

# ENVIRONMENTAL- ECONOMIC ACCOUNTING

**Direct and indirect CO<sub>2</sub> emissions in Germany,  
2000 – 2011**



**2015**

**Federal Statistical Office of Germany**

**Published by:** Statistisches Bundesamt (Federal Statistical Office), Wiesbaden

**Homepage:** [www.destatis.de](http://www.destatis.de)

You may contact us at:  
[www.destatis.de/kontakt](http://www.destatis.de/kontakt)

Central Information Service

Phone: +49 (0) 611 / 75 24 05

Periodicity: non-recurrent

Published 19 October 2015

Order number: 5851306-15900-4 [PDF]

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## Abbreviations

IPPC	=	Intergovernmental Panel on Climate Change
UNFCCC	=	United Nations Framework Convention on Climate Change
EEA	=	Environmental-Economic Accounting
EUR	=	Euro
mn	=	million
bn	=	billion
%	=	per cent
% point	=	percentage point

## Explanation of symbols

/	=	no data because the numerical value is not sufficiently reliable
X	=	cell blocked for logical reasons

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## Introduction

Carbon dioxide (CO<sub>2</sub>) emissions can be outlined both in terms of origin and of consumption. As part of international reporting of greenhouse gases CO<sub>2</sub> emissions are reported – in terms of origin – for a certain territory based on emission sources <sup>1</sup>. When they are considered from a consumer's point of view the emissions are determined in connection with the consumption of goods and are assigned to the various consumption categories. A distinction is drawn between consumption of private households, public consumption, gross fixed capital formation and exports. In doing so a fundamental distinction is made between domestic consumption and exports. The domestic consumption of goods causes emissions domestically and abroad. These emissions can be assigned to domestic consumers. The exports likewise cause emissions in Germany and abroad and are assigned to the rest of the world <sup>2</sup>.

The calculations are based on an extended hybrid input-output model with a regionalisation of the import flows <sup>3</sup>.

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1 Greenhouse inventories as part of Kyoto Reporting in accordance with the UN Climate Convention (UNFCCC).

2 See also: Mayer, H.: "Umweltökonomische Aspekte der Globalisierung" in: *Wirtschaft und Statistik*, No. 12/2007, p. 1261 – 1269.

3 A comprehensive description of the extended Input-Output model is available at DESTATIS: [www.destatis.de/ExtendedInputOutputModel.pdf](http://www.destatis.de/ExtendedInputOutputModel.pdf)

A short overview on the methods used is included in the paper "CO<sub>2</sub>-content of German import and export goods 2000 – 2010" (Wiesbaden, February 2014) available in the Internet: [www.destatis.de/ImExResultsPDF](http://www.destatis.de/ImExResultsPDF)

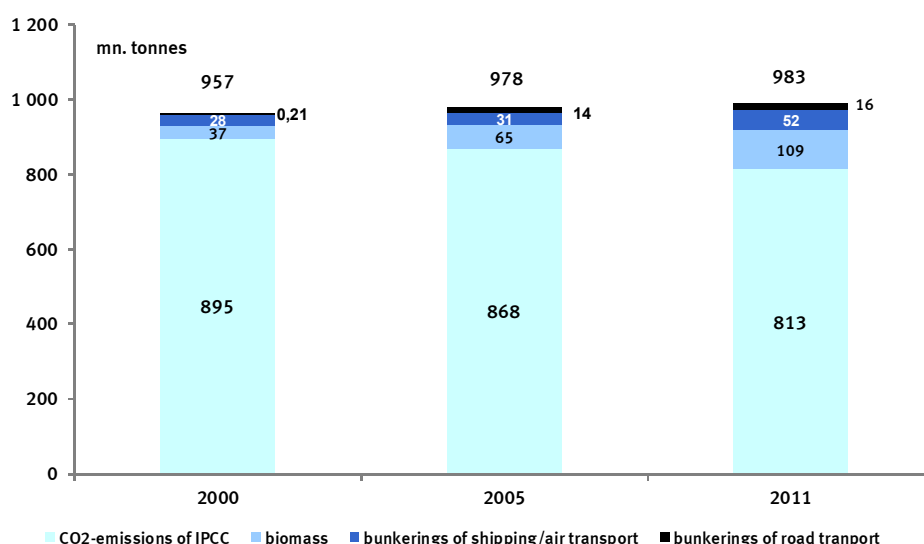
## CO<sub>2</sub> emissions by different concepts

In 2011 CO<sub>2</sub> emissions in Germany – within the delimitation of the Environmental-Economic Accounting<sup>4</sup> – amounted to 983 million tonnes. In 2000 the emissions were at 957 million tonnes. The reason for the slight rise in CO<sub>2</sub> emissions in Germany was an increased energy consumption of biomass with associated CO<sub>2</sub> emissions. Between 2000 and 2011 the emissions arising from the combustion of biomass more than tripled (2000: 37 million tonnes, 2011: 109 million tonnes).

