DESTATIS
Statistisches Bundesamt

ENVIRONMENTAL-ECONOMIC ACCOUNTING

Transport performance and energy consumption in road transport 2005 – 2016

2018

Published by: Statistisches Bundesamt (Destatis)/Federal Statistical Office (Destatis)

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Periodicity: irregular
Published on November 29th, 2018
Order number: 5850023-16900-4 [PDF]

Contents

Abbreviations, measures and symbols

DIW = German Institute for Economic Research (Berlin)
EB = energy balance
EEA = Environmental-Economic Accounting
KBA = Federal Motor Transport Authority
LDV = light duty vehicle
NA = National Accounts

bn. = billion
km = kilometre
PJ = petajoule (10^{15}joules)
l = litre
mill. = million
t = tonne
tkm = tonne-kilometre
veh.-km = vehicle-kilometre
yr = year
› = more than
‹ = less than
X = cell blocked for logical reason

Introduction

The transport sector – especially motorised road transport – is a significant consumer of energy. According to the national energy balance (source: Arbeitsgemeinschaft Energiebilanzen), road transport accounted for 24.6 % of total final energy consumption in 2016. In the energy balance, fuel consumption in road transport is reported in the form of an aggregate only. However, precise knowledge of the subsectors of road transport, e.g. by type of vehicles, is essential for both determining the causes of environmental pressures – especially air pollutants and greenhouse gas emissions – and formulating policy measures to limit and to reduce environmental burdens.

In the National Accounts (NA) the resident concept is used in recording economic activities. Regarding transport this means that all relevant activities of domestic units, including activities outside the national territory, are included in the accounts. In contrast transport activities of non-resident units are excluded.

Due to the close relationship between Environmental-Economic Accounting (EEA) and NA, the resident concept is also used for recording road transport in Environmental-Economic Accounting. This refers to account for mileage, transport performance and the related fuel consumption of residents.

By contrast, the national energy balance is related to the sales quantities of fuels on domestic territory, regardless of who – residents or non-residents – carries out the refuelling (territorial or domestic concept) [1].

For reasons of consistency with the energy balance, fuel consumption accounts include not only data according to the resident concept, but also so-called 'bridging items' which allow the transition to the domestic concept.

Detailed road transport results are contained in the EEA publication “UGR-Tabellenband” (Part 5 “Transport and the environment”: mileages, energy consumption and air emissions). This report shows summarized results

At first it provides an overview of energy consumption in road transport by type of vehicle and by type of fuel for the period 2005 to 2016 (data for reference year 2016 are partially preliminary). In addition, results of energy consumption are presented in a breakdown by group of vehicle keepers (cf. table 2). The next section provides an analysis of the changes of mileages.

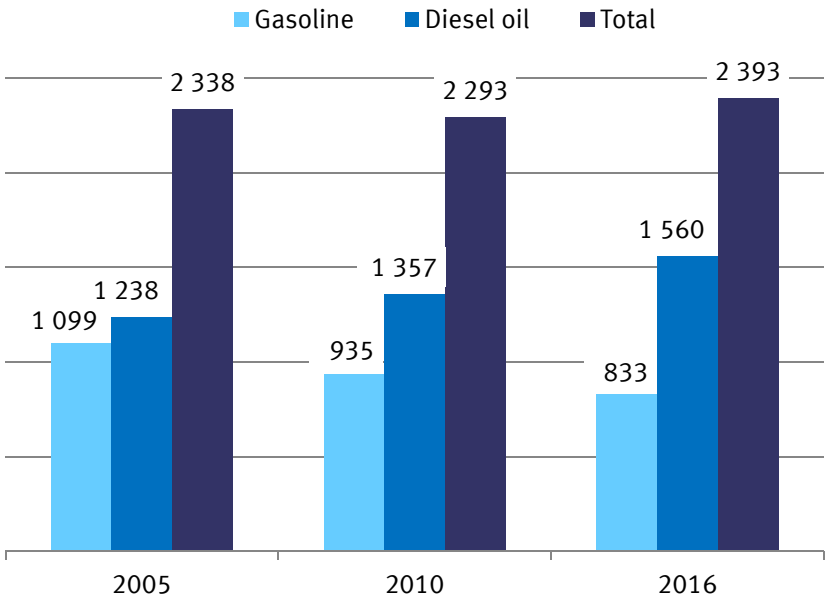
This is followed by a more detailed analysis of the vehicle stock, mileage and fuel consumption of cars and trucks. Finally, transitions between the domestic and the resident concept are demonstrated using trucks as an example.

