	13297	12186
LCV Diesel <3,5 t	Euro 2	41906	44510	30481	22357	20290	17595	16031	15569	15997	12894	13507	14041	13380	14128	14431	14628	13405
LCV Diesel <3,5 t	Euro 3	45722	48563	33256	24393	22138	19197	17491	16987	17453	14069	14737	15319	14598	15414	15745	15960	14626
LCV Diesel <3,5 t	Euro 4	52719	55995	38346	28126	25525	22135	20168	19586	20124	16222	16992	17664	16832	17773	18154	18402	16864
LCV Diesel <3,5 t	Euro 5	56473	59982	41076	30128	27343	23711	21604	20981	21557	17377	18202	18921	18031	19039	19447	19713	18065
LCV Diesel <3,5 t	Euro 6 a/b/c	61213	65016	44523	32657	29638	25701	23417	22742	23366	18835	19730	20509	19544	20636	21079	21367	19581
HDV Gasoline >3,5 t	Conventional	6185	5561	10950	9510	8552	8434	7732	6953	6518	5339	6142	6307	6229	7248	7021	6999	7291
HDV Diesel Rigid <=7,5 t	Conventional	47538	50491	34577	25361	23017	19959	18186	17661	18146	14627	15322	15927	15178	16026	16370	16593	15207
HDV Diesel Rigid <=7,5 t	Euro I	55738	59201	40541	29736	26987	23402	21323	20708	21276	17150	17965	18675	17796	18791	19194	19456	17830
HDV Diesel Rigid <=7,5 t	Euro II	65668	69748	47764	35034	31795	27572	25122	24397	25067	20206	21166	22002	20967	22139	22613	22922	21006
HDV Diesel Rigid <=7,5 t	Euro III	76844	81618	55893	40996	37206	32264	29397	28549	29333	23645	24768	25746	24535	25906	26462	26823	24581
HDV Diesel Rigid <=7,5 t	Euro IV	83095	88258	60440	44331	40233	34889	31789	30872	31720	25568	26783	27841	26531	28014	28614	29005	26581
HDV Diesel Rigid <=7,5 t	Euro V	93443	99249	67966	49851	45243	39233	35747	34716	35669	28752	30118	31308	29835	31502	32178	32617	29891
HDV Diesel Rigid <=7,5 t	Euro VI A/B/C	102665	109044	74674	54771	49708	43105	39275	38142	39190	31590	33090	34398	32779	34611	35353	35836	32841
HDV Diesel Rigid 7,5 - 12 t	Conventional	48903	51941	35570	26089	23678	20532	18708	18168	18667	15047	15762	16385	15614	16486	16840	17070	15643
HDV Diesel Rigid 7,5 - 12 t	Euro I	61411	65227	44668	32763	29734	25784	23493	22815	23442	18896	19794	20576	19608	20703	21147	21436	19645
HDV Diesel Rigid 7,5 - 12 t	Euro II	72125	76607	52461	38479	34922	30283	27592	26796	27532	22193	23247	24166	23028	24315	24837	25176	23072

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
HDV Diesel Rigid 7,5 - 12 t	Euro III	85297	90597	62042	45506	41299	35813	32631	31690	32560	26246	27492	28579	27234	28756	29373	29774	27285
HDV Diesel Rigid 7,5 - 12 t	Euro IV	93116	98901	67728	49677	45085	39096	35622	34594	35545	28652	30013	31198	29730	31392	32065	32503	29787
HDV Diesel Rigid 7,5 - 12 t	Euro V	105864	112442	77001	56478	51257	44448	40499	39331	40411	32574	34121	35470	33801	35690	36455	36953	33865
HDV Diesel Rigid 7,5 - 12 t	Euro VI A/B/C	117095	124371	85170	62470	56695	49164	44795	43503	44698	36030	37741	39233	37386	39476	40323	40873	37457
HDV Diesel Rigid 12 - 14 t	Conventional	42646	45296	31019	22752	20648	17906	16315	15844	16279	13122	13745	14289	13616	14377	14686	14886	13642
HDV Diesel Rigid 12 - 14 t	Euro I	55702	59163	40515	29717	26970	23387	21309	20694	21263	17139	17954	18663	17785	18779	19181	19443	17818