The emissions within the delimitation of the Environmental-Economic Accounting include in addition to the emissions in the IPCC delimitation<sup>5</sup> also emissions from international shipping and aviation – but only those of residential units<sup>6</sup>. This delimitation also includes CO<sub>2</sub> emissions arising from fuel purchases abroad in road traffic and sea transport by German residents (private households and companies).

CO<sub>2</sub> emissions according to the IPCC concept – have dropped by 9.2 % from 895 million tonnes (2000) to 813 million tonnes (2011) (figure 1).

Figure 1 CO<sub>2</sub> emissions in Germany<sup>1</sup>



<sup>1</sup> 2011 data status IPCC 2015, previous years 2013.

In 2011 domestic emissions have totalled 983 million tonnes. 769 million tonnes were caused by domestic industries, 214 million tonnes by private households. In 2011 CO<sub>2</sub> emissions at the production of imports amounted to 473 million tonnes. That is more than half – 61.5 % – of the emissions of domestic origin. Indirect emissions by industries and direct emissions of private households add up to 1,456 million tonnes in 2011. This total is based on measuring and allocating emissions from a production point of view.

<sup>4</sup> Including emissions from biomass, from bunkering by residents in international shipping and aviation and from fuel purchased abroad by residents but excluding bunkering of non-residents on the territory.

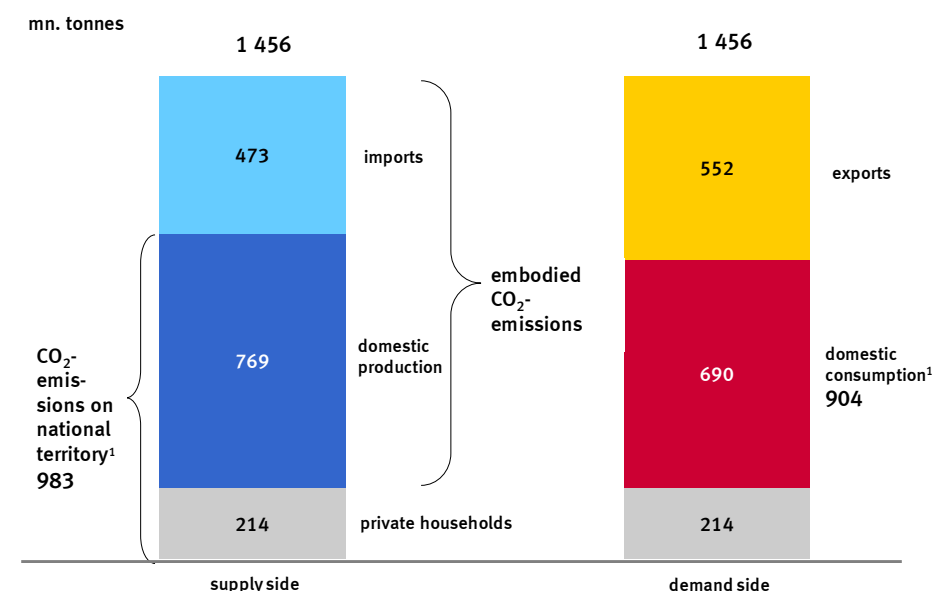
<sup>5</sup> IPCC: Intergovernmental Panel on Climate Change. Emissions excluding the position "Land use, land use change, forestry" (LULUCF).

<sup>6</sup> In international reporting of greenhouse gases all emissions from bunkering by international shipping and aviation in Germany are shown as "figures for information only". The level of these emissions is not included in the standardised final record.

## CO<sub>2</sub> emissions by different concepts

Based on the results of the model calculations CO<sub>2</sub> emissions can also be outlined from a consumption point of view (figure 2). Here a distinction is made between emissions to be assigned to domestic consumption and emissions arising from the production of exports.

Figure 2 Direct and indirect CO<sub>2</sub> emissions in Germany 2011



<sup>1</sup> Residents concept, incl. biomass and bunkering.

The emissions related to domestic consumption can be compared with domestic emissions derived from the production point of view. After deducting the CO<sub>2</sub> content of exports (552 million tonnes) from total emissions these results in CO<sub>2</sub> emissions of 904 million tonnes for domestic consumption. This figure is 79 million tonnes below the CO<sub>2</sub> emissions arising on the territory. The reason for the lower CO<sub>2</sub> figure for domestic consumption is the higher emission content of exports compared with imports.

## Supply of CO<sub>2</sub> emissions by demand areas

Between 2000 and 2011 direct CO<sub>2</sub> emissions from the combustion of fuels increased in Germany by 2.6 % from 957 million tonnes to 983 million tonnes. In 2011 thereof 214 million tonnes were emitted by households – this was 21.8 % of total direct emissions in Germany – and 769 million tonnes by industries.

