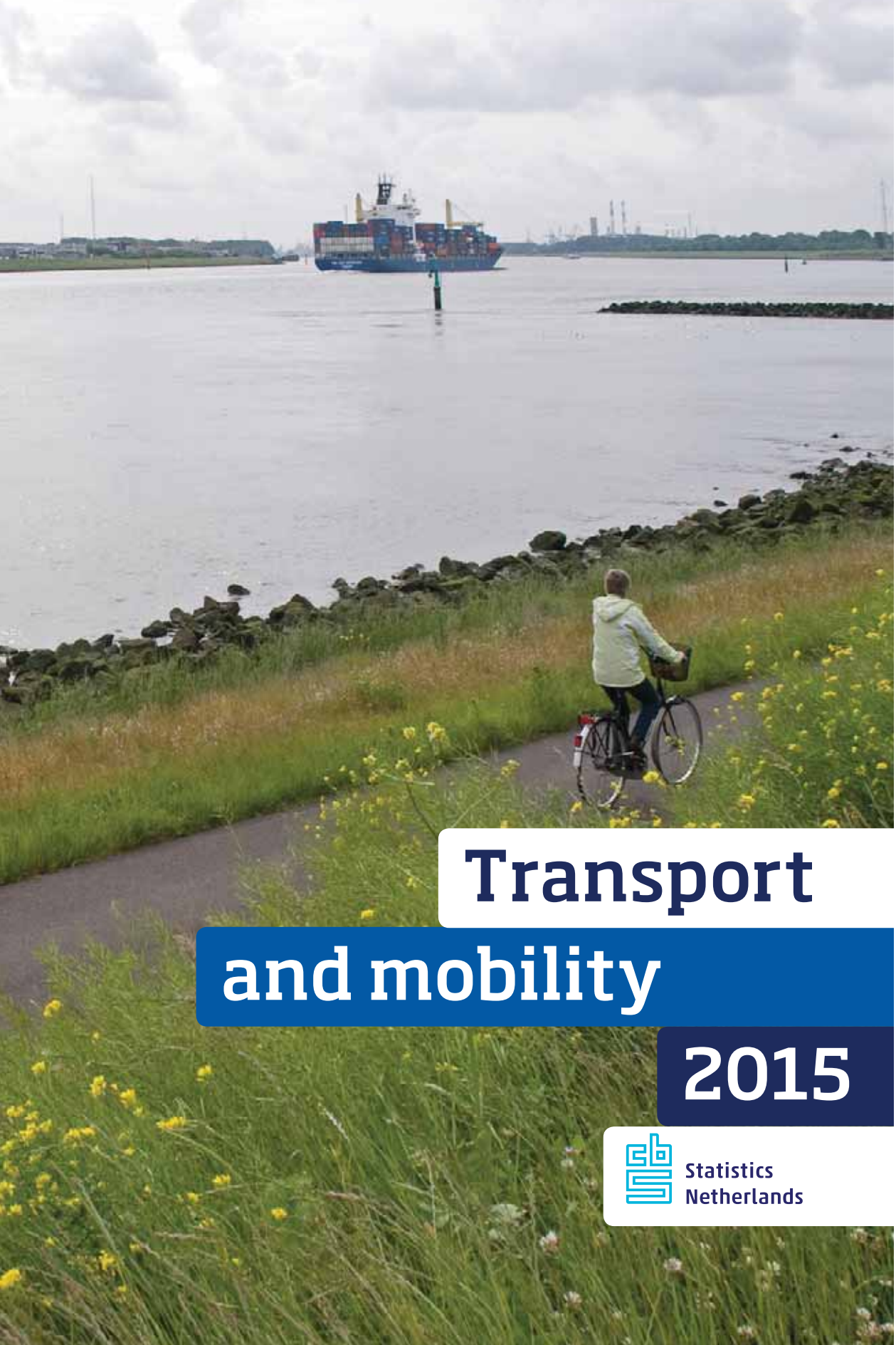

Transport and mobility 2015

Statistics Netherlands

Transport and mobility 2015

Explanation of symbols

Empty cell	Figure not applicable
.	Figure is unknown, insufficiently reliable or confidential
*	Provisional figure
**	Revised provisional figure
2014–2015	2014 to 2015 inclusive
2014/2015	Average for 2014 to 2015 inclusive
2014/'15	Crop year, financial year, school year, etc., beginning in 2014 and ending in 2015
2012/'13–2014/'15	Crop year, financial year, etc., 2012/'13 to 2014/'15 inclusive

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

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Foreword

In this first edition of Transport and mobility 2015 Statistics Netherlands presents facts and trends about traffic and transport in the Netherlands. The focus is on various aspects of the mobility of individuals and goods transport: traffic and transport flows, infrastructure, means of transport, energy use, environmental effects, traffic accidents and the economic significance of transport.

The Netherlands is a major international hub because of its unique location. Rotterdam is the largest sea port in Europe, and fourth in the world. Amsterdam Schiphol airport is one of the major European airports. Nearly 565 million tonnes of goods arrive in the Netherlands each year, nearly 70 percent by sea. Over 35 percent of the nearly 420 million tonnes of goods leaving the Netherlands are transported out by sea, a third by inland waterways and over a fifth by road. Over 80 percent of domestic goods transport is transported by road and nearly 20 percent by inland waterways.

Traffic intensity is high. Anti-congestion measures have been effective in recent years: delays in the evening rush hours were cut by 5 percent and in the morning rush hours by 3 percent. Recently rush hour traffic seems to have picked up again due to the economic recovery though.

Of the total number of kilometres covered by motor vehicles in the Netherlands, 78 percent is covered by cars, 11 percent by vans and 6 percent by lorries. Mopeds and motorbikes covered 2 percent each and buses 1 percent. The Netherlands is unique in that young and old people ride bicycles. The many bicycle lanes and the flat country make bicycles a suitable means of transport for school children, students and commuters.

Some 800,000 people are employed in transport activities, which contribute 8.5 percent to GDP. The economic downturn has hit the transport sector hard. In 2009 turnover fell by 13 percent on 2008. Recovery has been slow. Between 2008 and 2014 turnover in the transport sector as a whole fell by 1 percent. Goods transport by road and aviation were in the plus, but only just. The picture is far less positive for forwarders, sea shipping and removal companies. Emissions of nitrogen oxides have fallen by 42 percent and particulate matter or fine dust by 55 percent since 1990 due to measures involving motor

vehicles. The data used in the graphs of this publication are published on StatLine, the electronic database of Statistics Netherlands.

Director General
Dr. T.B.P.M. Tjin-A-Tsoi

The Hague/Heerlen/Bonaire, September 2015

Contents

Summary

The Netherlands is an international logistics hub: large amounts of raw materials and goods arrive from all over the world in the port of Rotterdam. Then a large share goes to the European hinterland by road, inland waterways and rail. Because of its unique location, the Netherlands serves as the gateway to Europe, for goods going in and out. Rotterdam is Europe's largest sea port and the fourth largest in the world. The Netherlands has several other major sea ports as well such as the port of Amsterdam. Due to the mild climate these ports are ice-free all year round. Amsterdam Schiphol Airport is one of Europe's major airports. Schiphol functions as a stopover for many transfer flights, for passengers as well as cargo. Regional airports are increasingly popular, especially Eindhoven for passengers and Maastricht for cargo flights.

Motives for mobility: people and businesses

Traffic and transport are found wherever people and companies are active whether going to school, to work, visiting family and friends, shopping, using sports clubs, consulting a doctor or going to hospital.
Manufacturers order raw materials and deliver products. Companies in construction, trade and the hotel and catering industry also need goods. This leads to domestic economic activity and international trade resulting in traffic and transport within the Netherlands and abroad.

Busy traffic, especially cars

On average Dutch people travel almost 12 thousand kilometres a year in their own country, almost three quarters by car. Of the total distance driven by motor vehicles on the Dutch roads, cars cover 78 percent, vans 11 percent, heavy freight vehicles 6 percent, mopeds and motorcycles 2 percent each and buses 1 percent. Foreign transporters drove ten percent of all freight kilometres on Dutch territory.
In the Netherlands traffic density is high in comparison with other countries, mainly because of the high population density and the amount of freight transport.

Most kilometres by car, short distances covered mostly by bicycle or on foot

Dutch people of all ages usually go by bicycle or walk for distances up to 5 kilometres. Most children and students ride their bicycles to school or university. The Netherlands has more bicycles than inhabitants and people ride an average of 900 kilometres a year. Electric bicycles (e-bikes) are becoming more popular especially among seniors: one in five bicycles sold is an e-bike. Cars cover 75 percent of all commutes, 15 percent is done by public transport and 6 percent by bicycle. Students also often use public transport because they get free passes.

Less traffic congestion due to traffic measures and the economic crisis

Passenger and freight transport use the same infrastructure, a combination that often results in congestion. Measures such as creating extra lanes have been effective: reducing travelling time in the evening rush hour by 5 percent and in the morning rush hour by 3 percent. The economic crisis had a visible impact on

Dutch roads as well. Meanwhile the economic recovery seems to result in more congestion again.

More cars, but not for young people

The number of cars has skyrocketed in 25 years from over 5 million to almost 8 million: an increase of over 50 percent. More people have driver's licenses, women and seniors now often own a car, and there is often more than one car in households. Electric and hybrid cars are gaining popularity partly because of tax incentives. The number is still relatively small: less than 2 percent of the total, although in 2014 almost 8 percent of the newly purchased cars were electric or hybrid. Cars are less popular than before among young people, a trend also observed in other European countries. Among the under 25's one in five owns a car. More young people live in the cities, where they can easily use a bicycle and public transport.

Goods transport mainly by road within the Netherlands

Of the total of 565 million tonnes of goods entering the Netherlands over 70 percent arrive by sea ship. Of the almost 420 million tonnes of goods leaving the Netherlands over 35 percent go by sea, one third by inland waterways and over one fifth by road. Over 80 percent of domestic goods transport go by road and almost 20 percent by inland waterways. Almost 10 million tonnes of goods enter and 26 million leave the country by rail. Aircraft carry 0.9 million tonnes of the goods coming in and about 0.8 million tonnes leaving the country.
The inland waterways are mostly used for transport of bulk goods and containers and for destinations along these waterways. Containers are increasingly used, as transhipping containers from sea ships to heavy freight vehicles, inland ships and trains is relatively simple. Several multimodal container hubs are located in the Netherlands: these are transfer stations between rail, inland waterways and road. If we include pipeline transport in the calculation, it would amount to about 20 percent of total goods transport.

Modal split and modal shift

Transporters and shipping agents often choose road transport for short distances, because this is more efficient and cheaper than shipping by rail or inland

waterways. The latter two are used more often for middle distances. For long distances the policy within the EU is to shift goods transport to rail and inland waterways so as to decongest roads and reduce emissions of the greenhouse gas carbon dioxide. 90 percent of goods loaded in the Netherlands do not go beyond 300 kilometres. Dutch road transporters mainly haul goods over short distances; transport over longer distances is often carried out by foreign companies.

Energy use

Fuel use by traffic and transport rose constantly until 2012, followed by a decline even though there was more traffic on the roads. This is because cars became much more energy efficient. Within the EU targets have been set on ecological driving: 10 percent of fuels used in transport have to be renewable by 2020. One measure taken to reach this target is to mix fuel with renewables at the filling stations: the required mixing percentage is raised every year.

Emissions: less nitrogen oxides and particulate matter, more carbon dioxide

Two thirds of the total emission of nitrogen oxides (NO_x) in the Netherlands are caused by traffic and transport. Technical improvements – especially application of catalytic converters – have led to great progress in the last 25 years. One third of the total emission of particulate matter, or fine dust, comes from traffic and transport. This emission was also reduced considerably by the use of diesel particulate filters. A troublesome development is that carbon dioxide (CO_2) emissions increased during this period. CO_2 is not harmful for humans like NO_x and particulate matter, but it is the most important greenhouse gas. Traffic and transport cause 20 percent of the total CO_2 emission in the Netherlands.
The environmental pressure from road traffic has decreased, despite the strong rise in car numbers and distances driven. Compared to 1990 there are now over 1.5 times as many cars, while the number of freight transport vehicles has doubled. The total kilometres covered on Dutch roads has increased by one third. Air pollution measures have led to a 70–80 percent reduction in nitrogen oxides and particulate matter emissions. CO_2 emissions by road traffic rose until 2009 and then fell slightly due to purchases of more energy efficient cars. Road traffic is responsible for 40 percent of NO_x emissions, 50 percent of particulate matter and 80 percent of the CO_2 emissions of total traffic and transport.

Traffic accidents

Targeted measures have led to a strong decrease in the number of fatal traffic accidents, while traffic became much heavier. Nevertheless the number of seriously injured people has gone up, particularly among bicyclists and pedestrians. Older people are vulnerable in traffic, especially on a bicycle. Dutch traffic safety compares favourably to that of many other countries. The UK, Norway, Sweden, Denmark and Ireland all have fewer traffic fatalities per inhabitant than the Netherlands, whereas the figure is higher in Germany, France, Italy and Spain.

Economic significance

Sea ports and airports create much economic activity and therefore employment. Many tens of thousands of people have jobs at Schiphol and in and around the ports of Rotterdam and Amsterdam. The transport industry employs 800 thousand people and contributes 8.5 percent to GDP. Freight transport by road is dominant within the transport industry.
Inland shipping faces an overcapacity problem because the sector had invested in larger ships while the economy flourished. In road traffic Dutch enterprises meet increasing competition from foreign transport enterprises.

Effects of the economic crisis

There has been a significant gradual 7 percent decrease in the number of heavy freight vehicles and vans in the last five years. This is related to the economic downturn as well as competition from Eastern European freight transporters. Since 2008 road transport of goods has decreased for heavy freight vehicles and vans. Turnover in the transport industry fell by almost 13 percent in 2009 on the year before mainly in road transport of goods, which is dominant in the transport industry. Sea shipping, aviation, removal businesses and freight forwarders were also greatly affected. Over the years 2008–2014 turnover for the transport industry as a whole decreased by 1 percent. Freight transport by road and aviation recorded a small rise. For freight forwarders, sea shipping and removal companies the picture is considerably bleaker. The stagnation in the housing market has had direct consequences for the removal companies.
Consumer services were relatively less affected by the crisis, with the exception of the aviation sector. Couriers do good business again thanks to growing internet sales.