HDV Diesel Rigid 12 - 14 t	Euro II	66590	70727	48435	35525	32241	27959	25474	24739	25419	20490	21463	22311	21261	22449	22931	23244	21301
HDV Diesel Rigid 12 - 14 t	Euro III	83080	88241	60429	44323	40225	34882	31783	30866	31714	25563	26778	27836	26526	28008	28609	29000	26576
HDV Diesel Rigid 12 - 14 t	Euro IV	85680	91004	62320	45710	41484	35974	32777	31832	32706	26364	27616	28707	27356	28885	29505	29907	27408
HDV Diesel Rigid 12 - 14 t	Euro V	100773	107034	73298	53762	48792	42311	38551	37439	38468	31008	32481	33764	32175	33973	34702	35176	32236
HDV Diesel Rigid 12 - 14 t	Euro VI A/B/C	112118	119084	81550	59815	54285	47074	42891	41654	42798	34498	36137	37565	35797	37798	38609	39136	35865
HDV Diesel Rigid 14 - 20 t	Conventional	53673	57008	39039	28634	25987	22535	20533	19941	20488	16515	17300	17983	17137	18095	18483	18735	17169
HDV Diesel Rigid 14 - 20 t	Euro I	67303	71484	48953	35906	32586	28258	25747	25004	25691	20709	21693	22550	21489	22690	23176	23493	21529
HDV Diesel Rigid 14 - 20 t	Euro II	77560	82379	56414	41378	37553	32565	29671	28815	29607	23865	24999	25986	24764	26148	26708	27073	24810
HDV Diesel Rigid 14 - 20 t	Euro III	89924	95511	65407	47974	43539	37756	34401	33409	34326	27669	28984	30129	28711	30316	30966	31389	28765
HDV Diesel Rigid 14 - 20 t	Euro IV	91894	97604	66840	49025	44493	38583	35155	34141	35078	28276	29619	30789	29340	30980	31645	32077	29396
HDV Diesel Rigid 14 - 20 t	Euro V	105790	112363	76947	56439	51221	44417	40471	39303	40383	32551	34098	35445	33777	35665	36430	36927	33841
HDV Diesel Rigid 14 - 20 t	Euro VI A/B/C	115696	122885	84153	61724	56018	48577	44260	42984	44164	35600	37291	38764	36940	39004	39841	40385	37010
HDV Diesel Rigid 20 - 26 t	Conventional	53752	57092	39097	28677	26026	22569	20563	19970	20519	16540	17325	18010	17162	18121	18510	18763	17195
HDV Diesel Rigid 20 - 26 t	Euro I	68199	72437	49605	36384	33021	28634	26090	25337	26033	20985	21982	22850	21775	22992	23485	23806	21816
HDV Diesel Rigid 20 - 26 t	Euro II	78205	83064	56883	41722	37865	32835	29918	29055	29853	24063	25206	26202	24969	26365	26930	27298	25017
HDV Diesel Rigid 20 - 26 t	Euro III	92881	98652	67558	49552	44971	38997	35532	34507	35455	28579	29937	31120	29655	31313	31984	32421	29711
HDV Diesel Rigid 20 - 26 t	Euro IV	84620	89877	61549	45144	40971	35529	32372	31438	32301	26037	27274	28352	27018	28528	29139	29537	27069
HDV Diesel Rigid 20 - 26 t	Euro V	101456	107760	73795	54127	49123	42598	38813	37693	38728	31218	32701	33993	32393	34204	34937	35414	32455
HDV Diesel Rigid 20 - 26 t	Euro VI A/B/C	110098	116939	80081	58737	53307	46226	42119	40904	42027	33877	35486	36888	35152	37117	37913	38431	35219
HDV Diesel Rigid 26 - 28 t	Conventional	53538	56865	38941	28562	25922	22479	20481	19890	20437	16474	17256	17938	17094	18049	18436	18688	17126
HDV Diesel Rigid 26 - 28 t	Euro I	65897	69992	47931	35156	31906	27668	25209	24482	25155	20277	21240	22079	21040	22216	22692	23002	21080
HDV Diesel Rigid 26 - 28 t	Euro II	75756	80462	55101	40415	36679	31807	28981	28145	28918	23310	24417	25382	24187	25539	26087	26443	24233