1 Source for the data in the energy balance with regard to refinery products is the Federal Office for Economic Affairs and Export Control (BAFA): Amtliche Mineralöldaten für die Bundesrepublik Deutschland, Table 7: Inlandsablieferungen nach ausgewählten Verwendungssektoren.

1 Energy consumption in road transport

In 2016, road transport, as defined in the energy balance, had a share of 24.6 % in total final energy consumption. In 2005 the proportion was 23.6 %. Total final energy consumption slightly declined from 9,127 PJ to 9,071 PJ (– 0.6 %) during that period. However, energy consumption in road transport (domestic fuelling of gasoline, diesel oil, biodiesel and bioethanol) increased by 3 %. In 2016 energy consumption of residential units in road transport amounted to 2,393 PJ, which was an increase of 2.4 % since 2005 (see table 1). According to the relevant definition, residents' refuelling abroad was taken into account in addition to the domestic refuelling of residents, but refuelling of non-residents on the domestic territory was excluded. The reason for the increase in residents' energy consumption being slightly smaller than that of domestic refuelling was that part of the refuelling of residents abroad was relocated back to the domestic territory. This applies to both the residents' refuelling abroad and the refuelling of non-residents in connection with trips in or through Germany. Between 2005 and 2012 refuelling of residents abroad increased by a good 5 %. After that time this refuelling has been significantly reduced because of the shrinking differences in fuel prices between Germany and its neighbouring countries. Both residents and non-residents refuelled their vehicles again more often in Germany.

Figure 1 **Energy consumption in road transport (resident concept) 2005 – 2016**
Petajoules (PJ)



Different trends were observed for the various types of motor vehicles. Between 2005 and 2016, energy consumption of cars increased sligthly by 1.7 % according to the resident concept. In the same period, energy consumption of light duty vehicles (LDV) increased sharply by 32.9 %. An opposite trend was however observed for heavy duty vehicles. Their energy consumption declined markedly (– 3.9 %) from 2005 to 2016. A decrease in energy consumption (– 2.3 %) was observed for motorbikes too (cf. table 1).

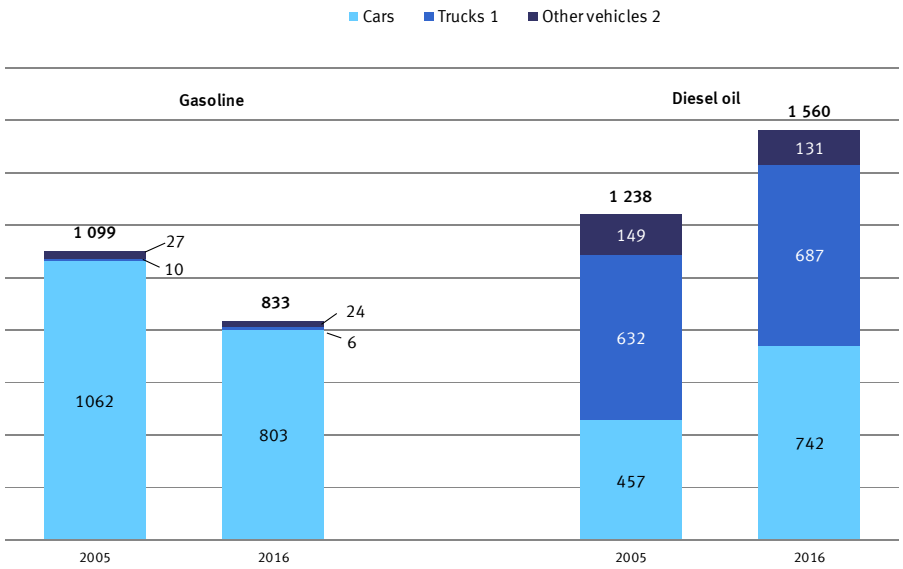
Table 1 **Energy consumption in road transport by vehicle type**

