Environmental accounts of the Netherlands 2013

First results

Statistics Netherlands

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Explanation of symbols

.	Data not available
*	Provisional figure
**	Revised provisional figure (but not definite)
x	Publication prohibited (confidential figure)
–	Nil
–	(Between two figures) inclusive
0 (0.0)	Less than half of unit concerned
empty cell	Not applicable
2013–2014	2012 to 2013 inclusive
2013/2014	Average for 2013 to 2014 inclusive
2013/'14	Crop year, financial year, school year, etc., beginning in 2013 and ending in 2014
2011/'12–2013/'14	Crop year, financial year, etc., 2011/'12 to 2013/'14 inclusive

Due to rounding, some totals may not correspond to the sum of the separate figures.

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Contents

1. First results

This chapter contains the first results of some topics of the environmental accounts. In November 2014 these topics will be published again in the publication Environmental accounts of the Netherlands 2013 together with the other topics of the environmental accounts.[1] The first two sections describe the natural inputs and resources energy use and mineral reserves. Sections 1.3 to 1.6 describe the residuals water emissions, greenhouse gas emissions, CO_2 per quarter and other air emissions. Section 1.7 describes one of the policy instruments, environmental taxes and fees.

1.1 Energy use

Energy is essential to all economic activities as input for production processes and as a consumer commodity. As global demand for energy increases and non-renewable energy resources like crude oil and natural gas become scarce, energy prices increase to a point where they may hamper future economic developments. The impact of economic developments on the environment is related to the use of energy. Energy use is often directly linked to the emission of the greenhouse gas CO_2 and many other environmental pollutants. Improving energy efficiency and decoupling energy use from economic growth are important goals for green growth. The energy accounts represent a consistent framework in which energy data, both in monetary and physical terms, have been integrated into the national accounting framework. Physical energy flow accounts (PEFA) show all energy flows that occur within the economy, with the environment and with the rest of the world. The data are fully consistent with the concepts of the national accounts. The energy accounts can be used to determine how energy use by economic activities changes over time, which industries are most energy intensive, how energy use is related to the creation of value added and how dependent the economy is on energy imports.

The methodology of the energy accounts is described in the report *Compilation of physical energy flow accounts in the Netherlands*.

Energy use in the Dutch economy has decreased slightly

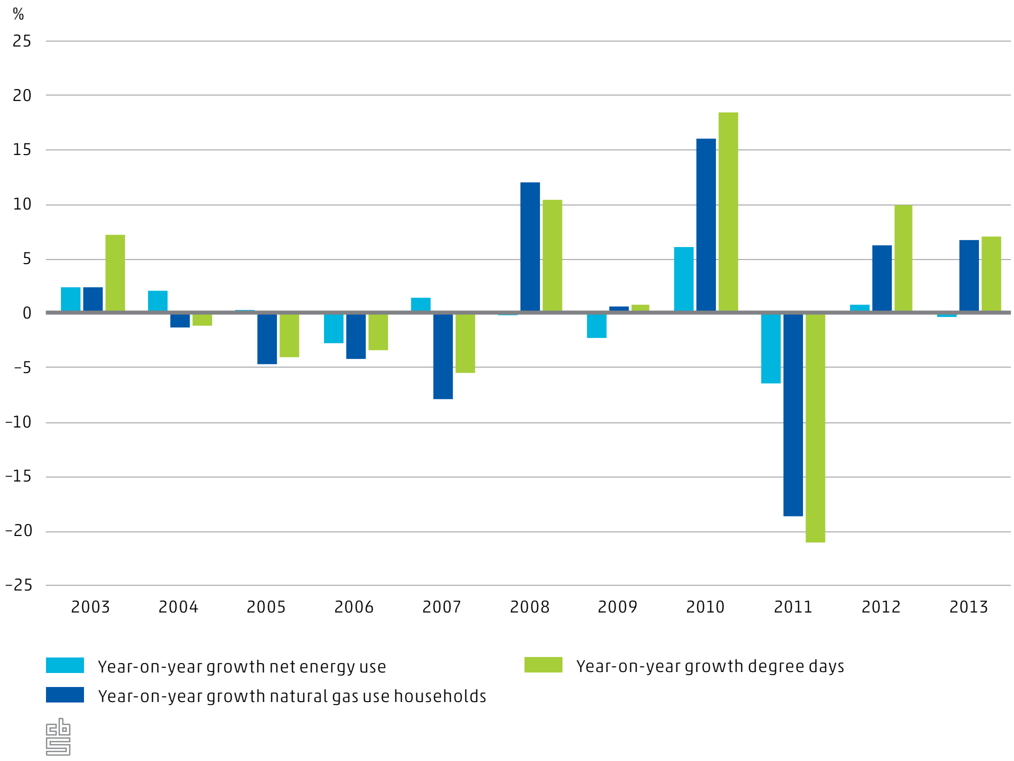
Net domestic energy use[2] in the Dutch economy decreased by around 0.4 percent in 2013. This stabilisation is remarkable given the relatively cold winter of 2013. This cold winter did cause the regular increase in the use of natural gas by households and the service sector, but this was compensated by a decrease in the construction, manufacturing and energy sectors.

The weather always has a substantial impact on the total net use of energy. Households and the service sector use more natural gas when a winter is relatively cold. Figure 1.1.1 shows the net energy use developments of the total economy, the natural gas use

[1] For this reason references are not included. In the publication of November references will be included.
[2] Net domestic energy use is equal to the total amount of energy used in an economy through production and consumption activities. This includes all final energy use for energetic and non-energetic purposes plus conversion losses.

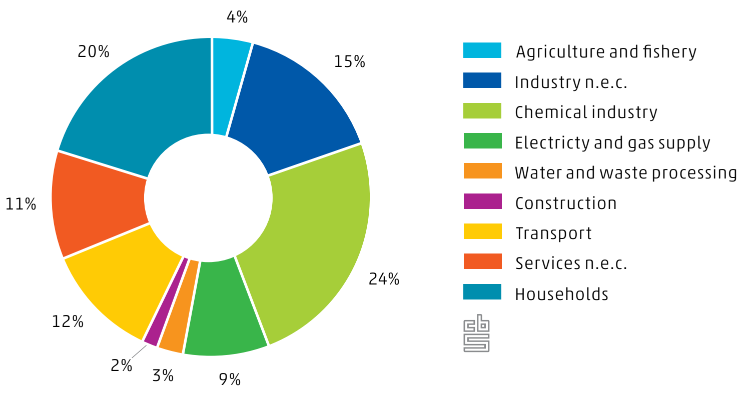
of households and the development of the number of 'degree days.[3] The year 2013 was colder than 2011 and 2012, which translates into additional use of natural gas by households.

1.1.1 Changes in net energy use in the Dutch economy, the use of natural gas of households and the number of 'degree days'



The current distribution of net domestic energy use among industries and households can be seen in Figure 1.1.2 below.

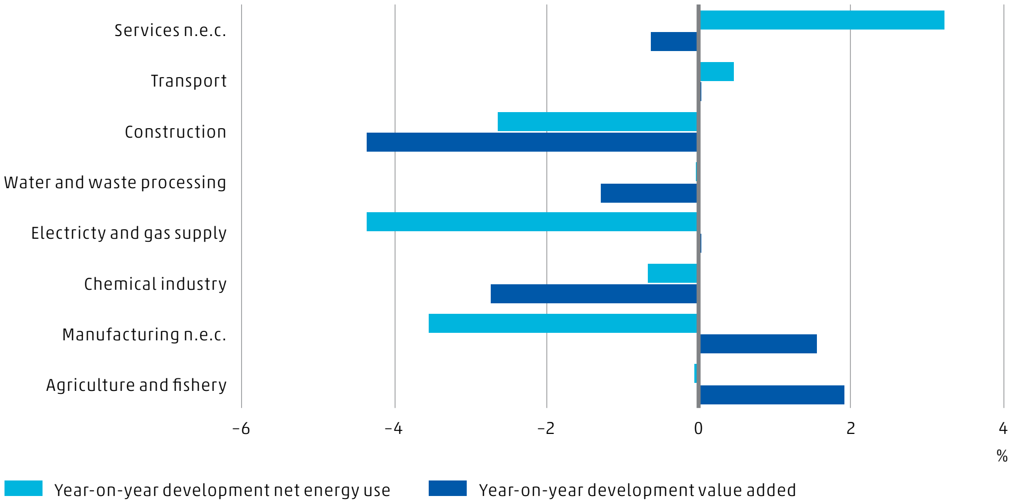
1.1.2 Net energy use in 2013 per sector



[3] Measure for the average outside temperature. If the average temperature on a particular day is x degrees below 18° C, that day counts as x degree days. If the average outside temperature exceeds 18° C, that day counts as 0 degree days.

Together the chemical industry, other manufacturing and electricity and gas supply use up around 50 percent. Households, services n.e.c. and transport also have a major share in Dutch energy use. Figure 1.1.3 below shows the 2012–2013 developments of net domestic energy use and value added of the various sectors of the Dutch economy. There are substantial differences between the sectors in terms of net year-on-year development of energy use.

1.1.3 Changes in net energy use and value added (in constant prices) per sector over the period 2011-2012



Net energy use fell in each sector except services and transport. This came with a reduced value added for some sectors although manufacturing managed to increase its value added without increasing its energy use. So these sectors improved their energy efficiency in terms of value added per joule. Electricity and gas supply also managed to increase its value added per joule by reducing its net energy use while its value added remained constant. This can be explained by a development that started in 2011–2012, when traders in electricity increased their imports by 56 percent. In 2012–2013 imports saw a small increase of just 3 percent. Importing electricity in 2012 and 2013 was favourable because energy from Germany and Norway was available at low prices due to a large surplus in their electricity production. Because the electricity imports require no domestic use of energy, the net use of energy per euro of value added fell.

In contrast to the other sectors, value added fell faster than energy use in the chemical industry and the construction sector. Cold weather probably affected the value added of the construction sector more than its energy use did, while the chemical industry, which largely depends on oil products, faced higher oil prices which affected the value added negatively. In agriculture, most energy is used in horticulture, where the cold weather caused a higher use of natural gas. However this effect was negated by lower use of natural gas for electricity production as a result of the low electricity prices.

Net energy use on the same level as in 2001

The net domestic energy use of the Dutch economy in 2013 was approximately at the same level as in 2001. Accordingly, there is no absolute decoupling between energy use and economic growth with respect to this period. Net energy use rose in aviation, the chemical sector, waste management as well as in most service industries. Horticulture, fisheries, the manufacturing of food products, of textile and leather products, of other non-metallic mineral products, of paper and paper products, publishing and printing, and water transport saw their energy use fall. Households in total also used the same amount of energy as in 2001. So energy use is lower on a per capita basis.

Energy intensity decreased in the last decade

Energy intensity, defined as energy use per unit of value added (fixed price level), is an indicator for the energy efficiency of the economy or different industries. A decrease in energy intensity can be caused by changes in the production process, for instance by energy conservation, by systematic changes in the economy, or simply by variation in temperature. The energy intensity of the Dutch economy is 12 percent lower than in 2001. When we correct this for changes in temperature, the efficiency gain is 13 percent. All sectors contributed to this improvement. In 2013, the energy intensity of the economy as a whole decreased by 1 percent.

