ENVIRONMENTAL ACCOUNTS

MIR 2016:3

New method for up-to-date environmental accounts:

– quarterly emissions to air

Statistiska centralbyrån Statistics Sweden

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Statistics Sweden
2016

Miljöräkenskaper 2016:3

Ny metod för aktuella miljöräkenskaper

– kvartalsvisa utsläpp till luft

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Statistics Sweden
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Foreword

Following up target for greenhouse gas emissions and taking environmental policy decisions requires current and relevant statistics. Environmental Accounts at Statistics Sweden is an information system that uses statistics to describe the connection between the environment and the economy.

There is great demand by many actors in society for up-to-date statistics on greenhouse gas emissions. Therefore, to provide faster access to statistics, since late 2015, Environmental Accounts has published regular quarterly statistics on Sweden's economy and Swedish economic actors' greenhouse gas emissions and air pollution.

The statistics make it possible to follow emissions trends on a quarterly basis. The statistics also make it possible to produce preliminary annual statistics (total quarterly statistics), which are published quicker than the final annual statistics on emissions to air. Statistics Sweden was the first in the world to report air emissions accounts for greenhouse gases and air pollution as current as this.

This report describes the results of quarterly statistics on greenhouse gas emissions and the method used to produce these statistics.

The report was produced by Maria Lidén, Susanna Roth, Fredrik Kanlén, and Nancy Steinbach at Environmental Accounts and Natural Resources at Statistics Sweden.

Statistics Sweden, November 2016

Marie Haldorson

Kaisa Ben Daher

Statistics Sweden would like to thank
our respondents – private individuals, enterprises, agencies and organisations – Statistics Sweden is able to produce reliable and timely statistics that meet the demands for information from society.

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Summary

All of Sweden's various economic actors need to reduce their greenhouse gas emissions if the target for Sweden to have no net greenhouse gas emissions by 2045 is to be met. Good quality and up-to-date data is needed to monitor this environmental policy objective as well as others, and to analyse developments in different parts of Sweden's economy. The Environmental Accounts are compiled within the framework of the System of Environmental and Economic Accounts (SEEA) and show national environmental statistics and economic statistics in the same framework using NACE industry classification. This is made possible by reworking environmental statistics classifications to harmonise with economic statistics, and by reporting them jointly.

Quarterly statistics on greenhouse gas emissions and air pollution are a new type of statistics that have been published by Environmental Accounts since the end of 2015. Production time for Environmental Accounts' final annual statistics on emissions to air is currently one and a half year, while quarterly statistics has a production time of approximately four months after the previous quarter. In other words, quarterly statistics provide quicker information on trends and enables more up-to-date analyses.

This report summarises and analyses preliminary annual statistics (total quarterly statistics) on greenhouse gas emissions and quarterly emissions up to 2015 by Swedish economic actors, including households. Since quarterly statistics are a new type of statistic, the report also contains a description of methods. We hope to inspire actors abroad to produce similar statistics.

An analysis of developments in 2015 shows that greenhouse gas emissions continue to decline, while at the same time the economy is growing. According to preliminary annual statistics, emissions amounted to about 62 million tons of carbon dioxide equivalents in 2015, which corresponds to a decrease of 0.7 percent compared with 2014. At the same time, Sweden's GDP rose by 3.9 percent.

The rate of emissions reduction was slightly lower in 2015 compared with the previous year. The decrease in 2015 is largely explained by lower emissions due to production disruptions in electricity, gas, and heating plants in the second and third quarters.

To reach the target of zero net greenhouse gas emissions by 2045, the All Party Committee on Environmental Objectives has highlighted three particularly important challenges: a fossil-free and competitive transport sector, sustainable and competitive basic industries and sustainable and competitive agriculture. The report concludes with a description of developments in these three areas.

1. Introduction

The All Party Committee on Environmental Objectives has presented a proposal for a long-term climate policy framework for Sweden[1]. The proposal includes a target of zero net greenhouse gas emissions to the atmosphere by 2045 in Sweden. This means that Sweden's various industries, the public sector and households, need to reduce their greenhouse gas emissions. According to the All Party Committee on Environmental Objectives, the main challenges lie in achieving a fossil-free and competitive transport sector, sustainable and competitive basic industries with low emissions of greenhouse gases, and sustainable and competitive agriculture[2].

Following up targets for greenhouse gas emissions and taking environmental policy decisions requires up-to-date and relevant statistics.

The Environmental Accounts are compiled within the framework of the System of Environmental and Economic Accounts (SEEA). It shows national environmental statistics and economic statistics in the same framework using NACE industry classification. Sweden's greenhouse gas emissions and air pollution can be analysed for the various economic actors in society, for instance in the areas highlighted as challenges by the All Party Committee on Environmental Objectives, as well as in other areas such as households and the public sector. Environmental Accounts can also contribute to international comparisons in the environmental field, particularly since the United Nations Statistical Commission adopted environmental accounts as a global statistical standard[3].

There is large demand by many actors in society for up-to-date statistics on greenhouse gas emissions. Production time for Environmental Accounts' annual final statistics on emissions to air is currently one and a half year. To more quickly provide access to statistics, Environmental Accounts has therefore published regular quarterly statistics since 2015

[1]SOU 2016:21 Ett klimatpolitiskt ramverk för Sverige.

[2]Ibid, p 27.

[3] United Nations et. al. (2014): System of Environmental-Economic Accounting 2012 Central Framework.

on Swedish economic actors' greenhouse gas emissions and air pollution. Production time for the statistics is approximately four months after the end of the previous quarter.

Quarterly statistics make it possible to monitor current emissions trends. It also enables production of preliminary annual statistics (total quarterly statistics), which is published ahead of the final annual statistics on emissions to air. The fact that Statistics Sweden can now report quarterly statistics means that Sweden was the first in the world to produce air emissions accounts for greenhouse gases and air pollution that are this up-to-date.

The purpose of this report is to summarise and deepen analysis of quarterly emissions up to and including 2015. Since this is a completely new type of statistic, the report also contains a description of methods. We also hope to inspire actors abroad to produce similar statistics.

The report begins with a presentation of preliminary results of Sweden's greenhouse gas emissions in 2015 (Chapter 2) followed by a description of quarterly emissions in different aggregated industries (Chapter 3). Results presented in the report are based on statistics published by Statistics Sweden in April 2016[4]. The report also contains a description of emissions trends in relation to economic developments and employment (Chapter 4), an international comparison (Chapter 5) and a description of developments in sectors highlighted by the All Party Committee on Environmental Objectives as Sweden's main challenges: the transport sector, basic industries and agriculture (Chapter 6). The report concludes with a description of the method used to produce the quarterly statistics and how this method differs from the one applied in final annual statistics (Chapter 7).

Those who wish to study quarterly emissions of individual greenhouse gases or different air pollution types can produce analyses similar to the ones in this report. Data on quarterly emissions of individual greenhouse gases and air pollution is available on Statistics Sweden's website.[5].

[4]As the statistics are preliminary, figures presented in this report may be revised on publication of new quarterly data.

[5] Statistics Sweden, Environmental Accounts www.scb.se/MI1301.

2. Preliminary greenhouse gas emissions 2015

The long-term trend is that greenhouse gas emissions[6] by Swedish economic actors are declining. Emissions figures cover the entire Swedish economy, that is, the business sector, the public sector and households. According to preliminary statistics, emissions amounted to approximately 62 million tons of carbon dioxide equivalents in 2015. This is equivalent to a decrease of 0.7 percent compared with 2014 or a decrease of 14.1 percent compared with the beginning of the time series in 2008.

At the same time, the Swedish economy has grown, with the exception of a slight drop in the wake of the global financial crisis in 2009. The GDP is used to measure economic growth. Different industries' contribution to the GDP are measured by their added value[7]. In 2015, Sweden's GDP increased by 3.9 percent (see Figure 1) compared with 2014 and by 9.9 percent compared with 2008.

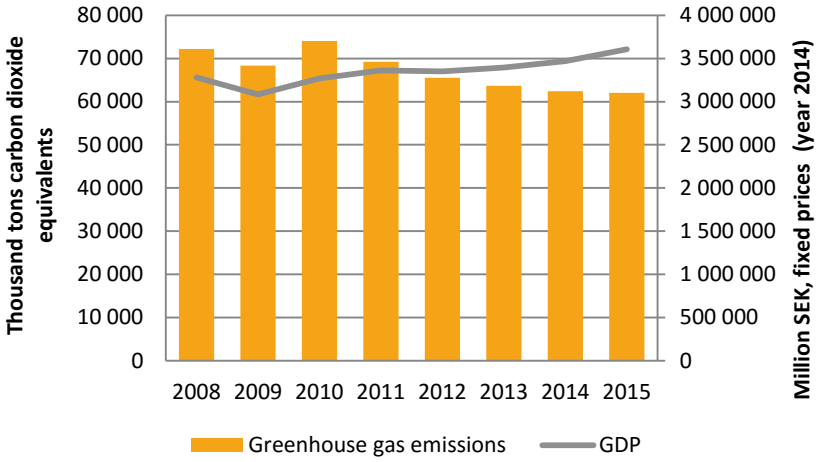
Although total emissions declined in 2015 compared with 2014, the rate of reduction was lower compared with the previous year. Aside from 2010, when emissions levels rose compared with the previous year, the annual reduction has always been at least 2 percent from one year to the next throughout the time series. At the same time, the growth rate in the Swedish economy has not been this high since the recovery after the financial crisis, when the GDP rose by 5.9 percent between 2009 and 2010.

[6]Greenhouse gas emissions comprise an aggregate of carbon dioxide (CO_2, fossil), methane (CH_4), nitrous oxide (N_2O), fluorinated gases (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF_6).

[7]The added value of an industry is measured as its production value minus its input consumption. The sum of all industries' gross added value, as well as net product taxes and subsidies (and any undistributed items) forms the GDP at market price.
(http://www.scb.se/sv_/dokumentation/)

Figure 1

Greenhouse gas emissions from Swedish economic actors in 2008–2015 and the GDP. Preliminary statistics.



Source: Environmental Accounts and National Accounts, Statistics Sweden

At an aggregated industry level[8], manufacturing industry[9] and the transport industry[10] account for the highest percentage of greenhouse gas emissions. Households[11], agriculture and electricity, gas and heating plants also account for a considerable proportion of emissions by

[8]Swedish classification of economic activities has been applied here. See also Table 3 in Chapter 7 *Facts about statistics*, for a description of the aggregated industries.

[9]The manufacturing industry includes steel and metal production, refineries, production of chemical products, cement, pulp and paper.

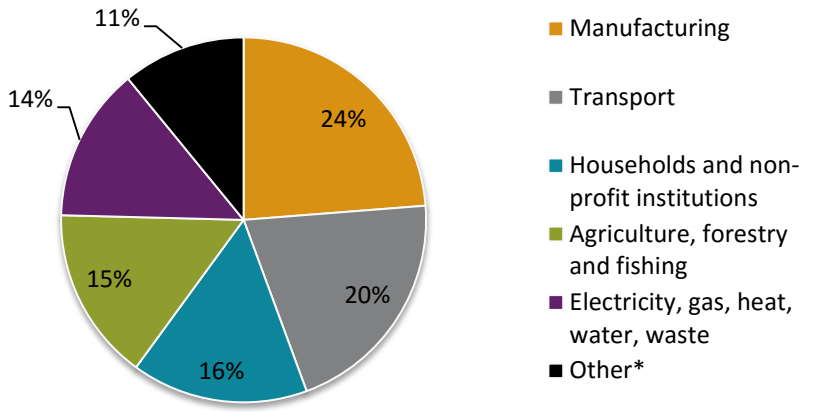
[10]The transport industry includes land transport enterprises, freight water transport, air transport and postal and courier activities. Vehicles owned directly by households, public sector or other industries are not included in the transport industry.