Vehicle typ	2005	2010	2015	2016 [1]	2016 to 2005
	Petajoule				%
Cars	1,519.1	1,4 84.7	1,516.1	1,545.1	*1.7*
Gasoline engine	1.062.3	905.6	802.6	802.8	*– 24.4*
Diesel engine	456.8	579.1	713.5	742.4	*62.5*
Motor bikes	22.8	20.7	21.9	22.2	*– 2.3*
LDV [2]	208.6	236.5	266.1	277.2	*32.9*
Gasoline engine	*9.9*	7.2	6.3	6.5	*– 34.5*
Diesel engine	198.7	229.3	259.8	270.7	*36.2*
Heavy duty transportation	433.2	435.0	414.1	416.4	*– 3.9*
Trucks	202.0	187.3	184.9	186.0	*– 7.9*
Truck-trailers	231.2	247.6	229.2	230.4	*– 0.3*
Buses	37.8	33.8	34.1	34.9	*– 7.5*
Other vehicles [3]	116.2	82.0	94.8	97.3	*– 16.3*
Gasoline engine	4.5	1.8	1.5	1.4	*– 68.4*
Diesel engine	111.7	80.2	93.3	95.9	*– 14.1*
Total residents	**2,337.7**	**2,292.6**	**2,347.1**	**2,393.2**	***2.4***
– Refueling of residents abroad	250.9	266.8	237.8	240.5	*– 4.1*
+ Refueling of non-residents on the territory	57.6	53.0	53.7	55.6	*– 3.5*
= Road transport on the territory	**2,144.4**	**2,078.8**	**2,163.0**	**2,208.3**	***3.0***
+ refueling of other motor fuels (gasoline, liquid gas, electricity, biomethane)	5.5	30.6	28.4	24.4	*345.2*
= Road transport on the territory (EB) [4]	**2,149.9**	**2,109.3**	**2,191.4**	**2,232.8**	***3.9***
Total transport (EB) [4,5]	**2,586.2**	**2,559.3**	**2,620.8**	**2,689.7**	***4.0***
Final energy consumption (EB) [4]	**9,127.4**	**9,309.7**	**8,898.1**	**9,071.2**	***– 0.6***
	% of final energy consumption				
Road transport on the territory (EB) [4]	***23.6***	***22.7***	***24.6***	***24.6***	X
Total transport (EB) [4,5]	***28.3***	***27.5***	***29.5***	***29.7***	X

Incl. bio-fuels, without gasoline, liquid gas, electricity, biomethane.
1 Preliminary.
2 LDV = Light duty vehicles (net load ‹ 3,5 t).
3 Tractors, Excavators, police and similar vehicles, mobile homes; from 2006 on mobile homes are registered with cars.
4 EB = Energiebilanz (energy balance), incl. Gasoline, liquid gas, electricity, biomethane.
5 Road transport, inland water transport, railway transportation, aviation..

Looking at energy consumption of vehicles by engine type, gasoline (petrol) consumption and diesel oil consumption moved in opposite directions (cf. figure 2). While consumption of petrol (including bioethanol) dropped by almost 24.2 % from 1,099 PJ (2005) to 833 PJ (2016), consumption of diesel oil (including biodiesel) increased by 26 % from 1,238 PJ (2005) to 1,560 PJ (2016). In 2005 diesel consumption accounted for just over half of total fuel consumption (53 %), whereas the relevant share was over 65 % in 2016.

Figure 2 **Energy consumption in road transport by vehicle type 2005 and 2016**
Petajoule (PJ)



1 Gasoline: light duty vehicles; Diesel oil: Truck trailors, trucks and light duty vehicles. 2 Motor bikes, tractors, buses, other.