1.2 Oil and natural gas reserves

The Netherlands has significant quantities of natural gas as well as some smaller oil deposits. Since the discovery of these natural resources in the fifties and sixties, they have been exploited for the Dutch economy. The extraction of natural gas makes a significant contribution to the Dutch treasury and GDP.

The reserves consist of the demonstrated and commercially producible quantities of natural gas and oil found in the Netherlands, plus the amount pending development. The opening stock of the reserves is 1 January and the closing stock is 31 December. Definitions and data are in accordance with the Petroleum Resource Management System which has been used by TNO since 2013. But for reasons of consistency with Dutch terminology, we have opted to use reserves rather than resources.
The reserves are not inexhaustible however. Although new reserves are discovered occasionally, about 75 percent of the initial gas reserves has already been extracted to our current knowledge. This chapter addresses the physical and monetary aspects of oil and natural gas reserves.

The methodology for the valuation and compilation of stock accounts for the oil and natural gas reserves is described in the report 'Valuation of oil and gas reserves in the Netherlands 1990–2005', but some assumptions were adapted in the ESA revision of the national accounts. The most important change is that the unit resource rent is no longer averaged over 3 years, so that the time series better reflects annual price changes.

The physical data of the oil and natural gas resources can be found in the annual reports 'Natural resources and geothermal energy in the Netherlands' and in StatLine.

Production of natural gas decreased

In 2013, the production (gross extraction) of natural gas[4] from the Dutch gas fields amounted to 84 billion standard cubic metres (Sm^3),[5] compared to 78 billion Sm^3 in 2012. Total production was up 8 percent on 2012. The main explanation for this rise lies in increased foreign demand in physical terms: the exports of natural gas grew by about 10 percent, while domestic demand rose only by about 1 percent.

1.2.1 Physical balance sheet of natural gas

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
	billion Sm^3											
Opening stock	1,865	1,997	1,836	1,572	1,510	1,439	1,390	1,364	1,390	1,304	1,230	1,130
Reappraisal	248	–45	–59	–62	–71	–49	–26	26	–86	–74	–100	–86
new discoveries of natural gas	33	15	25	15	9	5	3	3	5	6	4	0
re-evaluation of discovered resources	287	18	–17	–46	–9	14	52	95	–5	–2	–25	–2
gross extraction	–72	–78	–68	–73	–71	–68	–80	–74	–86	–79	–78	–84
underground storage of natural gas[1]	–	–	1	0	0	–1	1	0	2	2	1	0
other adjustments	0	0	0	42	0	2	–2	1	–2	–2	–1	0
Net closing stock	2,113	1,952	1,777	1,510	1,439	1,390	1,364	1,390	1,304	1,230	1,130	1,044

Sources: TNO/Ministry of Economic Affairs, 1988–2014 and Statistics Netherlands (2013); http://statline.cbs.nl 'Natural gas and oil reserves on the Dutch territory'.

[1] In 1997 natural gas was injected in one of the underground storage facilities for the first time.

At the end of 2013, the remaining expected reserves of natural gas in the Netherlands were estimated at 1,044 billion Sm^3. Assuming that the net annual production remains constant at its 2013 level, the Dutch natural gas reserves are enough to last another 12 years.

Production of oil stable

The production of oil remained stable at 1.3 million Sm^3 in 2013. The total expected oil reserves were estimated at 47.1 million Sm^3 at the end of 2013. This is 2 percent lower than in 2012.

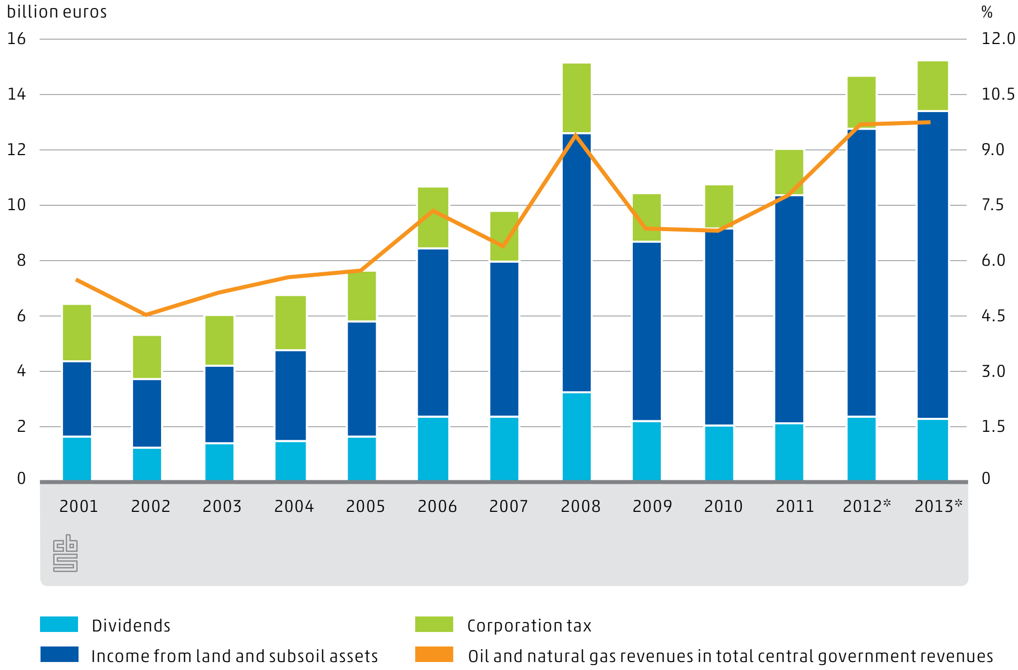
[4] The production equals the gross extraction at the expense of the reserve which excludes the use of natural gas from underground storage facilities as these are considered inventories that have been produced already.

[5] The 'standard' cubic meter (Sm^3) indicates a cubic metre of natural gas or oil under standard conditions corresponding with a temperature of 15 °C and a pressure of 101,325 kPa.

Highest government revenues from oil and natural extraction on record

Around 80 percent of the resource rents earned with the extraction of oil and gas reserves are appropriated by the government through fees and royalties. The remainder flows to the oil and gas industry. The government revenues consist of dividends, corporation tax and income from land and subsoil assets in the form of concession rights. In 2013 government revenues from oil and gas amounted to 15.2 billion euros, the highest amount since extraction began in the late 1960s. It is an increase of 4 percent compared to 2012 and equal to a 9.7 percent contribution to central government revenues. It is the highest relative contribution on record due to a combination of high natural gas revenues and a shrinking government budget. The benefits from oil and gas extraction have contributed an average of 7.1 percent to the total revenues of the Dutch central government since 2001.

1.2.2 Oil and natural gas revenues and their share in central government revenues



Source: Statistics Netherlands (2014); http://statline.cbs.nl Table 'Overheid; inkomsten en uitgaven'.

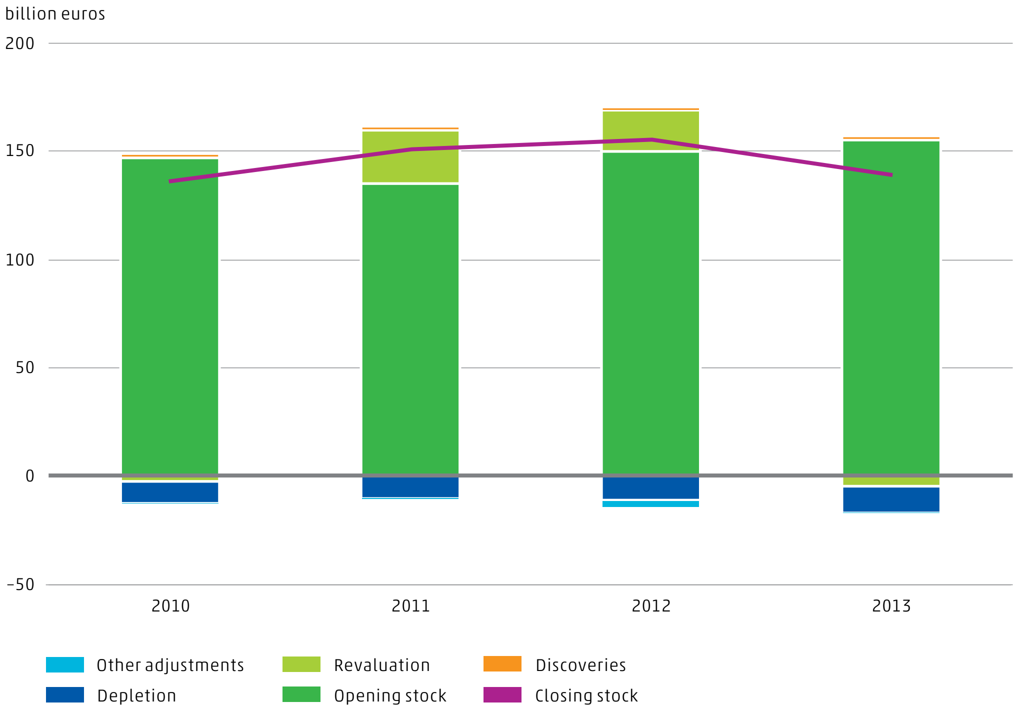
Value of gas reserves decreased by 10 percent

At the end of 2013, the value of the producible reserves of natural gas amounted to 139 billion euros.[6] This is a decrease of more than 10 percent compared to 2012 when the reserves were estimated at 156 billion euros. Figure 1.2.3 shows the importance of

[6] In the absence of market prices, the value of oil and gas reserves has been derived with the net present value methodology in which assets are valued as discounted streams of expected resource rent. With the SNA revision, in addition to recalibration of the source data, the method used to value natural gas has been updated.

revaluation and depletion in explaining the changes in value over time. Revaluation, which reflects price changes for natural gas, caused a downward adjustment of 5 billion euros in 2013, whereas it had caused an upward adjustment of 18 billion euros in 2012. Depletion occurs as a result of extraction at the expense of the reserves. In 2013 depletion amounted to more than 11 billion euros, up 5 percent on 2012. Finally, we see that discoveries only play a minor role in value terms. By comparison, the value of oil reserves amounted to 8 billion euros at the end of 2013.