[11]Emissions from purchases of fuels for transport and heating are included here. Consumption-based emissions of greenhouse gases in Sweden and other countries are not included.

Swedish economic actors (see Figure 2). Together these areas account for nearly 90 percent of Sweden's emissions.

Figure 2

Greenhouse gas emissions 2015, percentage of total emissions per aggregated industry NACE Rev. 2. Preliminary statistics.



*Other services, Construction, Mining and quarrying, Public sector

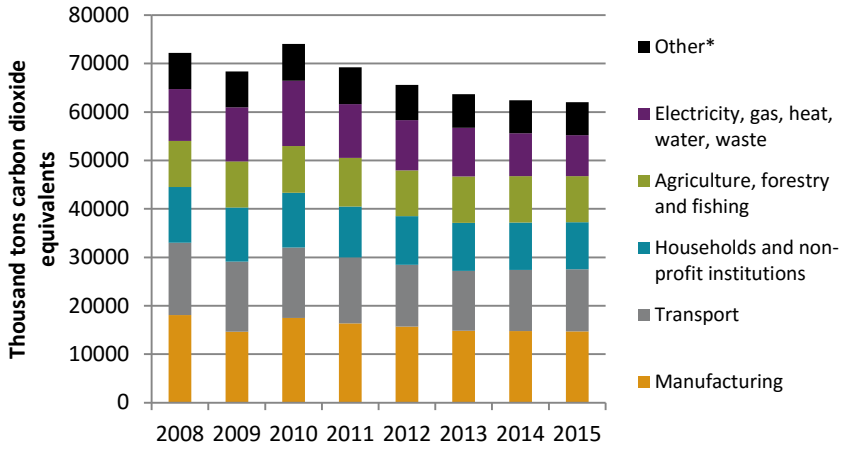
Source: Environmental Accounts, Statistics Sweden

Emissions in most industries, except the transport industry, construction and other services, dropped in 2015 compared with 2014 (see Table 1 and Figure 3). At the same time, economic growth has increased in most industries, with the exception of mining and quarrying.

Lower emissions in Sweden in 2015 compared with the previous year are largely due to reduced emissions by electricity, gas and heating plants and by a gradual increase of biofuel use as a replacement for fossil fuels. However, the decrease in emissions by electricity, gas and heating plants in 2015 is largely due to production disruptions, mainly in the second and third quarters, at some plants with high use of fossil fuels.

Figure 3

Greenhouse gas emissions by Swedish economic actors in 2008–2015 per aggregated industry NACE Rev. 2. Preliminary statistics.



*Other services, construction, mining and quarrying, public sector

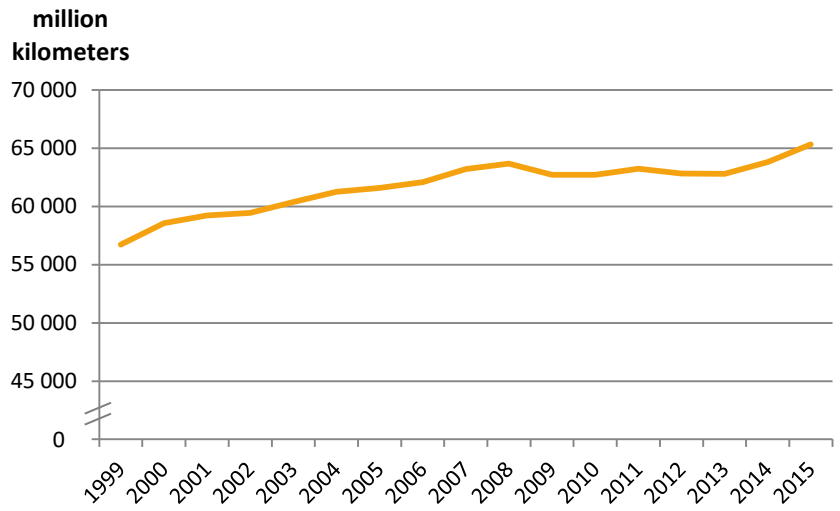
Source: Environmental Accounts, Statistics Sweden

Households' emissions, accounting for about 16 percent of Sweden's total greenhouse gas emissions, decreased by 0.9 percent in 2015 compared with 2014. The major part of households' emissions comes from passenger cars, while a smaller part comes from heating of housing and other activities.

While passenger cars have become more fuel-efficient and there is an increased element of electric power and use of biofuel, overall traffic in Sweden is increasing (see Figure 4). This means that emissions have not decreased significantly. In the fourth quarter in 2015, the preliminary figures show that households' emissions are even increasing compared to the same quarter in 2014.

Figure 4

Total mileage for passenger cars in billions of kilometres (note that the axis is cut off and starts at 40 000 million kilometres).



Source: Transport Analysis 2016[12]

The manufacturing industry, which accounts for 24 percent of Sweden's emissions, has had a positive economic development in 2015. At the same time, emissions levels have been relatively constant compared with 2014. There has been an economic rise in industries with relatively low emission intensity, such as manufacture of motor vehicles, computers and furniture.

There was also a strong economic rise in 2015 in several industries with low emission intensity, for instance other services such as IT, finance, insurance and legal and economic consultancy services.

[12] http://www.trafa.se/vagtrafik/korstrackor/

Table 1

Greenhouse gas emissions and value added in 2015, thousand tons carbon dioxide equivalents and GDP fixed prices reference year 2014, SEK millions

Aggregated industry NACE Rev. 2	Greenhouse gas emissions			Value added		
	2015	Change compared with 2014		2015	Change compared with 2014	
Agriculture, forestry, and fishing	9 536	-44	-0.5%	48 794	972	2.0%
Mining and quarrying	1 009	-71	-6.6%	18 154	-19	-0.1%
Manufacturing industry	14 735	-25	-0.2%	591 473	23 937	4.2%
Electricity, gas and heating, water supply, sewerage, waste	8 481	-349	-4.0%	110 558	3 679	3.4%
Construction	1 913	5	0.2%	232 610	23 504	11.2%
Transport industry	12 790	143	1.1%	154 585	2 029	1.3%
Other services	3 159	24	0.8%	1 677 377	72 825	4.5%
Public sector	689	-12	-1.7%	723 519	8 925	1.2%
Households and non-profit organisations	9 702	-88	-0.9%	48 276	237	0.5%
Economy, total	**62 012**	**-417**	**-0.7%**	**3 605 346**	**136 089**	**3.9%**

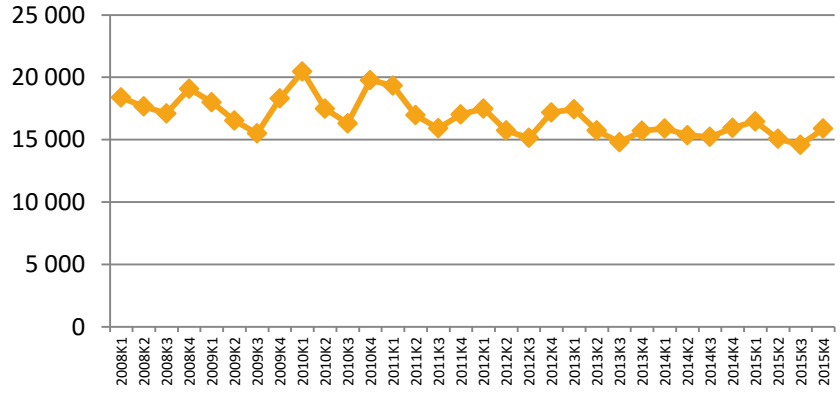
Source: Environmental Accounts and National Accounts, Statistics Sweden

3. Quarterly emissions of greenhouse gases 2015

Greenhouse gas emissions vary over the seasons and are highest during the coldest times of the year. Figure 5 describes quarterly emissions of greenhouse gases by Swedish economic actors in the time period 2008–2015.

Figure 5

Greenhouse gas emissions by Swedish economic actors, quarterly 2008–2015, thousands of tons carbon dioxide equivalents.



Source: Environmental Accounts, Statistics Sweden

In 2015, greenhouse gas emissions by Swedish economic actors were highest in the first quarter. Emissions increased by 3.6 percent compared with the same period in 2014 and amounted to nearly 16.5 million tons of carbon dioxide equivalents (see Table 2). Unlike in the other quarters, this also meant a rise in emissions compared with the same quarter in 2014. The increase in emissions is due to a large extent to increased emissions in the transport industry. It is common for emissions in primarily water transport to vary greatly. In the same period, value added in Sweden increased by 2.7 percent.

Table 2

Greenhouse gas emissions by Swedish economic actors and value added by quarter in 2015, thousands of tons carbon dioxide equivalents and fixed prices reference year 2014, SEK millions

	Greenhouse gas emissions			Value added		
Quarter	2015	Change compared with the same period in 2014		2015	Change compared with the same period in 2014	
Quarter 1	16 467	571	3.6%	881 774	23 568	2.7%
Quarter 2	15 063	-297	-1.9%	929 522	35 145	3.9%
Quarter 3	14 597	-626	-4.1%	842 171	32 928	4.1%
Quarter 4	15 885	-64	-0.4%	951 879	44 448	4.9%
Total 2015	62 012	-417	-0.7%	3 605 346	136 089	3.9%

Source: Environmental Accounts and National Accounts, Statistics Sweden.

In the second quarter in 2015, emissions of greenhouse gases by Swedish economic actors amounted to 15.1 million tons of carbon dioxide equivalents. This corresponds to a decrease of 1.9 percent compared with the same quarter in 2014. This is primarily the result of decreased emissions from electricity, gas and heating plants. The GDP increased by 3.9 percent in the second quarter of 2015 compared with the same period the previous year.

Greenhouse gas emissions levels were lowest in the third quarter in 2015, when they amounted to 14.6 million tons of carbon dioxide equivalents. This was a drop of 4.1 percent compared with the same quarter in 2014. The drop can be explained mainly by reduced emissions by electricity, gas and heating plants due to production disruptions, and by reduced emissions in the transport industry. Emissions levels in electricity, gas and heating plants in the third quarter were the lowest since the beginning of the time series in 2008.

Greenhouse gas emissions in the fourth quarter of 2015 amounted to 15.9 million tons of carbon dioxide equivalents. Emissions were largely unchanged compared with the same quarter in 2014. The GDP rose by 4.9 percent in the same period.

Emissions per industry

The connection between greenhouse gas emissions and different industries' contributions to the Swedish economy varies in strength. Some industries are emissions-intensive by nature. In these industries, increased production leads directly to increased emissions, while other industries can increase value added without significantly affecting emissions levels.

Quarterly emissions of greenhouse gases broken down by different aggregated industries are presented below. A description of what is included in the different aggregated industries is contained in Chapter 7 *Facts about statistics*. Industries are presented in the order they are broken down by, starting with agriculture, forestry and fishing, followed by manufacturing industry, electricity, gas and heating plants, service industries, public sector, and finally households and non-profit institutions.