1. Traffic – driving and flying

Since 2008 Dutch motor vehicles, especially freight vehicles, have covered fewer kilometres than before. Cars and most of all mopeds made more kilometres though, and also the number of passengers travelling via Dutch airports has risen substantially.

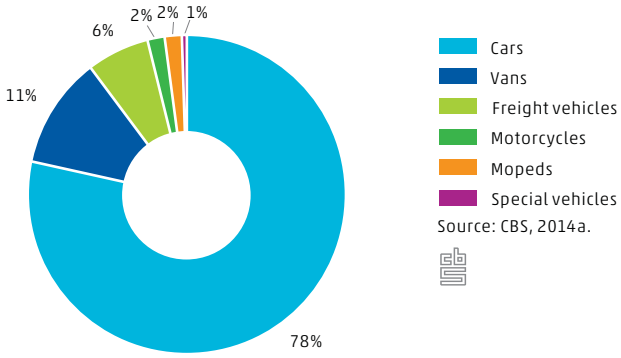
1.1 Introduction

Every road user, be it a bicyclist or driver of a car or a freight vehicle, participates in traffic. About 120 billion kilometres are covered by cars, buses, motorcycles and mopeds each year. Different kinds of freight vehicles are used for freight transport by road; vans, lorries and road tractors. In 2013 these vehicles drove 26 billion kilometres. In this chapter, road traffic includes kilometres covered by Dutch vehicles in the Netherlands and abroad, unless otherwise indicated.
Dutch people tend to travel more and more by air, the number of passengers travelling to, via and from the Netherlands by air is rising.

1.2 Slight decrease in motor vehicle kilometres

In 2013 Dutch motor vehicles covered over 146 billion kilometres, about a billion less than in 2008. Over three quarters of the vehicle kilometres are driven in cars, slightly more in 2013 than in 2008. With mopeds the rise was a fifth in total. In 2013, 9 percent fewer kilometres were covered by vans and heavy freight vehicles than five years before. Buses covered the least kilometres.

1.2.1 Kilometres by Dutch motor vehicles, 2013



Source: CBS, 2014a.

1.3 More kilometres for cars and mopeds

In 2013 the Dutch population drove more kilometres in cars and mopeds than five years before, with privately owned cars being driven more and company cars less than in 2008.

More car kilometres driven by private individuals

Most of the Dutch road kilometres are made by cars: in 2013 over 114 billion kilometres, up 1 percent on 2008. Almost 80 percent of the car kilometres were driven by private individuals, averaging 11.5 thousand kilometres a year.

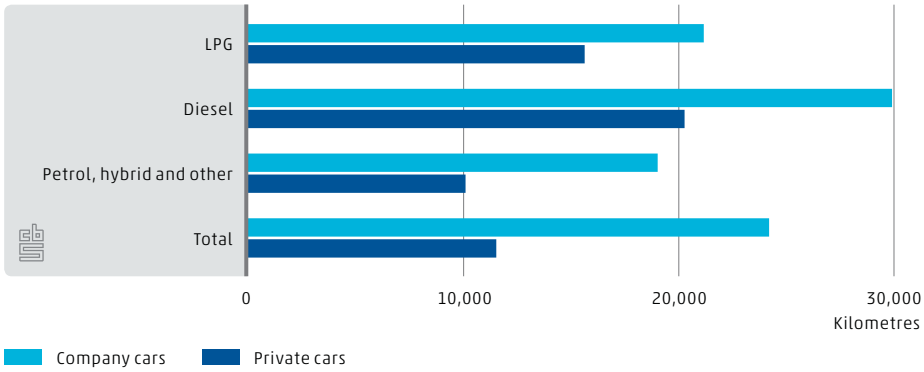
In 2013 private individuals drove almost 80 billion kilometres in total, which is 2.3 percent more than in 2008. This is mostly caused by the increase in the number of private cars. The distance covered by car has decreased from 12 thousand kilometres a year in 2008 to 11.5 thousand in 2013, as more people over 65 owned a car and more households owned several cars.

Average kilometrage Dutch vehicles

Company cars

Company cars made fewer kilometres than before, in 2013 almost 4 percent less than in 2008. Companies not only owned fewer cars, the cars were also driven less. Company cars made twice as many kilometres as privately owned cars.

1.3.1 Average kilometrage of cars, 2013



Source: CBS, 2014b.

Because company cars are used more intensively, they often have diesel engines. Some 58 percent of the company car kilometres are made by diesel cars, compared to 24 percent for privately owned cars.

Strong increase in moped kilometres

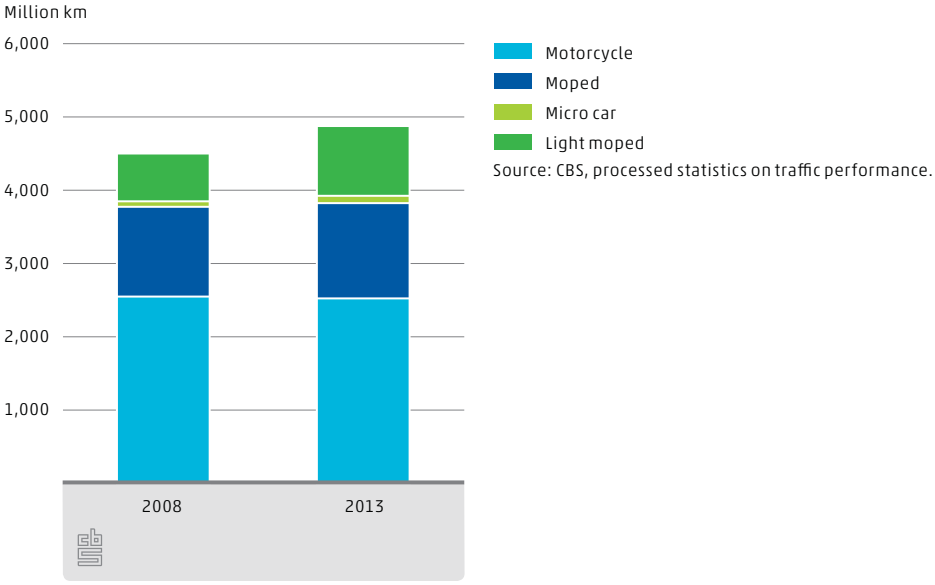
There are a great number of motorcycles and mopeds in the Netherlands, driving almost five billion kilometres a year. More than half is covered by motorcycles. The other half is covered by vehicles classified as mopeds such as classic and light mopeds, scooters and micro cars, trikes and segways.

One kind of moped that has become very popular is the light moped. The number of kilometres driven by light mopeds has shown an almost 55 percent increase since 2008. More and more people bought them as no helmet is required, which contributes greatly to their popularity. A light moped is not allowed to go faster than 25 km/h.

In the Netherlands there are more light than classic mopeds. Due to their lower kilometre average per year, all light mopeds together are driven fewer kilometres than all classic mopeds together. On average a light moped covers 1,600 kilometres a year, a classic moped 2,400 kilometres. One quarter of the total number of kilometres of motorcycles and all kinds of mopeds is driven on classic mopeds, one fifth on light mopeds.

Because classic mopeds are allowed to drive faster than light mopeds, they are used more for longer distances. Classic mopeds are especially popular in the countryside, while light mopeds are mostly used in the cities.

1.3.2 Total of kilometres of motorcycles and mopeds



Source: CBS, processed statistics on traffic performance.

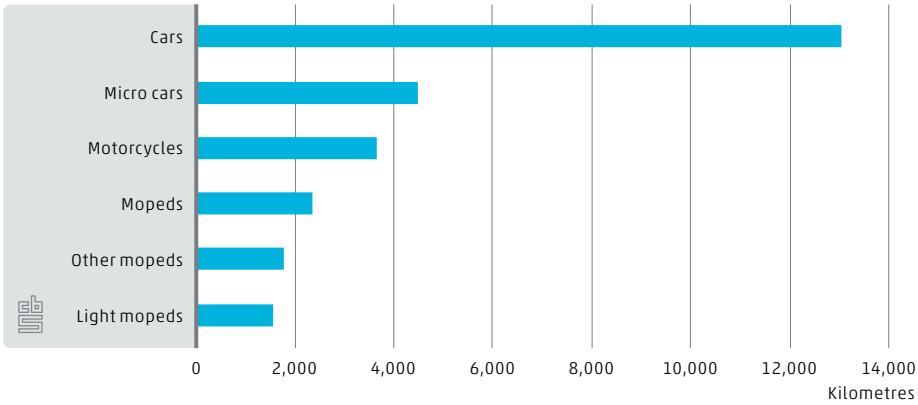
Most kilometres by micro car

The total number of kilometres covered by micro cars and mopeds had also increased, by 10 and 6 percent respectively. Micro cars, which look like small cars but are classified as mopeds, make the most kilometres on average. Micro cars combine the benefits of mopeds with those of cars. Their speed limit is 45 km/h, the same as for classic mopeds.

An average micro car covers 4,500 kilometres a year, which is more than a motorcycle and less than a car. Because there are relatively few micro cars in the Netherlands, the share in the total number of kilometres is small: 2 percent.

The number of kilometres covered by motorcycles has been fairly constant during 2008–2013.

1.3.3 Average kilometrage per year, 2013



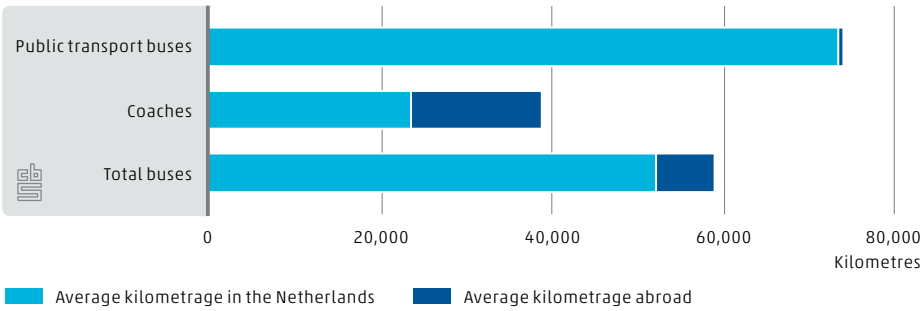
Source: CBS, 2014c, processed statistics on traffic performance.

Public transport buses cover 74 thousand kilometres a year

In 2013 Dutch buses covered 706 million kilometres a year in the Netherlands and abroad, somewhat less than in 2008. Almost three quarters is driven by public transport buses. Coaches are used as school buses, for day trips and overnight trips in the Netherlands and abroad.
Public transport buses are used intensively, covering 74 thousand kilometres a year, almost twice as many as coaches.

55% more kilometres covered on light mopeds in 2013 than in 2008

1.3.4 Average kilometrage a year for Dutch buses, in the Netherlands and abroad



Source: CBS, 2014d.

Border crossing bus lines

There are several scheduled bus lines where Dutch public transport buses have stops in Germany or Belgium or the other way around. However, the vast majority of kilometres covered by Dutch public transport buses are driven in the Netherlands.

Dutch coaches drive more of their kilometres abroad, as they are often used for holidays and day trips. Almost 40 percent of all kilometres are driven abroad.

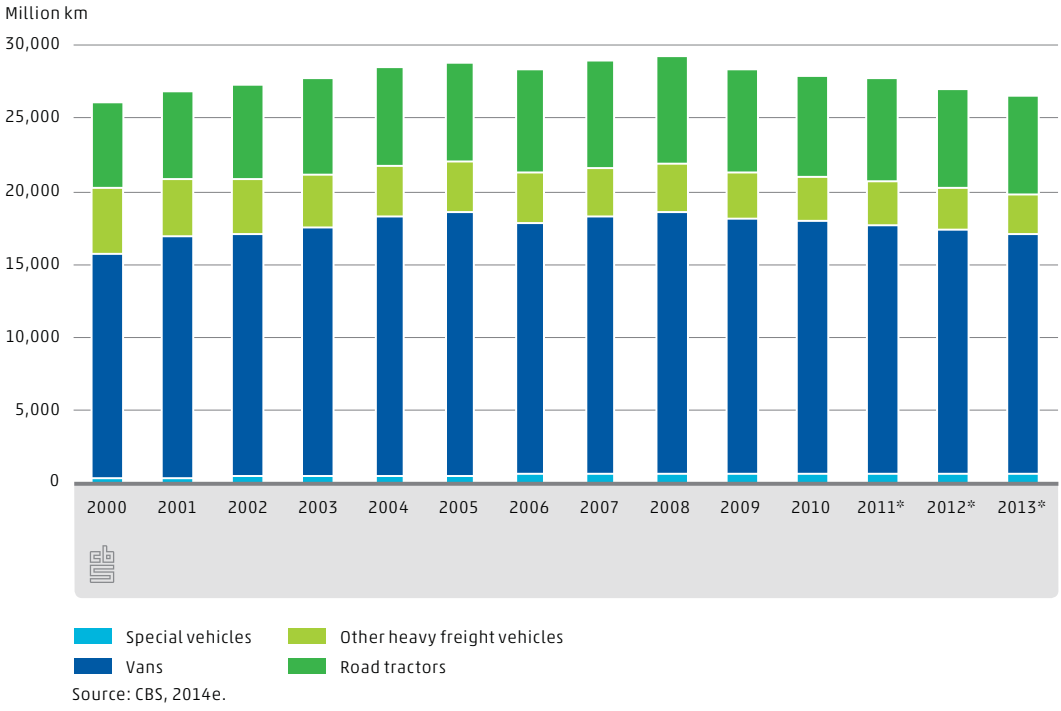
1.4 Decrease in freight vehicle kilometres

Dutch freight vehicles covered 26.5 billion kilometres in 2013. This involves vans, lorries, road tractors and special vehicles. The total number of kilometres driven decreased. Whereas the number of kilometres driven had increased by almost 12 percent between the year 2000 and the start of the economic crisis (2008), it was decreasing gradually in the years after. Compared to 2008 we see a decrease of 9 percent in kilometres driven in 2013.