HDV Diesel Rigid 26 - 28 t	Euro III	89018	94549	64748	47491	43100	37375	34054	33072	33980	27391	28692	29825	28422	30010	30654	31072	28476
HDV Diesel Rigid 26 - 28 t	Euro IV	91429	97109	66501	48777	44268	38388	34976	33968	34901	28132	29469	30633	29192	30823	31484	31914	29247
HDV Diesel Rigid 26 - 28 t	Euro V	104798	111309	76225	55909	50741	44001	40091	38934	40004	32246	33778	35112	33460	35330	36088	36581	33523
HDV Diesel Rigid 26 - 28 t	Euro VI A/B/C	114688	121814	83419	61186	55529	48153	43874	42609	43779	35289	36966	38426	36618	38664	39494	40033	36687
HDV Diesel Rigid 28 - 32 t	Conventional	53660	56994	39030	28628	25981	22530	20528	19936	20483	16511	17295	17979	17133	18090	18478	18731	17165
HDV Diesel Rigid 28 - 32 t	Euro I	66759	70907	48557	35616	32323	28030	25539	24802	25484	20542	21517	22367	21315	22506	22989	23303	21355
HDV Diesel Rigid 28 - 32 t	Euro II	76813	81586	55871	40980	37191	32251	29385	28538	29322	23635	24758	25736	24525	25896	26451	26812	24572
HDV Diesel Rigid 28 - 32 t	Euro III	91208	96875	66341	48659	44161	38295	34892	33886	34817	28065	29398	30559	29121	30749	31408	31837	29176
HDV Diesel Rigid 28 - 32 t	Euro IV	85974	91316	62534	45867	41627	36097	32890	31941	32819	26454	27711	28806	27450	28984	29606	30010	27502
HDV Diesel Rigid 28 - 32 t	Euro V	101606	107919	73904	54207	49195	42661	38870	37749	38786	31264	32749	34043	32441	34254	34989	35467	32503
HDV Diesel Rigid 28 - 32 t	Euro VI A/B/C	110514	117381	80383	58959	53508	46401	42278	41058	42186	34005	35620	37028	35285	37257	38056	38576	35352
HDV Diesel Rigid >32 t	Conventional	66113	70221	48088	35271	32010	27758	25292	24562	25237	20343	21309	22151	21109	22289	22767	23077	21149
HDV Diesel Rigid >32 t	Euro I	72950	77482	53061	38919	35321	30629	27907	27102	27847	22447	23513	24442	23292	24593	25121	25464	23336
HDV Diesel Rigid >32 t	Euro II	89514	95076	65109	47755	43341	37584	34244	33256	34170	27543	28852	29992	28580	30178	30825	31246	28634

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
HDV Diesel Rigid >32 t	Euro III	103100	109506	74990	55003	49919	43288	39441	38304	39356	31724	33231	34543	32918	34758	35503	35988	32980
HDV Diesel Rigid >32 t	Euro IV	94445	100314	68696	50386	45728	39654	36131	35088	36052	29061	30441	31644	30155	31840	32523	32967	30212
HDV Diesel Rigid >32 t	Euro V	111269	118182	80932	59362	53874	46718	42567	41339	42474	34237	35864	37280	35526	37512	38316	38839	35593
HDV Diesel Rigid >32 t	Euro VI A/B/C	1119950	127403	87247	63993	58077	50363	45888	44564	45788	36909	38662	40189	38298	40439	41306	41870	38371
HDV Diesel Articulated 14 - 20 t	Conventional	69909	74253	50849	37296	33849	29352	26744	25973	26686	21511	22533	23423	22321	23568	24074	24402	22363
HDV Diesel Articulated 14 - 20 t	Euro I	84480	89728	61447	45070	40903	35470	32318	31386	32248	25994	27229	28305	26973	28480	29091	29488	27024
HDV Diesel Articulated 14 - 20 t	Euro II	101076	107356	73519	53924	48939	42438	38667	37552	38583	31101	32578	33865	32272	34076	34806	35282	32333
HDV Diesel Articulated 14 - 20 t	Euro III	126024	133854	91664	67233	61018	52913	48211	46820	48106	38777	40619	42224	40237	42486	43397	43990	40313