Agriculture, forestry and fishing

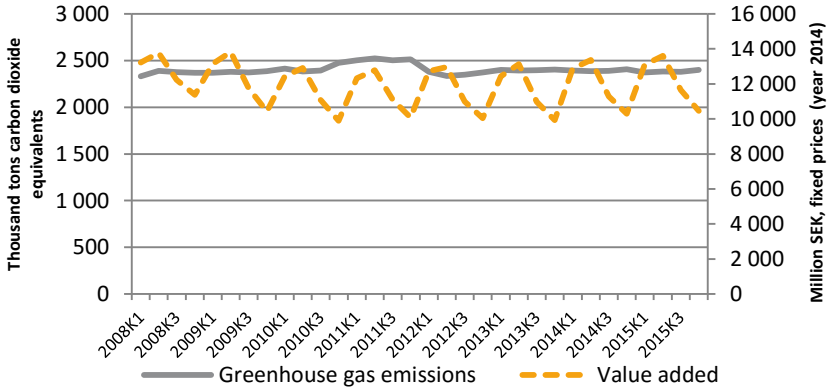
Agriculture, forestry and fishing accounts for approximately 15 percent of total emissions of greenhouse gases by Swedish economic actors. The major part of these emissions comes from agriculture and consists mainly of methane from enteric fermentation and N_2O from agricultural soils. At the same time, forest lands constitute large carbon sinks, however these are not included in this report.

In 2015, emissions from agriculture, forestry and fishing amounted to 9.5 million tons of carbon dioxide equivalents. Approximately 90 percent of these emissions come from agriculture. At the same time, agriculture, forestry and fishing accounts for 1.4 percent of value added in Sweden, of which forestry accounts for approximately 70 percent.

In 2015, there were only minor changes in emissions levels in agriculture, forestry and fishing compared with 2014. Also, no major emissions reductions have occurred compared with the beginning of the time series in 2008 (see Figure 7).

Figure 7

Agriculture, forestry and fishing, greenhouse gas emissions and value added, quarterly 2008–2015.

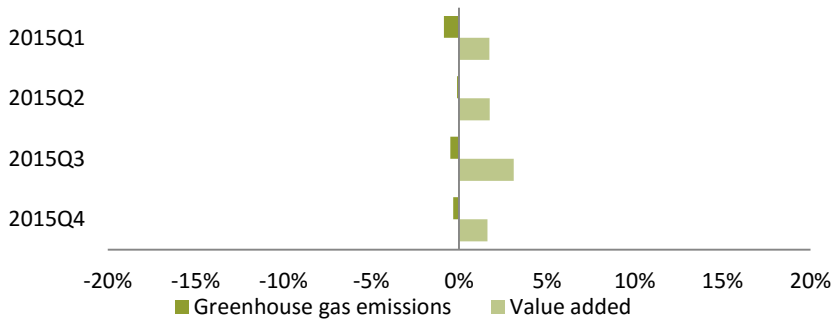


Source: Environmental Accounts and National Accounts, Statistics Sweden

In 2015, emissions levels were marginally reduced compared with the same quarter in 2014 (see Figure 8). The most significant emissions, 0.9 percent, occurred in the first quarter. At the same time, the sector's value added increased in all quarters compared with 2014. The highest value added increase, 3.1 percent, occurred in the third quarter.

Figure 8

Agriculture, forestry, and fishing, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



Source: Environmental Accounts and National Accounts, Statistics Sweden

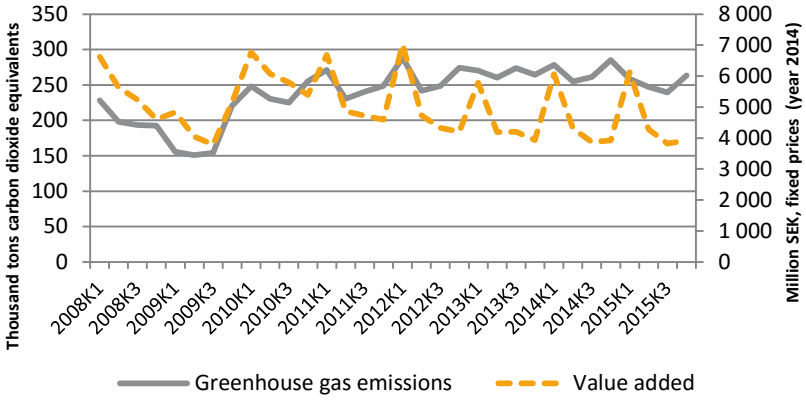
Mining and quarrying

Mining and quarrying accounts for a relatively small proportion of total greenhouse gas emissions by Swedish economic actors. In 2015, emissions amounted to approximately 1 million tons of carbon dioxide equivalents. This is equivalent to 1.6 percent of total emissions. The industry's contribution to Sweden's value added is approximately 0.5 percent.

Since the beginning of the time series in 2008 and after the financial crisis, greenhouse gas emissions by mining and quarrying have had a slightly growing trend. However, emissions dropped in 2015 compared with 2014 (see Figure 9).

Figure 9

Mining and quarrying, greenhouse gas emissions and value added, quarterly 2008–2015.

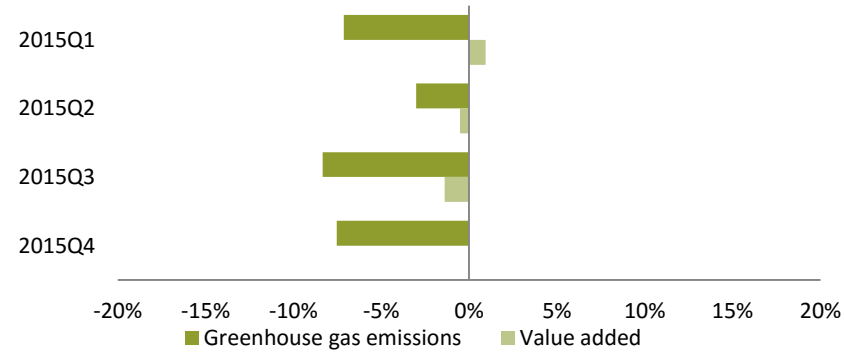


Source: Environmental Accounts and National Accounts, Statistics Sweden

The most significant emissions reduction occurred in the third quarter, which was 8.3 percent compared with the same quarter in 2014. Emissions reductions are largely due to reduced incineration for heating, but they are also linked to the industry's economy. During three quarters in the year, value added was reduced or remained unchanged (see Figure 10).

Figure 10

Mining and quarrying, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015, Volume changes in % compared with the same quarter in 2014.



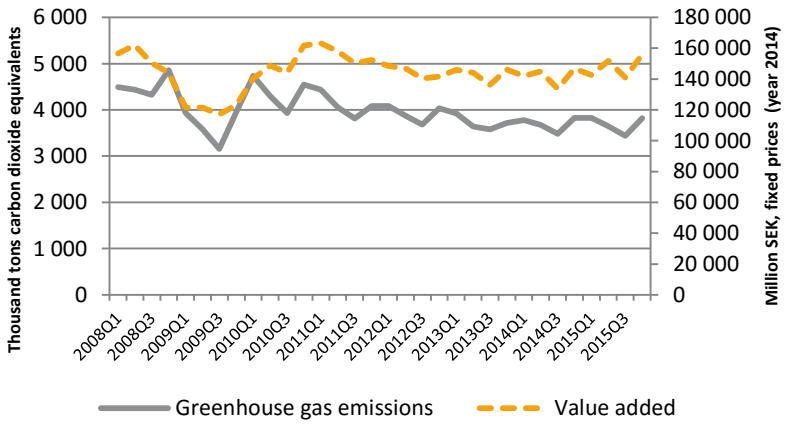
Source: Environmental Accounts and National Accounts, Statistics Sweden

Manufacturing industry

The manufacturing industry accounts for nearly one fourth of total emissions by Swedish economic actors. Steel and metal production, refineries, manufacture of chemical products and cement are the industries with the most greenhouse gas emissions. Emissions consist of process emissions, primarily from steel and metal production, cement industry, and from the use of fossil fuels in various activities. This sector accounts for a large part of Sweden's GDP, about 16 percent.

Since 2010, emissions from the manufacturing industry have decreased gradually, and in 2015, emissions amounted to 14.7 million tons of carbon dioxide equivalents according to preliminary figures. However, emissions levels in 2015 were largely unchanged compared with 2014 (see Figure 11).

Figure 11
Manufacturing industry, greenhouse gas emissions and value added, quarterly 2008–2015.



Source: Environmental Accounts and National Accounts, Statistics Sweden

In the first quarter, emissions increased by 1.3 percent compared with the same quarter in 2014 (see Figure 12). The largest share of the emissions increase comes from steel and metal production and the cement industry. In the first quarter, the value added was largely unchanged compared with the same quarter in 2014. While industries such as computers, electronic goods and optical products saw an economic upturn, economic growth decreased in other sectors, such as steel and metal production and the food industry.

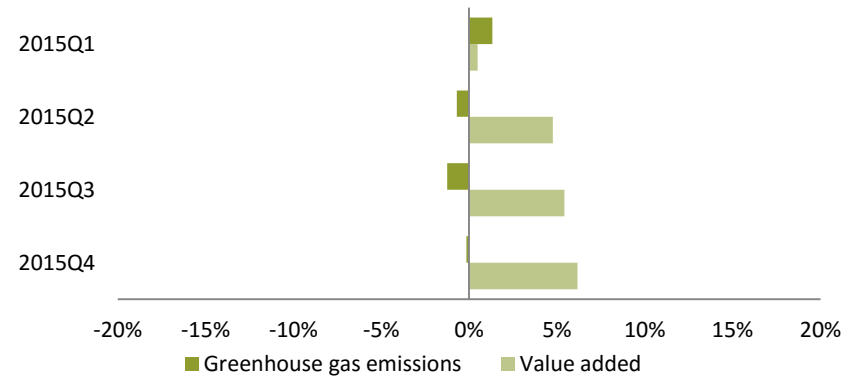
In the second to fourth quarter, emissions declined marginally or remained unchanged compared with the same period in 2014. Emissions reduction in the second and third quarter are mainly due to lower emissions from refineries. In the fourth quarter, emissions from refineries increased instead, which was compensated by lower emissions in steel and metal production.

Economic growth was strong in the manufacturing industry in the second quarter to fourth quarter compared with the same quarters the previous year. The upturn is distributed over a number of industries, of which many are not very emissions-intensive. The motor vehicle industry contributed most to the rise in value added in the third and fourth quarter. In the third and fourth quarter, value added was respectively

15.8 percent and 33.7 percent higher compared with the same quarter in 2014. The paper and pulp industry and the furniture industry have also had strong economic growth, while the economic development in the food industry declined.

Figure 12

Manufacturing industry, greenhouse gas emissions and economic growth, first quarter to fourth quarter 2015. Volume changes in % compared with the same quarter in 2014.