The strong decline in gasoline consumption was mainly due to the smaller quantities consumed by cars (– 24.4 %). By contrast, diesel consumption of cars increased significantly (+ 62.5 %). With regard to all diesel vehicles, in 2005 (heavy duty and light duty) trucks accounted for markedly more than half of total diesel consumption (51 %), which was equal to an energy amount of 632 petajoules. Consumption of cars was equal to 457 Petajoule (36.9 %). In 2016, however, cars consumed much more diesel oil (742 PJ, 47.6 %) than trucks (687 PJ, 44 %).

Table 2 gives an overview on energy consumption by group of vehicle keepers. It shows that households accounted for more than 83 % and industries for almost 17 % of energy consumption of cars in 2016. Regarding heavy duty transport (heavy duty trucks, trailer trucks), commercial transport accounted for 67.1 % of energy consumption and other vehicle keepers for the rest. Own-account transport of the manufacturing sector is included here, too.

Table 2 **Energy consumption by owner groups and vehicle type 2016**

Owner group	Total	Cars	Trucks. truck-trailers	Light duty trucks	Other [1]
	Petajoule				
Agriculture, forestry and fishing	64.0	1.5	3.1	3.7	55.7
Mining and quarrying	3.0	0.5	1.7	0.6	0.2
Manufacturing	87.9	46.7	15.5	23.3	2.5
Electricity, gas and water supply and waste disposal	69.8	12.0	39.0	14.8	4.0
Construction	67.9	12.6	12.2	41.0	2.1
Wholesale and retail trade; repair of motor vehicles	134.0	38.2	45.8	44.1	5.9
Transport and storage	365.8	21.7	279.4	35.7	29.1
Hotels and restaurants	5.2	3.3	0.0	1.7	0.2
Information and communication	32.5	12.8	10.1	8.2	1.4
Financial intermediation. Real estate. renting and business activities	114.4	75.5	2.8	29.2	6.9
Public administration and defence; compulsory social security	31.4	8.6	0.3	7.6	14.9
Education	2.4	1.5	0.3	0.5	0.2
Health and social work	15.1	11.9	0.1	2.1	1.0
Other services	31.5	13.4	6.0	9.7	2.4
Industries	1,025.0	260.0	416.4	222.1	126.5
Private households	1,368.2	1,285.1	0.0	55.1	28.0
Industries and private households (residents concept) [2]	2,393.2	1,545.1	416.4	277.2	154.5
Balance of refueling [3]	– 184.9	– 103.3	– 65.9	– 15.7	0.0
Industries and private households (territorial concept)	2,208.3	1,441.9	350.5	261.5	154.5
	In % of total energy consumption				
Agriculture, forestry and fishing	*2.7*	*0.1*	*0.8*	*1.3*	*36.1*
Mining and quarrying	*0.1*	*0.0*	*0.4*	*0.2*	*0.1*
Manufacturing	*3.7*	*3.0*	*3.7*	*8.4*	*1.6*
Electricity, gas and water supply and waste disposal	*2.9*	*0.8*	*9.4*	*5.4*	*2.6*
Construction	*2.8*	*0.8*	*2.9*	*14.8*	*1.4*
Wholesale and retail trade; repair of motor vehicles	*5.6*	*2.5*	*11.0*	*15.9*	*3.8*
Transport and storage	*15.3*	*1.4*	*67.1*	*12.9*	*18.8*
Hotels and restaurants	*0.2*	*0.2*	*0.0*	*0.6*	*0.1*
Information and communication	*1.4*	*0.8*	*2.4*	*3.0*	*0.9*
Financial intermediation. Real estate. renting and business activities	*4.8*	*4.9*	*0.7*	*10.5*	*4.5*
Public administration and defence; compulsory social security	*1.3*	*0.6*	*0.1*	*2.7*	*9.7*
Education	*0.1*	*0.1*	*0.1*	*0.2*	*0.1*
Health and social work	*0.6*	*0.8*	*0.0*	*0.8*	*0.6*
Other services	*1.3*	*0.9*	*1.4*	*3.5*	*1.6*
Industries	*42.8*	*16.8*	*100*	*80.1*	*81.9*
Private households	*57.2*	*83.2*	*0.0*	*19.9*	*18.1*
Industries and private households (residents concept) [2]	*100*	*100*	*100*	*100*	*100*

Incl. Bio-fuels. Preliminary.
1 Tractors, excavators, police and similar vehicles, mobile homes; from 2006 on mobile homes are registered with cars.
2 Residents concept: incl. refueling of residents abroad, exclusive refueling of non-residents on the territory.
3 Balance of refueling: refueling of non-residents on the territory minus refueling of residents abroad..