HDV Diesel Articulated 14 - 20 t	Euro IV	133773	142085	97301	71368	64770	56166	51176	49699	51065	41162	43117	44820	42711	45099	46066	46695	42792
HDV Diesel Articulated 14 - 20 t	Euro V	153834	163392	111892	82070	74483	64589	58850	57152	58722	47334	49583	51542	49116	51862	52974	53697	49209
HDV Diesel Articulated 14 - 20 t	Euro VI A/B/C	170761	181371	124204	91101	82679	71696	65326	63441	65184	52543	55039	57213	54521	57568	58803	59606	54624
HDV Diesel Articulated 20 - 28 t	Conventional	77515	82332	56381	41354	37531	32546	29654	28799	29590	23851	24984	25971	24749	26133	26693	27057	24796
HDV Diesel Articulated 20 - 28 t	Euro I	92086	97807	66979	49127	44586	38663	35228	34212	35151	28335	29681	30853	29401	31045	31710	32143	29457
HDV Diesel Articulated 20 - 28 t	Euro II	110265	117116	80202	58826	53388	46296	42183	40966	42091	33928	35540	36944	35206	37173	37971	38489	35272
HDV Diesel Articulated 20 - 28 t	Euro III	133630	141932	97197	71291	64700	56106	51121	49646	51010	41118	43071	44772	42666	45050	46016	46645	42746
HDV Diesel Articulated 20 - 28 t	Euro IV	133773	142085	97301	71368	64770	56166	51176	49699	51065	41162	43117	44820	42711	45099	46066	46695	42792
HDV Diesel Articulated 20 - 28 t	Euro V	155672	165344	113229	83050	75373	65361	59553	57835	59424	47900	50175	52158	49703	52481	53607	54339	49797
HDV Diesel Articulated 20 - 28 t	Euro VI	171078	181707	124435	91269	82832	71829	65447	63559	65305	52640	55141	57319	54622	57675	58912	59716	54725
HDV Diesel Articulated 28 - 34 t	Conventional	83220	88391	60531	44398	40293	34941	31836	30918	31767	25607	26823	27883	26571	28056	28657	29049	26621
HDV Diesel Articulated 28 - 34 t	Euro I	97652	103719	71028	52097	47281	41000	37357	36280	37276	30047	31475	32718	31179	32921	33627	34086	31238
HDV Diesel Articulated 28 - 34 t	Euro II	116794	124051	84951	62309	56549	49038	44680	43391	44583	35937	37644	39132	37290	39375	40219	40768	37361
HDV Diesel Articulated 28 - 34 t	Euro III	140857	149608	102453	75147	68200	59141	53886	52331	53769	43341	45400	47194	44973	47487	48505	49167	45058
HDV Diesel Articulated 28 - 34 t	Euro IV	153358	162886	111546	81816	74252	64389	58668	56975	58541	47188	49429	51382	48964	51701	52810	53531	49057
HDV Diesel Articulated 28 - 34 t	Euro V	173420	184195	126138	92519	83966	72813	66343	64429	66199	53361	55896	58104	55370	58465	59719	60534	55475
HDV Diesel Articulated 28 - 34 t	Euro VI A/B/C	191768	203683	139484	102308	92850	80517	73362	71246	73203	59007	61810	64252	61228	64650	66037	66938	61344
HDV Diesel Articulated 34 - 40 t	Conventional	79360	84291	57723	42338	38424	33320	30359	29484	30294	24419	25579	26589	25338	26754	27328	27701	25386
HDV Diesel Articulated 34 - 40 t	Euro I	102024	108363	74208	54430	49398	42836	39030	37904	38945	31393	32884	34183	32575	34395	35133	35612	32636
HDV Diesel Articulated 34 - 40 t	Euro II	121009	128528	88017	64558	58590	50807	46293	44957	46192	37234	39003	40544	38636	40796	41671	42239	38709
HDV Diesel Articulated 34 - 40 t	Euro III	146100	155178	106267	77944	70739	61342	55892	54279	55770	44955	47090	48951	46647	49254	50311	50998	46736