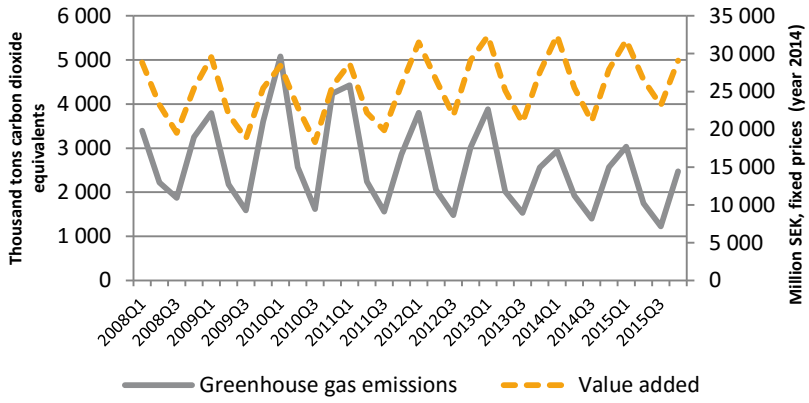
Source: Environmental Accounts and National Accounts, Statistics Sweden

Electricity, gas and heating plants and water, sewerage and waste

According to preliminary figures for 2015, electricity, gas and heating plants and water, sewerage and waste account for approximately 14 percent of total emissions by Swedish economic actors. The major part of these emissions (65–85 percent depending on the quarter) comes from production of electricity and district heating.

Emissions vary greatly over the seasons, since demand for electricity and district heating varies depending on temperature and weather (see Figure 13). Fossil fuels are often used as a marginal fuel, that is, a fuel that is used when there is a large need for electricity and district heating, and electricity and heating available from hydropower, nuclear power and biofuels are not sufficient. This means that emissions, and the proportion of fossil fuels, increase in cold periods and in dry years (when less hydropower available). Since 2010, annual emissions of greenhouse gases have seen a downward trend, which also applies in 2015.

Figure 13
Electricity, gas and heating plants and water, sewerage and waste, greenhouse gas emissions and value added, quarterly 2008–2015.



Source: Environmental Accounts and National Accounts, Statistics Sweden

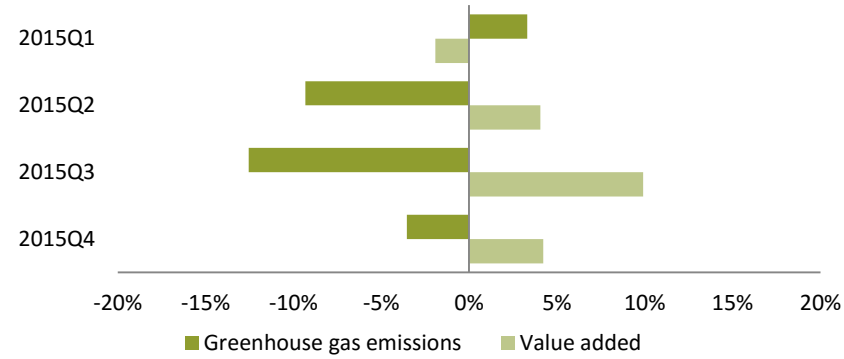
Greenhouse gas emissions in the first quarter in 2015 increased compared with the same quarter in 2014 (see Figure 14). However, the first quarters in both 2014 and 2015 were very mild and the 3.3 percent increase in emissions should be seen as a reversal from a low level.

The second quarter (May in particular) was colder in 2015 compared with 2014. Despite this, greenhouse gas emissions dropped by 9.3 percent in the second quarter compared with the same quarter in 2014. Emissions levels in the third quarter in 2015 were 12.6 percent lower compared with the same quarter in 2014 and the lowest ever since the beginning of the time series in 2008.

The drop in the second and third quarter is mainly due to reduced use of fossil fuels because of temporary production disruptions at some plants. At the same time, value added increased – at most in the third quarter – by 9.9 percent compared with the same quarter in 2014. Emissions were also lower in the fourth quarter than in the same period in 2014 – approximately 3.5 percent – while value added rose.

Figure 14

Electricity, gas and heating plants and water, sewerage and waste, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



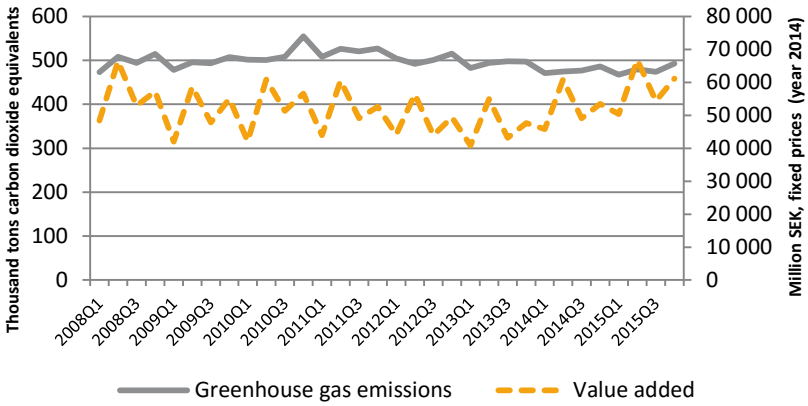
Source: Environmental Accounts and National Accounts, Statistics Sweden

Construction

Emissions from construction largely come from transport, machinery and work vehicles. Construction accounts for a relatively small part of emissions by Swedish economic actors. In 2015, emissions amounted to about 1.9 million tons of carbon dioxide equivalents, which is equivalent to 3 percent of total emissions according to preliminary figures for 20105.

While emissions have dropped gradually since 2011, they remain largely unchanged in 2015 compared with 2014 (see Figure 15).

Figure 15
Construction, greenhouse gas emissions and value added, quarterly 2008–2015.

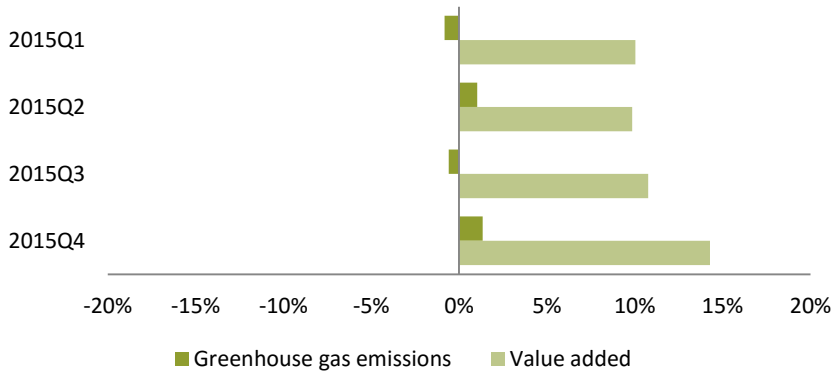


Source: Environmental Accounts and National Accounts, Statistics Sweden

On a quarterly basis, greenhouse gas emissions remain more or less unchanged compared with the same quarter in 2014, with marginal drops in the first and third quarter, and marginal increases in the second and fourth quarter (see Figure 16). The construction industry experienced strong economic growth in all quarters in 2015 compared with the same quarter in 2014, which may explain why emissions levels did not continue to drop in 2015. Value added increased the most in the fourth quarter, by 14.3 percent compared with the same quarter in 2014.

Figure 16

Construction, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



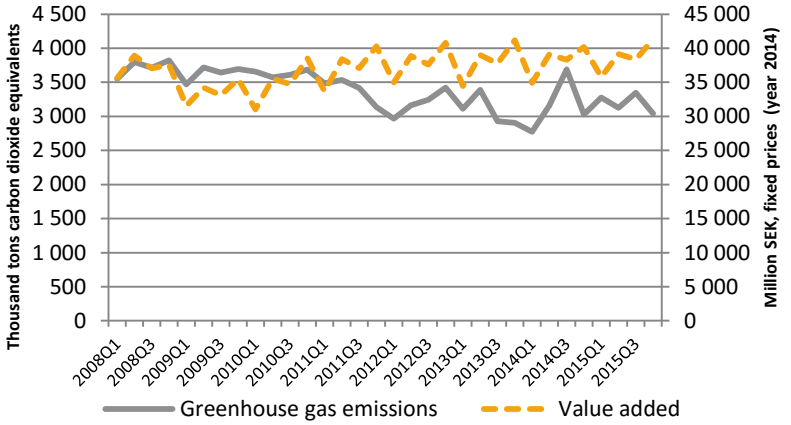
Source: Environmental Accounts and National Accounts, Statistics Sweden

Transport industry

The transport industry includes land transport enterprises, shipping, air transport and postal and courier activities. A large part of emissions comes from shipping.

Figure 17

Transport industry, greenhouse gas emissions and value added, quarterly 2008–2015.

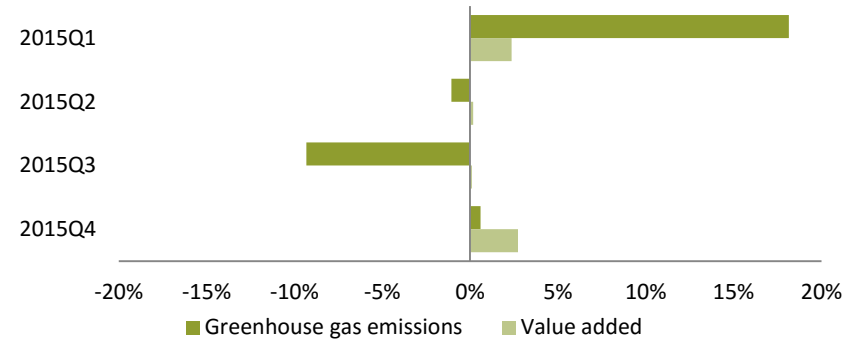


Source: Environmental Accounts and National Accounts, Statistics Sweden

Emissions levels increased slightly in 2015 compared with 2014, which is largely due to increased emissions in the first quarter (see Figure 18). In the first quarter of 2015, emissions rose by 18.1 percent compared with the same quarter in 2014, while value added remained largely unchanged. The increase comes from shipping's reported use of domestic heating oil.

Figure 18

Transport industry, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



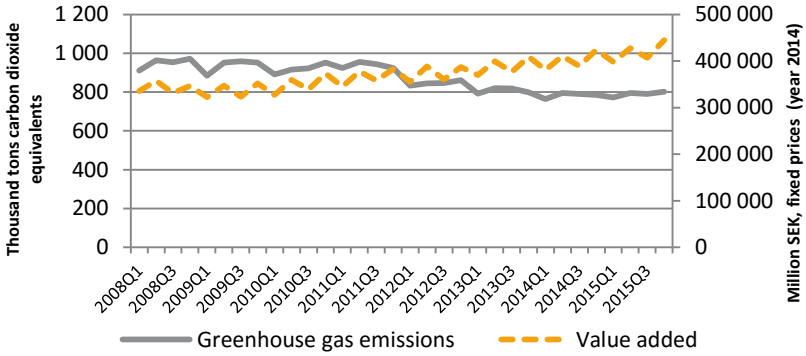
Source: Environmental Accounts and National Accounts, Statistics Sweden

In the second quarter of 2015 greenhouse gas emissions dropped by 1.1 percent compared with the same quarter in 2014. Corresponding figures for the third and fourth quarter show a decrease of 9.3 percent and an increase of 0.6 percent respectively. An underlying trend is the slow increase in the proportion of transport biofuel.

Other services

According to preliminary figures, industries in other services (service sector) accounted for about 5 percent of total emissions in 2015 by Swedish economic actors. At the same time, its percentage of total value added is high and amounted to about 47 percent. Emissions in the service sector are relatively small in relation to value added. A main part of emissions come from enterprises' transports. Emissions have declined gradually since the beginning of the time series in 2008 (see Figure 19).