Decrease in kilometres of heavy freight vehicles abroad

Freight vehicles and road tractor-trailers covered over 9 billion kilometres in the Netherlands as well as abroad in 2013. The number of kilometres by Dutch freight vehicles and road tractors has fallen by 12 percent since 2008. For heavy vehicles abroad the decrease was almost 20 percent. This is due to the economic downturn and the increased competition of Eastern European road transporters.

1.4.1 Kilometres Dutch freight vehicles



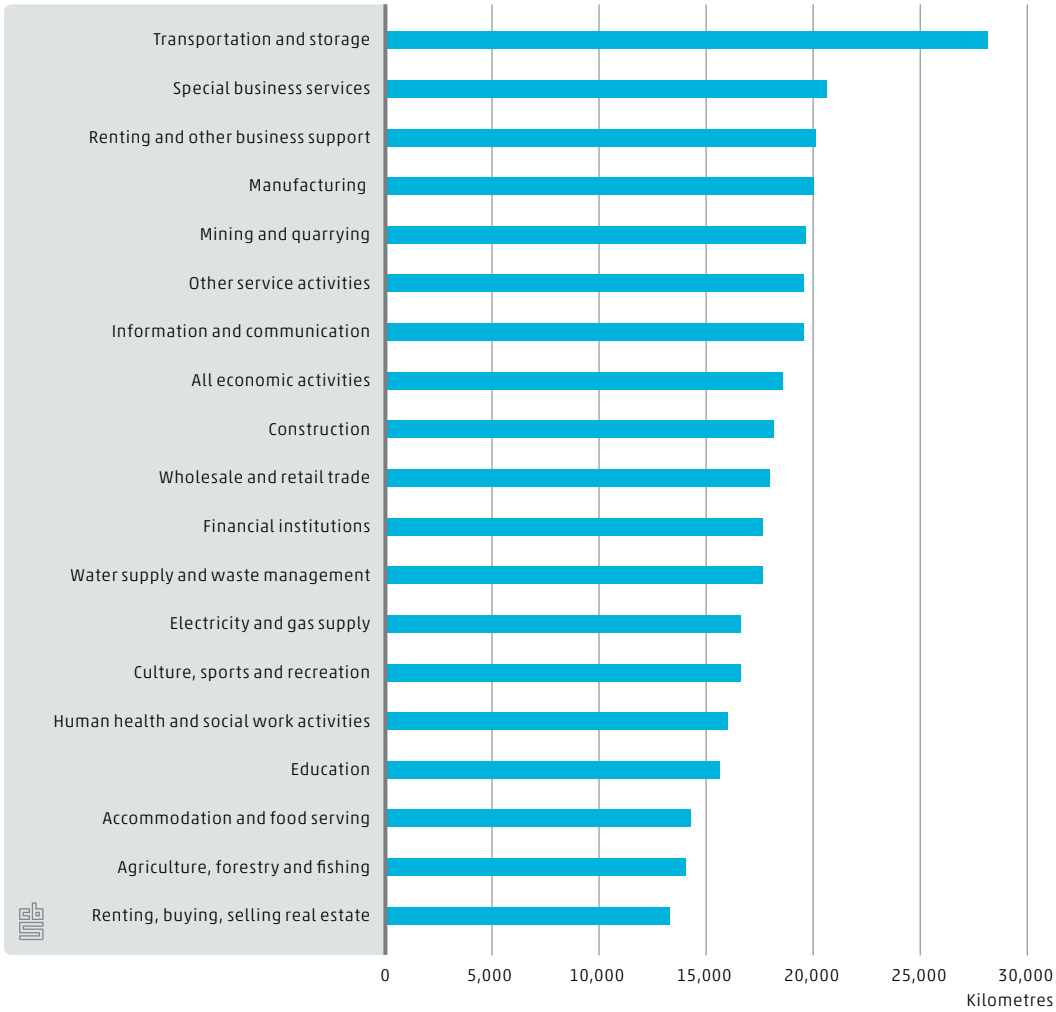
Source: CBS, 2014e.

Vans popular in construction, trade and hotels and restaurants

Vans have also made fewer kilometres. They are widely used in construction and in the hospitality industry, sectors that have suffered from the economic crisis for some time. Most kilometres in the transport of goods are covered by vans: 60 percent of the total.

Vans are mainly used to carry small freight. Company vans drive about 18,000 kilometres a year. Companies in the transport and storage sector use their vans most intensively, on average 28,000 kilometres a year.

1.4.2 Average kilometrage of company vans by sector, 2011



Source: CBS, 2014f.

12% decrease in kilometres of heavy freight vehicles 2008-2013

Transport and storage

Although freight vehicles and road tractors have a smaller share in the total number of kilometres than vans, they have the biggest share in the transport of goods by road. Most heavy freight vehicles are owned by companies in the transport and storage business. The vehicles of these companies account for almost 70 percent of all heavy freight kilometres driven. These vehicles also make the most kilometres: 90 thousand a year. Heavy vehicles owned by companies in other sectors cover about 35 thousand kilometres a year.

Companies in the transport and storage sector use heavier vehicles than companies in other sectors. Three quarters of their vehicles are truck-trailers. The capacity of about 63 percent of these vehicles is 40 tonnes or more.

Freight transport abroad

Because many transports cross the Dutch border, about 35 percent of the kilometres are driven abroad. This is more than for instance for cars, which cover about 15 percent abroad. Of all heavy freight vehicles, road tractors drive more long distances internationally: 40 percent abroad versus lorries about 25 percent.

Foreign transporters drove almost 700 million kilometres in the Netherlands, which is 10 percent of all freight kilometres on Dutch territory.

1.5 Record number of passengers via Dutch airports

In 2014, for the first time, over 60 million passengers travelled via Dutch airports. This is 26 percent more than five years before, and a 5 percent increase on 2013. The number of flight movements (in trade traffic) had only increased by 3 percent by 2014. This trend has been visible for years. The use of larger aircraft and a higher occupancy rate play a key role.

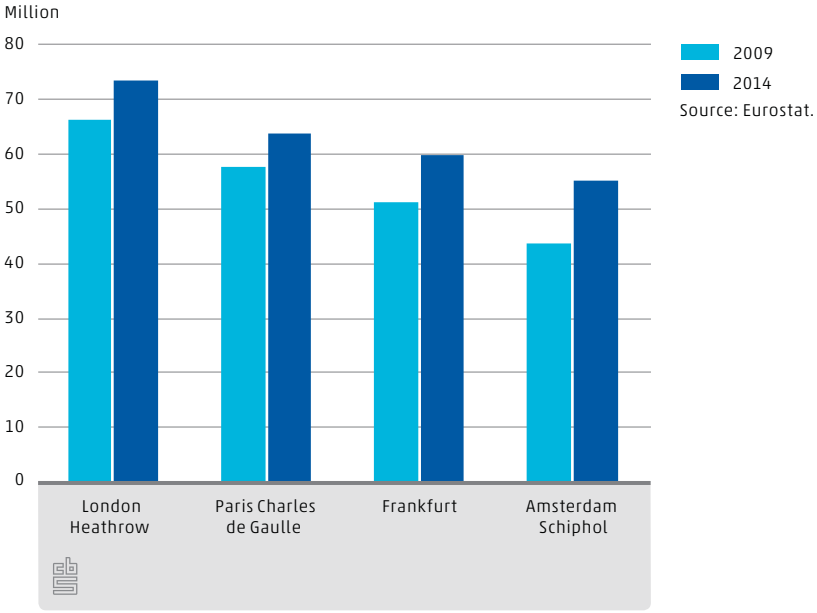
Schiphol fastest growing airport in Western Europe

Schiphol Amsterdam Airport is the most important airport in the Netherlands, servicing 90 percent of all passengers. The number of passengers is growing more rapidly than in other large airports in Western Europe. Whereas Schiphol had 26 percent more passengers in 2014 than in 2009, Frankfurt Airport scored 16 percent, London Heathrow and Paris Charles de Gaulle both 11 percent. Also last year the number of passengers increased most at Schiphol, because of the lower costs for take-off and landing for airlines.

Share of passengers for Eindhoven Airport increasing

The number of passengers travelling through Eindhoven Airport has risen sharply. Of all Dutch airports Eindhoven Airport has shown the most rapid growth in the last five years. Whereas in 2009 only 3.7 percent of all air passengers travelled through Eindhoven, this share had increased to 6.5 percent in 2014. This increase from 1.7 million to 4 million passengers in five years' time is mainly because destinations more than doubled, especially in Italy, Poland and Spain.

1.5.1 Number of passengers largest Western European airports



Sources

CBS, 2014a: Verkeersprestaties motorvoertuigen; kilometers, voertuigsoort, grondgebied (figures 1.2.1)

CBS, 2014b: Verkeersprestaties personenauto's; eigendom, brandstof, gewicht, leeftijd (figures 1.3.1)

CBS, 2014c: Verkeersprestaties personenauto's; eigendom, brandstof, gewicht, leeftijd (figures 1.3.3 (for cars))

CBS, 2014d: Verkeersprestaties bussen; kilometers, leeftijdsklasse, grondgebied (figures 1.3.4)

CBS, 2014e: Verkeersprestaties motorvoertuigen; kilometers, voertuigsoort, grondgebied (figures 1.4.1)

CBS, 2014f: Bedrijfsbestelauto's; km's, bedrijfstakken (SBI 2008), bedrijfsgrootte (figures 1.4.2)

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2. Mobility – Dutch people on the road

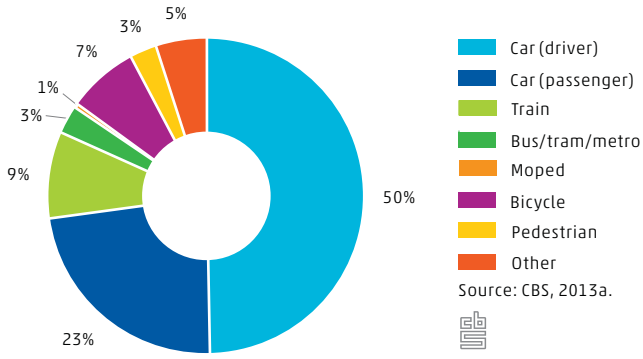
The average Dutch person travels nearly 12 thousand kilometres a year within the Netherlands, which is about 30 kilometres a day. Commuting takes less than 30 minutes on average: by car (70 percent), train (12 percent) or by bicycle (6 percent). Adolescents aged 12 to 18 usually ride their bicycle to school. Although the car is used most often, the Netherlands are known as a real bicycle country. Collectively Dutch people own about 19 million bicycles which are used to travel 900 kilometres a year. The e-bike is becoming quite popular.

2.1 Introduction

Dutch people travel 200 billion kilometres a year within the Netherlands

In total 200 billion kilometres were travelled in the country in 2013, which is 669 times the distance to the sun and back. Chapter 1 describes that motorised vehicles travel 120 billion kilometres a year, the 200 billion kilometres include distances covered by passengers, bicyclists and pedestrians, to work, school, and family or with leisure goals such as sports or holidays, and back home. Almost three quarters of these distances were travelled by car, by drivers and passengers. Apart from domestic travel, quite a distance is travelled across the borders, usually for vacation. Dutch people travel around 16 billion kilometres a year abroad by car, including around 7.5 million holidays. The airplane is used as the travelling mode for nearly 6 million holidays abroad.

2.1.1 Domestic distance travelled by transport mode



Source: CBS, 2013a.

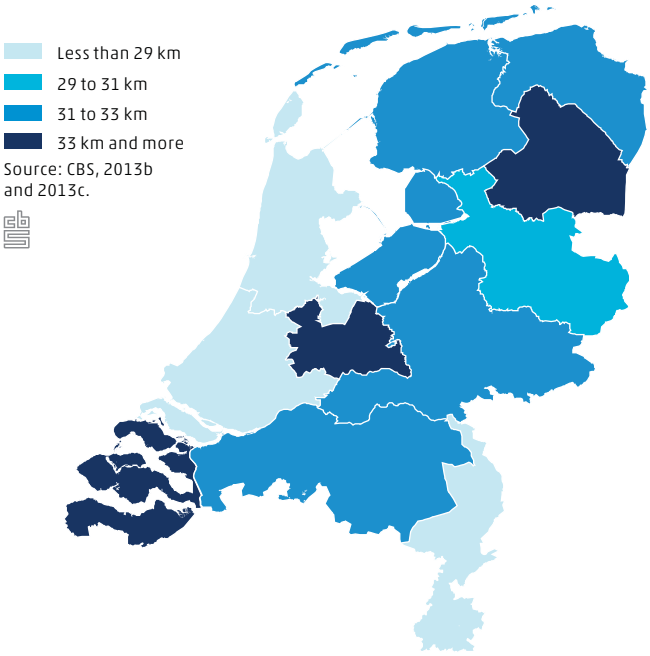
30 km a day is what Dutch people travelled in 2013

Annually, Dutch people travel around 12 thousand kilometres within the Dutch territory. This is over 30 kilometres a day, excluding professional transportation, such as the transport of goods and excluding domestic holidays. Men travel more than women; more than 34 kilometres compared to nearly 27 kilometres a day. All this travelling takes around an hour a day. And while over 73 percent of the distance is covered by car, it takes less than the average travelling time to do so. The Dutch spend a little under 30 minutes in the car. Men spend more time driving where women spend more time as passengers.