In addition to the direct emissions on the territory, emissions generated abroad at the production of German imports are to be considered when talking from a consumer's point of view. These (indirect) emissions have increased by 24.7 % from 379 million tonnes (2000) to 473 million tonnes (2011). The share of these emissions compared to the total supply increased from 28.4 % (2000) to 32.5 % (2011).

Table 1 Direct and indirect CO<sub>2</sub> emissions in Germany

	2000	2005	2011	2011/2000
	mn tonnes			%
<b>Direct emissions on territory</b> <sup>1</sup> .....	<b>957</b>	<b>978</b>	<b>983</b>	<b>2.6</b>
Private households .....	236	231	214	– 9.2
Industries .....	722	747	769 <sup>3</sup>	/
<b>Imports</b> .....	<b>379</b>	<b>387</b>	<b>473</b>	<b>24.7</b>
<b>Domestic supply</b> <sup>2</sup> .....	<b>1,337</b>	<b>1,365</b>	<b>1,456</b>	<b>8.9</b>
Private households.....	236	231	214	– 9.2
Exports .....	412	488	552 <sup>3</sup>	/
<b>Goods for domestic consumption</b> ....	<b>689</b>	<b>646</b>	<b>690</b>	<b>0.1</b>
Consumer goods .....	424	413	442	4.2
Government purchases, capital formation .....	265	234	248	– 6.4
<b>Total use</b> .....	<b>1,337</b>	<b>1,365</b>	<b>1,456</b>	<b>8.9</b>
	in % of supply/use			% points
Direct emissions on territory .....	71.6	71.6	67.5	– 4.1
Private households.....	17.6	16.9	14.7	– 2.9
Industries .....	54.0	54.7	52.8	– 1.2
Imports .....	28.4	28.4	32.5	4.1
<b>Total supply/use</b> .....	<b>100</b>	<b>100</b>	<b>100</b>	
Private households.....	17.6	16.9	14.7	– 2.9
Industries .....	30.8	35.7	37.9	7.1
<b>Goods for domestic consumption</b> ....	<b>51.5</b>	<b>47.4</b>	<b>47.4</b>	<b>– 4.2</b>
Consumer goods .....	31.7	30.3	30.4	– 1.4
Government purchases, capital formation .....	19.8	17.1	17.0	– 2.8

1 As defined in Environmental-Economic Accounting (residents concept, incl. emissions from the combustion of biomass).

2 Domestic supply = direct emissions on territory + imports.

3 For 2011 data for bunkering of German ships in sea-transport are not fully comparable with previous years.

At the use side exports have the highest emissions and its share in total emissions has risen sharply – from 30.8 % (2000) to 37.9 % (2011). In 2000 consumer goods caused with a share of 31.7 % the highest emissions. The share of these emissions decreased to 30.4 % in 2011. However, direct emissions of households and those of consumer goods together still form the largest source of emissions with 45.1 % of all emissions (2011).

## Direct CO<sub>2</sub> emissions of private households and CO<sub>2</sub> content of consumer goods

Direct CO<sub>2</sub> emissions of households arise through the combustion of fuels in road transport and in the area of "housing". These direct emissions have decreased from 236 million tonnes (2000) to 214 million tonnes (2011). The emissions from the consumption of fuels for transportations have decreased by 0.3 %. Due to the temperature-related decreases in consumption of fuels for heating, a significant decrease in emissions resulted for the fuels in 2011<sup>7</sup> compared to 2005.

Table 2 Direct CO<sub>2</sub> emissions of private households and CO<sub>2</sub> content of consumer goods

	2000	2005	2011	2011/2000
	mn tonnes			%
<b>Direct emissions</b> .....	<b>236</b>	<b>231</b>	<b>214</b>	<b>- 9.2</b>
Fuels (transport) .....	100	102	100	- 0.3
Fuels (housing).....	136	128	114	- 15.8
<b>CO<sub>2</sub> contents of consumer goods</b> .....	<b>424</b>	<b>413</b>	<b>442</b>	<b>4.2</b>
of which :				
Energy products .....	119	122	130	9.8
Goods .....	152	138	159	4.9
Services <sup>1</sup> .....	153	153	152	- 0.9
<b>Total emissions</b> .....	<b>660</b>	<b>644</b>	<b>656</b>	<b>- 0.6</b>
<b>share of total emissions in %</b>				
<b>Direct emissions</b> .....	<b>35.7</b>	<b>35.8</b>	<b>32.6</b>	
<b>CO<sub>2</sub> contents of consumer goods</b> .....	<b>64.3</b>	<b>64.2</b>	<b>67.4</b>	
Energy products .....	18.0	18.9	19.9	
Goods .....	23.0	21.4	24.3	
Services <sup>1</sup> .....	23.2	23.8	23.2	
<b>tonnes per capita</b>				
<b>Total emissions</b> .....	<b>8.03</b>	<b>7.81</b>	<b>8.02</b>	<b>- 0.1</b>

1 Incl. trade and transport services.

In 2011 direct emissions accounted for 32.6 % of total direct and indirect emissions of households. Indirect emissions – 442 million tonnes in 2011 – are accumulated to more or less equal portions to the use of energy, products and services. The emissions of energy products arise mainly from the power plants generating electricity for households. Although the emission coefficients (CO<sub>2</sub> emissions per kWh produced) remained almost constant between 2000 and 2011, the emissions rose because electricity consumption of households increased by 3.8 % during that period. Between 2000 and 2011 the consumption of district heating increased also very strong by 23.4 %. This has led to a corresponding increase in emissions of heating plants.