1.2.3 Decomposition of changes in the value of natural gas

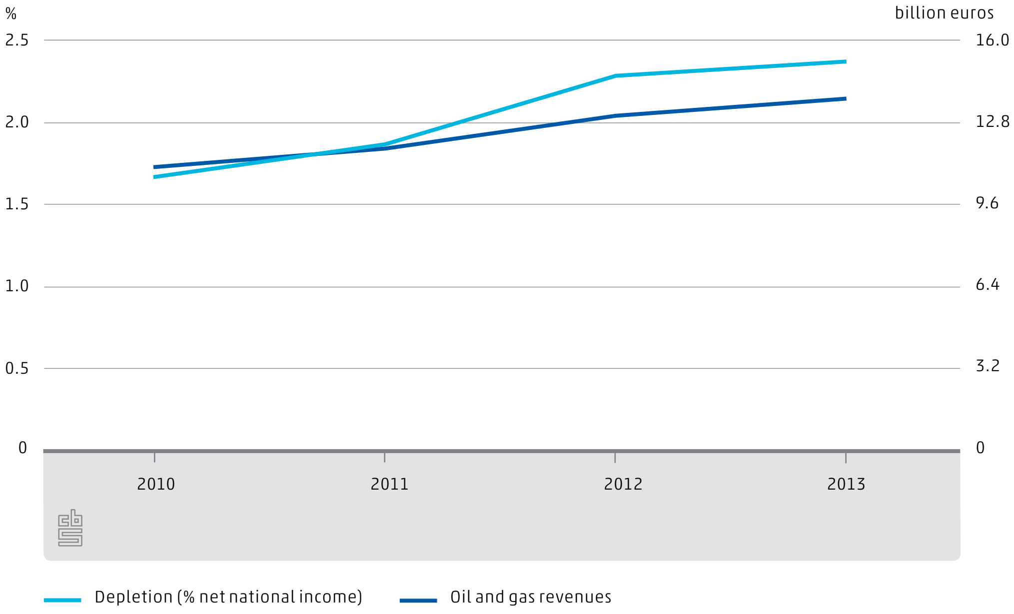


Depletion of oil and gas reserves reduces net national income by 2.1 percent

The total value generated by the exploitation of the oil and natural gas reserves is regarded as income in the national accounts. The System of National Accounts (SNA) does in fact record the depletion of natural resources in the balance sheets, but not in the production or income generation accounts. From a perspective of sustainability, it is not correct to regard the complete receipts from exploitation of oil and natural gas resources as income. The extraction hampers future opportunities for production and income. So the depletion costs should be properly offset against income, just as the depreciation of produced assets is treated via the ‘consumption of fixed capital’. This would constitute equal treatment of natural and produced capital used in production.

In the SEEA, balancing items of the current accounts, such as net income and savings, are adjusted for depletion in addition to consumption of fixed capital. As shown in Figure 1.2.4, the depletion of the Dutch oil and natural gas reserves caused a 2.1 percent downward adjustment of net national income in 2013. The adjustment to net national income shows an upward trend in the period 2010–2013, keeping up with the observed increase in revenues from oil and gas extraction.

1.2.4 Depletion as percentage of Net National Income (2010-2013)



1.3 Emissions to water

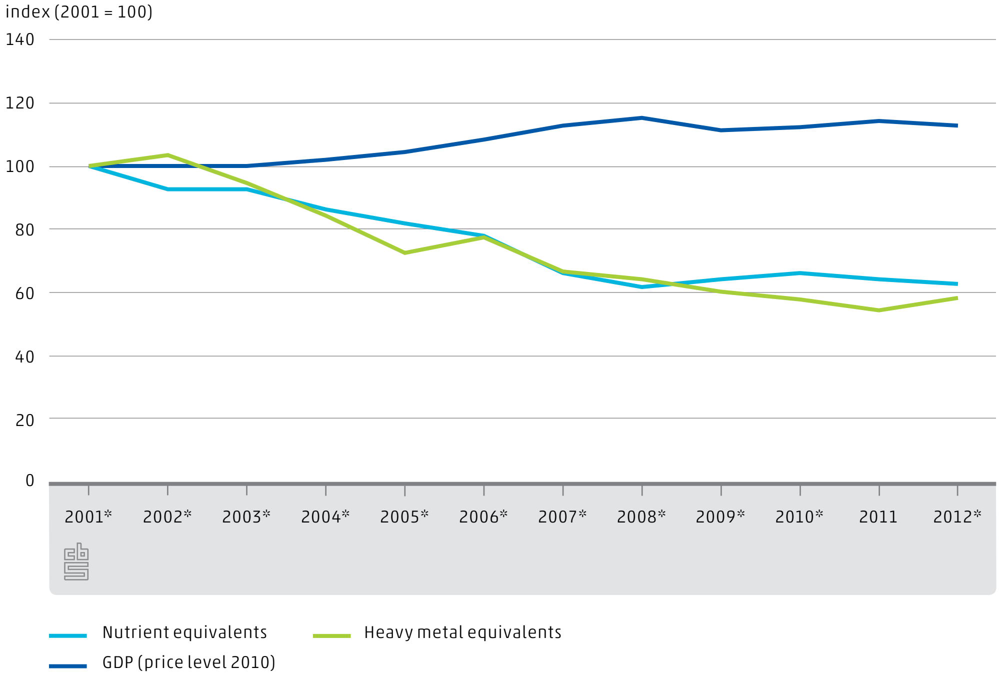
The availability of clean water is essential for humans and many other species on earth. However, nowadays surface waters are continually exposed to discharges of harmful substances by industries and households. These substances can cause severe damage to ecosystems in ditches, rivers and lakes. Therefore, the European Commission introduced the European Water Framework Directive (WFD) in order to meet European environmental quality standards in the future. The WFD states that all domestic surface waters should meet certain qualitative and quantitative targets by 2015. Two major groups of substances that play a key role in the WFD are heavy metals and nutrients. Heavy metals naturally occur in the environment, but are toxic in high concentrations. An excess amount of nutrients in the surface water causes algae and duckweed to grow rampant, which can lead to limited access of sunlight below the water surface. This makes it impossible for certain species of fish, aquatic plants and other organisms to survive. Because the emissions of these pollutants are often directly linked to economic activities, it is essential to reduce emission intensities of production processes as well as stimulate the decoupling between water emissions and economic growth.

The water accounts provide information about the emissions to water by industries and households and are fully consistent with the concepts of the national accounts. More information can be found in Emissions to water, methodology on the website of Statistics Netherlands. Due to its consistency with the national accounts, it is feasible to compare its physical emission data with economic indicators such as value added. This consistency also suits environmental-economic modelling.

Emissions to water decrease

The relation between economic growth and the emissions to water is an indicator for the environmental performance of an economy. If the emissions decrease with respect to economic growth, this indicates improved environmental efficiency. Run-off and seepage by agriculture are excluded in the analyses in this section, because these two sources are very dependent on the weather and therefore have a great influence on the figures of nutrients in agriculture. For example, in 2012 emissions of nutrients in agriculture were 9.3 billion nutrient equivalents. Without run-off and seepage, the discharge was almost 841 thousand nutrient equivalents.

1.3.1 Emissions to water and GDP

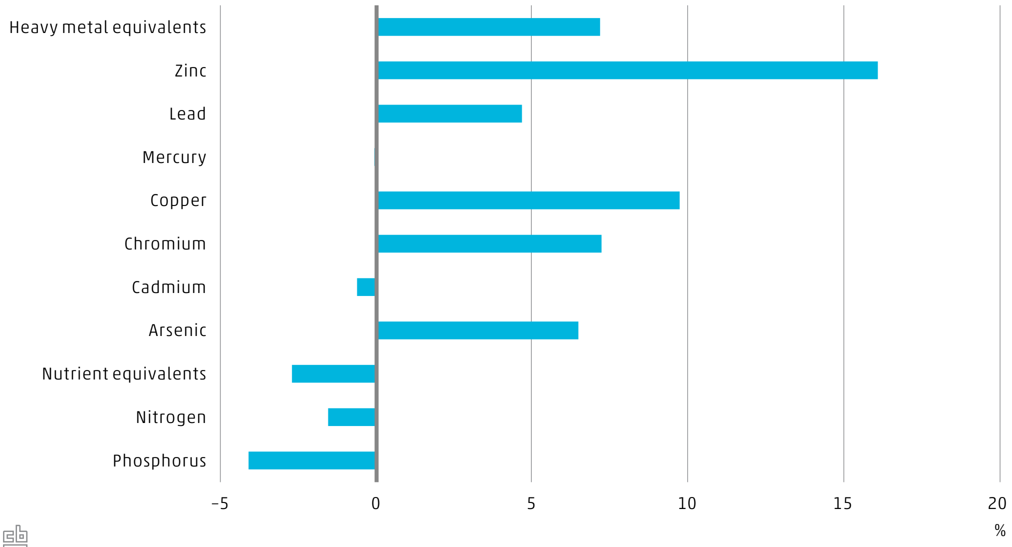


In terms of GDP, the Dutch economy grew 13 percent between 2001 and 2012, while in that same period the emissions of heavy metals were reduced by 46 percent and nutrient emissions by 35 percent. With regard to 2012, nutrient emissions continued to decrease but emissions of heavy metals went up for the first time since 2001.

When we zoom in on the emissions of different metals in recent years, we see that the increase in zinc emissions was the largest contributor to the total increase of heavy metals between 2011 and 2012, followed by copper. Mercury emissions did not contribute to the total increase that occurred. Cadmium was the only metal with lower discharges. The increase of heavy metals emissions in 2012 was primarily caused by the manufacturing of metal products and chemical products. Also the amount of heavy metals in the effluents of Urban Waste Water Treatment Plants (UWWTP's) increased, especially effluents of zinc and copper. 2011 was a dry year with less than average precipitation whereas 2012 was wetter than average. This is the main reason for the increase of the loads of copper (+55 percent) and zinc (+60 percent) from atmospheric deposition on paved surface areas draining into the sewer system and subsequently to UWWTP's.

In contrast with heavy metals, the discharge of nutrients decreased in 2012 as well as the discharge of the underlying substances nitrogen and phosphorus. There was less discharge in the manufacturing of food products and of chemical products. Increased emissions of nitrogen and phosphorus were reported in other industries, but the net result is an overall decrease.

1.3.2 Emissions to water net approach, 2011-2012

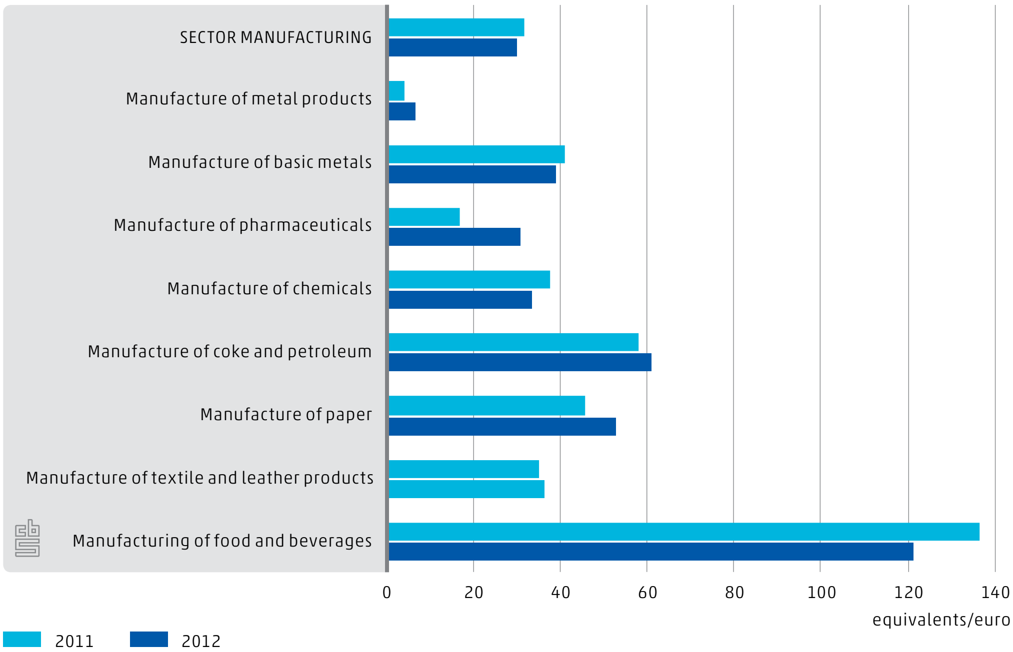


Emission intensities of nutrients in manufacturing

The emission intensity is a measure for the environmental efficiency of production processes. It is equal to the total emission divided by value added. In 2011, the emission intensity of manufacturing as a whole was equal to almost 32 equivalents per euro. In 2012 this decreased slightly to 30 equivalents per euro. Within manufacturing there are significant differences. The biggest polluter, measured as total emission divided by value added, is manufacturing of food products, with an intensity of more than 136 equivalents per euro in 2011. Here the processing of agricultural products is responsible for the high nutrient emissions. Another big polluter is the sector manufacturing of coke and petroleum (refineries). In 2011 the emission intensity of this sector was 58 equivalents per euro. In 2012 this increased to 60 equivalents per euro.