Inhabitants of Drenthe travel most kilometres

There are large regional differences between distances travelled. The average person living in the province Zuid-Holland travels a mere 28 kilometres per day, while someone living in Drenthe travels over 36 kilometres. This is mostly because of the distance to amenities. Someone in Drenthe must travel 1.6 kilometres to consult a general practitioner, twice as far as someone living in Zuid-Holland. The distance to the nearest supermarket is also twice as long in Drenthe. About seven times as many people live in the province Zuid-Holland as in Drenthe, so is the total travelling time; namely 100 million versus 18 million kilometres. Inhabitants of Limburg and Overijssel travel less compared to inhabitants of Zeeland and Drenthe. There are a few larger towns in these provinces where many of the province's inhabitants live. So the average travelling distance is less for people living in Limburg and Overijssel.

2.1.2 Average daily travel distance per person by province



Source: CBS, 2013b and 2013c.

The Dutch and the holy cow

Over 6.6 million, over half of the Dutch adults, owned a car in 2013. Furthermore 520 thousand people owned a motorcycle. Slightly over 71 percent of the households owned at least one car. In 2011 some 22.4 percent owned 2 or more cars which had risen to 23.2 percent by 2013. High income households more often own cars (9 out of 10) than lower income households (4 out of 10). In the countryside, where public transport is less extensive, more households own a car and less public transport is used. More information on the stock of vehicles in the Netherlands can be found in Chapter 4 of this publication.

2.2 Destinations: Why and where?

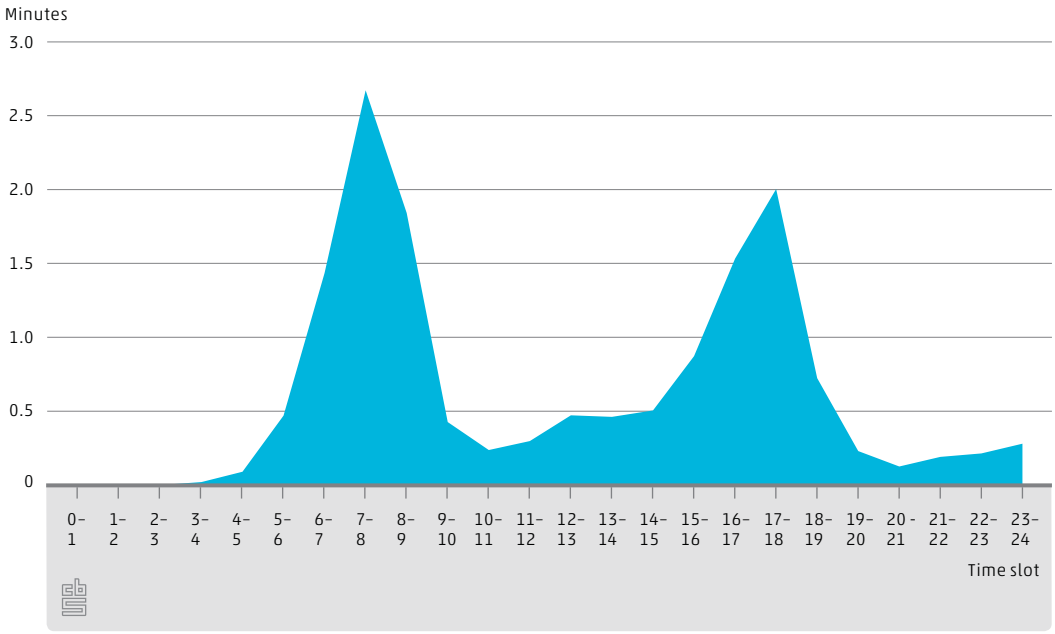
Taking part of traffic is never a goal but a means to an end. The most important travelling motives are work, school, and domestic chores such as grocery shopping and leisure activities such as hobbies or sports, or going to service providers such as dentists and medical doctors. In the following paragraphs the individual travel motives are sketched in terms of how the distances are travelled, when and by whom.

Home-Work commute

The daily commute to and from work is the motive for most of the distances and times travelled, and contributes to the daily rush hour with its peak moments (see Chapter 11). Using several travelling modes Dutch employees travel an average 17.5 kilometres a day to and from work, this takes about 26 minutes. Some 75 percent is done by car, 12 percent by train and 6 percent by bicycle.

The daily rush hours are between 7 and 8 in the morning and 5 and 6 in the afternoon. The weekdays with the most commuter traffic and longest travel distance are Monday (17.2 km) and Thursday (17.3 km) per working individual. Travelling to work takes longest in urban areas. Commuters living in urban areas travel shorter distances to get to work but take longer – due to heavy traffic – than people living in more rural areas.

2.2.1 Average commuter time by car per timeslot



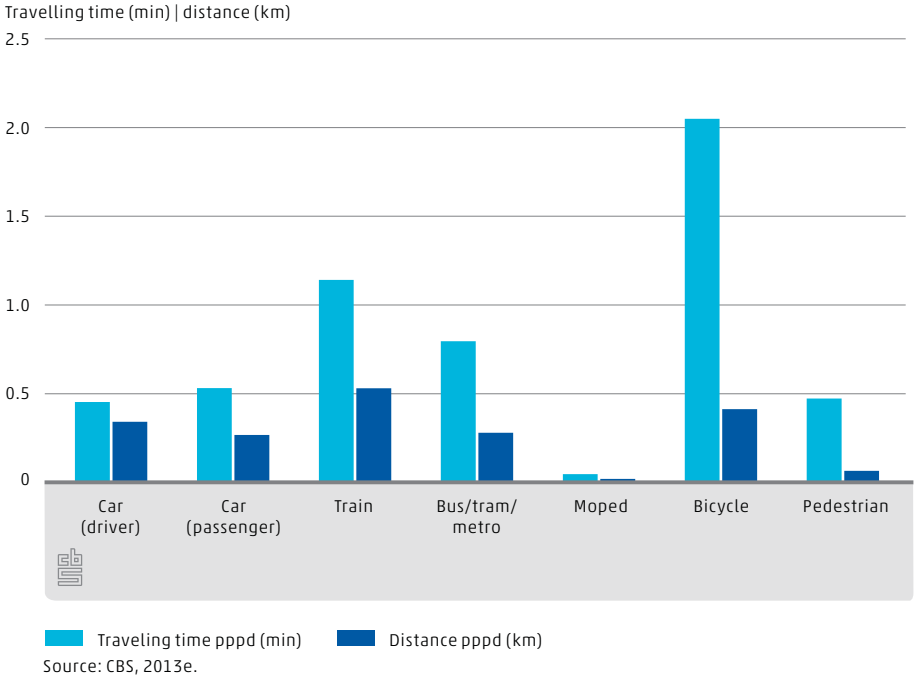
Source: CBS, 2013d.

Men travel nearly half an hour to and from work, for women this is more than 8 minutes shorter. It seem to be mostly 25 to 45 year-olds who travel for work, with an average 19 kilometres a day (28 minutes), closely followed by the 45 to 65 year-olds. Highly educated people travel considerably more than less educated people, this goes for men as well as for women.

Travelling for education

Adolescents aged between 12 and 18 travel an average of 26 minutes a day to school and back. 18 to 20 year-olds travel the longest, with a travelling time of 27 minutes they cover over 11 kilometres to get their education. Adolescents within these age groups who travel to school or studies have mostly graduated from secondary education and have moved on to university or MBO or HBO. They travel mostly during weekdays, just like commuters. The peak moments are somewhat different though, between 8 and 9 in the mornings and 2 to 4 in the afternoons. This is because the average school day is shorter than the average working day. Students use the train to cover most of the travelling distance to get to education. In terms of travelling time the bicycle takes the lead. It is the most frequently used travelling mode for students and takes relatively more time because of the low speed.

2.2.2 Average daily commute to education by transport mode

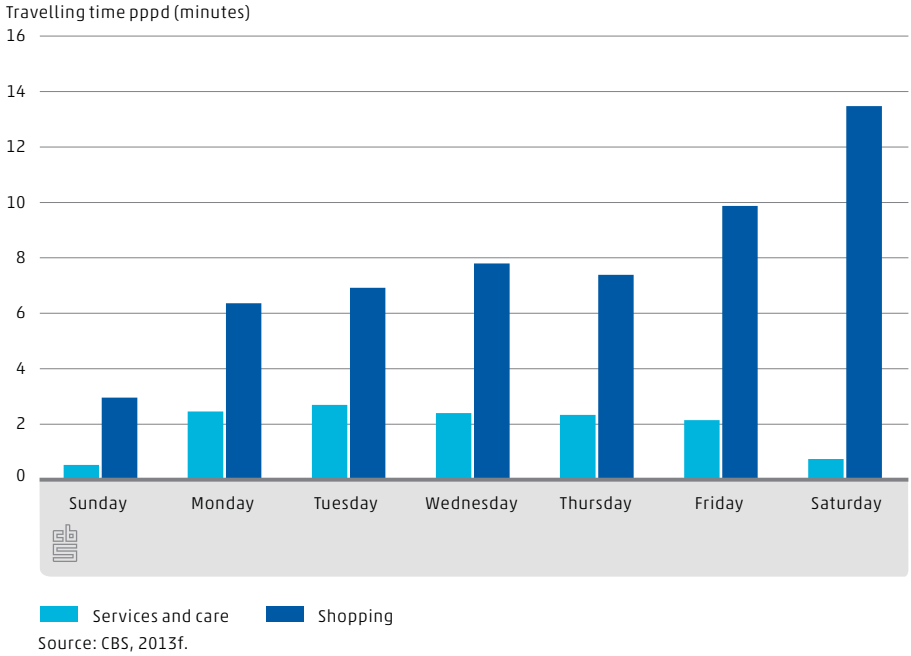


Source: CBS, 2013e.

Going shopping and seeing service providers

There is less need to travel to the supermarket, stores or service providers on set times than with the daily commutes and student travels. The opening hours of stores and service providers make that the trips are made between 9 and 12 in the mornings and 2 to 4 in the afternoons. There are few trips after 5 for services. Shopping is often done in the evenings but considerably less than during the day. Trips to services such as doctors or hairdressers mostly take place on weekdays. Measured in travelling time this is about 5 times as often on Tuesdays as on a Sunday. Grocery and other shopping is mostly done on Saturdays: on average 13 minutes per person per day. On weekdays this varies between over 6 minutes (Mondays) and almost 10 minutes (Fridays). The opening times of shops and grocery stores have been extended to allow people to shop in the evenings and on Sundays, whereas service providers stick the traditional working hours and days.

2.2.3 The average travelling time to services and shops



Source: CBS, 2013f.

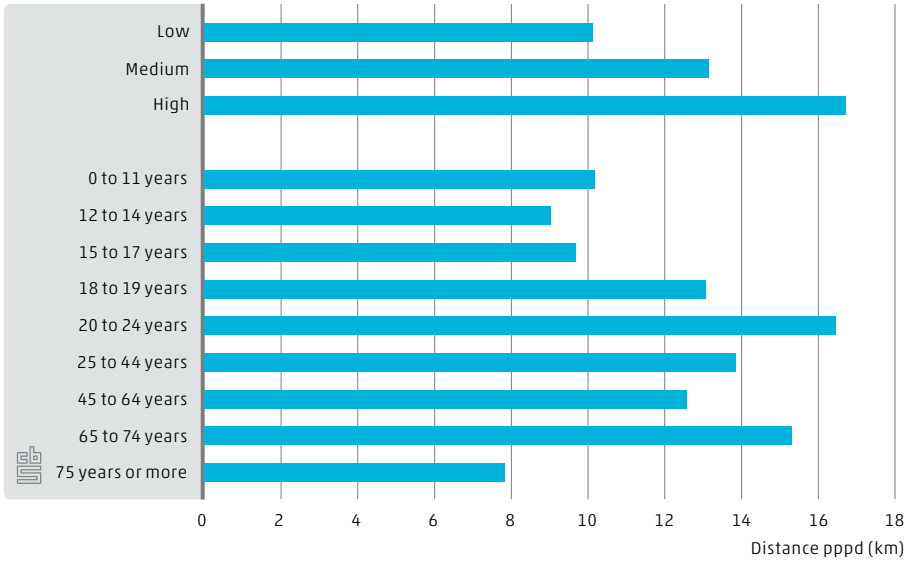
Compared to people living in urban areas, people living in rural areas travel over one and a half times as far to visit a shop, supermarket or service provider, but take 2 minutes less per day to do so. They often use the car to travel these relatively long distances, whereas city dwellers often choose to travel the shorter distances on foot or on bicycle. Overall the car is the most commonly used means

of transport: covering almost half of the trips and three quarters of the distances travelled. People often shop using their bicycle or walking, more so than by going to a service provider. People over 65 spend most travelling time on these activities. Women travel about 9 minutes more than men (7 minutes a day) to shop.

Leisure, visits and recreation

On average Dutch people travel almost 13 kilometres per person per day – 4.5 thousand kilometres per year – for recreational purposes. This includes sports such as jogging and bicycling and driving to the gym or sports association, but also all trips to restaurants or cultural and religious activities. All recreational activities such as walking the dog or riding a bicycle or motorcycle or driving have been included. These movements mostly take place during the weekends. On Saturdays and Sundays the average Dutch person travels 21 kilometres for recreation. On weekdays this is considerably less, especially on Mondays (7 km). In the winter months less time goes into recreational trips than during the summer months. In January we travel almost 23 minutes a day to recreational goals, in July the travelling time is over 10 minutes longer.

2.2.4 Average daily distance travelled for recreation by age and educational level



Source: CBS, 2013g.

Three quarters of the distance travelled for recreation are done by car. One fifth of the travelling time is covered on bicycle and a quarter on foot. Highly educated people travel more for recreational activities than less educated people. People aged between 20–25 and 65–75 travel the most kilometres for recreations, sports and visits.