7 The year 2011 was a relatively warm year regarding the demand for heating energy. Between 2000 and 2011 temperature adjusted a decline by 15.3 % of the emissions can be reported. See tables of Environmental-Economic Accounting, Part 3 Energy, table 3.3.6.5 "Total CO<sub>2</sub> emissions of private households – direct and indirect".

[https://www.destatis.de/DE/Publikationen/Thematisch/UmweltoekonomischeGesamtrechnungen/Querschnitt/UmweltnutzungundWirtschaftTabelle5850007137006Teil\\_2.pdf?\\_\\_blob=publicationFile](https://www.destatis.de/DE/Publikationen/Thematisch/UmweltoekonomischeGesamtrechnungen/Querschnitt/UmweltnutzungundWirtschaftTabelle5850007137006Teil_2.pdf?__blob=publicationFile)



## Direct CO<sub>2</sub> emissions of private households and CO<sub>2</sub> content . . .

The emissions of the service sector also include emissions of the trade and transport industries, which provide services to households at the distribution of goods. The emissions of the service sector have fallen in total by 0.9 %. Emissions however, have changed differently within the service sector. For example, the emissions from the transport industry, in particular because of the sharp rise in emissions from aviation, increased by 16.2 % during this period.

Between 2000 and 2011 purchases of private households in Germany have increased by 128 bn. EUR (+ 20.7 %). Their share in total purchases accounts for about 10 %. Considering only the purchases of products, then the import share is much higher: in 2011 the import share of products (excluding energy) was 30.4 %.

**Table 3 Purchases of private households**

year	domestic purchases <sup>1</sup>	purchases <sup>2</sup>				
		domestic production and imports	imports		on the territory	
			total	including: products <sup>3</sup>	total	including: products <sup>3</sup>
	2000 = 100	EUR bn				
2000 .....	100	1 024	106	92	919	198
2005 .....	102.0	1 121	120	102	1 002	186
2010 .....	105.0	1 220	115	94	1 105	213
2011 .....	107.4	1 269	128	104	1 142	237
<b>change in %</b>						
2011 zu 2000 ..	7.4	23.9	20.7	38.0	24.3	19.7
<b>% of total</b>		<b>% of products</b>		<b>% of total</b>	<b>% of products</b>	
2000 .....		100	10.3	31.8	89.7	68.2
2005 .....		100	10.7	35.5	89.3	64.5
2010 .....		100	9.4	30.5	90.6	69.5
2011 .....		100	10.1	30.4	89.9	69.6

1 Domestic purchases of private households, price-adjusted, chain-linked index.

2 At basic prices without net taxes; data from the input-output tables.

3 Purchases of goods excluding energy.

In 2011 about 67 % of the emissions from consumer goods – 288 million tonnes – have been generated in Germany, 33 % or 154 million tonnes abroad (table 4). The emissions abroad can be separated in roughly equal parts on emissions for intermediate goods and of finished consumer goods. The emissions of intermediate goods are a portion of total emissions of imported intermediate goods. This portion is linked to intermediate goods that are used domestically at the production of consumer goods.

Comparing the trend of emissions with the change of price-adjusted purchases shows that emissions – both domestically and abroad – have increased. The trends can be influenced either by changes in the composition of purchases by commodity or – when looking at the imports by origin – by changes in the supplying countries.

