

**Documentation of statistics for  
Emission Accounts 2021**

## 1 Introduction

The purpose of the Air Emission Account is to illustrate the emission of greenhouse gases and other air pollutants related to industry and households energy consumption and other activities. The accounts can be used for climate and environmental-economic analysis. The emission accounts are developed for 1990 and onwards according to EEA, System of Environmental Economic Accounting, which is a statistical standard published by the UN and several other international organizations provides the "State of the art" for Green National Accounts. The statistics is part of the Environmental-Economic Accounts for Denmark (Green National Accounts).

The climate footprint is an important supplement of the Air Emission Account, which helps to shed light on how activities in Denmark affect the rest of the world. The climate footprint focuses on the emissions that are caused by final consumption. The inventory covers not only the country where consumption takes place, but also helps to shed light on how activities in one country effect other countries through the production of goods and services for import. Thus, the Danish consumption climate footprint includes the emissions that Danish consumers entails in other countries. The calculation of the climate footprint is experimental statistics.

## 2 Statistical presentation

The air emission accounts are annually accounts on the emission of greenhouse gases and other air pollutants. The air emission accounts follow the same definitions and classification as National Accounts, which allows for analyses of the connection between the economy and air pollution. The accounts are published in a Danish press release and in StatBank under the subject [Energy and air emissions](#).

The climate footprint is experimental statistics on greenhouse gas emissions calculated in tonnes. The inventory is divided into industries, consumption groups and countries. The climate footprint is disseminated in a DST Analysis and in StatBank Denmark.

## 2.1 Data description

Air emission accounts: The air emission accounts show emissions of green house gases as well as other polluting substances caused by the industries' or households' use of energy. In addition to that, the air emission accounts also accounts for emissions originating from activities not related to the use of energy, e.g. processes.

Emission accounts for the greenhouse gases CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O are published 9 months after the reference year on the 21 industry aggregation level. The final year is compiled using the most recent data from the energy accounts, coefficients from the previous year and emissions from processes and agriculture are estimated using relevant indicators. In particular for agriculture emissions are adjusted for the change in the stock of cattle and swine. Emissions from processes of the Manufacture of concrete and bricks is adjusted with the production index for the most recent year.

The Greenhouse gas account is supplemented with emissions from production of electricity and district heat distributed by actual use.

The climate footprint is a supplement to the air emission accounts, which help to shed light on how activities in Denmark effect the rest of the world. The climate footprint calculates which emissions are caused by consumption. The climate footprint focuses on the emissions that are caused by final consumption. The inventory covers not only the country where consumption takes place, but also helps to shed light on how activities in one country effect other countries through the production of goods and services for import. Thus, the Danish consumption climate footprint includes the emissions that Danish consumers entails in other countries. The calculation of the climate footprint is experimental statistics.

The calculation model links the Danish input-output tables to the multiregional input-output database EXIOBASE using figures for Denmark's imports divided into both industries and countries. This industry- and country-specific linking takes place for each year from 2010 on. The figures for the last two years are based on the preliminary input-output tables.

## 2.2 Classification system

[Statistics Denmark's industrial classification DBo7](#), which is a Danish version of the EU NACE, rev. 2, and the UN's ISIC, rev. 4, contains a number of standard classifications: the 127, 36, 19, and 10 classifications.

The 117 industry classification in Air Emission Accounts, which is the same as in the national accounts, corresponds to the standard 127 standard classification. The 117 industry classification can be aggregated to other standard classifications as well. Air Emission Accounts are thus fully comparable and can be combined with other statistics operating with the DBo7 standard classifications.

The climate footprint has the same industry groups as the emission accounts. The country groups follows EXIOBASE's country scope. The database contains among others characteristics for 44 individual countries (incl. Denmark) and five groups for the rest of the world.