HDV Diesel Articulated 34 - 40 t	Euro IV	154877	164499	112651	82626	74988	65027	59249	57540	59120	47655	49919	51891	49449	52213	53333	54061	49543
HDV Diesel Articulated 34 - 40 t	Euro V	179207	190342	130347	95606	86768	75242	68557	66579	68408	55142	57761	60043	57218	60416	61711	62554	57326
HDV Diesel Articulated 34 - 40 t	Euro VI A/B/C	198718	211065	144539	106015	96215	83434	76021	73828	75856	61145	64050	66580	63447	66993	68430	69364	63567
HDV Diesel Articulated 40 - 50 t	Conventional	91620	97312	66640	48879	44360	38468	35050	34039	34974	28191	29530	30697	29253	30888	31550	31981	29308
HDV Diesel Articulated 40 - 50 t	Euro I	112385	119368	81744	59957	54414	47186	42993	41753	42900	34581	36223	37654	35882	37888	38701	39229	35950
HDV Diesel Articulated 40 - 50 t	Euro II	138285	146877	100583	73775	66955	58061	52902	51376	52787	42550	44571	46332	44152	46620	47620	48270	44236
HDV Diesel Articulated 40 - 50 t	Euro III	165141	175401	120116	88102	79957	69336	63175	61353	63038	50813	53227	55330	52726	55673	56867	57644	52826
HDV Diesel Articulated 40 - 50 t	Euro IV	154877	164499	112651	82626	74988	65027	59249	57540	59120	47655	49919	51891	49449	52213	53333	54061	49543
HDV Diesel Articulated 40 - 50 t	Euro V	186242	197814	135465	99360	90174	78196	71248	69193	71093	57306	60028	62400	59464	62787	64134	65009	59576
HDV Diesel Articulated 40 - 50 t	Euro VI A/B/C	204169	216855	148504	108924	98854	85723	78106	75853	77936	62822	65807	68407	65188	68831	70307	71267	65311
HDV Diesel Articulated 50 - 60 t	Conventional	84257	89492	61285	44951	40795	35376	32233	31303	32163	25926	27157	28230	26902	28405	29014	29411	26953
HDV Diesel Articulated 50 - 60 t	Euro I	100070	106288	72787	53387	48452	42016	38282	37178	38199	30791	32254	33528	31951	33736	34460	34930	32011
HDV Diesel Articulated 50 - 60 t	Euro II	121165	128693	88130	64641	58665	50873	46352	45015	46252	37282	39053	40596	38686	40848	41724	42294	38759

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
HDV Diesel Articulated 50 - 60 t	Euro III	147634	156806	107382	78762	71481	61986	56478	54849	56355	45427	47584	49464	47137	49771	50839	51533	47226
HDV Diesel Articulated 50 - 60 t	Euro IV	154877	164499	112651	82626	74988	65027	59249	57540	59120	47655	49919	51891	49449	52213	53333	54061	49543
HDV Diesel Articulated 50 - 60 t	Euro V	178241	189316	129645	95091	86300	74837	68187	66220	68039	54845	57450	59719	56909	60090	61379	62217	57017
HDV Diesel Articulated 50 - 60 t	Euro VI A/B/C	197122	209369	143378	105164	95442	82764	75410	73235	75246	60654	63535	66045	62937	66455	67880	68807	63057
BUS Diesel Urban Midi <=15 t	Conventional	84989	90269	61817	45341	41150	35684	32513	31575	32442	26151	27393	28475	27135	28652	29267	29666	27187
BUS Diesel Urban Midi <=15 t	Euro I	104640	111141	76111	55825	50664	43934	40031	38876	39944	32197	33727	35059	33410	35277	36033	36525	33473
BUS Diesel Urban Midi <=15 t	Euro II	111687	118627	81237	59585	54077	46893	42727	41494	42634	34366	35998	37421	35660	37653	38460	38986	35727
BUS Diesel Urban Midi <=15 t	Euro III	119138	126541	86656	63560	57684	50022	45577	44262	45478	36659	38400	39917	38039	40165	41026	41586	38111