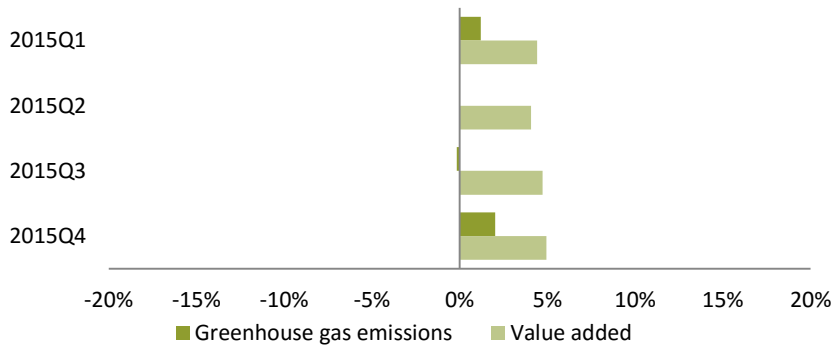
Figure 19
Other services, greenhouse gas emissions and value added, quarterly 2008–2015.



Source: Environmental Accounts and National Accounts, Statistics Sweden

However, emissions rose slightly in 2015 compared with 2014, primarily in the first and fourth quarter. Emissions remained largely unchanged in the second and third quarter. At the same time, value added has increased by about 4–5 percent in all quarters (see Figure 20), which has been part of the underlying trend of positive economic growth in the service sector since 2009.

Figure 20
Other services, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



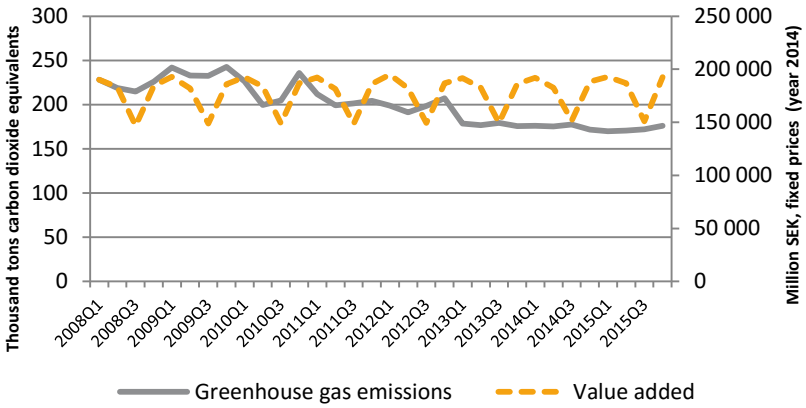
Source: Environmental Accounts and National Accounts, Statistics Sweden

Public sector

Emissions in the public sector are very small. They account for only 1 percent of total emissions by Swedish economic actors and come largely from transport. The public sector accounts for about 20 percent of Sweden's GDP.[13]. Emissions in this sector have dropped gradually since the beginning of the time series in 2008 (see Figure 21).

Since emissions from the public sector are small, this also means that the percentage change in emissions by quarter, from -3.5 percent to 2.5 percent, compared with the same quarter the previous year does not imply any large overall changes (see Figure 22). Value added increased in the second and fourth quarter compared with the same quarters in 2014, but remained largely unchanged in the other quarters.

Figure 21
Public sector, greenhouse gas emissions and value added, quarterly 2008–2015.

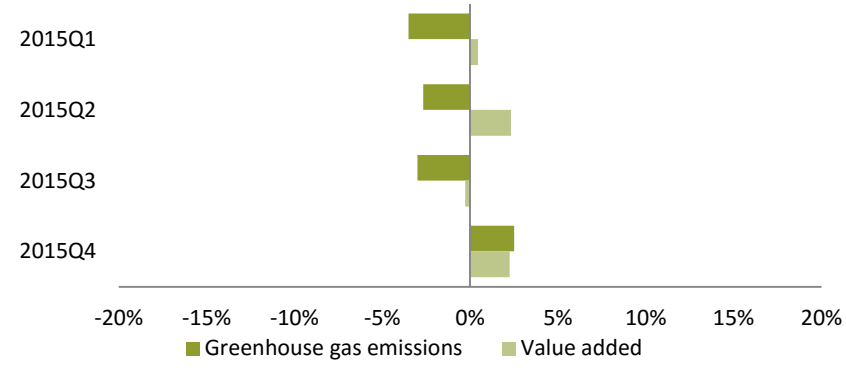


Source: Environmental Accounts and National Accounts, Statistics Sweden

[13]The public sector's contribution to the GDP is calculated in costs in the form of paid salaries and collective fees plus consumption of fixed capital.

Figure 22

Public sector, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



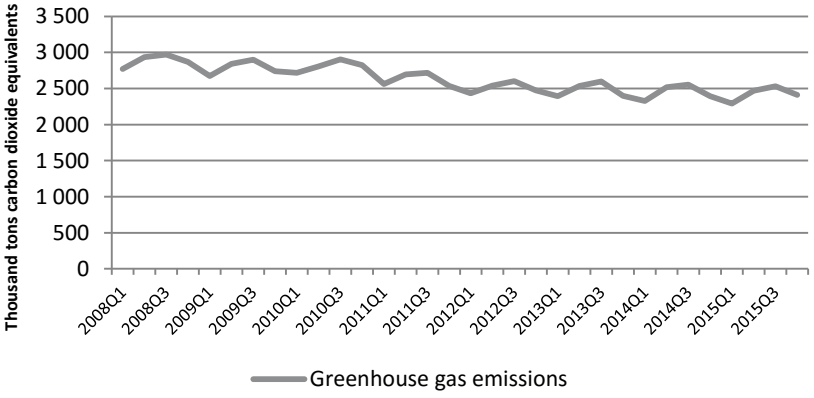
Source: Environmental Accounts and National Accounts, Statistics Sweden

Households and non-profit organisations

According to preliminary figures for 2015, households and non-profit organisations account for about 16 percent of emissions by Swedish economic actors. Households account for nearly all emissions, which come primarily from car transport. Only non-profit organisations give a slight value added and are therefore not reported in the figures.

Since 2008, emissions by households have gradually declined, mainly due to an increased element of transport biofuel (from 4 percent in the first quarter in 2008 to 10 percent in the third quarter in 2015), but emissions remained largely unchanged in 2015 compared with 2014 (see Figure 23).

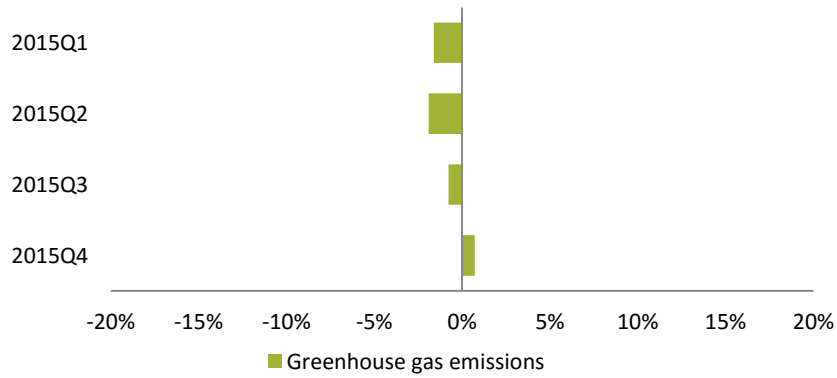
Figure 23
Households and non-profit organisations, greenhouse gas emissions, quarterly 2008–2015.



Source: Environmental Accounts and National Accounts, Statistics Sweden

On a quarterly basis, emissions fell marginally in the first three quarters compared with 2014, but rose by 0.7 percent in the last quarter (see Figure 24).

Figure 24
Households and non-profit organisations, greenhouse gas emissions and economic growth, quarter 1 to quarter 4, 2015. Volume changes in % compared with the same quarter in 2014.



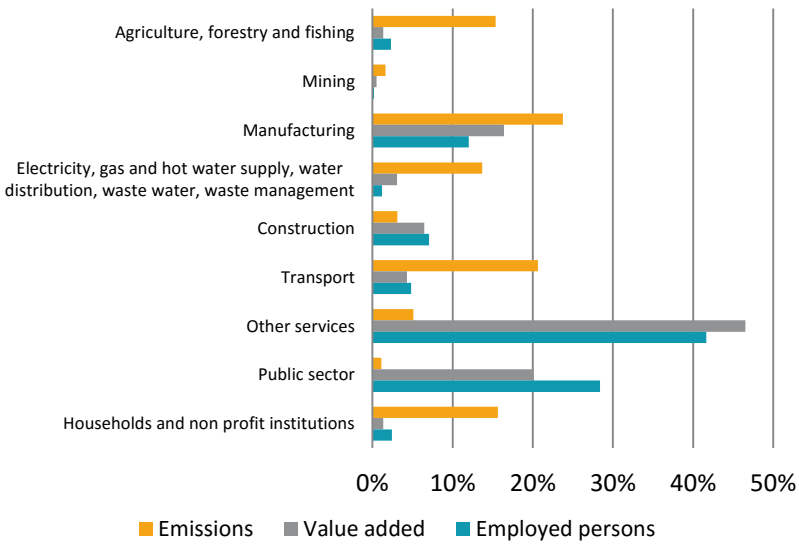
Source: Environmental Accounts and National Accounts, Statistics Sweden

4. Emissions, the economy and employment

Since the beginning of the 1990s, greenhouse gas emissions in Sweden have dropped, while economic growth, measured by the GDP, has increased. The connection between greenhouse gas emissions and their contribution to the economy varies between different industries. Figure 25 shows different economic actors' contributions to greenhouse gas emissions, value added and employed persons. The manufacturing industry is in the lead as regards greenhouse gas emissions, while other services contribute most to value added and employment. Some industries, such as agriculture, forestry and fishing, and the transport industries, generally have higher emissions of greenhouse gases in relation to their economic contribution, while others, such as other services, have low levels of emissions in relation to their economic contribution.

Figure 25

Proportion of greenhouse gas emissions, value added and employed persons, preliminary statistics 2015. Aggregated industry, NACE Rev. 2.

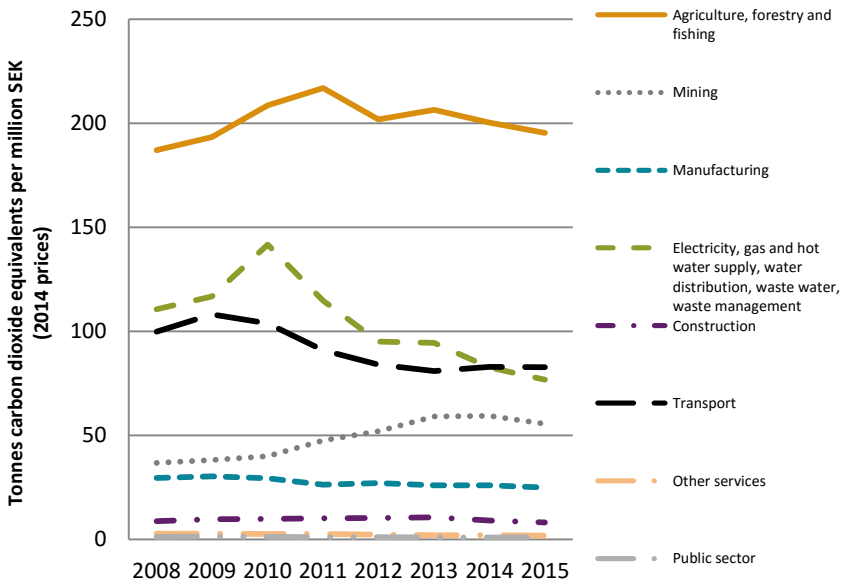


Source: Environmental Accounts and National Accounts, Statistics Sweden

Greenhouse gas emissions set in relation to value added produce intensities that can be monitored over time for different industries. At the aggregated industry level, agriculture, forestry and fishing have the highest levels of emissions by value added (see Figure 26). Compared with the beginning of the time series in 2008, intensity has also increased slightly, since emissions levels have increased, while the contribution to value added has decreased. The public sector, other services and construction are examples of industries with low levels of emission intensity.