## Direct CO<sub>2</sub> emissions of private households and CO<sub>2</sub> content . . .

Table 4 CO<sub>2</sub> content of consumer goods

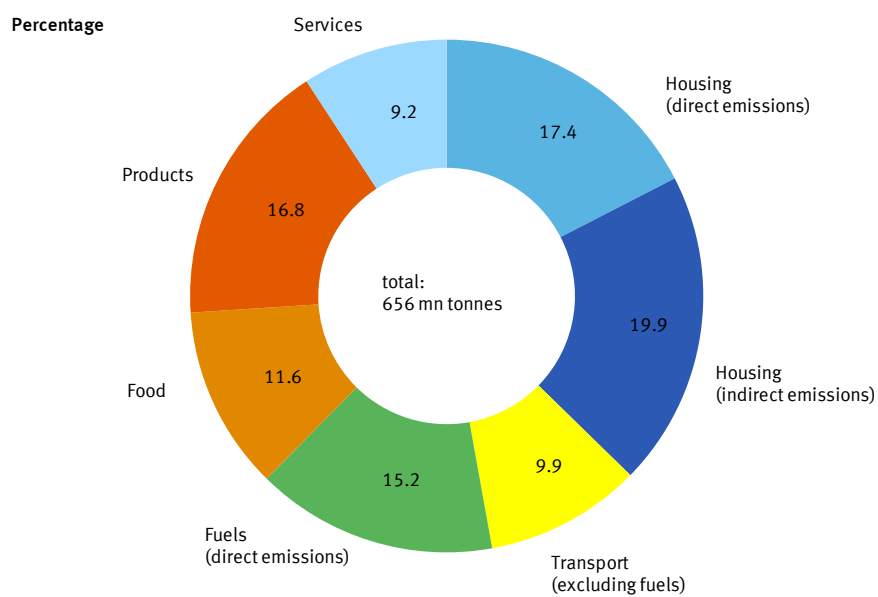
Year	CO <sub>2</sub> content				
	total	on the territory	abroad	at the production of	
				intermediate consumption for domestic consumption	final goods
	mn tonnes				
2000 .....	424	284	140	67	73
2005 .....	413	278	134	67	68
2010 .....	442	293	149	81	68
2011 .....	442	288	154	84	70
change in %					
2011 zu 2000 .....	4.2	1.3	10.1	25.2	– 3.9
% of total					
2000 .....	100	67.0	33.0	15.9	17.1
2005 .....	100	67.4	32.6	16.1	16.4
2010 .....	100	66.3	33.7	18.2	15.5
2011 .....	100	65.1	34.9	19.1	15.8

For example, price-adjusted purchases of services showed an increase of 9.2 %, much more than the increase of total purchases<sup>8</sup>. The purchases of everyday consumer goods, however, declined by 5.7 %. Since the production of goods usually requires a higher energy input and thus higher CO<sub>2</sub> emissions than average, a shift of purchases towards services contributes to a reduction in total emissions. However, certain service activities, such as transport activities, also have relatively high specific emissions. Also telecommunications services cause – when involving backward linkages – high emissions.

Direct and indirect emissions can be grouped according to “areas of demand”. About 37 % of the emissions can be assigned to the area of “housing”, another 24.5 % are assigned to “transport”. These areas already account for more than two thirds of total emissions. Another important area is “food” with a share of 11.6 %. The remaining emissions can be attributed with 16.8 % to miscellaneous products and 9.2 % to the services.

<sup>8</sup> See Volkswirtschaftliche Gesamtrechnungen (National Accounts), Fachserie 18, Reihe 1.4, 2012, Tabelle 3.3.4.

Figure 3 Direct CO<sub>2</sub> emissions of private households and CO<sub>2</sub> emissions of consumer goods by areas of demand 2011



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## **CO<sub>2</sub> emissions of imported consumer goods by country of origin**

In 2011 most imports of goods came from the Netherlands (EUR 81.9 billion). This is followed by China and France with imports of EUR 79.5 billion and EUR 65.2 billion. These three countries are also the most important countries for imported consumer goods. With purchases of EUR 11.3 billion China is here in the first place.

Looking at the CO<sub>2</sub> emissions of consumer goods the Netherlands with emissions of 13.9 million tonnes is the country with the highest emissions (table 5). This corresponds to a share of 9.0 % of total CO<sub>2</sub> emissions of imports of consumer goods (including imported intermediate goods). This is followed by China and France with shares of 8.1 % and 4.7 % respectively. For the Netherlands, the emissions of imported intermediate goods are the highest of all countries. The reason for this is that particular agricultural and chemical products are imported, which cause relatively high CO<sub>2</sub> emissions at their production. China and France, however, export much less intermediate goods with high CO<sub>2</sub> emissions to Germany. In Russia, high CO<sub>2</sub> emissions occur during the transport of natural gas and oil to Germany, which are used in Germany directly by private households or as intermediate goods at the production of consumer goods.