BUS Diesel Urban Midi <=15 t	Euro IV	112548	119541	81863	60044	54493	47255	43056	41814	42962	34631	36276	37709	35935	37943	38757	39286	36003
BUS Diesel Urban Midi <=15 t	Euro V	127486	135407	92728	68013	61726	53527	48770	47363	48664	39227	41090	42714	40704	42979	43901	44500	40781
BUS Diesel Urban Midi <=15 t	Euro VI A/B/C	134447	142801	97791	71727	65096	56450	51434	49950	51322	41369	43334	45046	42927	45326	46298	46930	43008
BUS Diesel Urban Standard 15 - 18 t	Conventional	89992	95583	65456	48010	43572	37784	34427	33434	34352	27690	29006	30152	28733	30339	30989	31412	28787
BUS Diesel Urban Standard 15 - 18 t	Euro I	109373	116168	79553	58350	52956	45922	41841	40634	41750	33654	35252	36645	34921	36873	37663	38178	34987
BUS Diesel Urban Standard 15 - 18 t	Euro II	121910	129485	88672	65039	59026	51186	46637	45292	46536	37512	39293	40846	38924	41099	41981	42554	38998
BUS Diesel Urban Standard 15 - 18 t	Euro III	130004	138081	94559	69357	62945	54584	49734	48299	49626	40002	41902	43558	41508	43828	44768	45379	41587
BUS Diesel Urban Standard 15 - 18 t	Euro IV	125872	133692	91554	67152	60944	52849	48153	46764	48048	38730	40570	42173	40189	42435	43345	43937	40265
BUS Diesel Urban Standard 15 - 18 t	Euro V	143147	152041	104119	76369	69309	60102	54762	53182	54643	44046	46138	47961	45704	48259	49294	49967	45791
BUS Diesel Urban Standard 15 - 18 t	Euro VI A/B/C	152386	161854	110839	81298	73782	63981	58296	56615	58170	46889	49116	51057	48654	51374	52475	53192	48746
BUS Diesel Urban Articulated >18 t	Conventional	86211	91568	62706	45993	41741	36197	32981	32029	32909	26527	27787	28885	27526	29064	29687	30093	27578
BUS Diesel Urban Articulated >18 t	Euro I	109986	116819	79999	58677	53253	46179	42076	40862	41984	33842	35450	36850	35116	37079	37874	38391	35183
BUS Diesel Urban Articulated >18 t	Euro II	123885	131583	90109	66092	59982	52015	47393	46026	47290	38119	39930	41508	39554	41765	42661	43243	39629
BUS Diesel Urban Articulated >18 t	Euro III	131484	139653	95635	70146	63661	55205	50300	48849	50191	40457	42379	44053	41980	44327	45277	45895	42060
BUS Diesel Urban Articulated >18 t	Euro IV	124833	132590	90798	66598	60442	52413	47756	46378	47652	38411	40236	41825	39857	42085	42987	43574	39933
BUS Diesel Urban Articulated >18 t	Euro V	144903	153906	105396	77305	70159	60839	55433	53834	55313	44586	46704	48549	46265	48851	49898	50580	46352
BUS Diesel Urban Articulated >18 t	Euro VI A/B/C	154777	164393	112578	82573	74939	64985	59211	57503	59082	47625	49887	51858	49417	52180	53299	54026	49511
BUS Diesel Coach Standard <=18 t	Conventional	86716	92104	63074	46263	41986	36409	33174	32217	33102	26682	27950	29054	27687	29234	29861	30269	27739
BUS Diesel Coach Standard <=18 t	Euro I	101392	107691	73748	54092	49092	42571	38788	37669	38704	31198	32680	33971	32373	34182	34915	35392	32434
BUS Diesel Coach Standard <=18 t	Euro II	111780	118726	81304	59635	54122	46933	42762	41529	42669	34395	36028	37452	35690	37684	38492	39018	35757
BUS Diesel Coach Standard <=18 t	Euro III	120998	128516	88009	64552	58585	50803	46288	44953	46188	37231	38999	40540	38633	40792	41667	42235	38706