2 Mileage in road transport

Total mileage in road transport - according to the resident concept - increased by 10.5 % between 2005 and 2016 (cf. table 3). The mileage of cars increased in the same extent by 10.2 %. Looking at cars in a breakdown by engine type, mileage shows a trend similar to that of energy consumption: mileage of diesel cars rose sharply by 64.3 %, whereas mileage of gasoline models decreased by 15.6 %. These changes were due to the trend away from petrol to diesel vehicles (cf. chapter 3).

Table 3 **Mileage in road transport by vehicle type**

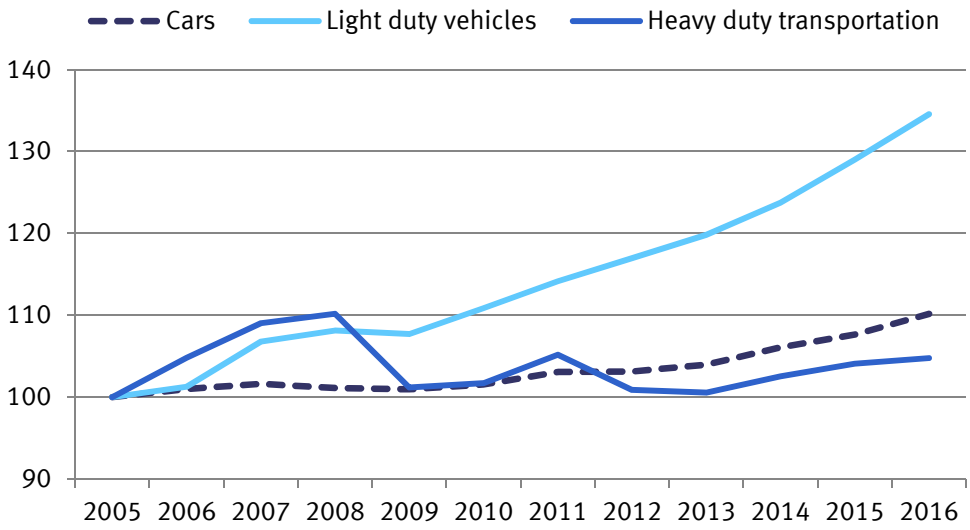
Vehicle typ	2005	2010	2015	2016 [1]	2016 to 2005
	bn.km				%
Cars	**577.8**	**587.1**	**622.3**	**636.9**	***10.2***
Gasoline engine	391.1	349.4	328.0	330.2	*– 15.6*
Diesel engine	186.7	237.7	294.3	306.7	*64.3*
Motor bikes	17.3	16.3	17.4	17.6	*1.9*
LDV [2]	**43.6**	**47.6**	**54.9**	**57.2**	***31.1***
Gasoline engine	2.4	1.9	1.7	1.8	*– 27.2*
Diesel engine	41.2	45.7	53.1	55.4	*34.5*
Heavy duty transportation	**28.9**	**29.3**	**30.0**	**30.2**	***4.8***
Trucks	13.3	12.4	12.9	13.0	*– 2.4*
Truck-trailers	15.5	16.9	17.1	17.2	*10.9*
Buses	3.5	3.3	3.3	3.4	*– 3.4*
Other vehicles [3]	**12.8**	**8.5**	**9.8**	**10.0**	***– 21.6***
Gasoline engine	0.8	0.3	0.3	0.3	*– 66.3*
Diesel engine	12.0	8.2	9.5	9.8	*– 18.7*
Total residents	**683.9**	**792.1**	**737.7**	**755.4**	***10.5***

Inclusive mileage with bio-fuels.
1 Preliminary.
2 LDV = Light duty vehicles (net load 3,5 t).
3 Tractors, excavators, police and similar vehicles, mobile homes; from 2006 on mobile homes are registered with cars.
Source: German Institut for Economic Research (DIW - Berlin)

Mileage of heavy duty transport increased by 4.8 %. The rise was completely due to the strong increase in mileage of trailer trucks (+ 10.9 %), while other trucks showed a decline of 2.4 %. These changes were caused by shifting transports to trailer trucks whose transport volumes are larger and therefore less costly compared to other trucks.