In EXIOBASE, there are 4 main groups of the gases carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and fluorinated gases (SF<sub>6</sub>, PFC, HFC), which are divided into 22 types of emissions. Emissions from burning biomass, e.g. wood pellets and firewood, are not included in the inventory. On the other hand, emissions from land use, as well as changes therein and forestry (LULUCF) are included.

The climate footprint of Danish consumption is divided into 11 consumption groups according to purposes that follow the consumption groups in the national accounts.

## 2.3 Sector coverage

All industries according to Danish Industrial Classification of All Economic Activities 2007 (DBo7).

All final consumption groups according to the [National Accounts' classifications](#).

## 2.4 Statistical concepts and definitions

**Air emission:** 'Air emission' means the physical flow of gaseous or particulate materials from the national economy (production or consumption processes) to the atmosphere (as part of the environmental system).

**Danish consumption climate footprint:** Greenhouse gas emissions in both Denmark and abroad, which can be directly and indirectly related to Danish consumption. Danish consumption is to be understood as the final domestic consumption expenditure or the sum of private consumption (including NPISH), public consumption and investments (including stock changes).

## 2.5 Statistical unit

The statistical unit is the local kind-of-activity unit, enterprise.

## 2.6 Statistical population

All units engaged in economic activity on the Danish territory.

## **2.7 Reference area**

Air emission account: Denmark.

Climate footprint: Denmark and the rest of world.

## **2.8 Time coverage**

The air emission accounts covers the years since 1990.

The climate footprint covers the years since 2010.

## **2.9 Base period**

Not relevant for this statistics.

## **2.10 Unit of measure**

Emissions to air are measured in tons for all substances.

## **2.11 Reference period**

The air emission accounts: 01-01-2020 - 31-12-2021

The climate footprint: 01-01-2020 – 31-12-2020

## **2.12 Frequency of dissemination**

Annually.

## **2.13 Legal acts and other agreements**

Legal authority can be found in § 8.1 in [Law on Statistics in Denmark](#) and in [Regulation no. 691/2011 on European environmental economic accounts](#).

## **2.14 Cost and burden**

No direct response burden, since all information is based on existing statistics.

## **2.15 Comment**

[Link to Subject page](#)

### **3 Statistical processing**

Emission accounts are compiled taking energy accounts as a starting point for the emissions caused by the use of energy. Emissions caused by other factors than energy use are added subsequently and distributed among the relevant industries.

The climate footprint links the Danish input-output tables to EXIOBASE database and using these the greenhouse gas emissions that Danish consumption gives rise to in Denmark is calculated initially. Next, using multipliers from EXIOBASE, the model calculates the emissions that the import of goods and services for Danish consumption (directly and indirectly) gives rise to in the rest of the world. These multipliers tell us how many emissions imports cause in the world, broken down by industry and country.

#### **3.1 Source data**

The environmental accounts are based on: The air emissions accounts are based on technical information on emissions and emission inventories obtained from the DCE, Danish Centre for Environment and Energy, University of Aarhus. This information is supplemented by specific information on fuel oil consumption and emission of SO<sub>2</sub> from Danish operated ships abroad. The break down by industries and households is based on information obtained from the national accounts. The emission accounts are further supplemented with information on Land use, Land use change and Forestry (LULUCF) as reported to UNFCCC by DCE.

The climate footprint is based on the Danish input-output tables, figures for Denmark's imports by both industries and countries, the air emissions accounts and the EXIOBASE database. The calculations of the climate footprint are based on the monetary release of EXIOBASE, version 3.8.2.

#### **3.2 Frequency of data collection**

Annually.

#### **3.3 Data collection**

Data for the air emission accounts is collected from different internal sources e.g. Energy accounts and external sources (Denmark's reporting to UNFCCC and UNECE) by extracting information from data bases, excel spreadsheets and printed publications. These sources are supplemented by Environmental reports/Sustainability reports from certain private companies.

Data for the climate footprint are collected from the Danish input-output tables, figures for Denmark's imports by both industries and countries, the air emissions accounts and the EXIOBASE database.