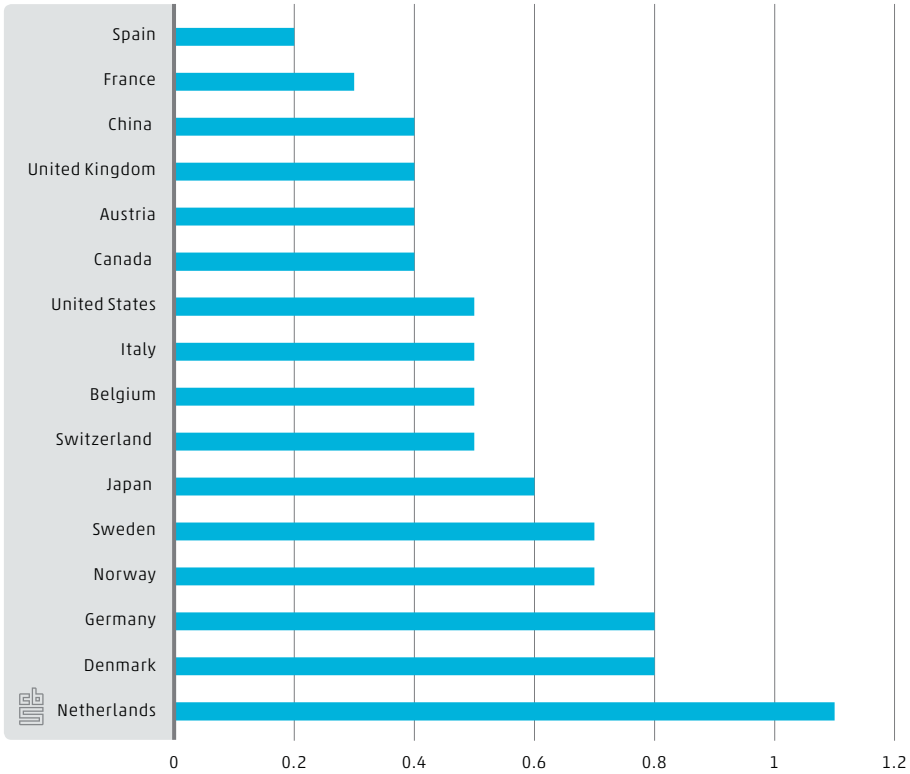
Netherlands bicycling country

The Netherlands is a real bicycling country, as there are 19 million bicycles, about 1.1 bicycle per inhabitant. This gives it the highest bicycle density in the world. The bicycle is the third most used means of transport in terms of distance covered. All Dutch people together travel 14.5 billion kilometres by bicycle, an average of 900 kilometres per person per year. Men bicycle more than women, averaging 2.6 and 2.3 kilometres per day respectively. Regional differences are considerable. While an inhabitant of Utrecht bicycles nearly 3 kilometres a day, someone living in Flevoland rides a mere 1.7 kilometres. Bicycling is strongly age related with 12–15 year-olds riding nearly 6 kilometres a day versus people over 75 who ride just 1.4 kilometres a day.

E-bikes account for a little over 10 percent of the bicycling kilometres travelled. E-bikes are mostly used for recreational activities, covering more than half of the total distance bicycled. For ordinary, non-electric bicycles 39 percent of the travelled distance is recreational. The most frequent users of E-bikes are people over 65, who ride more than half of the kilometrage on E-bikes. The 45–65 year-olds account for one third of the distance.

in 2013 people travelled **4,500** kilometres for recreation

2.2.5 Number of bicycles per inhabitant, internationally



Source: www.fietsen.123.nl.

Sources

CBS, 2013a: Reizigerskilometers (personen); vervoerwijzen, regio's (figures 2.1.1)

CBS, 2013b: Mobiliteit in Nederland; persoonskenmerken en vervoerwijzen, regio's (figures 2.1.2)

CBS, 2013c: Bevolking; geslacht, leeftijd, burgerlijke staat en regio, 1 januari (figures 2.1.2)

CBS, 2013d: Mobiliteit in Nederland; mobiliteitskenmerken en motieven, regio's (figures 2.2.1)

CBS, 2013e: Mobiliteit in Nederland; vervoerwijzen en motieven, regio's (figures 2.2.2)

CBS, 2013f: Mobiliteit in Nederland; persoonskenmerken en vervoerwijzen, regio's (figures 2.2.3)

CBS, 2013g: Mobiliteit in Nederland; persoonskenmerken en vervoerwijzen, regio's (figures 2.2.4)

Literature

CBS (2013): Onderzoek Verplaatsingen in Nederland (OViN), Centraal Bureau voor de Statistiek Den Haag/Heerlen

3.

Goods transport

Some 70 percent of the 565 million tonnes of goods arriving annually in the Netherlands are sea transports, as are over 35 percent of the nearly 420 million tonnes of goods leaving the Netherlands. Out of the 625 million tonnes of goods transported within the Dutch borders, 80 percent goes by road and nearly 20 percent by inland waterways. A mere 2 percent of goods are transported by rail and less than 1 percent by air. Here goods transported through pipelines are excluded. Although not visible above ground, this forms a large part of total goods transport. When included in the total, nearly 20 percent of goods are transported to other countries through pipes.
Inland waterways are mainly used to transport bulk goods and containers to destinations within reach. Containers are increasingly used, because shifting containers from sea ship onto lorries, inland ships and trains is relatively easy. There are multimodal container hubs on several locations in the Netherlands where these shifts take place.

3.1 Introduction

Goods transport can be broken down into national, intercontinental and continental transport. National transport mostly goes by road, partly by inland waterways and a small part by rail. Intercontinental goods transport, which means that either the origin or destination is non-European, is mostly done by sea shipping or airplane. Continental transport – inside Europe – is mostly by road, inland waterways or rail. The origin and destination as well as the characteristics of the goods determine which means of transport is used. Continental transport faces more competition between transport modes than intercontinental or national transport.

3.2 Goods transports in the Netherlands

Transport nation

For centuries, the Netherlands has been a major gateway to the rest of Europe due to its geographic location. Trade and transport play a key role in the Dutch

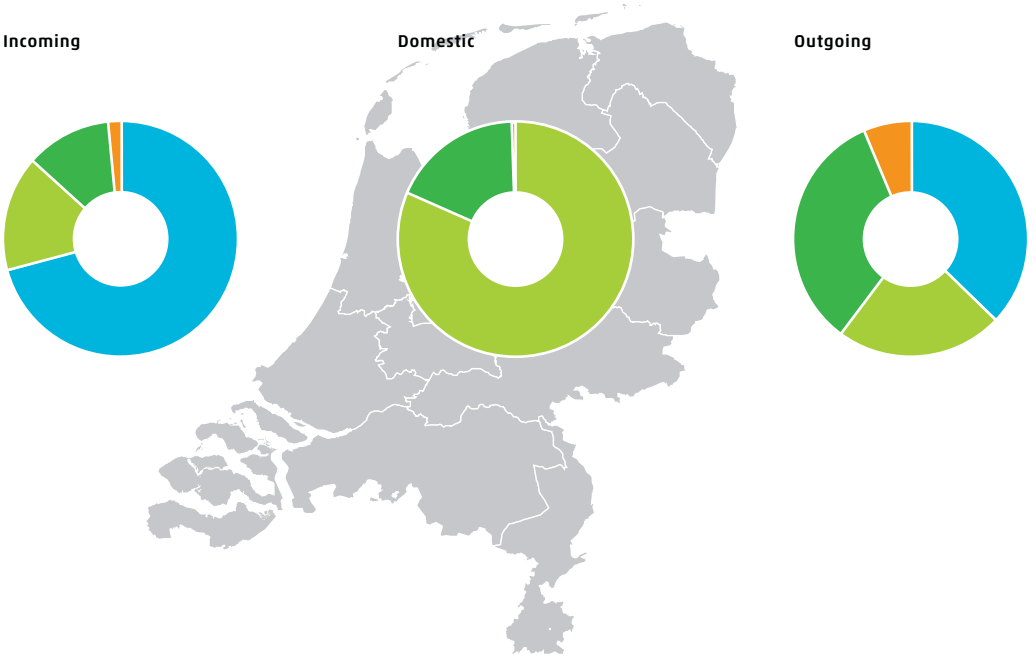
economy, next to national production. Resources and products from all over the world reach their final European destination through the Netherlands. Likewise, the Netherlands forms an important route for the European companies to reach their customers. The Ruhr area is an example of such an important industrial and commercial area that made the Netherlands into a major transport country with relatively many trading companies and companies active in transport and logistics services.

3.2.1 Incoming, domestic and outgoing goods transport

Definitions

Part of the goods imported by the Netherlands are to be processed or consumed and part is directly transported to other countries. This second flow of transit transport is included in this chapter as imports as well as exports. This causes double counting in total transport. Double counting may also arise from national transport with imports and exports when shifting between means of transport. A container that enters the Netherlands by sea ship is commonly transported within the Netherlands by lorry. This container will therefore be included in imports but also in domestic transport.

3.2.2 Goods transport in the Netherlands, 2014



Source: CBS, 2015a.

Domestic transport dominant

Annually nearly 565 million tonnes of goods are transported into the Netherlands, of which some 55 percent are transported directly to another country. The rest is import for national consumption or will be processed by Dutch companies. Nearly 420 millions of tonnes are transported to foreign countries, so this is less than the goods entering the Netherlands. Incoming goods are often raw materials for processing in the Netherlands such as coal, crude oil and oil products. They are also often products for consumption in the Netherlands (foods, cars) or investments (machinery, lorries). Within the Netherlands over 625 million tonnes of goods are being transported.

These goods can be transported by different transport modes, depending on the characteristics of the goods and on the destination. Intercontinentally, so often over long distances, goods are transported by sea or air. Continental transportation, often over shorter distances, is often done by inland shipping or rail. Each means of transportation will be considered.

3.3 Intercontinental transport

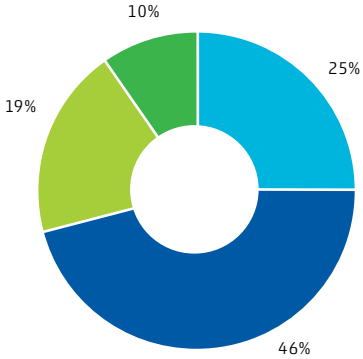
For long distance transport, sea shipping and aviation are the most important modes. Aviation is relatively fast, but also rather expensive, so it is only suitable for a limited assortment of goods.

Sea shipping: far more container transport

Many goods enter the Netherlands via the sea ports, nearly 400 million tonnes in total. These goods go to locations in the Netherlands as well as to the European hinterland via various means of transport. Nearly 160 million tonnes of goods leave the Netherlands through its sea ports. The port of Rotterdam is the largest port in Europe and fourth largest in the world, following Singapore, Shanghai and Tianjin. Other major Dutch sea ports are Amsterdam and IJmuiden. Bulk goods such as crude oil and oil products mainly enter through sea ports.

Increasingly goods are transported in containers which shift easily onto lorries, trains and inland ships. Ships, container ships as well as bulk carriers, are increasing in size.

3.3.1 Weight per cargo type on sea ships, 2014*



Source: CBS, 2015b.

71% of the goods entering the Netherlands arrive by sea

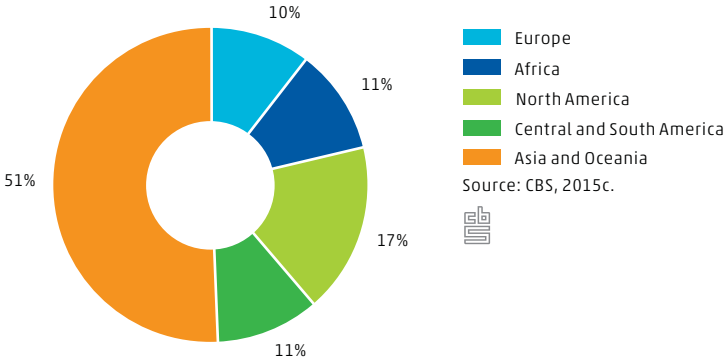
Aviation : Schiphol Europe's second largest cargo airport

Aviation is suitable for transporting goods long distance. Expressed in weight, only a small part of imported goods enters the Netherlands by air, 0.9 million tonnes. About 0.8 tonnes of goods are transported by air to other countries.

Airplanes are mainly used to transport high-quality products, express deliveries and special products. These are often lighter yet precious products. A well-known example is that roses grown around Nairobi are flown into Schiphol, go to the flower auction in Aalsmeer and are then distributed to different European countries.

Almost 97 percent of the flown-in goods come through Amsterdam Schiphol Airport. The rest comes through Maastricht Aachen Airport. In Europe, Schiphol is the second largest cargo airport, after Frankfurt. Asia is the main origin and destination for goods transported by airplane.

3.3.2 Origin/destination of goods by air in tonnes, 2014



Source: CBS, 2015c.

3.4 Continental transport

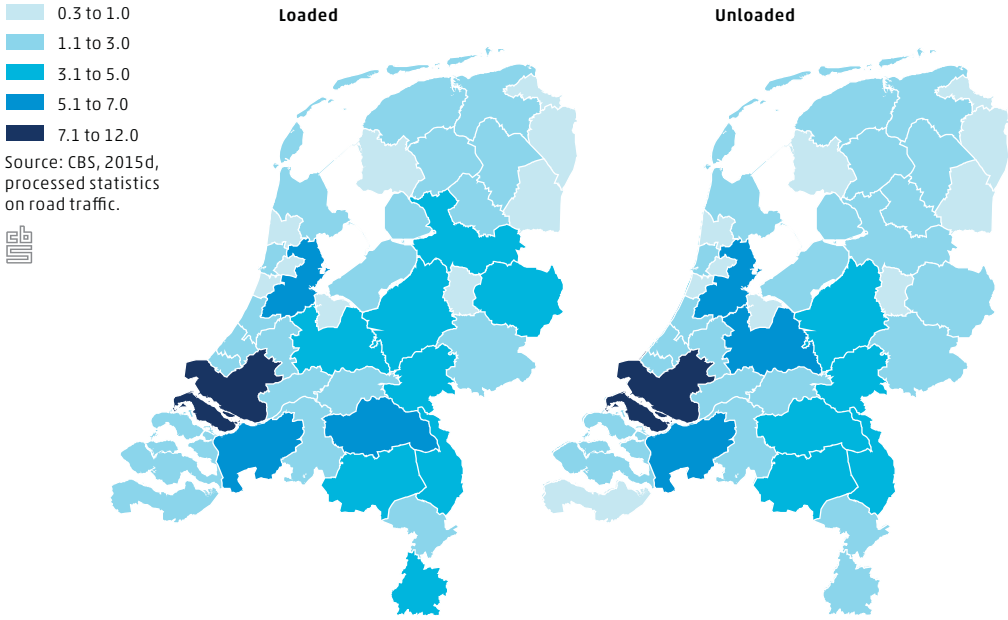
Road transport, inland shipping and railway transport are the main modes of transport within Europe. There is some competition between means of transport in cross-border transport to the hinterland. Many goods can be transported either by lorry, ship or train. The choice is determined by how fast and easy the destination can be reached and the availability of well-designed infrastructure.