Figure 26

Greenhouse gas emissions by value added (constant prices), 2008–2015. Preliminary statistics.



Source: Environmental Accounts and National Accounts, Statistics Sweden

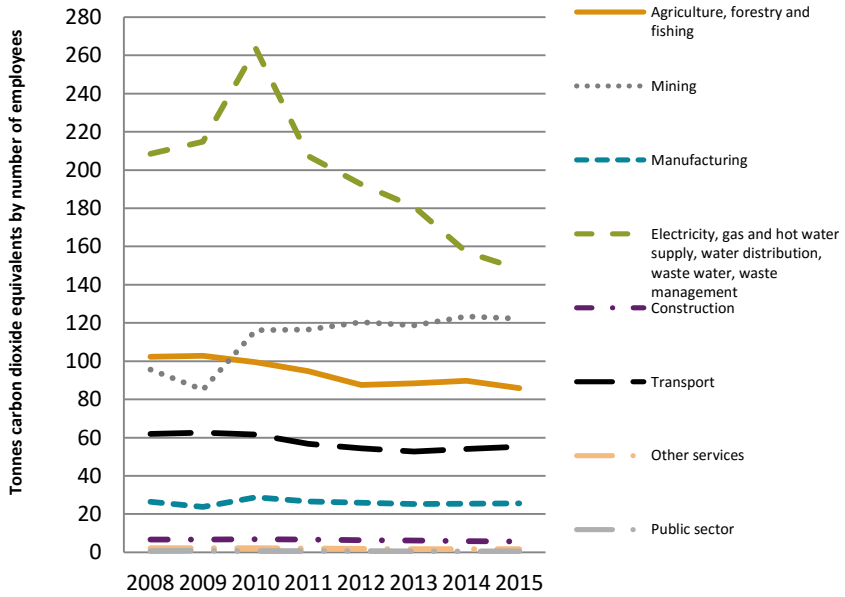
The major changes in greenhouse gas emissions by value added have occurred in electricity, gas and heating plants, the transport industry and mining and quarrying. Emissions have dropped in electricity, gas and heating plants, in part due to increased use of biofuels instead of fossil fuels, while the industry's contribution to value added has increased. The biofuel element has also increased in the transport industry, at the same

time as economic growth has been positive, which has led to a drop in intensity. Since 2008, the mining and quarrying industry's contribution to value added has dropped, which has led to a rise in intensity.

Emission intensity can also be analysed based on the number of employed persons in each industry (see Figure 27). Based on this measure, the level of intensity in agriculture, forestry and fishing is in no way as high as previously. The highest level of intensity is found in the energy sector. However, this intensity has dropped sharply since the beginning of the time series, since the number of employed persons in the industry has been relatively stable, while emissions have dropped.

Figure 27

Greenhouse gas emissions per employed person, 2008–2015. Preliminary statistics.



Source: Environmental Accounts and National Accounts, Statistics Sweden

5. International comparisons

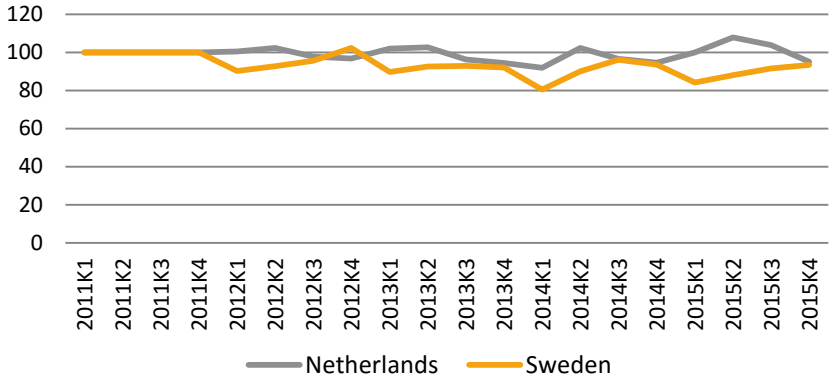
In addition to Statistics Sweden, Statistics Netherlands (CBS) also produces quarterly statistics on air emissions. While quarterly statistics in Sweden includes all types of air emissions and greenhouse gases, the statistics from Statistics Netherlands only include carbon dioxide emissions. Swedish and Dutch quarterly statistics also differ in that emissions levels in the Netherlands are only reported as percentage differences compared with the same quarter the previous year. The purpose is to provide an early indication on progress in carbon dioxide emissions and economic growth. Statistics Sweden has chosen to publish actual emissions levels that are downloadable from the Statistics Sweden website.

Although statistics published in Sweden and the Netherlands differ, it is possible to compare trends in the two countries. Since this is a new type of statistics, it would seem that this type of comparison may be improved upon and may come to include more countries going forward. Various examples of comparisons between Sweden's and the Netherlands' quarterly emissions of carbon dioxide are shown below. Note that the report in general presents greenhouse gas emissions, but this section reports developments in carbon dioxide emissions. The figures are indexed and show development per quarter 2012–2015 compared with the same quarter in 2011.

Figure 28 shows the change in quarterly emissions in 2012–2015 compared with 2011 in the Swedish and Dutch economy respectively. Swedish emissions are generally at a lower level compared with 2011, while emissions in the Netherlands are sometimes higher and sometimes lower. The largest decreases in Sweden are found mainly in the first quarters. In the Netherlands, emissions are mainly higher in the second quarter.

Figure 28

Carbon dioxide emissions in Sweden and the Netherlands, in total, 2011–2015, quarterly, Index Q1–Q4 2011=100.

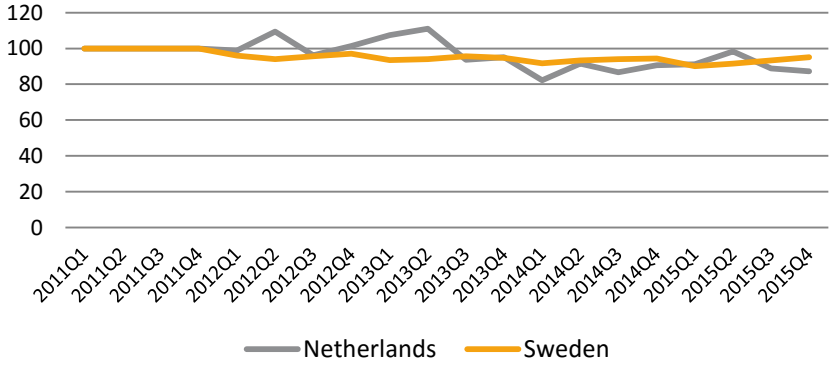


Source: Environmental Accounts, Statistics Sweden and Statistics Netherlands (CBS)

As in Sweden, households in the Netherlands account for a large proportion of carbon dioxide emissions (about 18 percent in Sweden and 20 percent in the Netherlands). Figure 29 illustrates that carbon dioxide emissions in Sweden have remained relatively stable in the time period 2012–2015. In the Netherlands, emissions have been more varied, but in the last two years emissions levels have been lower than in the reference year 2011.

Figure 29

Carbon dioxide emissions in Sweden and the Netherlands from households, 2011–2015, quarterly, Index Q1–Q4 2011=100.

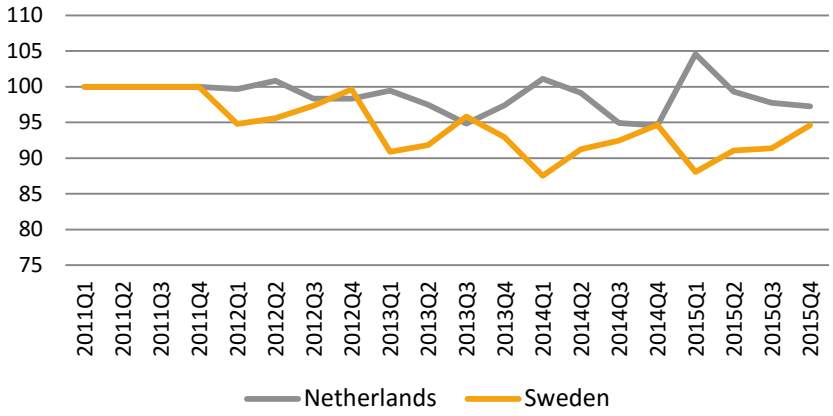


Source: Environmental Accounts, Statistics Sweden and Statistics Netherlands (CBS)

Figure 30 shows the development of carbon dioxide emissions in agriculture, the mining industry, and the manufacturing and construction industries. While emissions in Sweden dropped primarily in the first quarters of 2012–2015 compared with 2011, Dutch emissions dropped in the third and fourth quarter. Emissions in the Netherlands increased in the first quarters in 2014 and 2015 compared with 2011.

Figure 30

Carbon dioxide emissions in Sweden and the Netherlands from agriculture, the mining industry, and the manufacturing and construction industries, 2011–2015, quarterly, Index Q1–Q4 2011=100.



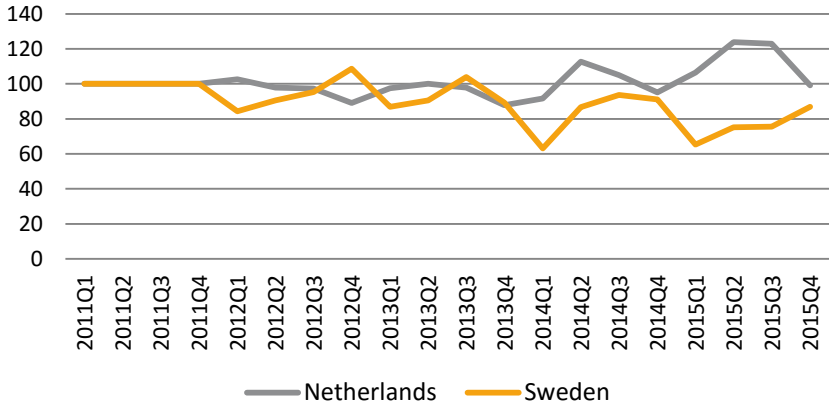
Source: Environmental Accounts, Statistics Sweden and Statistics Netherlands (CBS)

Figure 31 shows the emissions trend in electricity, gas and heating plants, and water, sewerage and waste in 2012–2015 in Sweden and the Netherlands. Emissions in Sweden have had a downward trend compared with 2011, which is visible mainly in the last two years in the time series. At the same time, emissions in the Netherlands have increased, particularly in the second and third quarters in 2015. The high emissions levels in 2015 in the Netherlands are mainly due to increased use of coal instead of natural gas in the production of electricity[14].