In 2011 manufacturing of food products had a share of more than 80 percent in the total emissions of phosphorus for total manufacturing. In 2012 it came to almost 76 percent. Its share in the total emissions of nitrogen was 58 percent in 2011 and almost 55 percent in 2012. Due to strict standards, the total discharge of nutrients for manufacturing was lower in 2012 than in 2011.

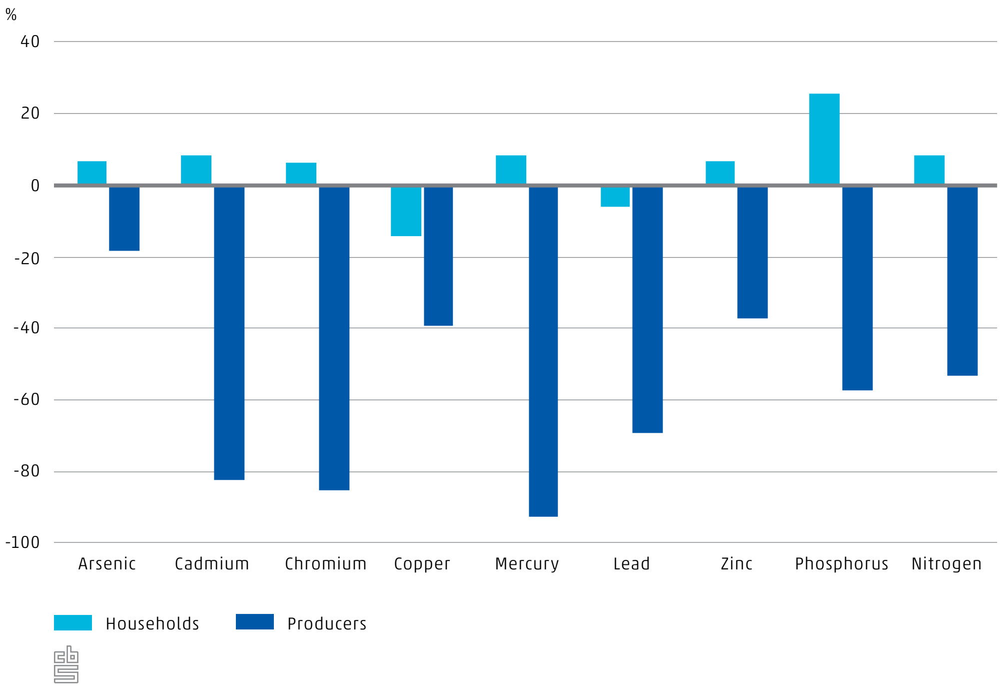
1.3.3 Emission intensity of nutrients sector manufacturing



Households emitted more in 2012 than in 1995

Compared to 1995, the discharge of emissions by households had increased for almost all substances in 2012. The main cause is the growing population. Copper and lead are the exceptions. The decrease of discharge of copper and lead by households is mainly caused by using less copper coatings in recreational shipping and by using less load in bullets for hunting.

1.3.4 Changes in emissions to water 1995-2012 by households and producers



In the period 1995–2012 the discharge of emissions by producers decreased for all substances, for some substances by more than 80 percent even. This is due to the strong measures producers have taken to reduce emissions, as a result of policy measures and European Directives. Also a few major polluters in the chemical industry have been closed, which caused a sharp drop in the emissions of nutrients and heavy metals.

1.4 Greenhouse gas emissions

Climate change is one of the major global challenges of our time. There is abundant scientific evidence that the emission of greenhouse gases caused by economic activities contributes to climate change. Accelerating emissions of carbon dioxide, methane, and other greenhouse gases since the beginning of the 20th century have substantially increased the concentration of greenhouse gases in the atmosphere. As a result the average global temperature rose by 0.85°C over the period 1880–2012 and global precipitation patterns changed. Combustion of fossil fuels, deforestation, but also specific industrial processes and extended agricultural activities are the main drivers of the increased emission of greenhouse gases. Enhanced concentrations of greenhouse gases in the atmosphere, CO_2 in particular, will increase global temperatures by radiative forcing. Likewise, climate change has a direct impact on all kinds of economic processes. This may be positive or negative, though the expectation is that the overall impact will be primarily negative. A good conception of the economic driving forces of climate change is key for the design of effective mitigation policies.

The *air emission accounts* can be used to analyse the environmental pressures and responsibilities in terms of greenhouse gas emissions in relation to production and consumption patterns. Because of their compatibility with the national accounts, greenhouse gas data can be linked directly to the economic drivers of global warming. Statistics Netherlands annually publishes the air emission accounts, which include all emissions caused by the residents of a country, regardless of where the emissions take place.

Greenhouse gas emissions according to different frameworks

There are several frameworks for estimating the greenhouse gas emissions for a country, yielding different results. Well-known are the:

1. emissions reported to the UNFCCC (United National Framework Convention on Climate Change) in particular under the Kyoto Protocol. The IPCC (Intergovernmental Panel on Climate Change) has drawn up specific guidelines to estimate and report on national inventories of anthropogenic greenhouse gas emissions and removals;
2. but also environmental statistics (greenhouse gas emissions within the Dutch territory, the so-called actual emissions);
3. as well as the air emission accounts (emissions by residents).

These frameworks all provide independent greenhouse gas estimates. The differences are not the result of disputes about the accuracy of the estimates themselves, but arise from different interpretations of what has to be counted. The inclusion or exclusion of certain elements depends on the concepts and definitions that underlie these frameworks. The estimates differ in their possible applications for analysis and policy making. A bridge table provides insight in how the different conceptions quantitatively relate to each other (see Table 1.4.1).

1.4.1 Bridge table for greenhouse gases

	2001	2005	2010	2011	2012	2013*
	Mton CO_2-equivalents					
1. Stationary sources[1]	184	180	183	169	168	168
2. Mobile sources on Dutch territory	40	41	41	42	41	41
3. Mobile sources according to IPCC	38	39	38	39	37	36
4. Short cyclic CO_2	8	11	14	14	14	13
5. Total, IPCC (excl. LULUCF)[2] = 1 + 3 - 4	213	208	208	194	191	192
6. Land Use, Land-Use Change and Forestry (LULUCF)	3	3	3	3	3	3
7. Total, IPCC (incl. LULUCF) = 5 + 6 (Kyoto-protocol)	215	211	211	197	195	195
8. Actual emissions in the Netherlands = 1 + 2	224	221	224	211	209	210
9. Residents abroad	26	26	25	25	26	26
10. Non-residents in the Netherlands	6	7	7	7	7	7
11. Total emissions by residents = 8 + 9 - 10	243	241	243	229	228	228

[1] sources include short-cyclic CO_2.
[2] Include Land Use, Land Use Change and Forestry. This concerns the effect of land use and forestry on greenhouse gas emissions and sequestration of CO_2 into biomass.

The total greenhouse gas emissions for the Netherlands according to the IPCC guidelines equalled 192 Mton CO_2 equivalents in 2013[7]. This is 10 percent below the emission level of 2001. The CO_2 emissions. However, diminished by 9 Mton, a 5 percent decrease during this period. The substantial reductions of the other greenhouse gases, as a result from a variety of emission reduction efforts, by far surpassed the small decrease in CO_2 emissions. These have led to a 32 percent cut in emissions of all other greenhouse gases (CH_4, N_2O, F-gases) in period 2001–2013[8]. This increased the share of CO_2 in total greenhouse gas emissions from 83 percent in 2001 to 87 percent in 2013. The emissions of greenhouse gases generated by the Dutch economy equalled 228 Mton in 2013 which is 6 percent less than the 2001 emissions. The differences between these conceptualisations are primarily due to the different treatment of the emissions caused by international transport, which is only partly included in the Kyoto figures. More information can be found in the background document Greenhouse gas emissions according to different frameworks at the website of Statistics Netherlands.

[7] Excluding LULUCF (Land Use, Land Use Change and Forestry), both emissions and uptake. Data are calculated based upon 1996 Guidelines.
[8] As part of ESA-2010 revision, Dutch National Accounts are revised. So far time series for 2001–2013 are compiled. As a result for this publication most data are compiled for 2001 onwards. Longer time series are foreseen for next year.