## CO<sub>2</sub> emissions of imported consumer goods . . .

Table 5 Imports by country of origin and CO<sub>2</sub> emissions 2011

Country	Imports					
	products <sup>1</sup>			consumer goods <sup>2</sup>		
	EUR mn	%	rank	EUR mn	%	rank
<b>Total</b> .....	<b>899,403</b>	<b>100</b>		<b>114,282</b>	<b>100</b>	
China .....	79,490	8.8	2	11,315	9.9	1
Netherlands .....	81,850	9.1	1	10,149	8.9	2
France .....	65,171	7.2	3	8,538	7.5	3
Italy .....	48,155	5.4	5	7,491	6.6	4
United States .....	48,304	5.4	4	6,400	5.6	5
United Kingdom .....	44,827	5.0	6	5,804	5.1	6
Austria .....	37,098	4.1	9	5,132	4.5	7
Poland .....	32,363	3.6	12	4,704	4.1	8
Belgium .....	38,340	4.3	8	3,904	3.4	9
Czech Republic .....	32,446	3.6	11	3,774	3.3	10
Spain .....	22,541	2.5	14	3,708	3.2	11
Switzerland .....	36,750	4.1	10	3,582	3.1	12
Japan .....	23,545	2.6	13	2,112	1.8	13
Brasilia .....	11,194	1.2	17	1,739	1.5	14
Sweden .....	14,065	1.6	16	1,228	1.1	15
Norway .....	20,601	2.3	15	426	0.4	16
Russia .....	40,550	4.5	7	366	0.3	17
<b>Sum</b> .....	<b>677,290</b>	<b>75.3</b>		<b>80,370</b>	<b>70.3</b>	
<b>Other</b> .....	<b>222,112</b>	<b>24.7</b>		<b>33,912</b>	<b>29.7</b>	

Country	CO <sub>2</sub> emissions				
	total			of which	
	mn tonnes	%	rank	final use	intermediate consumption
				mn tonnes	
<b>Total</b> .....	<b>154,3</b>	<b>100</b>		<b>69.9</b>	<b>84.4</b>
China .....	12,6	8.1	2	7.3	5.3
Netherlands .....	13,9	9.0	1	6.6	7.3
France .....	7,3	4.7	5	3.0	4.3
Italy .....	6,2	4.0	8	2.7	3.5
United States .....	6,7	4.4	7	3.0	3.7
United Kingdom .....	5,8	3.7	9	2.3	3.5
Austria .....	4,9	3.2	11	2.0	2.9
Poland .....	7,2	4.7	6	3.1	4.1
Belgium .....	5,1	3.3	10	1.8	3.3
Czech Republic .....	8,5	5.5	4	4.1	4.4
Spain .....	2,7	1.8	12	1.2	1.5
Switzerland .....	2,2	1.4	13	0.9	1.3
Japan .....	2,0	1.3	14	0.9	1.2
Brasilia .....	1,7	1.1	16	0.7	1.0
Sweden .....	1,7	1.1	17	0.5	1.2
Norway .....	1,9	1.2	15	0.7	1.2
Russia .....	9,7	6.3	3	3.6	6.2
<b>Sum</b> .....	<b>100,1</b>	<b>64.9</b>		<b>44.5</b>	<b>55.7</b>
<b>Other</b> .....	<b>54,2</b>	<b>35.1</b>		<b>25.4</b>	<b>28.7</b>

1 Source: Foreign Trade Statistics.

2 Products (excluding energy) and services. Only finished goods without intermediate consumption.  
Total Imports (cif) for private consumption including energy amounted to EUR 127.7 billion.

## CO<sub>2</sub> emissions of exports

Between 2000 and 2011 CO<sub>2</sub> emissions of exports as a whole rose by 33.9 % from 412 million tonnes to 552 million tonnes. In 2011 domestic production with 339 million tonnes makes up somewhat more than half (61 %) of these emissions (Table 6). The remaining emissions – 213 million tonnes – are attributed to the production of imported raw materials and supplies used at the domestic production of exports. These emissions increased strongly both in absolute terms (+ 51 %) and pro rata. In 2000 these emissions accounted for 34.1 % of total emissions, in 2011 this share rose to 38 %.

In spite of the rise in the import portion, the domestic manufacture of exports is the most significant source for CO<sub>2</sub> emissions in Germany. In 2011 44 % of all CO<sub>2</sub> emissions from domestic industries arose in the production of exports. In 2000 the share was just under 38 %.

Table 6 CO<sub>2</sub> emissions of exports

	2000	2005	2011	2011/2000
	mn Tonnes			%
<b>Exports</b> .....	<b>412.0</b>	<b>487.8</b>	<b>551.9</b>	<b>33.9</b>
Domestic production .....	271.4	320.3	339.4	25.1
Imported intermediate consumption .	140.6	167.5	212.5	51.1
<b>Imports</b> .....	<b>379.3</b>	<b>387.1</b>	<b>472.9</b>	<b>24.7</b>
<b>Exports less Imports</b> .....	<b>32.7</b>	<b>100.7</b>	<b>79.0</b>	<b>X</b>
Domestic production .....	721.6	747.2	768.5	6.5
	in % of domestic production			% points
Exports from domestic production.....	37.6	42.9	44.2	6.6

The substantial rise in domestic and foreign CO<sub>2</sub> emissions for exports can be explained by a sharp increase of exports between 2000 and 2011 (table 7). Exports at current prices (excluding re-exports) rose by 85.7 % between 2000 and 2011. Price-adjusted exports increased by 77.5 %.