Road transport: increasing foreign competition

Nearly 90 million tonnes of the incoming goods enter the Netherlands by road while up to 95 million tonnes leaving the Netherlands do. The road is the dominant mode for domestic goods transport: over 510 million tonnes are transported by lorry, equalling 80 percent of the total domestic transport.

Many goods stay within the Randstad. Provisions, agricultural goods, general cargo and construction materials are the most important goods transported by road. Foreign transport companies have become more active in the Netherlands: accounting for more than 40 percent of the cross-border transport.

3.4.1 Share of loaded and unloaded tonnes of goods by road, 2013



Source: CBS, 2015d, processed statistics on road traffic.

Inland shipping: large Dutch share in Europe

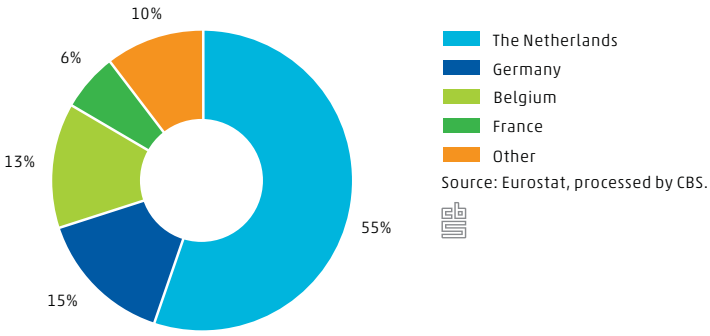
Many goods from the hinterland enter the Netherlands via inland waterways, in total 65 million tonnes of goods. Many goods that have entered the country through sea ports, leave the country via inland waterways: 140 million tonnes in total. Within the Dutch borders over 110 million tonnes of goods are shipped through inland waterways a year. Large rivers, the Rhine and Danube in particular, are crucial for transport on the inland waterways in Europe. Dutch ships transport 55 percent of all inland navigation in Europe, next are German and Belgium ships.

Goods are mainly loaded in the ports of Rotterdam and Amsterdam. Many goods stay in the Netherlands or are transported to Germany. Inland shipping transports mainly bulk goods, such as sand, gravel and diesel. Piece goods are transported in containers.

The Dutch inland fleet consists of about 5,000 ships. This number is fairly constant, but the loading capacity has increased greatly in the last couple of years. This had led to overcapacity, which has put pressure on the transport prices. This overcapacity is now diminishing (CBS, 18 March 2015).

510 000 000 tonnes of goods
were transported by lorries in the Netherlands in 2014

3.4.2 Inland shipping in Europe in tonnes, 2013



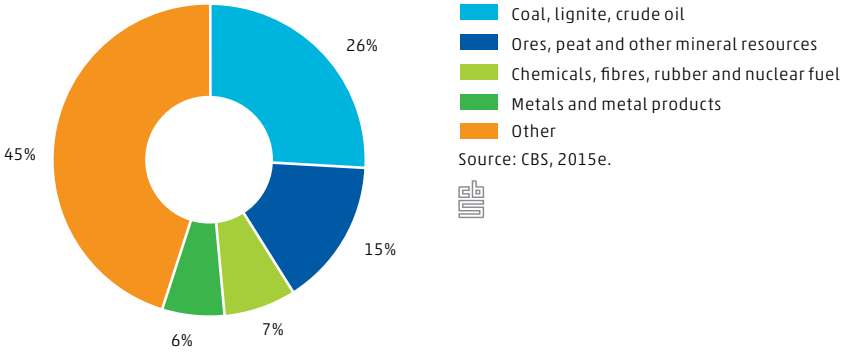
Source: Eurostat, processed by CBS.

Rail transport

Rail transport plays a more modest role in goods transport than sea and inland shipping and road transport. Nearly 10 million tonnes of goods enter and 26 million tonnes leave the Netherlands by train.

Trains transport only 3 million tonnes within the Netherlands. This is because the Netherlands has the most crowded rail network of Europe, which is mostly used for passenger transport. Another reason is the fact that the Betuwe Route is not yet connected to the German railway system. Inland shipping provides an excellent alternative transport mode in the Netherlands, which lacks in most other countries.

3.4.3 Types of goods per train in tonnes, 2014



Source: CBS, 2015e.

Railways mostly carry sea containers and bulk goods, such as coal and ores. In the last couple of years more coal has been transported to Germany, over 10 million tonnes in 2014, because Germany has partly replaced its nuclear energy by energy generated in coal fuelled power stations. Container transport has also increased greatly.

Sources

CBS, 2015a: Goederenvervoer; vervoerwijzen, vervoerstromen van en naar Nederland. (figures 3.2.2)

CBS, 2015b: Zeevaart; overgeslagen gewicht, zeehaven, vervoerstroom, soort lading. (figures 3.3.1)

CBS, 2015c: Luchtvaart; maandcijfers Nederlandse luchthavens van nationaal belang. (figures 3.3.2)

CBS, 2015d: Wegvervoer; vervoerd gewicht naar provincie van laden en lossen. (figures 3.4.1)

CBS, 2015e: Spoorvervoer; goederenvervoer over Nederlands spoor, goederensoort. (figures 3.4.3)

Literature

CBS (2015, 19 March): More goods carried by inland waterways in 2014 but hardly or no turnover growth. Statistics Netherlands, The Hague/Heerlen.

CBS (2015, 13 februari). Statistics Netherlands: 2.8 billion roses imported from Africa. Statistics Netherlands, The Hague/Heerlen.

4. Vehicles

There are far more Dutch motor vehicles than at the beginning of the century. More older and elderly people own cars, while mopeds and e-bikes are also gaining popularity. Car ownership is diminishing among the younger generation. There are fewer freight transport vehicles on the road, both heavy freight vehicles and vans. The Dutch air fleet comprises about three hundred planes for the commercial transport of passengers and goods; the vast majority of the fleet, however, is for recreational use. Almost a hundred ships arrive in Dutch ports every day.

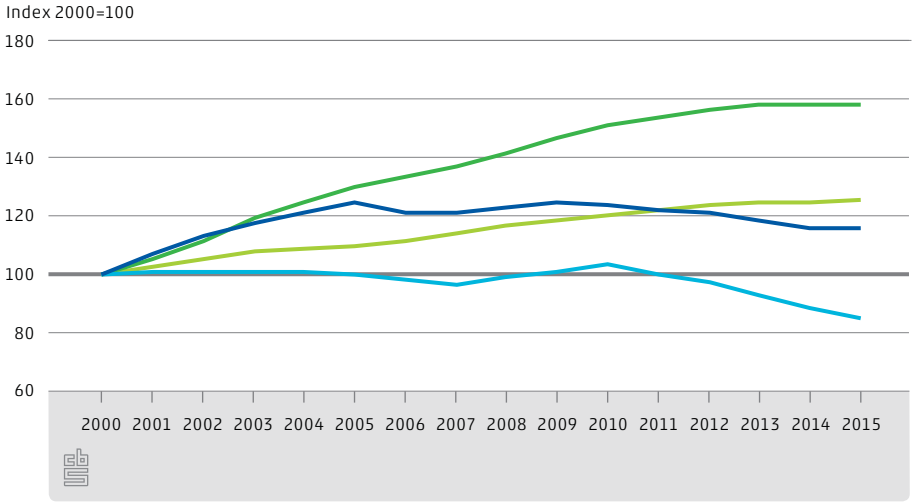
4.1 Introduction

Vehicles for transporting individuals are mainly motorised vehicles (motorcycles, mopeds), aircraft and bicycles. Some vehicles used in public transport (trains, trams, metros) are not covered in this chapter because of lack of data. The same is true for ships used for passenger transport (cruise ships, yachts, water taxis).
Vehicles for goods transport are heavy freight vehicles and vans for road transport, aircraft for cargo transport by air and sea ships and inland ships for transport over water.

4.2 More motor vehicles in the Netherlands

There were almost 10.8 million motor vehicles at the start of 2015. In comparison with five years ago the number of cars, motorcycles and mopeds is up by 6 percent. However, the number of freight vehicles has fallen. These include vans, lorries and road tractor-trailers. There are also fewer buses than five years ago. Currently there are 9,500 buses.

4.2.1 Developments in motor vehicle numbers



Source: CBS, 2014a.

4.3 Ownership of vehicles

Car ownership is still increasing in the Netherlands, especially among older people. The car is becoming less popular among young people, who tend to opt more for bicycles, mopeds or public transport.

Half of all adults in the Netherlands own a car

The number of cars has increased in the last fifteen years. In 2015 there were almost eight million cars in the Netherlands, a quarter more than at the beginning of the century. They form three quarters of the stock of motors vehicles in total. The vast majority of the cars is owned by private individuals.

In the last five years car numbers have increased by 5 percent, partly due to the growing population. In this period the 18-plus population has increased by almost 3.5 percent. Car numbers also rose because more people have a driver's license. It is as common for women as for men to have a driver's license and a job, which is why car ownership among women has increased.

Many households have a second or even a third car. In 2013 some 50 percent of all households had one car, almost a quarter had two or more cars. About 50 percent of all Dutch adults own a car.

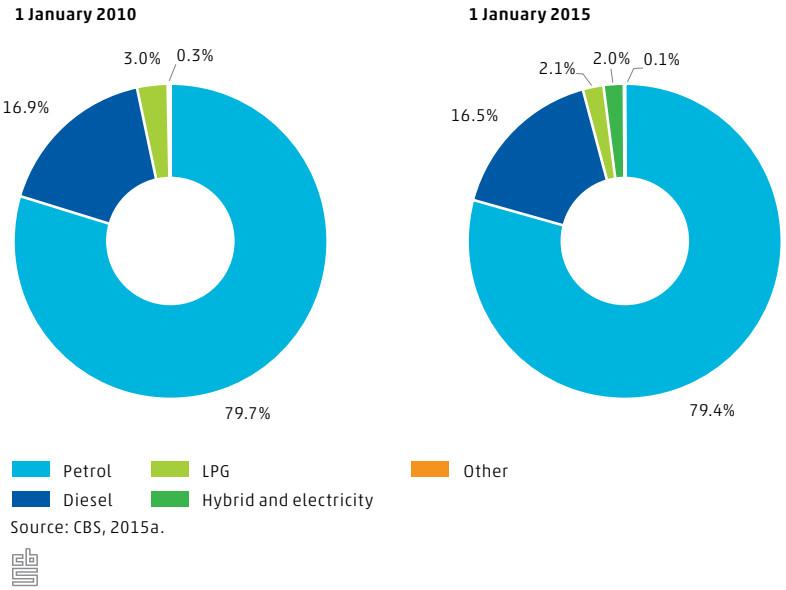
Hybrid and electric cars gaining popularity

Most cars run on petrol (80 percent) or diesel (17 percent), but a growing number are now running on alternative fuels. On 1 January there were 156 thousand hybrid and electric cars in the Netherlands, a quadrupling of the situation five years ago. Hybrid cars have a combustion engine as well as an electric motor and a battery.

2013 was a top year with a total of 47 thousand new hybrids sold. More companies and private individuals bought new hybrid cars because of tax incentives for fuel-efficient cars. Purchases were brought forward to benefit from tax exemptions for purchases and road tax. The result was a spike in sales in December 2013, when 1 in 3 new cars sold was a hybrid versus 1 in 11 in the months before. After the tax regulations were tightened, there was a 34 percent drop in the sales of new hybrids in 2014.

Although hybrid and electric cars have been increasing in number for years, they still make up only 2 percent of total car numbers.

4.3.1 Cars by type of fuel



Source: CBS, 2015a.

Car ownership among older people increasing

Older people often own cars: in 2000 over a third of the people over 65 did, while in 2014 this was up to about 50 percent. Since the beginning of this century the number of cars owned by people over 65 has doubled from over 750 thousand to almost 1.5 million. Car ownership and car use have become commonplace, with many people having a driver's license, especially women. There is still a big difference in car ownership between men and women over 65; about three quarters of older men own a car versus one quarter of older women. The difference in car ownership between men and women is less pronounced among the under 65's. Car ownership among people over 85 has grown fastest. In 2000 about 10 percent owned a car, in 2013 almost 25 percent did. About 50 percent of the men and almost 12 percent of the women over 85 were car owners. In 2014 they owned 3.5 times as many cars as in the year 2000: from 21 to over 72 thousand.

25% of Dutch over 85's owned a car in 2013, up from 10% in 2000

Car less popular among young people

Not only in the Netherlands, but also in other countries car ownership is becoming less popular among young people. Free public transport for students was introduced in 1991, and the Netherlands is a real country of bicyclists. Young Dutch people use fewer cars than their counterparts elsewhere in West.