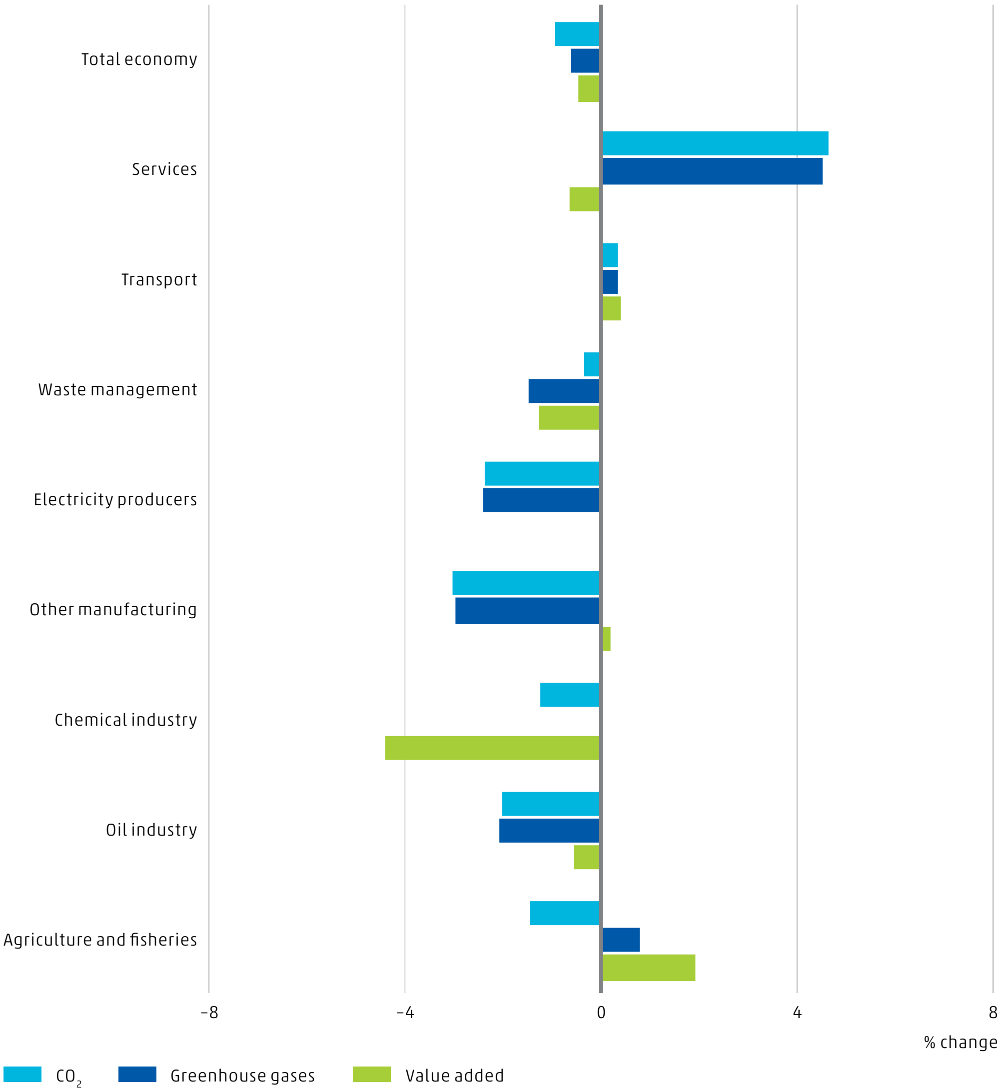
Greenhouse gas emissions in 2013

The total level of greenhouse gas emissions in the Netherlands in 2013 was comparable to 2012 and 2011. The total emissions by economic activities, which includes emissions by households, equalled 228.4 Mton CO_2 equivalents. Carbon dioxide (CO_2) emissions were nearly equal to 2012. Methane (CH_4) emissions increased by 1 percent and nitrous oxide (N_2O) by 3 percent. The economy contracted by 0.7 percent in 2013 after an even stronger contraction in 2012. The fact that the economic downturn was not accompanied by a decrease in emissions is mainly due to the cold weather in the beginning of 2013. March has been the coldest month since 1987 and saw records in the gas sales for space heating.

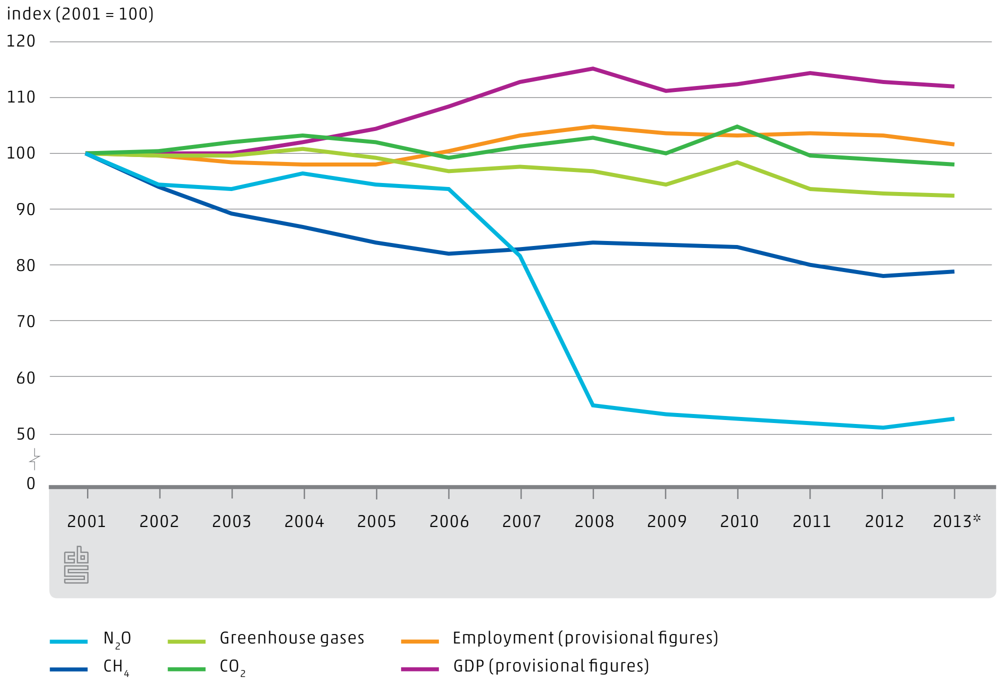
The emissions from all industries have been falling since 2010. The 2013 emissions were 1 percent lower, like in 2012, while the decline in 2011 was 5 percent. The emission reductions in 2013 were similar to those in 2012. However, they were less than the decrease in production and value added. Among the manufacturing industries, the chemical industry was the largest emitter in 2013 and contributed nearly 40 percent to the total greenhouse gas emissions of the total production by manufacturing industry. In 2013 its value added fell by 3 percent and its CO_2 emissions decreased by 2 percent. For some other non-manufacturing industries with extensive emissions, as the electricity companies and refineries, greenhouse gas emissions fell by 2 percent or more. The electricity producers in particular showed a drop in greenhouse gas emissions. A further increase of the already positive import balance, and the shrinking demand for electricity, had their impact on further lowering of the domestic electricity production as from 2012. CO_2 emissions from horticulture (glasshouses) remained virtually the same in 2013, while both production and value added increased by about 1 percent in horticulture.

An important measure for environmental pressure caused by economic activities is the emission intensity, which can be calculated by dividing the greenhouse gas emissions by value added. In 2013 the emission intensity remained the same despite of the declining long term trend. For several of the large emitters such as the mining industry, food and beverages industry, and the basic metal industry and also electricity producers, the emission intensity improved. In contrast the emission intensity increased for manufacturers of chemicals. Services in general also showed increasing intensities mainly due to extra greenhouse gas emissions from energy used for space heating.

1.4.2 Changes in value added, greenhouse gas and CO_2 emissions, 2012-2013*



1.4.3 Volume changes in GDP, employment and greenhouse gas emissions by industries



In the period 2001–2013, economic growth far exceeded greenhouse gas emissions. While the economy grew by 12 percent and employment by 2 percent in twelve years, the emissions of greenhouse gases by industries fell by 8 percent and CO_2 emissions by 2 percent. The strongest reduction in absolute terms came from the electricity producers, refineries and building material manufacture , mainly as a direct result from reduced production volumes, partly from adjusted production processes. So we observe absolute decoupling in the Netherlands with respect to the 2001 emission levels for greenhouse gases and for CO_2 separately. The latter mainly observed in recent years. Absolute decoupling here means lower emissions than in 2001 despite economic growth.

Households directly contribute to the emission of greenhouse gases by consuming energy products for heating, cooking and generating warm water, and by using motor fuels for driving. Dutch households were responsible for 42.0 Mton of greenhouse gas emissions in 2013, which represent 18 percent of the total emissions by economic activities. In 2013 direct greenhouse gas emissions from households rose by 3 percent with respect to 2012, while consumer expenditure decreased by 1.6 percent. The population grew only by 0.3 percent in 2013 compared to 2012 and the number of households only by 0.7 percent, both far less than the growth in emissions. The main reason for increased emissions was the additional use of natural gas for space heating due to the extra cold weather in the beginning of 2013.

1.5 CO_2 emissions on a quarterly basis

Accurate and timely measurements of the amount and the origin of the emitted greenhouse gases are essential to help governments achieve their objectives. Data on national greenhouse gas emissions (national emission inventory and environmental accounts) usually become available nine months after the end of the year under review. Quarterly based CO_2 emission data could serve as a short term indicator for policymakers and researchers to assess how the greenhouse gas emissions change in response to economic growth or decline, as carbon dioxide is the most important anthropogenic greenhouse gas. In 2011 Statistics Netherlands started publishing quarterly CO_2 emissions 45 days after the end of a quarter, at the same moment as the first quarterly GDP estimate is published (flash). The quarterly CO_2 emissions are compatible with the national accounts and can be linked directly to economic output, allowing the comparison of the environmental performance of different industries. The CO_2 emissions are calculated according to the definitions of the environmental accounts. Besides these year-on-year changes there are also weather adjusted changes. For households, agriculture and some other services the assumption is that the natural gas consumption has not changed compared to the same quarter of the previous year.

Quarter 1 of 2014

CO_2 emissions down by 10 percent in the first quarter of 2014

CO_2 emissions by the Dutch economy were 10.1 percent lower in the first quarter of 2014 than in the same quarter of 2013. Adjusted for the differences in the weather, CO_2 emissions fell by just 0.4 percent. The Dutch economy contracted by 0.5 percent year-on-year in the first quarter of 2014 (flash estimate[9)]).

Mild winter leads to lower CO_2 emissions

Last winter was relatively warm, so far less natural gas was burned to heat indoor spaces than the year before. The CO_2 emissions by households were therefore cut by over 20 percent. Likewise CO_2 emissions in services fell sharply because of the mild winter.

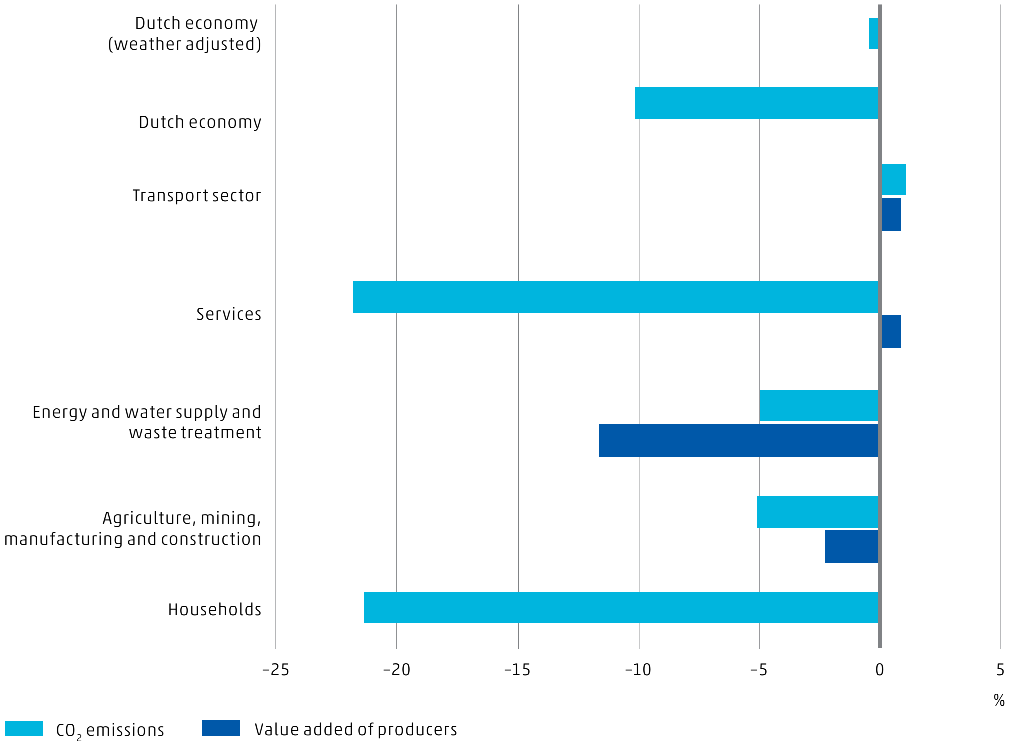
Lower CO_2 emissions by energy companies

CO_2 emissions by 'energy, water supply and waste management' was lower than a year before. The energy companies produced less electricity and consumed less natural gas. However, they did use more coal, although the increase in coal was lower than the decrease in natural gas consumption.