Table 7 Exports

	2000	2005	2010	2011	11/00
	EUR bn				%
<b>Total exports (fob)</b> .....	<b>636.2</b>	<b>847.9</b>	<b>1,066.5</b>	<b>1,185.5</b>	<b>86.3</b>
cif/fob correction <sup>1</sup> .....	- 2.6	- 2.0	- 2.3	- 2.4	- 5.9
Final consumption expenditure of non-residents in the territory .....	18.8	22.4	25.4	26.3	39.5
Re-exports .....	94.0	140.5	162.3	180.1	91.6
<b>Exports (adjusted)</b> .....	<b>652.5</b>	<b>868.4</b>	<b>1,090.1</b>	<b>1,211.5</b>	<b>85.7</b>
Products .....	562.2	740.0	918.3	1,030.1	83.2
Services.....	90.3	144.3	171.7	181.4	100.9
	price-adjusted; chain index (2010 = 100)				
<b>Exports</b> .....	<b>61.0</b>	<b>81.4</b>	<b>100</b>	<b>108.3</b>	
Products .....	61.9	82.4	100	108.8	
Services .....	56.0	75.9	100	105.4	

Source: Federal Statistical Office; Input-Output Accounts.

<sup>1</sup> Cif: cost, insurance and freight; fob: free on board.

## CO<sub>2</sub> emissions of exports

In parallel with the increase of exports domestic industries have increased the amount of imported materials and supplies as a proportion of their intermediate consumption. This share increased from 18.6 % to 20.2 % (table 8). This increase is a main reason for the rise of embodied emissions of imported materials and supplies. Within the industries the car manufacturing industry showed a significant rise in the import share with an increase from 21.9 % (2000) to 26.2 % (2011).

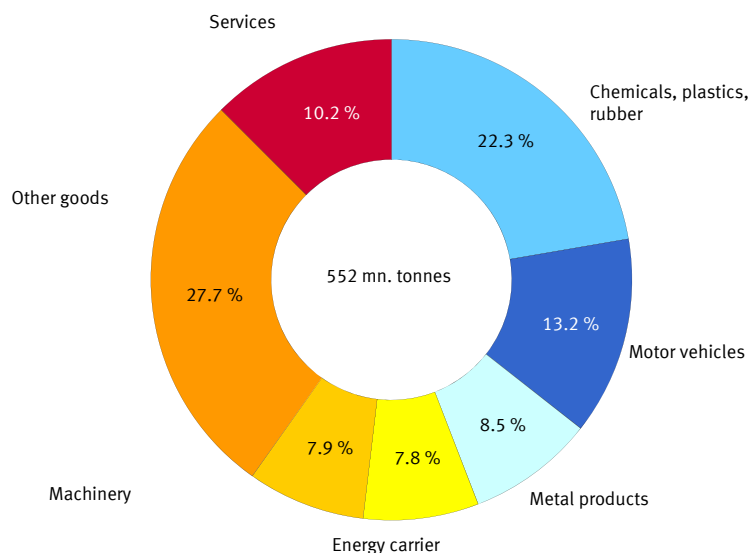
**Table 8 Shares for imported intermediate goods**

Industries	2000	2005	2011	2011/2000
	%			% points
<b>Total industries</b> .....	<b>18.6</b>	<b>19.7</b>	<b>20.2</b>	<b>1.7</b>
Thereof:				
Manufacture of motor vehicles .....	21.9	24.3	26.2	4.3
Manufacture of machinery .....	25.1	25.2	27.3	2.3
Manufacture of chemicals .....	24.5	22.1	24.0	- 0.5

Source: Federal Statistical Office; Input-Output Accounts (several years of publications).

In the case of exports most emissions arise in the production of chemical and plastic products (22.3 %) and of motor vehicles (13.2 %). The export of metal products with a share of 8.5 % also causes high emissions.

**Figure 4 CO<sub>2</sub> emissions of exports in terms of goods 2011**

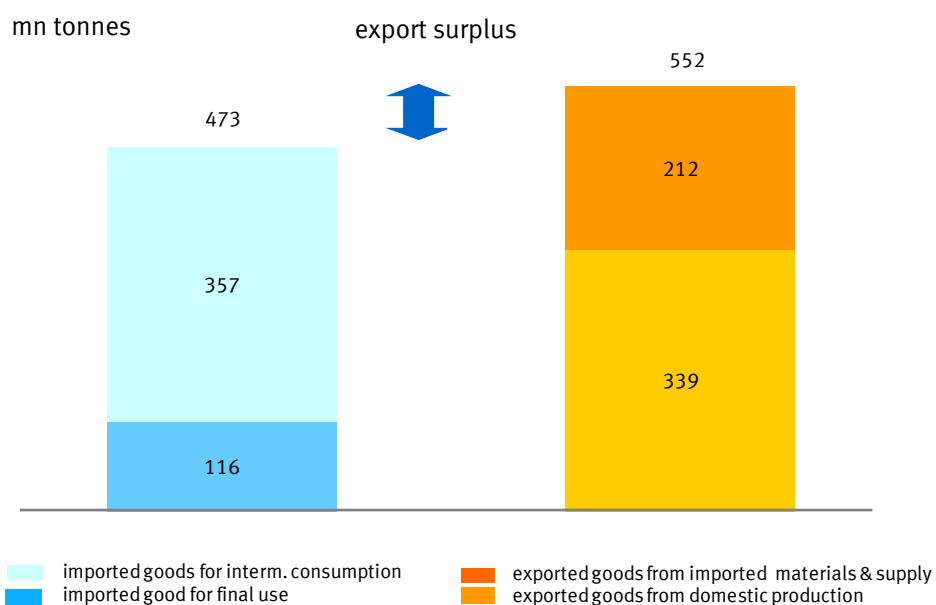


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## CO<sub>2</sub> emissions of imports and foreign trade balance