#### **3.4 Data validation**

First there is a process of data validation of each primary statistics, as described in the respective quality statements of the relevant statistics. It is followed by an initial validation of input data in connection to compilation of Air Emission Accounts.

### **3.5 Data compilation**

Air emission accounts are compiled using Energy First principle, which takes energy accounts as a starting point and the emissions are calculated by multiplying energy use with the respective emission coefficients. This information is supplemented by specific information on fuel oil consumption and emission of SO<sub>2</sub> from Danish operated ships abroad. Emission accounts are further supplemented with the emissions not related to the combustion of energy products. These include emissions from agriculture as well as emissions from the industrial processes. Air emission accounts are then aligned with the official emission inventories in regards to overall national totals as well as the subtotals for groups of industries to ensure consistency between the official statistics on the national level.

Statistics Denmark's model for calculating the climate footprint links the Danish input-output tables with EXIOBASE database. Using Danish input-output tables and Danish emission data, initially, the greenhouse gas emissions that Danish consumption gives rise to are calculated. Next, the import of consumer goods is added together with the import of raw materials etc. that Danish companies need in order to produce goods for the Danish consumers. Finally, using multipliers from EXIOBASE, it is calculated how many emissions the production of these imports gives rise to in the rest of the world. These multipliers tell us how much emissions imports cause in the world, broken down by industry and country.

### **3.6 Adjustment**

Not relevant for this statistics.

## **4 Relevance**

Environmental Accounts are relevant for those interested in the correlation between the economy on the one side and environment and natural resources on the other side. Ministries and consultant firms are among the main users of environmental accounts. Accounts are included in the overall European environmental accounts, collected and compiled by Eurostat.

The climate footprint is an important supplement to the emissions accounts, which helps to shed light on how activities in one country have effects in other countries via the production activities created through the import of products. This is important not least in relation to the greenhouse gases, as the problem is global. Therefore, it is important to know how our consumption as a whole contributes to the global emission of greenhouse gases.

### **4.1 User Needs**

External users of the air emission accounts are ministries, business and trade organizations, research institutes and engineering consultancy firms who want a general view of the interactions between the economy and the environment. Linking the input-output calculations to the air emission accounts makes it possible to examine the interaction between economic activity and the emissions of different polluting substances. The interaction between different types of demands (e.g. household's consumption, exports, etc.) and emissions can also be monitored.

## **4.2 User Satisfaction**

A liaison group on environmental economic accounts and statistics holds at least one meeting per year. All or part of the committee's meetings are in a seminar form, where several participants from the institutions may be represented on the committee. The following institutions and organizations have a representative on the committee: Statistics Denmark, The Ministry of Industry, Business and Financial Affairs, The Ministry of Finance, The Danish Ministry of Climate, Energy and Utilities, The Ministry of Environment of Denmark, The Ministry of Transport, Ministry of the Interior and Housing, The Danish Energy Agency, The Danish Environmental Protection Agency.

## **4.3 Data completeness rate**

Data meets all the requirements of the Regulation no. 691/2011 on European environmental economic accounts.

## **5 Accuracy and reliability**

There is an uncertainty connected to the compilation of Air Emission Accounts as a combination of scientific assumptions and calculations have to be made. Uncertainty inherited in the source data is transferred to the Air Emission Accounts. However, conceptually consistent and over time uniform treatment of source data contribute to increasing the certainty of data.

### **5.1 Overall accuracy**

There is variability in accuracy for the emissions to air for different industries and for types of air emissions. The uncertainty reflects, inter alia, the uncertainty about the allocation of energy by industries, given that the starting point for calculations of emissions is the energy accounts (cf. the documentation of statistics for the Danish energy accounts). Add to this variability in the technical emission factors for the various industries as well as a substantial variability related to the non-energy related emissions.

The calculations of the climate footprint constitute Statistics Denmark's first attempt and may therefore be changed. A number of assumptions and estimations are made in the calculations, and there is considerable uncertainty associated with the calculations, especially regarding the emissions abroad. The EXIOBASE database is in practice a combination of official statistics, projections and balancing. The calculations of the climate footprint are therefore to be regarded as experimental statistics.