Looking at the mileage of heavy duty transport over time shows considerable increases until 2008 (+10.2% compared with 2005). The economic crisis in 2009 stopped this trend abruptly and led to a drop in mileage (2009 to 2008: – 8.2 %). The 2008 level (31.8 bn. km) was not reached again until 2016 (2016 to 2009: + 3.6 %). In contrast, a steady increase was recorded in road freight transport by light duty vehicles (LDV). Over the whole period, mileage increased by 31.1 %.

Figure 3 **Mileage in road transport by selected vehicle types 2005 – 2016**
2005 = 100



3 Vehicle stock, mileage and fuel consumption of cars

Data on the vehicle stock are collected by the Federal Motor Transport Authority in Germany (Kraftfahrtbundesamt - KBA). Due to changes in measuring the stock of vehicles registered (cars temporarily taken off the road have not been included since 2007), the number of vehicles recorded in 2016 cannot be directly compared with that of 2005. Therefore, the overall change between 2005 and 2016 indicated in table 4 represents the total of the changes in sub-periods 2005 to 2006 and 2007 to 2016. Between 2005 and 2006 the number of cars was up 1.7 %, while stocks increased markedly by almost 10 % from 2007 to 2016. Consequently, the increase over the whole period was 11.6 %, which was the result of adding up the proportions for the two subperiods. The increase was exclusively due to the rapidly growing number of diesel cars. The latter rose by 59.5 % between 2005 and 2016, while the number of petrol cars fell by 3.4%. Actually, vehicle keepers responded to the jump in fuel prices by buying more fuel-efficient and therefore less costly diesel cars. One had to pay for petrol in March 2012 an average of 1.73 Euro per litre – for diesel it was 1.52 Euro [2] (consumer price index 2000 – 2012: diesel oil prices: + 85.8 %, petrol prices: + 61.9 % [3]. However, the trend towards diesel vehicles has continued unabated despite the fact that fuel prices have fallen since 2013. In 2016 the average fuel prices for gasoline were 21.1 % and for diesel 27.7 % below the 2012 level. The shift to diesel cars is closely associated with an trend towards larger and more powerful engines (SUVs). Cars with more than 100 kW have increased 2012 to 2016 nearly by 30 %.

Total mileage increased from 578.2 billion kilometres in 2005 to 636.9 billion kilometres in 2016 (+ 10.2 %). In that period, specific fuel consumption of cars declined due to technical improvements. In 2005 the average fuel consumption of cars was 7.8 litres per 100 vehicle-km, while it amounted to 7.3 litres in 2016 – with a significantly changed vehicle fleet. This equals a decline of 7.4 %. Despite growing annual mileage in the first few years after 2005, total fuel consumption could be

2 Source: https://de.wikipedia.org/wiki/Motorenbenzin
3 Source: DESTATIS: Daten zur Energiepreisentwicklung - Lange Reihen;
www.destatis.de/DE/Publikationen/Thematisch/Preise/Energiepreise/Energiepreisentwicklung.html

lowered due to technical improvements (2008 in comparison with 2005: – 3.3 %). This positive trend has not continued in recent years. Between 2010 and 2016 fuel consumption rose for 5.5 % and reached a level 2 % above that in 2005 (see Table 4). The steadily rising annual mileage and a vehicle fleet with significantly higher motorized vehicles have overcompensated the savings due to technical progress.

Fuel consumption changed similarly to vehicle stocks. While diesel consumption of cars increased by 63.7 %, gasoline consumption decreased by 22.2 %. The steeper decline in gasoline consumption compared to the decrease in vehicle stocks resulted from a decline in annual mileage (– 11 %) and the trend from petrol to diesel vehicles, especially among frequent drivers. Furthermore, the reduced petrol consumption was due to a decline in average fuel consumption (– 8.2 %).