BUS Diesel Coach Standard <=18 t	Euro IV	126576	134440	92066	67528	61285	53145	48422	47025	48317	38947	40797	42409	40413	42672	43587	44182	40490
BUS Diesel Coach Standard <=18 t	Euro V	139290	147945	101314	74311	67441	58483	53286	51749	53171	42859	44895	46669	44473	46959	47966	48620	44557
BUS Diesel Coach Standard <=18 t	Euro VI A/B/C	149223	158494	108538	79610	72250	62653	57086	55439	56962	45916	48097	49997	47644	50307	51386	52088	47734
BUS Diesel Coach Articulated >18 t	Conventional	85821	91154	62423	45785	41553	36033	32831	31884	32760	26407	27661	28754	27401	28933	29553	29957	27453
BUS Diesel Coach Articulated >18 t	Euro I	103464	109892	75255	55198	50095	43441	39581	38439	39495	31836	33348	34665	33034	34880	35629	36115	33097
BUS Diesel Coach Articulated >18 t	Euro II	118184	125527	85962	63051	57222	49621	45212	43908	45114	36365	38092	39597	37734	39843	40697	41253	37805
BUS Diesel Coach Articulated >18 t	Euro III	125267	133050	91114	66830	60652	52595	47922	46539	47818	38544	40375	41971	39996	42231	43137	43726	40071
BUS Diesel Coach Articulated >18 t	Euro IV	125142	132917	91023	66763	60591	52542	47874	46493	47770	38506	40335	41929	39956	42189	43093	43682	40031
BUS Diesel Coach Articulated >18 t	Euro V	141709	150513	103073	75601	68612	59498	54211	52648	54094	43604	45675	47479	45245	47774	48798	49465	45331
BUS Diesel Coach Articulated >18 t	Euro VI A/B/C	151753	161182	110379	80960	73475	63716	58054	56379	57928	46694	48912	50845	48452	51160	52257	52971	48544
BUS CNG Urban	Euro I	44026	72123	64152	70388	53225	62087	71381	66950	69551	74075	76025	68439	65180	66408	61929	62464	55147
BUS CNG Urban	Euro II	49072	80391	71506	78456	59327	69204	79564	74624	77524	82566	84740	76284	72651	74021	69028	69625	61468
BUS CNG Urban	Euro III	52330	85728	76254	83665	63265	73798	84846	79579	82671	88048	90366	81348	77475	78935	73611	74247	65549

Subsector	Technology	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BUS CNG Urban	EEV	61340	100487	89382	98069	74157	86504	99454	93279	96904	103207	105924	95354	90813	92525	86284	87030	76834
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Conventional	652	586	1154	1003	902	889	815	733	687	563	648	665	657	764	740	738	769
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 1	780	701	1380	1199	1078	1063	974	876	821	673	774	795	785	913	885	882	919
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 2	997	896	1765	1532	1378	1359	1246	1121	1050	860	990	1016	1004	1168	1131	1128	1175
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 3	1051	945	1860	1615	1453	1433	1313	1181	1107	907	1043	1071	1058	1231	1193	1189	1239
MOP Gasoline 2-stroke <50 cm <sup>3</sup>	Euro 4	1223	1100	2165	1880	1691	1668	1529	1375	1289	1056	1215	1247	1232	1433	1388	1384	1442
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Conventional	1482	1333	2624	2279	2050	2021	1853	1666	1562	1280	1472	1512	1493	1737	1683	1677	1747
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 1	1546	1390	2737	2377	2138	2108	1933	1738	1629	1335	1535	1577	1557	1812	1755	1749	1822