'Agriculture, mining, manufacturing and construction' saw a decrease in its totality. This mainly came about by the lower emissions in agriculture caused by the mild weather. Heavy industries did have higher CO_2 emissions though. This is because production in manufacturing increased relative to the first quarter of 2013.

9) Figures have been adjusted. The year-on-year volume change is equal to zero according to the second estimate. For more information see: http://www.cbs.nl/nl-NL/menu/themas/dossiers/conjunctuur/publicaties/conjunctuurbericht/inhoud/kwartaal/archief/2014/2014-804-pb.htm.

1.5.1 Changes in CO_2 emissions and economic development, first quarter of 2014



Rise in CO_2 emissions of the transport sector

CO_2 emissions by the transport sector rose slightly due to the growing production of aviation and sea transport. Emissions by road transport of goods has remained stable.

Quarter 2 of 2014

Mild weather leads to lower CO_2 emissions

CO_2 emissions by the Dutch economy were 0.9 percent lower in the second quarter of 2014 than in the same quarter of 2013[10]. Adjusted for the differences in the weather, CO_2 emissions increased by 3.7 percent however. The Dutch economy grew by 0.9 percent year-on-year in the second quarter of 2014 (flash estimate).

Higher CO_2 emissions by energy companies due to the increased use of coal

CO_2 emissions by 'energy, water supply and waste management' was higher than in 2013. The energy companies produced more electricity and consumed more coal. They also used less natural gas, but this did not compensate for the increased CO_2 emissions due to the extra use of coal. Firing coal not only leads to relatively higher emissions, it also has a lower efficiency than natural gas. The value added of the energy companies fell.

[10] The figures have been adjusted. The year-on- year volume change is 1.1 according to the second estimate. For more information see: http://www.cbs.nl/nl-NL/menu/themas/dossiers/conjunctuur/publicaties/conjunctuurbericht/inhoud/kwartaal/2014-tweederaming-economische-groei-2013-mededeling.htm.

While electricity production rose, the production of energy distributors and networks fell due to the mild weather.

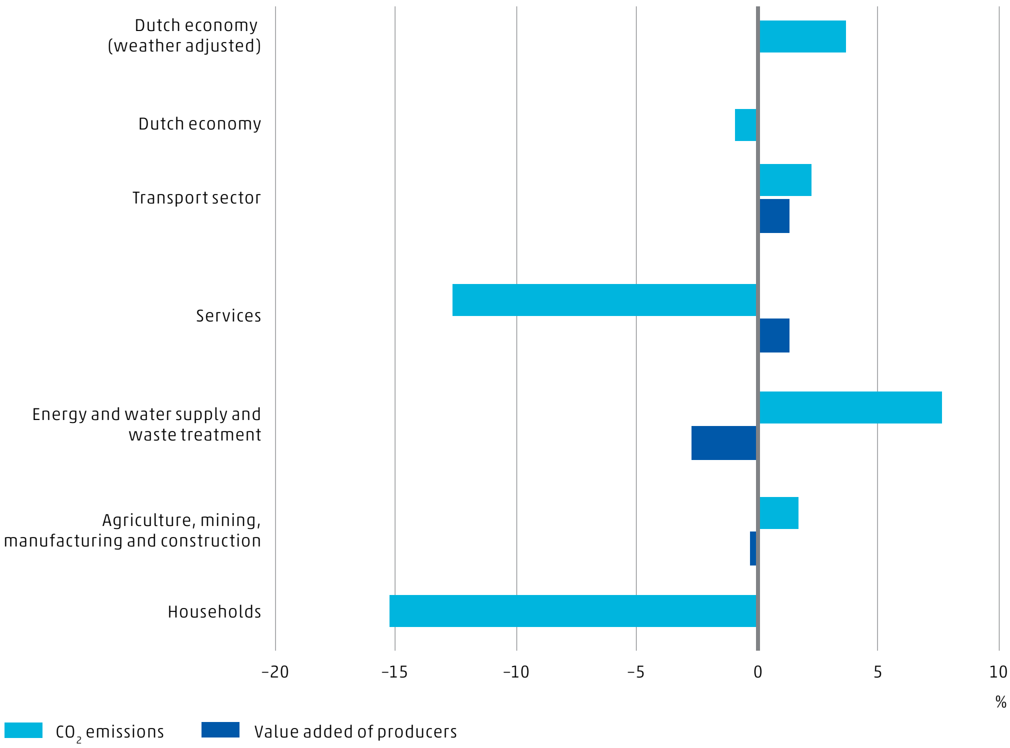
Industrial growth lead to higher emissions

Emissions rose in 'agriculture, mining and extraction, manufacturing and construction'. Manufacturing in particular increased its CO_2 emissions due to rising production. However the value added of 'agriculture, mining and extraction, manufacturing and construction' fell. This is because the value added of mining and extraction as well as construction were significantly lower than in the same quarter of 2013. Agriculture grew, but had lower CO_2 emissions due to the mild weather.

Rise in CO_2 emissions of the transport sector

CO_2 emissions by the transport sector rose again this quarter, mainly because of the growing production of sea transport and road transport of goods. The number of flights in aviation also rose slightly.

1.5.2 Changes in CO_2 emissions and economic development, second quarter of 2014



Households and the services sector used less fuel due to the warm weather

Far less natural gas was burned to heat indoor spaces in the Netherlands in the second quarter of 2014 than in the corresponding quarter of 2013, because it was relatively warm like in the first quarter. Therefore CO_2 emissions by households and services were much lower. So the mild weather led to a reduction of CO_2 emissions in the second quarter.

1.6 Other air emissions

Production and consumption activities cause the emission of a variety of substances to the air. Due to their physical and chemical characteristics some substances, such as greenhouse gases, have effects on a global scale. The air emissions discussed in this section, such as nitrogen oxides or particulate matter, have a more local or regional impact. Their impact may be on human health and/or on the quality of the environment. Air emissions of several substances can be aggregated by weighting them by their respective impacts, so as to form indicators to measure their contribution to a variety of key environmental themes. The themes discussed here are acidification, smog formation, particulate matter emissions, and ozone layer depletion[11)]. Some polluting substances contribute to several themes. NO_x for example contributes to both acidification and smog formation (TOFP), while CH_4 contributes to both smog and the greenhouse effect[12)].

Emissions of acidifying pollutants continue their downtrend

Acidification is caused by the emissions and resulting deposition of nitrogen oxides (NO_x), sulphur dioxide (SO_2) and ammonia (NH_3), affecting the living environment. The combined emissions of these acidifying substances, expressed as acid equivalents, increased by 1 percent in 2013, after a 2 percent decrease in 2012. Acidifying emissions have been cut by 33 percent since 2001. The NO_x emissions were responsible for 53 percent of the emissions of acidifying pollutants, ammonia for one third and sulphur dioxide emissions only for 11 percent in 2013.

Acidifying soils and ground and surface water have a negative impact on the biodiversity of natural areas such as forests and heaths, but also in agricultural areas. Because acidification also affects ground and surface water, it forms a threat to both drinking water and industrial process water. Agriculture and transport in particular are responsible for the acidifying emissions. This is mainly due to the ammonia emissions from livestock farming, manure application, and to emissions of nitrogen oxides and sulphur dioxide by transport over water, but also from air travel and transportation by households. The quantities of emissions from these sectors and activities are much higher than those from refineries and the chemical industry.

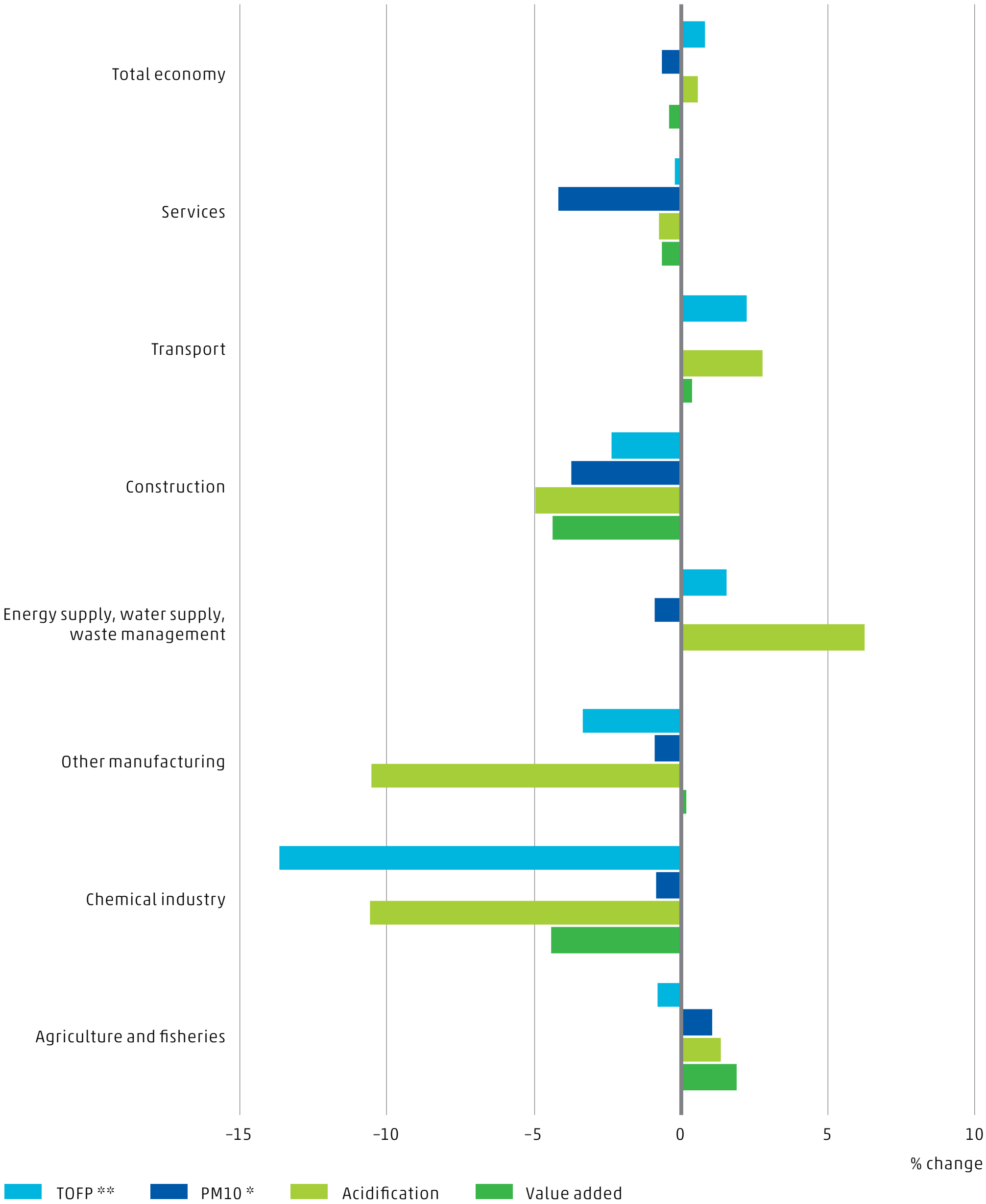
In 2013 the emissions of nitrogen oxides (NO_x) related to the Dutch economy as a whole practically equalled the 2012 emissions. In contrast, the emissions originating from transportation, particularly road transport, declined steadily with minus 6 percent, while production was down by only 1.5 percent. The strong growth in the number of vehicles with cleaner engines helped to cut emissions in road transport. These cleaner engines are enforced by robust European legislation with gradually tightened emission

11) Smog formation and emission of particulate matter are not officially 'environmental themes' under the Dutch National Environmental Policy plan number II, but belong to the theme 'transboundary air pollution'. Emissions of substances that contribute to ozone layer depletion form the sole exception here, having an effect globally similar for the greenhouse gas emissions.