Table 4 **Vehicle stock, mileage and fuel cosumption of cars**

	Unit	2005	2010	2015	2016	2016 to 2005
						%
		Total				
Vehicle stock [1]	mill.	45.7	41.8	44.5	45.3	*11.6* [2]
Mileage per year [1]	1,000 km/yr	12.7	14.0	14.0	14.1	*– 2.1* [2]
Total mileage	bn. km	578.2	587.1	622.3	636.9	*10.2*
Specific consumption	l/100 km	7.8	7.5	7.3	7.3	*– 7.4*
Total consumption	bn. l	45.3	43.9	45.3	46.2	*2.0*
		Gasoline engine				
Vehicle stock [1]	mill.	36.1	30.5	30.0	30.2	*– 3.4* [2]
Mileage per year [1]	1,000 km/yr	10.9	11.4	10.9	10.9	*– 11.0*
Total mileage	bn. km	391.4	349.4	328.0	330.2	*– 15.7*
Specific consumption	l/100 km	8.3	7.9	7.7	7.7	*– 8.2*
Total consumption	bn. l	32.5	27.7	25.3	25.3	*– 22.2*
		Diesel engine				
Vehicle stock [1]	mill.	9.6	11.3	14.5	15.1	*59.5* [2]
Mileage per year [1]	1,000 km/yr	19.5	21.1	20.3	20.3	*– 5.3* [2]
Total mileage	bn. km	186.7	237.7	294.3	306.7	*64.3*
Specific consumption	l/100 km	6.8	6.8	6.8	6.8	*– 0.4*
Total consumption	bn. l	12.7	16.1	20.0	20.9	*63.7*
		Gasoline engine in % of total				
Vehicle stock [1]	mill.	*79.0*	*73.1*	*67.4*	*66.7*	*– 13.8* [2]
Total mileage	bn. km	*67.7*	*59.5*	*52.7*	*51.8*	*– 23.4*
Total consumption	bn. l	*71.9*	*63.2*	*55.8*	*54.8*	*– 23.7*

Residents concept. Inclusive consumption of bio-fuels.
1 Until 2006 incl. vehicles temporarily out of service.
2 Change from 2016 to 2005 is based on changes of 2005 to 2006 and 2007 to 2016.
Source: German Institut for Economic Research (DIW - Berlin)

4 Vehicle stock, mileage and fuel consumption of road freight transport

Between 2005 and 2016, the stock of heavy duty vehicles increased by 4.2 % (cf. table 5). Due to changes in the relevant delimitation in 2007, the comparability of vehicle stocks is limited over the whole period. The comparatively slowly increase in vehicle stocks was largely attributable to the decrease between 2008 and2009 because of the economic crisis. In 2009, vehicle stocks were down by 8.7 % compared with 2008. From 2009 onwards, however, numbers increased (2009 – 2016: + 11.7 %) and the level of 2008 is reached again. If we consider heavy duty trucks (net load ›3.5 t) separately from trailer trucks, the number of trailer trucks increased much more (+ 18 %) than heavy duty trucks (+ 7.9 %).

The stock of LDV has increased for many years now. Between 2005 and 2016, the number of LDV increased by 32.9 %. Looking at heavy and light duty transport as a whole, stocks grew by 27.0 %.

Table 5 **Vehicle stock, transport performance and fuel consumption of road freight transport**