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 2	1751	1575	3101	2693	2421	2388	2189	1969	1845	1512	1739	1786	1764	2052	1988	1982	2064
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 3	1795	1614	3178	2760	2482	2448	2244	2018	1891	1550	1783	1830	1808	2103	2038	2031	2116
MOT Gasoline 2-stroke >50 cm <sup>3</sup>	Euro 4	1930	1735	3416	2967	2668	2631	2412	2169	2033	1666	1916	1968	1943	2261	2190	2183	2274
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Conventional	1920	1726	3400	2952	2655	2618	2400	2159	2023	1658	1907	1958	1934	2250	2180	2173	2264
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 1	2136	1920	3781	3283	2953	2912	2670	2401	2250	1844	2121	2178	2151	2502	2424	2416	2517
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 2	1892	1701	3349	2908	2615	2579	2364	2126	1993	1633	1878	1929	1905	2216	2147	2140	2230
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 3	2020	1816	3577	3106	2793	2755	2525	2271	2129	1744	2006	2060	2035	2367	2293	2286	2381
MOT Gasoline 4-stroke <250 cm <sup>3</sup>	Euro 4	2006	1803	3551	3084	2773	2735	2507	2255	2114	1732	1992	2045	2020	2350	2277	2270	2364
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Conventional	1976	1777	3498	3038	2732	2694	2470	2221	2082	1706	1962	2015	1990	2315	2243	2236	2329
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 1	2223	1999	3935	3418	3073	3031	2779	2499	2342	1919	2207	2267	2239	2605	2523	2515	2620
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 2	1992	1791	3526	3062	2754	2716	2490	2239	2099	1720	1978	2031	2006	2334	2261	2254	2348
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 3	2020	1816	3577	3106	2793	2755	2525	2271	2129	1744	2006	2060	2035	2367	2293	2286	2381
MOT Gasoline 4-stroke 250 - 750 cm <sup>3</sup>	Euro 4	2028	1824	3591	3118	2804	2765	2535	2280	2137	1751	2014	2068	2043	2377	2302	2295	2391
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Conventional	2006	1803	3551	3084	2773	2735	2507	2255	2114	1732	1992	2045	2020	2350	2277	2270	2364
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 1	2286	2055	4047	3515	3161	3117	2858	2570	2409	1973	2270	2331	2302	2679	2595	2587	2695
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 2	2044	1838	3619	3142	2826	2787	2555	2298	2154	1764	2030	2084	2059	2395	2320	2313	2409
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 3	2020	1816	3577	3106	2793	2755	2525	2271	2129	1744	2006	2060	2035	2367	2293	2286	2381
MOT Gasoline 4-stroke >750 cm <sup>3</sup>	Euro 4	2039	1833	3610	3135	2819	2781	2549	2293	2149	1760	2025	2080	2054	2390	2315	2307	2404

**ANNEX 5: Table A2.1 Inclusion/exclusion of the condensable component from PM<sub>10</sub> and PM<sub>2.5</sub> emission factors** - Bulgaria do not have data for the condensable component from PM<sub>10</sub> and PM<sub>2.5</sub> emission factors. Default emission factors from the EMEP/EEA Guidebook 2019 are used in the inventory.

NFR	Source/sector name	PM emissions: the condensable component is		EF reference and comments
		included	excluded	
1A1a	Public electricity and heat production	-	-	-
1A1b	Petroleum refining	-	-	-
1A1c	Manufacture of solid fuels and other energy industries	-	-	-