In 2011 total CO<sub>2</sub> emissions of imports were 473 million tonnes (figure 5), CO<sub>2</sub> content of exports was 552 million tonnes. This resulted in a CO<sub>2</sub>-surplus of exports over imports of 79 million tonnes.

Figure 5 CO<sub>2</sub> emissions at the production of imports and exports to and from Germany 2011



By far the largest portion of CO<sub>2</sub> emissions for imports – 357 million tonnes or just under 75 % of total emissions of imports – applies to materials and supplies. The production of finished goods (consumer goods and capital goods) accounted for 116 million tonnes of CO<sub>2</sub>.

For imports too CO<sub>2</sub> emissions related to (German) exports were the most important driver. In 2011 212 million tonnes of CO<sub>2</sub> arose during the production of materials and supplies for German export production in the supplier countries. That is 38 % of all CO<sub>2</sub> emissions related to imports. These emissions are influenced by the dynamic growth of exports and the increase in the purchase of imported materials and supplies (see tables 7 and 8).



## CO<sub>2</sub> emissions of imports by country of origin

In 2011 by far the highest emissions resulting from German imports occurred in China: 38.8 million tonnes, followed by the Netherlands (36.9 million tonnes) and the Czech Republic (26.9 million tonnes).

China is second in imports of commodities, but first at CO<sub>2</sub> emissions. This is mainly due to the energy- and CO<sub>2</sub>-intensive production of commodities by using a high amount of coal at the generation of electricity. The high CO<sub>2</sub> content of imports from the Netherlands can be explained by the relatively high emission coefficients for the most important import commodities: The Netherlands has the highest shares of imports in the case of agricultural products, food products and basic chemicals. The industries producing these products have relatively high emission coefficients compared to other European countries. In the case of electricity generation – this is the industry that accounts for by far the most emissions – the Netherlands also has relatively high emission coefficients.

Table 9 CO<sub>2</sub> emissions of imports 2011 by country of origin

Country	CO <sub>2</sub> emissions					total imports		
	total			of which		products <sup>1</sup>		
				final use	inter- mediate consump- tion			
	mn tonnes	%	rank	mn tonnes		EUR mn	%	rank
<b>Total</b> .....	<b>472.9</b>	<b>100</b>		<b>115.8</b>	<b>357.1</b>	<b>899,403</b>	<b>100</b>	
Netherlands .....	36.9	7.8	2	8.8	28.1	81,850	9.1	1
China .....	38.8	8.2	1	14.8	24.0	79,490	8.8	2
France .....	25.5	5.4	4	6.2	19.3	65,171	7.2	3
United States .....	21.5	4.5	7	6.0	15.5	48,304	5.4	4
Italy .....	20.8	4.4	8	5.0	15.7	48,155	5.4	5
United Kingdom ....	18.8	4.0	9	4.2	14.5	44,827	5.0	6
Russia .....	25.4	5.4	5	3.7	21.7	40,550	4.5	7
Belgium .....	18.5	3.9	10	2.8	15.7	38,340	4.3	8
Austria .....	17.9	3.8	11	3.8	14.1	37,098	4.1	9
Switzerland .....	7.7	1.6	14	1.9	5.8	36,750	4.1	10
Czech Republik.....	26.9	5.7	3	7.0	19.9	32,446	3.6	11
Poland .....	23.4	5.0	6	5.5	18.0	32,363	3.6	12
Japan .....	8.0	1.7	13	2.5	5.5	23,545	2.6	13
Spain .....	8.0	1.7	12	1.9	6.1	22,541	2.5	14
Norway .....	4.8	1.0	17	1.0	3.8	20,601	2.3	15
Sweden .....	5.8	1.2	15	0.9	4.9	14,065	1.6	16
Brasilia .....	4.9	1.0	16	1.0	3.9	11,194	1.2	17
<b>Sum</b> .....	<b>313.5</b>	<b>66.3</b>		<b>77.0</b>	<b>236.4</b>	<b>677,290</b>	<b>75.3</b>	
<b>Other</b> .....	<b>159.5</b>	<b>33.7</b>			<b>120.7</b>	<b>222,112</b>	<b>24.7</b>	

1 Source: Foreign Trade Statistics.