12) TOFP, Tropospheric Ozone Formation Potential is an indicator for the formation of tropospheric ozone (local air pollution).

standards for all kinds of road vehicles, in particular those with diesel engines. The NO_x emissions resulting from maritime and inland water transport remained stable, while air transport extended its emissions by over 10 percent. Electricity companies increased their NO_x emissions by 3 percent, despite the fact that nearly 4 percent less electricity was generated in 2013 and 2 percent less by the large power plants. The emissions did not decrease correspondingly because of a change in fuel mix using more coal at the expense of natural gas in specific plants. The downward trend seems to have stalled. NO_x emissions by electricity companies have been reduced by close to 30 percent since 2001, while production increased, as a result of extensive emission reduction measures at plant level.

1.6.1 Changes in value added, emissions of acidifying substances, particulate matter (PM10) and smog, 2012-2013



* PM10, Particulate matter (with aerodynamic diameter less than or equal to a nominal 10 microns).
** TOFP, Tropospheric Ozone Formation Potential, is an indicator for the formation of troposheric ozone.

Although there was only a limited decrease in 2013 of 2 percent compared to 2012, households too have been able to steadily decrease their NO_x emissions to almost half of their 2001 emission level. This is largely the result of the continuously improved performance of car engines, due to the step by step tightening of exhaust gas standards set by the European Union. Other factors that contributed to lowering the emissions are the improved energy efficiency in space heating, i.e. from the use of improved boilers, good quality insulation in a larger share of new houses, improved energy performance of existing homes and related emissions.

The sulphur dioxide emissions (SO_2) fell by 2 percent in 2013. Sulphur dioxide emissions are mainly caused by water transport (46 percent) and, although significantly less, by the oil industry (15 percent), power production (13 percent), aviation (8 percent) and the basic metal industry (6 percent). Advancing technology induced by the implementation of environmental policies resulted in a reduction of emissions for several sectors. For shipping, especially maritime shipping, SO_2 emissions seem to have stabilized after the sharp decline since 2006. For 2013 a 1 percent increase was observed following the substantial 6 percent increment in 2012.

The oil industry and the electricity plants have been able to structurally reduce sulphur emissions since 2001 notwithstanding strong growth. The annually recurring reductions are mainly achieved through technical measures, such as the application of desulphurisation of flue gases, and in some cases by using more natural gas and adjustment of the fuel mix at the expense of fuels with higher sulphur content. This downtrend came to a halt for both industries in 2012, but continued again in 2013 for the oil industry. The increase in emissions from electricity companies since 2012 is mostly explained by the changed fuel mix,primarily the increased use of coal at the expense of natural gas, as we mentioned earlier.

The ammonia emissions (NH_3), primarily stemming from livestock and from the application of manure on arable land, were up by 2 percent in 2013. This mainly came from a larger number of dairy cows in the cow sheds. NH_3 emissions have been reduced by over 20 percent since 2001.

PM10 emissions continued to decrease in 2013

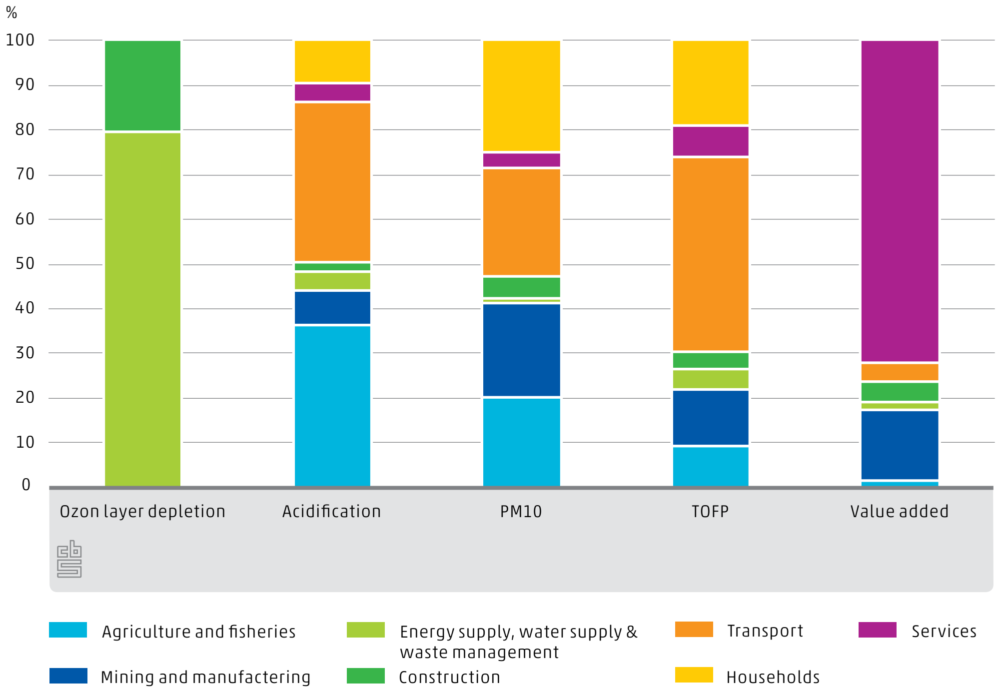
Air pollution of fine particulates can be harmful to the respiratory system. The transport sector, animal husbandry, households and to lesser extent some other industries and construction are the main contributors. In 2013 the total emissions of particulate matter (PM10) decreased by 1 percent compared to 2012. Since 2001 a total reduction of 35 percent across all economic activities has been achieved. It turned out to be much harder to make reductions in agriculture and transport, resulting in the highest shares in total emissions for those industries.

Emissions of ozone precursors (CH_4, CO, NMVOC, NO_X) are weighted by their Tropospheric Ozone Formation Potentials (TOFP), or smog formation in short. In 2013 these emissions increased by 1 percent. Since 2001 these emissions have fallen by 28 percent across all activities.

Figure 1.6.2 provides a breakdown of the environmental themes and value added in 2013 by economic sectors and households. It demonstrates that whereas services (excluding transport) are responsible for over 70 percent of value added, their contribution to environmental themes is 7 percent at most.

Ozone layer depletion is mostly caused by Chlorofluorocarbon (CFCs)[13] that reduces the amount of ozone in the stratosphere and causing higher levels of UV rays to reach the earth. This has damaging effects for humans and nature. Ozone layer depletion is primarily driven by waste management and construction, while acidification is dominated by agriculture and transport. PM10 emissions originate from a mixture of sectors where households, transport, mining and manufacturing and agriculture all contribute substantially. Smog formation (TOFP) is mainly determined by transportation emissions stemming primarily from the transport sectors, but also from transportation activity across all industries and households.

1.6.2 Contributions to value added and environmental themes in 2013



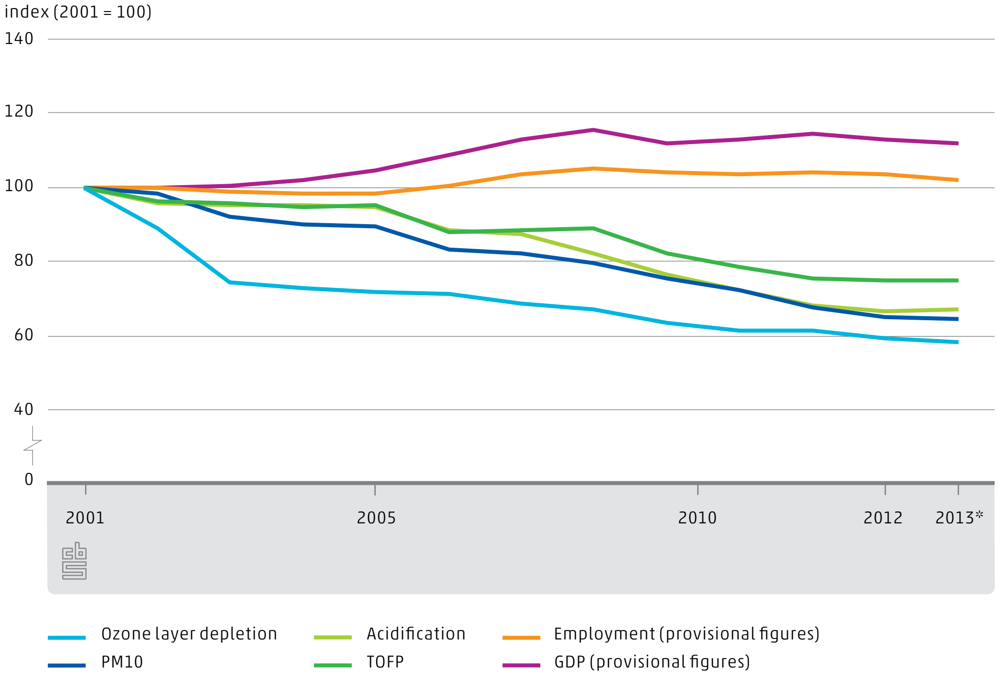
Other air emissions continue to decouple from economic growth in 2013

Between 2001 and 2013 the Dutch economy grew at an average rate of close to 1 percent annually. Employment grew by 2 percent in the 2001–2013 period as a whole. At the same time the emission of all substances to air were cut by 33 percent or more, with the exception of Tropospheric Ozone Formation Potential (TOFP) with a 25 percent decline and of course of the CO_2 emissions hardly experiencing a drop. The drop in all local air pollutants described in this section implies that absolute decoupling has taken place

[13] Some other ozone depleting substances are halons and methyl chloroform.

in the Netherlands since 2001. Gases contributing to ozone layer depletion were no exception. These emissions still decrease, although the major reductions were achieved prior to 2001. Emission levels for particulate matter and the substances contributing to acidification and to smog formation to some extent also generally show the same pattern of decline since 2001. Net energy use, as one of the main denominators of emissions of several of these substances, roughly matches the 2001 level of use. It shows that emission factors have structurally improved, with a variety of explanations such as technological advancement in engine technologies.

1.6.3 Volume changes in GDP, employment and several environmental themes



1.7 Environmental taxes and fees

Production and consumption activities result in pressure on the environment due to the use of natural resources, waste generation and the emission of pollutants. The government has several options for discouraging environmentally damaging consumptive or productive activities. Imposing environmental taxes and fees is one of them.

The main difference between a tax and a fee is the use of revenues. Tax revenues flow into the general budget, while the revenues of fees are earmarked mostly for providing environmental services. Environmental taxes and fees relate to activities or products that have a negative effect on the environment. According to SEEA and the Eurostat 2001 and 2013 statistical guidelines, an environmental tax is 'A tax of which the tax base is a physical unit (or a proxy of a physical unit) of something that has a proven, specific negative impact on the environment'. Examples of environmental taxes are the tax on gas and electricity use and the motor vehicle tax. Examples of environmental fees are sewerage charges and fees on the after-care of refuse dumps.