[14]CBS Statistics Netherlands, 2016, https://www.cbs.nl/en-gb/news/2015/46/co2-emissions-grow-much-faster-than-dutch-economy (2016-06-16)

Figure 31

Carbon dioxide emissions in Sweden and the Netherlands from electricity, gas and heating plants, and water, sewerage and waste, 2011–2015, quarterly, Index Q1–Q4 2011=100.



Source: Environmental Accounts, Statistics Sweden and Statistics Netherlands (CBS)

CBS Statistics Netherlands, 2016, https://www.cbs.nl/en-gb/news/2015/33/higher-co2-emissions-in-the-second-quarter (2016-06-16)

6. Key industries for reduced emissions

To exemplify how quarterly statistics from the Environmental Accounts can be used, developments are briefly described regarding areas highlighted by the All Party Committee on Environmental Objectives as Sweden's main challenges: the transport sector, basic industries and agriculture.

Transport sector

Emissions by the transport sector in, for instance, the Swedish Environmental Protection Agency's national emissions statistics, are found in the environmental accounts system, allocated by vehicle owners, that is, industries, the public sector and households. A large part of transport emissions come from the transport industry and households.

Emissions have increased in 2015 in the transport industry, in which maritime transport accounts for a large percentage of emissions. Emissions rose mainly in the first quarter of the year. The increase comes from maritime transport's reported use of domestic heating oil.

Although emissions by households have gradually dropped in the previous year, this decline came to a standstill in 2015, which can be partly explained by increased passenger car traffic. Compared with the same quarter in 2014, emissions dropped marginally in the first three quarters of 2015, and increased in the last quarter of the year.

Overall, developments in 2015 show that more measures are needed to achieve decreased emissions and a conversion of the sector.

Environmental Accounts are analysing emissions from transport in more detail in a separate publication[15].

Base industries

The entire manufacturing industry and mining and quarrying account for about one fourth of Sweden's greenhouse gas emissions. Steel and metal

[15] http://www.scb.se/sv_/Hitta-statistik/Artiklar/Utslappen-fran-transporter-en-vaxande-utmaning/ (In Swedish only)

production, refineries, manufacture of chemical products and cement are the manufacturing industries with the highest levels of greenhouse gas emissions. Emissions comprise process emissions, which pose a large challenge for future conversion, and the use of fossil fuels in different activities (including emissions from their transport activities).

At the aggregated level, emissions from the manufacturing industry have had a downward trend since 2010. However, emissions remained largely unchanged in 2015 compared with 2014.

In the first quarter, emissions in the manufacturing industry rose slightly compared with the same quarter in 2014, and dropped slightly or remained unchanged in the remaining quarters. One explanation for the standstill in emissions reduction in 2015 may be the strong economic growth in the manufacturing industry that year. However, the upturn is distributed over several industries, many of which are not very emissions-intensive. Developments in 2015 points to a continued need for relevant follow-up and more measures in some activities in the manufacturing industry to be able to achieve sustainable and competitive basic industries.

Agriculture

Agriculture, forestry and fishing account for about 15 percent of greenhouse gas emissions by Swedish economic actors. Agriculture accounts for the major part. In 2015 there were only minor changes in emissions levels from agriculture, forestry and fishing compared with 2014. No major emissions reductions have occurred compared with the beginning of the time series in 2008.

The agriculture, forestry and fishing industry has the highest level of emissions at the aggregated level by value added in Sweden. In addition, emission intensity increased slightly compared with the beginning of the time series in 2008. Overall, this indicates that conversion to sustainable and competitive agriculture will continue to be a future challenge.

7. Facts about the statistics

Emissions to air form part of the environmental accounts. The Environmental Accounts are compiled within the framework of the System of Environmental and Economic Accounts (SEEA). It shows national environmental statistics and economic statistics in the same framework using NACE industry classification. Environmentally-related statistics connected to the system of national accounts e.g. enable an analysis between the Swedish economy and the impact that each industry has on the environment.

One objective of the environmental accounts is their use as a basis for decision-making in economic and environmental policy. However, they are also designed to support follow-up of both international and national environmental objectives.

Production time for Environmental Accounts' annual statistics on emissions to air is relatively long. Quarterly statistics on emissions to air have been published since December 2015 to meet users' needs for quicker access to statistics. The production time for quarterly statistics – about four months after the end of the survey quarter – depends on when short-term primary statistics become available.

Scope of the statistics

Calculations include emissions to air by economic activity that takes place in Swedish territory and by transactions across Sweden's borders.

Emissions to air are reported by industry, based on the Swedish Standard Industrial Classification (SNI2007, equal to NACE Rev. 2) and by the public sector non-profit organisations and households (private consumption). Aggregation of industries is selected to conform with the National Accounts' quarterly reporting. Statistics is also summarised to large aggregated industries and as a total.

The following variables are available on the Environmental Accounts' website[16]:

Emissions	Statistical measures
Greenhouse gases (aggregate of CO_2 (fossil), CH_4, N_2O, HFC, PFC, SF_6)	totals, thousand tonnes carbon dioxide equivalents
CO_2 – carbon dioxide (biogenic)	totals, thousand tonnes
SO_2 – sulfur dioxide	totals, tonnes
NO_X – nitrous oxides	totals, tonnes
CH_4 – methane	totals, tonnes
CO – carbon monoxide	totals, tonnes
N_2O – nitrogen dioxide	totals, tonnes
NH_3 – ammonia	totals, tonnes
NMVOC – volatile organic compounds	totals, tonnes
PM_{10} – particles, <10 micrometres	totals, tonnes
$PM_{2,5}$ – particles, <2.5 micrometres	totals, tonnes
TSP – particles, all sizes	totals, tonnes
HFC – hydrofluorocarbons	totals, tonnes of carbon dioxide equivalents
PFC – perfluorocarbons	totals, tonnes of carbon dioxide equivalents
SF_6 – sulfur hexafluoride	totals, tonnes of carbon dioxide equivalents

Definitions and explanations

Aggregated industries – The aggregated industries used in the report are defined according to Table 3 below.

[16] Statistics Sweden, Environmental Accounts, http://www.scb.se/MI1301/

Table 3
Aggregated industries

Aggregated industry	Type of industry NACE Rev. 2
Agriculture, forestry and fishing	A01–A03 Agriculture, forestry and fishing
Mining and quarrying	B05–B09 Mining and quarrying
Manufacturing industry	C10–C12 Food, beverages and tobacco products C13–C15 Manufacture of textiles, wearing apparel and leather products C22–C23 Manufacture of rubber and plastic products; and other non-metallic mineral products C24–C25 Manufacture of basic metals; and fabricated metal products, except machinery and equipment C26 Manufacture of computer, electronic and optical products C27 Manufacture of electrical equipment C28 Manufacture of machinery and equipment n.e.c C29 Manufacture of motor vehicles, trailers and semi-trailers C30 Manufacture of other transport equipment C31–C33 Manufacture of furniture; other manufacturing; Repair and installation of machinery and equipment
Electricity, gas and heating plants and water, sewerage and waste	D35–E39 Electricity, gas, steam and air conditioning supply and water supply, sewerage, waste management and remediation activities
Construction	F41–F43 Construction
Other services	G45–G47 Wholesale and retail trade I55–I56 Accommodation and food and beverage service activities J58–J60 Publishing activities, motion picture, video, television, sound recording, programming and broadcasting activities J61 Telecommunications J62–J63 Computer programming, consultancy and information service activities K64–K66 Financial service and insurance activities L68 Real estate activities M69–M72 Legal and accounting activities; activities of head offices and management consultancy activities; architectural and engineering activities and research and development M73–M75 Advertising and market research, other professional, scientific and technical activities, and; veterinary activities N77–N82 Rental and leasing activities, travel agency activities and other business support services

	P85 Education Q86 Human health and medical practice activities Q87–Q88 Residential care activities, and social work activities without accommodation R90–R93 Culture, leisure and recreation S94–T98 Other service activities, and activities of households as employers, etc.
Public sector	Y0135 Government agencies and social security funds Y0485 Primary municipal authorities and municipal associations Y0605 County council authorities
Households and non-profit organisations	Y0115 Non-profit institutions serving households Private consumption

Fugitive emission – In this context, fugitive emission refers to flaring and various kinds of leakage in which energy from the fuel has not been utilised.

Emission factor – The emission factor specifies the amount of greenhouse gas emissions when a given fuel type is processed.

Value added – An industry's added value is measured as its production value minus the industry's input consumption. The sum of all industries' gross added value, as well as net product taxes and subsidies (and any undistributed items) comprise the GDP at market price.

Intensities – In this report, intensities are used to describe emission by value added or emission by employee.

Intermittent surveys – Recurring surveys, e.g. every second or fifth year.

Calibration factors – In this case, the term refers to factors used to calibrate calculated quarterly emissions to bring them in line with annual emissions.

Carbon dioxide equivalents – Common unit of measure for greenhouse gases. To ensure that all greenhouse gases are comparable, all emissions, except carbon dioxide, are multiplied by a global warming potential as defined by the Intergovernmental Panel on Climate Change (IPCC)[17].

[17] http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf

Greenhouse gases – Greenhouse gases refer to gases that form the basis for the greenhouse effect. Greenhouse gas emissions are an aggregate of carbon dioxide (CO_2, fossil), methane (CH_4), nitrous oxide (N_2O), fluorinated gases (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF_6).

How the statistics are produced

Just like most parts of the environmental accounts, quarterly emissions to air provide further processing of other statistics within and outside Statistics Sweden. The emission factors are the same ones that are used in annual emissions to air in the environmental accounts, that is, emission factors used in the environmental accounts are also used in national emissions statistics reported to the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Long Range Transboundary Air Pollution (CLRTAP).

Calculations are carried out differently for stationary combustion, mobile combustion and other emissions.

Stationary combustion

Data on fuel use in mining and quarrying, the manufacturing industry and electricity, gas and heat production is retrieved from Quarterly fuel statistics[18].

Annual energy balances is considered to be the best and most complete data source for information about fuel use in other sectors. For this reason, data is retrieved from Annual energy balances to the greatest extent possible. Quarterly energy balances are used to classify fuel use by quarter. Using the quarterly energy balances, factors (percentage per quarter of different fuel types) are calculated based on existing fuel types to break down fuel use on a quarterly basis.[19]

[18] Statistics Sweden, Quarterly fuel statistics, http://www.scb.se/EN0106

[19]Statistics Sweden, Quarterly energy balances, http://www.scb.se/sv_/Hitta-statistik/Statistik-efter-amne/Energi/Energibalanser/Kvartalsvisa-energibalanser/

The items concerning service enterprises, small-scale industries and public sector are allocated by the industry classification available in the environmental accounts' annual statistics on emissions to air[20].

Two sources of data are available for the time periods not covered by data in the Annual energy balances: quarterly energy balances and monthly fuel, gas and inventory statistics. Neither of these include all fuel types. Production time for monthly fuel, gas and inventory statistics is shorter, and these are therefore chosen as a data source. Since information is missing for some fuel types and the quality of annual energy balances is considered to be better, data from the monthly fuel, gas and inventory statistics are only used to create projection factors by fuel type, which are then applied to energy statistics by fuel type in annual energy balances.