	Unit	2005	2010	2015	2016	2016 to 2005
						%
		Total				
Vehicle stock [1]	1,000	2,555.6	2,459.6	2,842.9	2,958.6	*27.0*
Mileage per year [1]	1,000 km/yr.	27.4	30.5	29.3	29.0	*– 8.3*
Total mileage	bn. km	70.1	75.0	83.2	85.7	*22.3*
Specific consumption	l/100 km	25.2	24.7	21.1	20.9	*– 16.9*
Total consumption	bn. l	17.6	18.5	17.5	17.9	*1.6*
		Heavy duty transport [2]				
Vehicle stock [1]	1,000	526.0	450.9	481.0	495.1	*4.2*
Mileage per year [1]	1,000 km/yr.	54.9	65.1	62.4	61.1	*– 3.3* [3]
Total mileage	bn. km	28.9	29.3	30.0	30.2	*4.8*
Specific consumption	l/100 km	41.9	41.3	34.1	34.1	*– 18.6*
Total consumption	bn. l	12.1	12.1	10.2	10.3	*– 14.7*
Transport performance per year	1,000 tkm/yr.	588.8	693.6	653.6	635.1	*– 4.2*
Total Transport performance	bn. tkm	309.7	312.8	314.4	314.4	*1.5*
Specific consumption	l/100 tkm	3.9	3.9	3.3	3.3	*– 16.0*
		LDV [4]				
Vehicle stock [1]	1,000	2,029.6	2,008.7	2,361.9	2,463.6	*32.9*
Mileage per year [1]	1,000 FZ-km/yr.	20.3	22.7	22.5	22.5	*– 4.3*
Total mileage	bn. km	41.2	45.7	53.1	55.4	*34.5*
Specific consumption	l/100km	13.5	14.0	13.7	13.7	*2.0*
Total consumption	bn. l	5.5	6.4	7.3	7.6	*37.2*

Residents concept. Inclusive consumption of bio-fuels.
1 Until 2006 incl. vehicles temporarily out of service.
2 Trucks › 3.5 t net load, truck-trailers.
3 Change from 2016 to 2005 is based on changes of 2005 to 2006 and 2007 to 2016.
4 LDV = Light duty vehicles (net load ‹ 3,5 t).
Sources: German Institut for EconomicResearch (DIW - Berlin) and Kraftfahrtbundesamt, Flensburg

In the period 2005 to 2016, total mileage in heavy duty transport grew nearly in the same way than the stock (+ 4.8 %). The vehicle utilisation rate increased continuously until the crisis year of 2009. Between 2009 and 2016, the annual mileage per vehicle dropped sharply (– 7.3 %). These trends are even more visible in transport performance (tons-kilometres). In the years before the economic crisis, transport performance increased markedly (2005 – 2008: + 10.2 %). In the crisis year 2008/2009, however, there was a collapse of almost 10 %. In the following years, there was a slight recovery in transport performance, but the level of the years 2007/08 could no longer be achieved. In 2012 there was a further decline and the transport performance in 2016 was with 314.4 bn. tkm barely higher than in 2005 (2005 – 2016: + 1.5 %).

In heavy duty transport, specific fuel consumption per 100 vehicle-kilometres declined by 18.6 % between 2005 and 2016. In the same period, the specific consumption per 100 tons-kilometres dropped by 16.0 %. Reasons for the stronger decline in vehicle kilometre-related consumption were presumably that larger trucks or trailer trucks were increasingly used and the utilisation rate was improved. In line with the increasing transport performance, fuel consumption in heavy duty transport was down 14.7 % during that period.

Table 6 **Transport performance in heavy duty transport – residents and on domestic territory**

	2005	2010	2012	2014	2015	2016 to 2005
	bn. tkm					%
Residents [1]	310,1	312,8	306,7	309,9	314,4	*1,4*
Residents abroad [2]	38,3	31,2	27,1	24,2	24,6	*– 35,8*
Non-residents on domestic territory [3]	130,9	158,7	152,0	166,0	170,0	*29,9*
On domestic territory	402,7	440,3	431,6	451,7	459,8	*14,2*

1 Source: Kraftfahrtbundesamt, Flensburg.
2 Own calculations.
3 Source: Bundesministerium für Verkehr: Verkehr in Zahlen 2017/2018.

A comparison of the total transport performance of residents in heavy duty transport with total performance on domestic territory reveals the following (cf. table 6): the transport performance of residents slightly increased (+ 1.4 %) from 2005 to 2015. In the same period, the transport performance on German territory increased drastically by 14.2 %. This means that domestic transports was provided increasingly by foreign companies. They recorded a sharp increase of almost 30 %. As a result, the share of non-residents transports on German roads rose noticeably from 32.5 % in 2005 to 37.0 %. By contrast, the residents' transport performance abroad has declined substantially since 2005 (– 35.8 %).