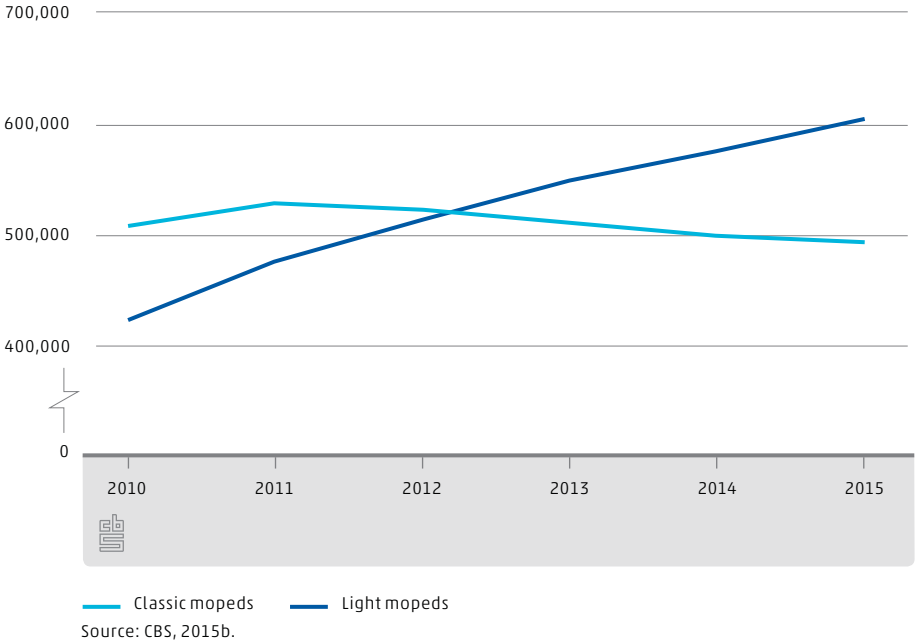
Car ownership by 18 to 25 year-olds has been decreasing since 2011. This is partly because many young people live in towns, where public transport is well established and bicycles and mopeds are common. Moreover amenities tend to be nearer in towns and parking problems are a major issue. Therefore bicycles and public transport are attractive alternatives for car ownership. About one in five young Dutch people owns a car, men more often than women.

Strong growth in mopeds, especially light mopeds

The number of mopeds has increased by almost 60 percent since 2007. At the start of 2015, 1.1 million vehicles were registered as mopeds. Since 2005 all new mopeds are registered, while moped registration has been required for all mopeds since 2007.

The number of mopeds has risen faster than that of cars and motorcycles in the last five years, namely by 18 percent. Light mopeds have particularly become popular, even outnumbering the classic moped. In 2010 there were 85 thousand more classic than light mopeds, whereas at the start of 2015 there were 111 thousand more light than classic mopeds.

4.3.2 Classic and light mopeds



Source: CBS, 2015b.

One reason for the popularity of light mopeds is that no helmet is required. Moreover the cooler look of the light scooter may play a role in the decision to purchase, especially among young people. The light scooter is mostly used in towns. In the countryside there are relatively more classic mopeds. Both classic and light mopeds are most popular among men.

In 2013 women owned 37 percent of light mopeds and about a quarter of the classic mopeds.

Different types of vehicles registered as mopeds

Light moped
The speed limit is 25 km/h and a helmet is not required. The light moped has a blue license plate. E-bikes are also registered in this group, with the exception of bicycles with pedal assistance (Pedelec).

A light scooter is another kind of light moped. It has small, wide wheels and the feet of the driver are placed next to each other below the steering wheel and the saddle.

Classic moped
For a classic moped the speed limit is 45 km/h and a helmet is required. The license plate is yellow.
A classic scooter is also a kind of moped. Like the light scooter this one has small, wide wheels and the driver places his feet next to each other below the steering wheel and the saddle.

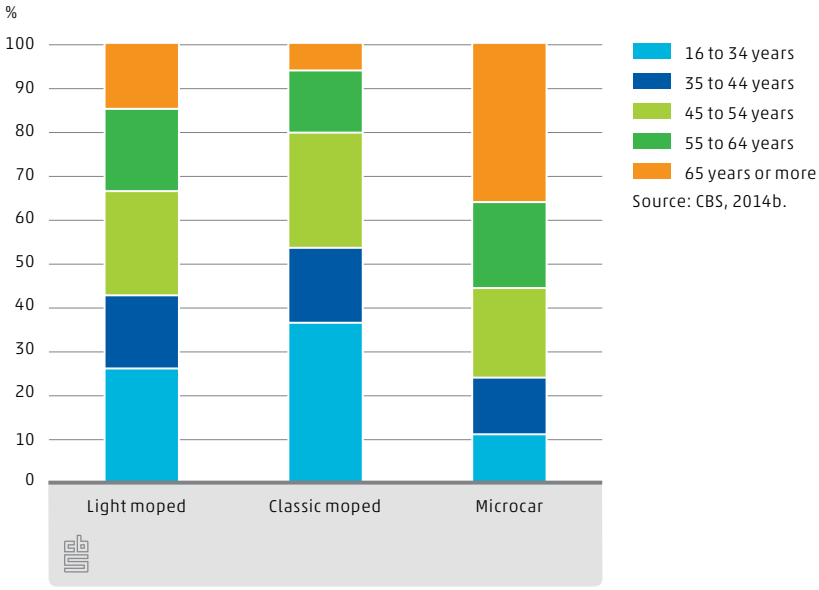
Micro car
A micro car looks like a little car but is registered as a moped. Its speed limit is also 45 km/h and its weight must not exceed 350 kilos.

Micro cars popular with elderly people

The number of micro cars rose by more than a quarter between 2007 and 2010. In 2015 there were 20 thousand micro cars in the Netherlands. In the past five years the number of micro cars has been quite stable.

The micro car has evolved into a more luxury vehicle that is hardly inferior to a real car anymore. It has the benefits of a car: it seats two people, it transports groceries and other luggage and people stay dry when it rains. Other major benefits are that no purchase or additional tax has to be paid and that they are exempt from road tax.
Micro cars are especially popular with older people: 36 percent of the owners are over 65, one in ten is under 35. In contrast, mopeds are more popular among young people and less so with the elderly.

4.3.3 Moped owners, 2013



Source: CBS, 2014b.

Four on ten micro car owners are women. This is relatively more than female ownership of classic and light mopeds, but also in this case most owners are men.

Netherlands bicycling country

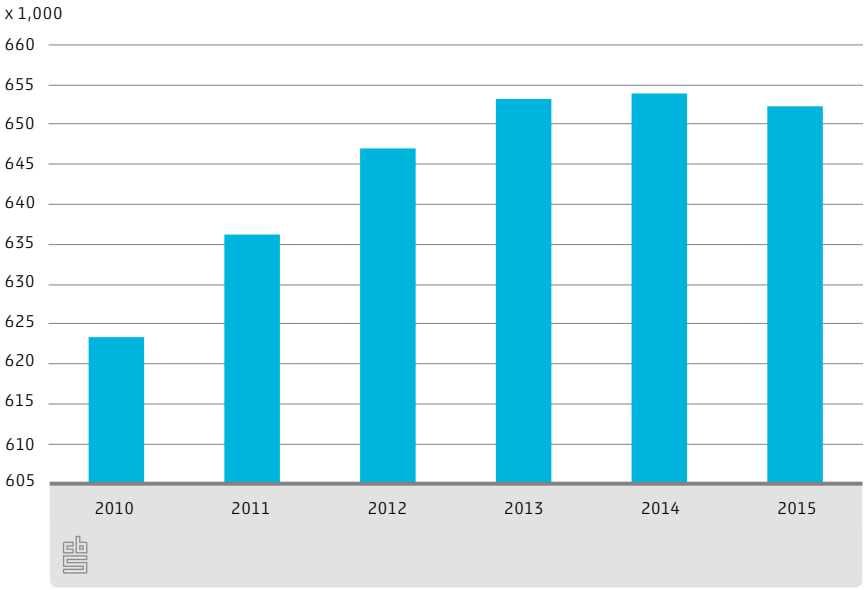
In 2014 over one million bicycles were sold bringing the total in the Netherlands up to almost 19 million bicycles. The e-bike has become very popular. In 2014 over 1 in 5 bicycles sold was an e-bike. Five years ago this was 1 in 8.

There is no other country in the world with a comparable prosperity level where people ride bicycles as much as in the Netherlands. A quarter of all trips are bicycle rides.

Fewer motorcycles sold

In 2015 there are 652 thousand motorcycles, 5 percent more than in 2010. The increase in motorcycles has been slowing down since the start of the crisis in 2008, including fewer motorcycles each year. This is partly because new motorcycle sales were falling, so that in 2015 there were fewer motorcycles than in 2014.

4.3.4 Motorcycles



Source: CBS, 2015c.

One in 25 Dutch people owns a motorcycle. Most motorcycles are bought by men. Only 1 in 8 owners is a woman. In 2014 there were almost 65 thousand female motorcycle owners. In the group of motorcycle owners aged over 55 men outnumber women 14 times. In the group motorcycle owners aged under 35 there are 5 times as many men as there are women.

4.4 Vehicles for goods transport by road

The Netherlands is a major transport country, using heavy freight vehicles and vans for transport by road. There are many vans used for transporting small loads. There are far fewer heavy freight carriers, transporting larger loads over longer distances.

Decrease in freight carrier numbers

The number of heavy freight carriers and vans has dropped gradually since 2008. In the last five years their number has fallen by 7 percent, partly because of the economic recession in which the purchases of new vehicles were delayed or cancelled and partly because of competition by road transporters from Eastern Europe.

7% **fewer freight vehicles in 2014 than in 2009**

Vans popular in construction, trade, hotels and restaurants

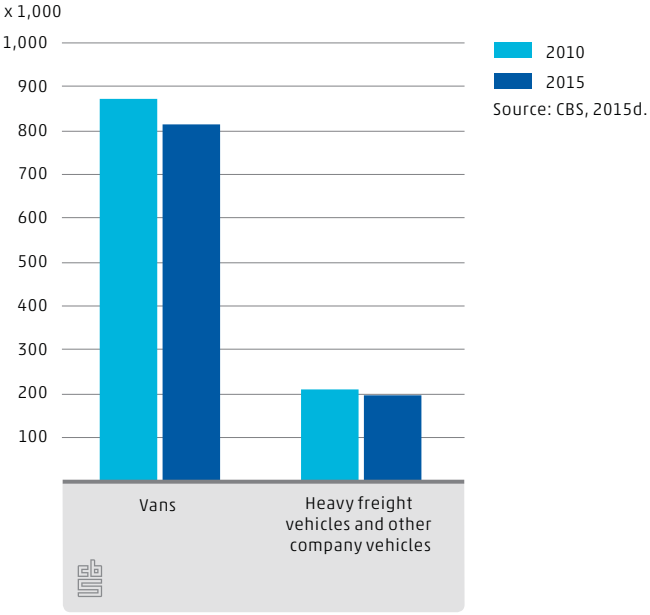
815 thousand vans are registered in the Netherlands. They are used for transporting loads up to 2,000 kilogrammes. About 85 percent is owned by companies and 15 percent by private individuals. The share of private van owners is falling every year. This has to do with tax regulations that make it unattractive for private individuals to buy a new van. Purchase and road tax for vans were raised in July 2005, but not for entrepreneurs. They can ask for a refund.

Privately owned vans tend to be a lot older than those owned by companies. In 2011 the average company van was 7 years old and a privately owned one over 13.
More than half of the company vans are used in construction, in the trade sector (including wholesale and retail) and by hotels and restaurants.

Heavy freight vehicles

At the start of 2015 there were 134 thousand registered heavy freight vehicles, while there still were 145 thousand lorries and tractor-trailers in 2010. These vehicles are equipped to carry larger loads, tractor-trailers are mostly used on longer (international) hauls. Most are owned by transport companies. In 2015 there were 1.5 percent fewer tractor-trailers than five years ago, the number of lorries was down by 14 percent.
There are also 61 thousand special vehicles, such as campers, fire trucks, tow trucks and so on.

4.4.1 Vans and heavy freight vehicles



Source: CBS, 2015d.

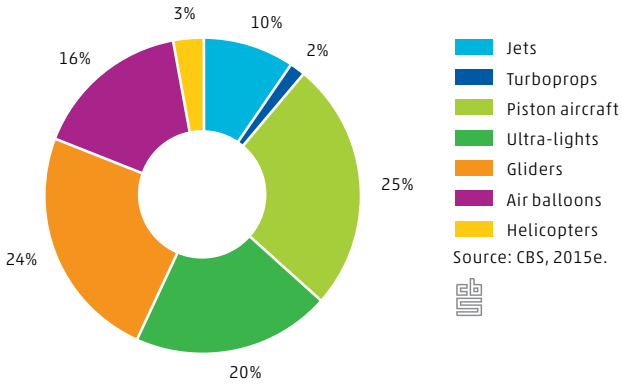
4.5 Ships and aircraft

Sea and inland ships transport vast quantities of goods. Many of the ships entering Dutch ports are tankers. Inland ships mostly transport bulk such as sand and gravel along inland waterways. Goods are also transported by air. However, most of the Dutch air fleet is used recreationally.

Dutch air fleet

The Dutch air fleet consists of 2.7 thousand aircraft. These are mainly planes that are used for recreation, such as gliders, ultra-lights for one or two persons and piston aircraft. Piston aircraft are often used for training, sightseeing and private flights. Aircraft with jet engines and turboprops are generally used commercially for transporting passengers and cargo in scheduled flights, holiday flights and business traffic. In the Netherlands there are about 300 of these aircraft. Besides the air fleet comprises 450 air balloons and almost 80 helicopters.

4.5.1 Air fleet, 31 December 2014



Source: CBS, 2015e.

Sea and inland shipping

About 35 thousand ships a year enter Dutch ports and harbours to load and/or unload freight or passengers. One third of the total are tankers or ships equipped for transport of liquids or gas. These can be oil tankers, tankers for chemicals, but also tankers for fruit juice. Tankers transported the largest quantity of cargo in 2013, almost half of the total weight unloaded in Dutch ports.