This section reports on the revenues from the various environmental taxes and fees and shows who are actually paying them. An analysis of mobility taxes and a comparison between mobility taxes and environment taxes are also included.

Environmental tax revenues slightly higher, environmental fee revenues slightly lower

1.7.1 Developments in revenues of environmental taxes and environmental fees

In 2013 environmental tax revenues came to almost 19 billion euros, up 1.7 percent on 2012. Environmental tax revenues decreased by almost 6 percent in 2012, due to the abolition of the groundwater and waste tax, and a dip of more than 24 percent in car and motor cycle tax. The increase in 2013 was caused by the introduction of an additional increment on the tax on gas and electricity to afford renewable energy subsidies (in Dutch: *opslag duurzame energie*). Furthermore, companies were no longer exempt from fuel tax, especially tax on the use of coal by electricity companies. This increase was offset by a further decrease of the tax on cars and motor vehicles and the abolition of the packaging tax. Therefore, the overall increase of tax revenues was limited.

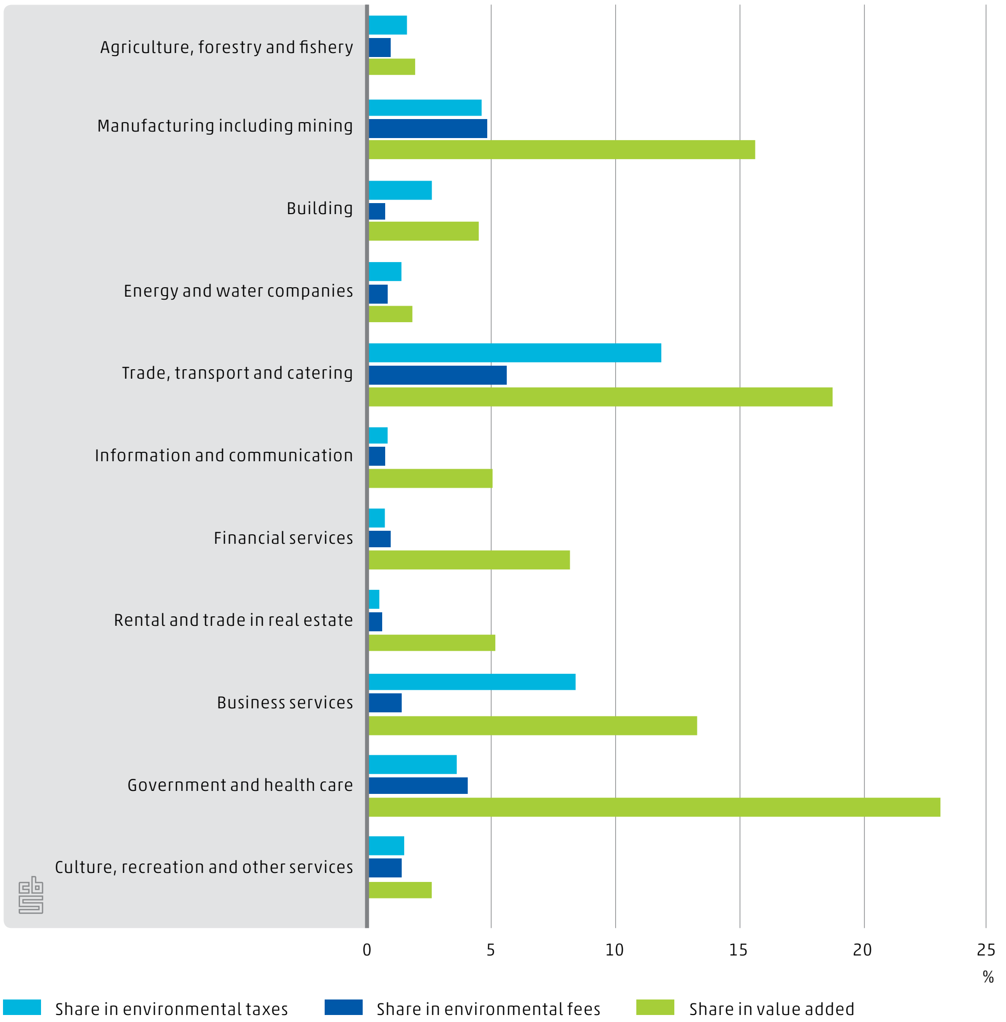
The share of environmental taxes in the total tax revenues of the government had fluctuated around 14 percent for years and then declined slightly towards 13.5 percent in the last two years. Total environmental tax revenues increased by 37 percent in the period 2001–2008. Subsequently they remained more or less stable until 2012, and then, by 2013, environmental tax revenues increased again but at a lower level than before the economic crisis.

Total revenues of environmental fees have increased by almost 40 percent since 2001. This is caused by a massive increase in the revenues from sewerage charges. In 2001 the revenues amounted to 665 million euros, whereas in 2013 they had risen to nearly 1.5 billion euros, a 110 percent increase.

Households largest payers

In 2013, households paid more than 62 percent of the total environmental tax revenues. Their contribution to environmental fees was even higher, 78 percent. The remainder is paid by companies.

1.7.2 Contributions of companies to environmental taxes and environmental fees, 2013*



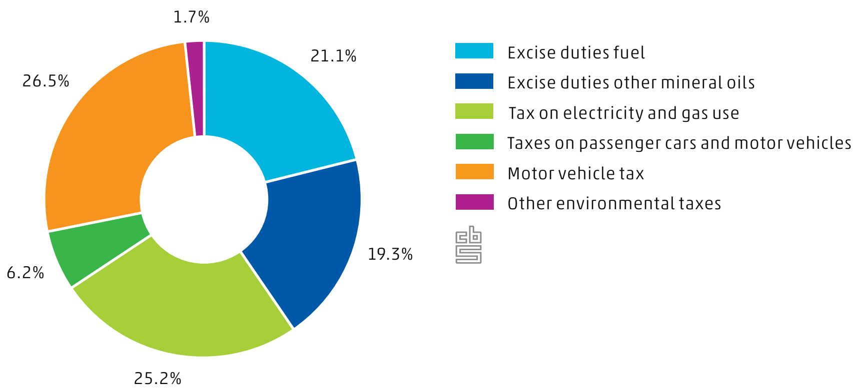
Companies in business services and in trade, transportation and catering contributed most to the revenues from environmental taxes, 8.4 percent and 12 percent respectively. These sectors also generate a lot of value added. Companies in the sectors rentals and trade in real estate, information and communication, and financial services paid less than 1 percent.

The outliers in paid environmental fees are companies in the sectors trade, transport and catering, government and health care. They contribute 5.6 and 4 percent respectively to revenues from environmental fees. In contrast to the environmental taxes, companies in the sector business services make a very small contribution to environmental fees. It is striking that manufacturing, an important sector for the economy and one of the biggest polluters, did not contribute much to environmental taxes and fees.

Motor vehicle tax largest contributor

In 2013, the largest part of total environmental tax revenues came from the motor vehicle taxes, over 26 percent, followed by the tax on gas and electricity use. The share of the latter was substantially higher in 2013 than in 2012, due to the introduction of the additional increment mentioned before.

1.7.3 Share of different environmental taxes, 2013*

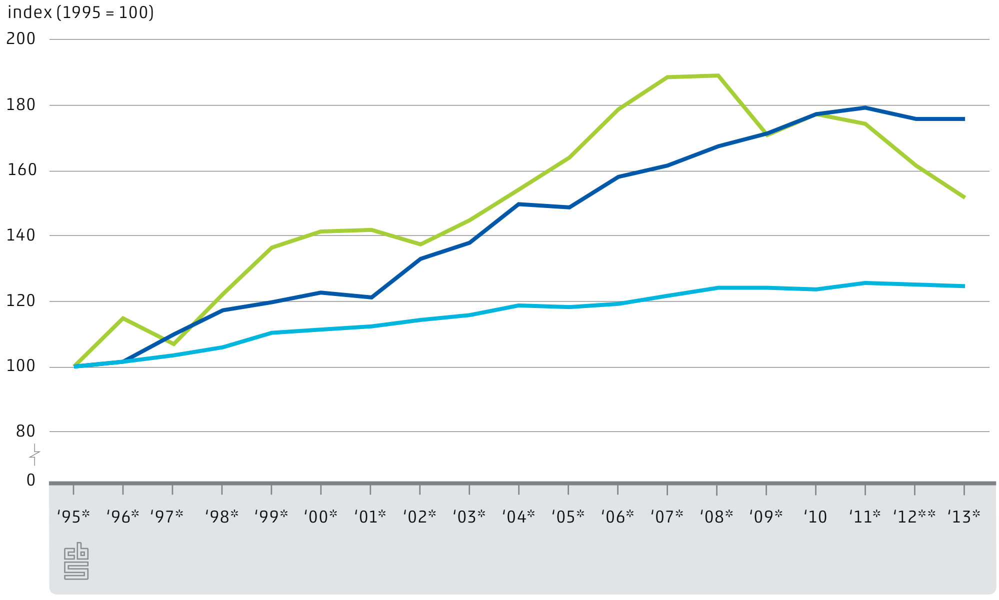


Tax on car ownership and car use diverges

Taxes on mobility (excise duties, tax on passenger cars and motor vehicles and the motor vehicle tax) have increased considerably since 1995. In 1995, mobility tax yielded 8.3 billion euros. In 2013 this had risen to 13.7 billion euros, which constitutes an increase of over 64 percent. However, the peak was in 2008, when mobility tax yielded nearly 15 billion euros. In 2013, 73 percent of the environmental taxes consisted of mobility tax.

The tax paid when purchasing a car or motor vehicle (in Dutch: *BPM*) and the motor vehicle tax are taxes on the ownership of cars. The use of cars is being taxed through excise duties on fuels. Until 2008 their ratios remained more or less the same. Then car ownership taxes taxes fell sharply, BPM in particular. BPM on environmentally friendly cars was abolished and otherwise reduced and sales of new cars declined.
In contrast, the revenues from excise duties increased from more than 72 billion euros in 2008 to nearly 76 billion euros in 2013, with a peak of more than 77 billion euros in 2011. The decrease in revenues from excise duties since 2012 was partly caused by a decrease in the number of kilometers driven. Another explanation is the fact that people in the border regions buy more fuel in Belgium and Germany, as excise duties there are lower than in the Netherlands.

1.7.4 Taxes on car ownership and car use



[1] Figures are final.

Environmentally based taxes increase rapidly

Taxes on mobility are one pillar of the total of environmental taxes. The other pillar consists of taxes under the environmentally based tax act of 1995. The latter includes taxes on tap and groundwater, the tax on gas and electricity use, fuel tax, waste tax, the tax on flying and the packaging tax. In 2013, 73 percent of total revenues of environmental taxes came from the mobility taxes. The environmentally based taxes had a 27 percent share. Despite this fairly low percentage, their revenues increased enormously in the period 1995–2013, namely over 482 percent. In 1995 these taxes together yielded 858 million euros, in 2013 their total revenues had increased to almost 5 billion euros. This is mainly due to several price increases in the electricity rates. The tax on average electricity consumption (MWh 0.8–10) increased from 13.39 euro per KWh in 1996 to 118.50 euro per KWh in 2013.

1.7.5 Environmentally based and mobility taxes