In some industries, emission calculations are not entirely accurate if they are only based on reported energy use according to quarterly fuel statistics. In national emissions statistics, this problem is managed by using data from environmental reports, the emissions trading scheme and, in some cases, from model calculations. This information is only available by year, not by quarter.

To ensure that quarterly emissions calculations are reasonable, emissions are calibrated to bring levels by year in line with emissions reports to the UNFCCC and CLRTAP (and with environmental accounts' annual statistics on emissions to air). The calibration factor varies by industry and by type of emissions, and also to some extent by year.

Mobile combustion

Emissions by industry in 2008–2014 are retrieved from annual calculations of emissions to air. Statistics for road transport is based on the national emissions inventory, which in turn is based on the Swedish Transport Administration's model-calculated emissions figures that take account of vehicle type and mileage using the HBEFA model. This data is used to create keys for industry classification and implicit emissions factors for all types of emissions. Values from 2014 were also used in 2015.

[20]Statistics Sweden, 2016, Environmental Accounts – Emissions to air by year 2008–2014, Description of the statistics.

Data about fuel use by fuel type and month is retrieved from monthly fuel, gas and inventory statistics and summarised quarterly. With regard to domestic heating oil and residual fuel oil, only values for oils in domestic maritime traffic and international bunkering are used. With regard to diesel, consumption for stationary combustion (see above) is deducted before the data is used.

Processed fuel amounts in monthly fuel, gas and inventory statistics are then multiplied by implicit emissions factors and the industry classification key.

Other emissions

Quarterly or monthly data sources are not available here. This means that quarterly emissions must be estimated based on existing annual statistics and various models. Estimates for an individual quarter are therefore less precise.

Data allocated by by industry is retrieved from the emissions to air in the environmental accounts' annual statistics. Quarterly figures are produced by simply dividing annual figures by four. Estimates of emissions for the most recent time period (not covered by annual statistics) are produced according to the description below and are based on how trends progress in annual statistics.

Fugitive emissions

Fugitive emissions refer to flaring and leakage of various kinds in which energy from the fuel has not been utilised. There is no trend in the annual statistics. Variations may be significant, but since there is no particular pattern, changes cannot be predicted. Values for the past year in annual statistics are projected for the next year.

With regard to the fourth quarter publication, 2015 emissions were estimated based on data from the emissions trading scheme and 2015 environmental reports.

Industrial processes and product use

To come close to the real development, the past year's values are projected in annual statistics using the Industrial Production Index, not calender-adjusted information.

With regard to the fourth quarter publication, 2015 emissions were estimated based on data from the emissions trading scheme and 2015 environmental reports.

Agriculture

Developments in agriculture are stable. Values for the past year in annual statistics are projected for the next year.

Waste management and sewerage

Methane levels show a downward trend as a result of declining emissions from landfill sites, as landfilling of organic material is no longer permitted. These emissions come from old waste and will subside. Values for the past year in the annual statistics are projected to the next year by a factor of *0.92 that is consistent with the change that occurred after 2005:

Emission year T+1=Emission year T*0.92

Emission year T+2=Emission year T+1*0.92

With regard to other emissions, developments are stable, and values for the past year in annual statistics will be projected forward to the next year.

Reliability of the statistics

The statistics are not based on any proprietary survey, but are rather the result of information processed from a number of sources of primary statistics. Each survey is subjected to QA/QC before being processed by the environmental accounts.

As total sums are in line with emissions to air per year reported by environmental accounts and statistics on emissions to air that the Swedish Environmental Protection Agency are responsible for, overall reliability is considered to be good, although no single measurement of reliability exists. Reliability varies for individual industries. Input data in annual statistics that can be considered more unreliable (used as a basis for quarterly statistics according to the description under "How the statistics are produced") is described below:

- Emissions from stationary combustion in agriculture, forestry and fishing, construction, heating of premises in the service and

public sectors: annual statistics are based on items in the Swedish Energy Agency's annual energy balances. These are, in turn, based on intermittent surveys, some with long intervals. This means that statistics are not able to fully reflect actual energy use or emissions in non-survey years.

- Machinery in all sectors: annual statistics are based on the same a model as in national territorial statistics on emissions to air . Good input data to the model is difficult to find, which leads to uncertainties. At an overall level, fuel amounts are reconciled, which means that total emissions for machinery in all industries combined are relatively reliable. The breakdown by different industries in the model involves uncertainties.
- There are often very large variations in emissions in maritime traffic, and current calculation methods make it difficult to completely distinguish between Swedish and foreign actors, which means that results in this industry should be interpreted with some caution.
- Annual calibration factors applied to emissions from stationary combustion in industry, which also, to some extent, affects the accuracy of statistics in individual quarters. With regard to total greenhouse gases, calibration factors have the largest effect on the following industries: *C19–C21 Manufacture of coke and refined petroleum products, chemicals and chemical products and basic pharmaceutical products and pharmaceutical preparations* and *C24–C25 Manufacture of basic metals; and fabricated metal products, except machinery and equipment.*

Traditional reporting of measures of uncertainty is not done. The percentage of emissions in the underlying data, based on short-term statistics (month or quarter) provides an indication on estimation accuracy for the quarter for each industry. See Table 4 below, where a higher value indicates higher accuracy for individual quarters.

Table 4

Percentage of short-term underlying data for quarterly emissions statistics by industry for total greenhouse gases.

Industry	Percentage short-term underlying data, average over the year
A01–A03 Agriculture, forestry and fishing	23%

B05–B09 Mining and quarrying	61%
C10–C12 Food, beverages and tobacco products	97%
C13–C15 Manufacturing of textiles, clothing and leather products	98%
C16–C18 Manufacture of wood, pulp, paper, and printing activities	90%
C19–C21 Manufacture of coke and refined petroleum products, chemicals and chemical products and basic pharmaceutical products and pharmaceutical preparations	85%
C22–C23 Manufacture of rubber and plastic products; and other non-metallic mineral products	40%
C24–C25 Manufacture of basic metals; and fabricated metal products, except machinery and equipment	48%
C26 Manufacture of computer, electronic and optical products	97%
C27 Manufacture of electrical equipment	36%
C28 Manufacture of machinery and equipment n.e.c	98%
C29 Manufacture of motor vehicles, trailers and semi-trailers	99%
C30 Manufacture of other transport equipment	97%
C31–C33 Manufacture of furniture; other manufacturing; repair and installation of machinery and equipment	98%
D35–E39 Electricity, gas, steam and air conditioning supply and water supply, sewerage, waste management and remediation activities	74%
F41–F43 Construction	93%
G45–G47 Wholesale and retail trade	97%
H49–H53 Transportation and storage	100%
I55–I56 Accommodation and food and beverage service activities	95%
J58–J60 Publishing activities, motion picture, video and television programme production, sound recording and music publishing activities and radio broadcasting	97%
J61 Telecommunications	96%
J62–J63 Computer programming, consultancy and information service activities	97%
K64–K66 Financial service and insurance activities	97%
L68 Real estate activities	98%
M69–M72 Legal and accounting activities; activities of head offices and management consultancy activities; architectural and engineering activities and research and development	97%
M73–M75 Advertising and market research, other professional, scientific and technical activities, and; veterinary services	97%
N77–N82 Rental and leasing activities, travel agency activities and other business support services	92%

P85 Education	97%
Q86 Human health and social work activities	33%
Q87–Q88 Residential care activities, and social work activities without accommodation	97%
R90–R93 Culture, leisure and recreation	97%
S94–T98 Other service activities, and activities of households as employers, etc.	97%
Private consumption	95%
Y0115 Non-profit institutions serving households	97%
Y0135 Government agencies and social security funds	96%
Y0485 Primary municipal authorities and municipal associations	98%
Y0605 County council authorities	97%
Total	**75%**

Equivalent percentages and differences vary for individual greenhouse gases and air pollution. The percentage of short-term statistics varies slightly at different times of the year for some industries.

Helpful information

Quarterly statistics on emissions to air, which is also summarised in preliminary annual statistics, follow the same delimitations as final annual environmental accounts on emissions to air, which entails good opportunities for joint use. However, as different underlying data is used, annually summarised results will differ slightly from final annual statistics and quarterly and preliminary annual statistics.

There is good coherence with national accounts' quarterly statistics, since the material is allocated by industry according to the Swedish Standard Industrial Classification (SNI 2007, equal to NACE Rev. 2) and by the same level of aggregation.

Emissions to air in the environmental accounts are based on information from Swedish economic actors, that is, industries, the public sector and households. Direct emissions by Swedish ***economic actors*** are reported here, no matter where in the world the emissions occur. This means that emissions from international bunkering, that is, aviation and shipping that entered and filled their tanks at Swedish airports and harbours are included. Emissions and removals from land use, land use change and forestry and carbon capture and storage are not included.

The Swedish Environmental Protection Agency's statistics on emissions to air present ***territorial emissions***, that is, emissions within Sweden's borders. Sector breakdown is based on the emission type rather than on the industry. Emissions and removals from land use, land use change and forestry are included, while emissions from international transport are reported separately.

Thanks to the connection with the National Accounts, annual statistics on emissions to air in the environmental accounts are used to produce estimates with the help of model calculations and input-output analysis on ***Sweden's consumption-based emissions*** (or final use according to the National Accounts). The information is produced by environmental accounts at Statistics Sweden, for instance on commission by the Swedish Environmental Protection Agency.

Enquiries and orders of special productions can be made at miljorakenskaper@scb.se.

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For more information about the Environmental Accounts' emissions statistics and statistics used as underlying data, see:

Environmental accounts/Emissions to air MI1301:

http://www.scb.se/MI1301

Greenhouse gas emissions MI0107:

http://www.scb.se/MI0107

https://www.naturvardsverket.se/Miljoarbete-i-samhallet/EU-och-internationellt/Internationellt-miljoarbete/miljokonventioner/Klimatkonventionen/Sveriges-rapportering-till-fns-klimatkonvention/

http://www.naturvardsverket.se/klimatutslapp

Emissions of air pollutants MI0108:

http://www.scb.se/MI0108

http://www.naturvardsverket.se/Sa-mar-miljon/Klimat-och-luft/Statistik-om-luft/Utslappsstatistik/

Quarterly fuel statistics EN0106:

http://www.scb.se/EN0106

Monthly fuel, gas and inventory statistics EN0107:
http://www.scb.se/EN0107

Annual energy balances EN0202:

http://www.energimyndigheten.se/sv/Statistik/

Industrial Production Index NV0402:

http://www.scb.se/NV0402

New method for up-to-date environmental accounts:
– quarterly emissions to air

Report 2016:3 New method for up-to-date environmental accounts: quarterly emissions to air

Environmental Accounts is an information system that uses statistics to describe the connection between the environment and the economy. Therefore, to provide faster access to statistics, Environmental Accounts has published, since late 2015, regular quarterly statistics on Sweden's economy and Swedish economic actors' greenhouse gas emissions and air pollution.

The statistics make it possible to follow emissions trends on a quarterly basis. The statistics also make it possible to produce preliminary annual statistics (total quarterly statistics), which are published quicker than the final annual statistics on emissions to air. Statistics Sweden was the first in the world to report air emissions accounts for greenhouse gases and air pollution as current as this.

This report describes the results of quarterly statistics on greenhouse gas emissions and the method used to produce these statistics.

Statistics Sweden has published a number of reports in the Environmental Accounts series since 1998.
These reports are available at www.scb.se/MI1301

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