### **5.2 Sampling error**

Not relevant for these statistics.

### **5.3 Non-sampling error**

Uncertainty in the emission accounts are connected to the uncertainties in the source data. Detailed information regarding emission coefficients and emission levels can be found in [Denmark's National Inventory Report 2022](#).



#### **5.4 Quality management**

Statistics Denmark follows the recommendations on organisation and management of quality given in the Code of Practice for European Statistics (CoP) and the implementation guidelines given in the Quality Assurance Framework of the European Statistical System (QAF). A Working Group on Quality and a central quality assurance function have been established to continuously carry through control of products and processes.

#### **5.5 Quality assurance**

Statistics Denmark follows the principles in the Code of Practice for European Statistics (CoP) and uses the Quality Assurance Framework of the European Statistical System (QAF) for the implementation of the principles. This involves continuous decentralized and central control of products and processes based on documentation following international standards. The central quality assurance function reports to the Working Group on Quality. Reports include suggestions for improvement that are assessed, decided and subsequently implemented.

#### **5.6 Quality assessment**

No measurements of quality has been done, however the quality of the statistics is seen as best possible, given the resources available for the compilation of accounts. Air Emission Account have the scope and the degree of detail that is on the same level as other countries, such as Netherlands, Sweden and Norway. Accounts are compiled in accordance with recommendations and quality standards provided by UN and Eurostat.

#### **5.7 Data revision - policy**

Statistics Denmark revises published figures in accordance with the [Revision Policy for Statistics Denmark](#). The common procedures and principles of the Revision Policy are for some statistics supplemented by a specific revision practice.

#### **5.8 Data revision practice**

The time series is fully revised annually e.g. as a consequence of revised energy accounts and revised submissions to UNECE or UNFCCC as well as with improvement of methodologies.

Major revisions in 2022:

- Emissions from Danish shipping abroad have been adjusted upwards
- Methane from agriculture increased during the whole time series \_ Nitrous oxide from agriculture increased during the whole time series
- NMVOC from agriculture revised during the whole time series
- LULUCF revised during the whole time series
- Emissions from mobile combustion revised

The calculation of the climate footprint is experimental statistics and is revised on an ongoing basis.

## **6 Timeliness and punctuality**

Data is normally published without delays.

## **6.1 Timeliness and time lag - final results**

The Statistics is published annually.

## **6.2 Punctuality**

The environmental accounts are normally published without delay in relation to the scheduled publication.

## **7 Comparability**

The industry classification in the tables is the same as the one used in the national accounts. The tables can therefore be compared to other statistics based on the industry classification. Accounts are compiled in form of time series. For example accounts for air emissions are available for each year from 1990 until the last year that is published. Accounts are consistent and fully comparable within these years. On the more aggregated level (NACE 64), the Danish accounts are comparable with accounts of other EU countries compiled according to the Regulation no. 691/2011 on European environmental economic accounts.

### **7.1 Comparability - geographical**

Internationally there is a high degree of comparability with other countries, as the Danish Environmental accounts follow the same principles and methods as described in SEEA- framework.

The climate footprint is an experimental statistic based on model calculations and therefore, it can not be compared directly internationally.

### **7.2 Comparability over time**

Time series for Air Emission Accounts are revised back in time in connection with each publication. Data thus can be different compared with earlier publications, but there is full conceptual consistency and comparability over time within a publication.

### **7.3 Coherence - cross domain**

Air Emission Accounts follow the same industry classifications and boundaries as National Accounts. Therefore it is possible to combine the data on emissions with other statistical data that follow the same industry classifications. The emission account for the year T - 1 is based on submissions to UNECE published on February 15 and on submission to UNFCCC published on April 15.

The calculation of the climate footprint is based on the Danish input-output tables and the emission accounts and can therefore be directly compared with them.

### **7.4 Coherence - internal**

It is ensured that data is internally consistent.

## 8 Accessibility and clarity

These statistics are published annually in a Danish press release, at the same time as the tables are updated in the StatBank. In the StatBank, these statistics can be found under the subject [Energy and air emissions](#). For further information, go to the subject page for [Environmental-Economic Accounting](#).

The climate footprint is published in DST Analysis: [Dansk forbrug sætter i høj grad sit klimaaftryk i udlandet \(only in Danish\)](#). In Statbank Denmark, the figures are published under the topic [Energy and air emissions](#).

### 8.1 Release calendar

The publication date appears in the release calendar. The date is confirmed in the weeks before.

### 8.2 Release calendar access

The Release Calendar can be accessed on our English website: [Release Calendar](#).

### 8.3 User access

Statistics are always published at 8:00 a.m. at the day announced in the release calendar. No one outside of Statistics Denmark can access the statistics before they are published.

### 8.4 News release

These statistics are published annually in a Danish press release.

### 8.5 Publications

Not relevant.

### 8.6 On-line database

The statistics are published in the StatBank under the subject [Energy and air emissions](#) in the following tables:

- [MRU1](#): Air Emission Accounts by industry, type of emission and time
- [MRO1](#): Bridge table by bridging items, type of emission and time
- [DRIVHUS](#): Greenhouse Gas Accounts (in CO<sub>2</sub> equivalents) by type of emission, industry and time
- [MRO2](#): Bridge table (in CO<sub>2</sub> equivalents) by bridging items, type of emission and time
- [DRIVHUS2](#): Greenhouse Gas Accounts (in CO<sub>2</sub> equivalents) by type of emission, industry, time and calculation principle
- [AFTRYK](#): Climate footprint of Danish Consumption (Experimental statistics) by types of use (Causes of emissions), industries (Origin of emissions) and countries/economies (Origin of emissions)

### **8.7 Micro-data access**

Accounts are published at the most detailed level.

The climate footprint is published at the most detailed level for the countries and industries, but there is a possibility of further fragmentation of the final consumption categories.

### **8.8 Other**

Not relevant.

### **8.9 Confidentiality - policy**

[Data Confidentiality Policy](#) at Statistics Denmark.

### **8.10 Confidentiality - data treatment**

Not relevant for these statistics.

### **8.11 Documentation on methodology**

- Statistics Denmark (2013). "Grønne nationalregnskaber. Metoder og muligheder" (publication in the Danish language).
- European Commission. Eurostat (2013) Compilation Guide (2013) for Eurostat's Air Emissions Accounts (AEA). Version: April 2013.
- Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank (2012). System of Environmental-Economic Accounting, Central Framework. White cover publication. New York.
- Statistics Denmark (2007). "Nationalregnskab Kilder og metoder 2003"(publication in the Danish language).
- Statistics Denmark [Note with methodology description of the climate footprint \(in Danish\)](#)

### **8.12 Quality documentation**

Results from the quality evaluation of products and selected processes are available in detail for each statistics and in summary reports for the Working Group on Quality.

## **9 Contact**

The air emission account is administered by the National Accounts division. The contact person for the statistics is Leif Hoffmann, tel. 3917 3496, e-mail: [lhf@dst.dk](mailto:lhf@dst.dk).

The contact person for the climate footprint is Peter Rørmose Jensen, tel. 3917 3862, e-mail: [prj@dst.dk](mailto:prj@dst.dk).

### **9.1 Contact organisation**

Statistics Denmark

**9.2 Contact organisation unit**

National Accounts, Economic Statistics

**9.3 Contact name**

Leif Hoffmann

**9.4 Contact person function**

Responsible for the statistics

**9.5 Contact mail address**

Sejrøgade 11, 2100 Copenhagen

**9.6 Contact email address**

lhf@dst.dk

**9.7 Contact phone number**

+45 3917 3496

**9.8 Contact fax number**

N/A