Conventional ships

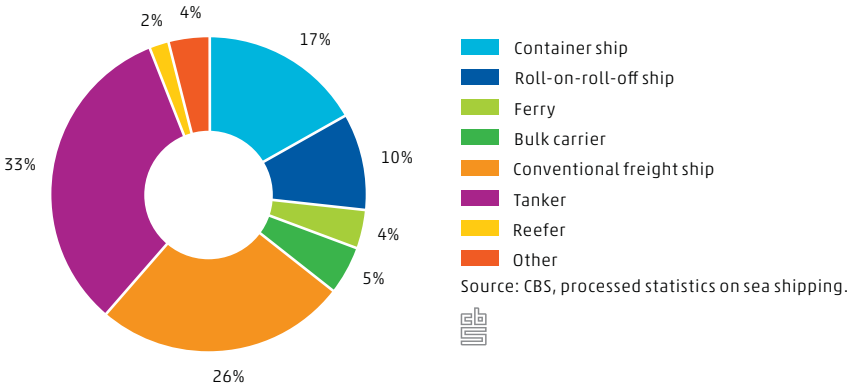
Besides tankers many conventional ships enter Dutch ports. These are ships that can transport different types of loads, such as containers, piece goods, dry bulk cargo and cars. Piece goods are counted by piece and are transported in boxes, crates, barrels or bales. Bulk cargo is counted in weight. A quarter of the ships visiting Dutch harbours are conventional freight ships.

Containerships and bulk carriers

Another type of ship that regularly enters Dutch ports are container ships. They carry sea containers that often transport piece goods. The largest container ship of the world can carry almost 20 thousand containers. Bulk carriers transport bulk cargo such as ores, grain and coal. Both container ships and bulk carriers have been increasing in size over the years (Statistics Netherlands news item 10 December 2014).

Reefers mainly transport food products that need to be refrigerated such as fruit, meat and fish. Roll-on-roll-off ships are suitable to get rolling loads aboard, such as vehicles. Ferries carry passengers and their vehicles as well as freight carriers.

4.5.2 Ships entering Dutch ports, 2013



Source: CBS, processed statistics on sea shipping.

Inland ships

Inland ships transport goods and passengers on inland waterways or in coastal waters. They are not built to sail at open sea. About 5 thousand Dutch inland ships were active in goods transport in 2014. Half of them are motor freighters, carrying for example dry cargo like sand and gravel or containers.

About 20 percent of the inland ships are barges that can carry the same kind of cargo. These engine-less barges have to be pushed by a pusher tug. Furthermore there are tankers and other inland ships.

Sources

CBS, 2014a: Motorvoertuigenpark; type, leeftijdsklasse, 1 januari (figure 4.2.1 (except mopeds))

CBS, 2014b: Personen in bezit van bromfiets; persoonskenmerken (figure 4.3.3)

CBS, 2015a: Personenauto's; voertuigkenmerken, regio's, 1 januari (figure 4.3.1)

CBS, 2015b: Bromfietsen; soort voertuig, bouwjaar, eigendom, leeftijd, regio, 1 januari (figure 4.3.2)

CBS, 2015c: Motorfietsen; voertuigkenmerken, regio's, 1 januari (figure 4.3.4)

CBS, 2015d: Bedrijfsvoertuigen; voertuigkenmerken, regio's, 1 januari (figure 4.4.1)

CBS, 2015e: Luchtvloot; omvang en samenstelling, 31 december (figure 4.5.1)

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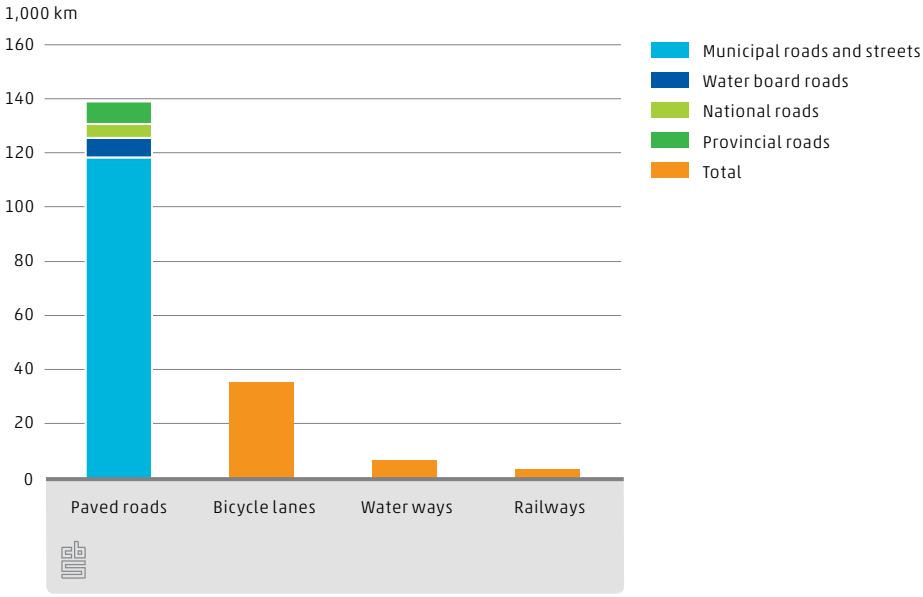
5. Infrastructure

139 thousand kilometres of paved road, 6 thousand kilometres of waterways and nearly 3 thousand kilometres of railways and 35 thousand kilometres of bicycle lanes have been constructed for transport in the Netherlands. This is nearly 11 meters of infrastructure per inhabitant. By infrastructure we mean the total network intended for passenger and goods transport.

5.1 The intricate road network

The Netherlands has nearly 139 thousand kilometres of paved roads. Municipal roads and streets form 86 percent of all roads. The national roads connect the regions and the hinterland, provincial roads connect the different provincial regions. Together these constitute the main roads. Municipal roads mainly consist of streets and roads connecting neighbourhoods. Water board roads form a separate category: they link the water board controlled flood defences found mostly in the western provinces. So the road network is finely meshed, which has a positive outcome on the transport and mobility options.

5.1.1 Road traffic infrastructure



Source: CBS, 2014a; National Road Database (NWB).

Main roads

Crucial issue is who controls the maintenance of the roads, the state or the province. The maximum speed limit is 130 km per hour on most national roads and 80 km on provincial roads.

Source: Rijkswaterstaat.

86% of paved roads are municipal roads

5.1.2 Main roads

Main roads maintainance by
Provinces (7,749 km)
State (5,242 km)

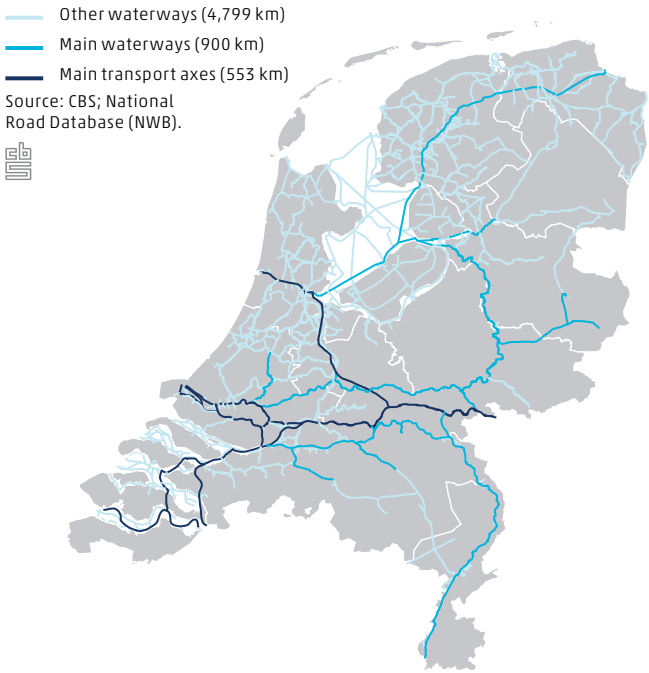
Source: CBS; National Road Database (NWB).

5.2 Waterways located mainly in the west and north

Waterways are mainly concentrated in the west and north of the Netherlands. They are found west of the one-meter altitude line of the country. The waterways often originated out of the need for agricultural land and for draining peat moors to cut peat. In order to discharge excess water, waterways and canals where connected to existing rivers and canals, thus creating a whole network of waterways. This network was initially used to carry supplies from the rural areas to the cities in the vicinity, and to dispatch peat in the north. Back in the days the most comfortable way to travel was across water because the roads were of poor quality. Nowadays the waterways are often used for recreational activities in addition to shipping. The main transport axes, the 'great rivers' Rhine and Meuse, the 'Amsterdam–Rhine Canal' and the 'Rhine-Scheldt connection', are mainly used for the transit of goods

from the sea ports in Rotterdam and Amsterdam to Germany and Belgium by professional shipping. The main waterways unlock the country for water transport.

5.2.1 Waterways by economic significance

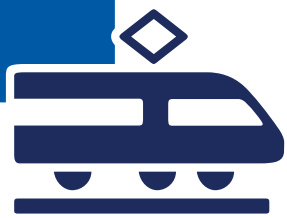


5.3 Railways

The Dutch railway network is over 3 thousand kilometres long. In 1839 the first train connected Amsterdam and Haarlem. A decade later and the four major cities had been connected and the first rail connection to Germany realised. In the 25 years that followed, the country was further unlocked and the province capitals were connected to the network. Over 3 quarters of the current rail tracks is electrified and over 60 percent is double track. The non-electrified tracks are mainly located in the Northern and Eastern part of the country. The network includes 397 railway stations, one for every 7.6 kilometres of track.

The railways are used for passenger and goods transport. The Betuwe Line (160 kilometres) from Rotterdam Europort to Germany is used solely for goods transport. The same goes for the track from Terneuzen to Belgium. The high-speed track (190 kilometres) from Amsterdam through Rotterdam and on to Paris is used only for passenger transport.

7.6 km is the average distance between train stations



5.3.1 Railways

Source: CBS; National Road Database (NWB).

5.4 Cycling lanes

There are more bicycles than people in the Netherlands (1.1), which shows the popularity of the bicycle as a means of transport. According to the cycling association there are nearly 35 thousand kilometres of cycling lanes. Zuid-Holland even has a 'Velostrada', a broad cycling track with only few crossings, which enables bicyclists to merrily bypass traffic jams. And there are many campaigns to lure motorists out of their cars and onto bicycles.
All those kilometres worth of cycling lanes are not just used for commuting, but also for recreational activities. The concept 'fietsvierdaagse' is popular throughout the country and attracts thousands of recreational bicyclists.

Fietsvierdaagse

The 'fietsvierdaagse' is typically a Dutch event. Each year many participants make four-day bicycling tours through rural areas, to enjoy nature rather than finish within a certain time. These areas have many cycling lanes so that participants are not disturbed by other traffic. One of the best known 'Fietsvierdaagse' events is organised in Drenthe.

Source: Wikipedia.

5.5 Airports

Schiphol is by far the largest airport of the country for both passengers and cargo. Other civilian airports are Eelde/Groningen, Eindhoven, Maastricht/Aachen and Rotterdam/The Hague. There are an additional 25 domestic airports across the country, mostly for recreational use, and 7 military airports.

5.5.1 Airports

Civilian airport
Domestic airport
Military airport

Source: CBS, 2014a; Wikipedia.

5.6 Accessibility and proximity

The distance that needs to be travelled is determined by the spatial structure such as the density of infrastructure, and the mix of work and housing functions. The accessibility and proximity of facilities, such as train stations and main road entrances, doctor and shops, usually lead to less mobility. Good facilities ensure less rush hour traffic.

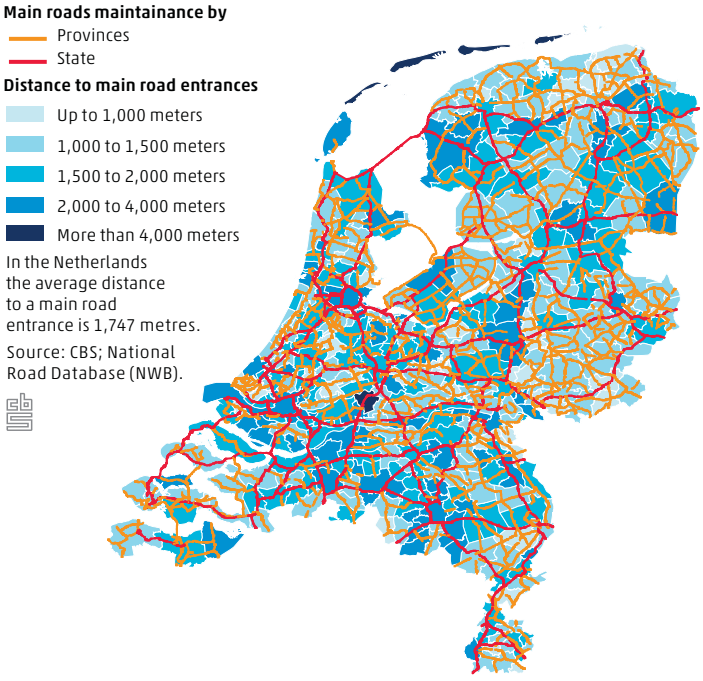
Proximity to main road entrances

National and provincial roads form the main road network. Figure 5.6.1 shows the distance from the nearest entrance to a main road per municipality. The Wadden islands have no main roads and no entrances, so the greatest distances are there. In the northern part of Groningen entrances are close to home addresses. The dark blue spot in the centre of the map he community shows Zederik which has no provincial roads within its municipal borders and the nearby A27 national road only has two entrances situated at the ends of the municipal border.

Proximity

Vicinity statistics describe the average traveling distance from home addresses to the amenities by road such as doctors, theatres, libraries and supermarkets. The statistics also include the average traveling distance to the nearest main road entrance and train station. This is interesting for the mobility options from the home address. These figures are available at the neighbourhood level.

5.6.1 Proximity to main road entrances



Proximity to train stations

The situation for train stations is similar to that of road entrances: the Wadden islands have no railways and are therefore furthest away from any train stations. The same goes for the islands Goeree-Overflakkee and Schouwen-Duiveland and for Zeeuws-Vlaanderen which only has a railway dedicated to goods transport from the industrial area in Terneuzen to Belgium. The north of Groningen is again characterised by short distances.

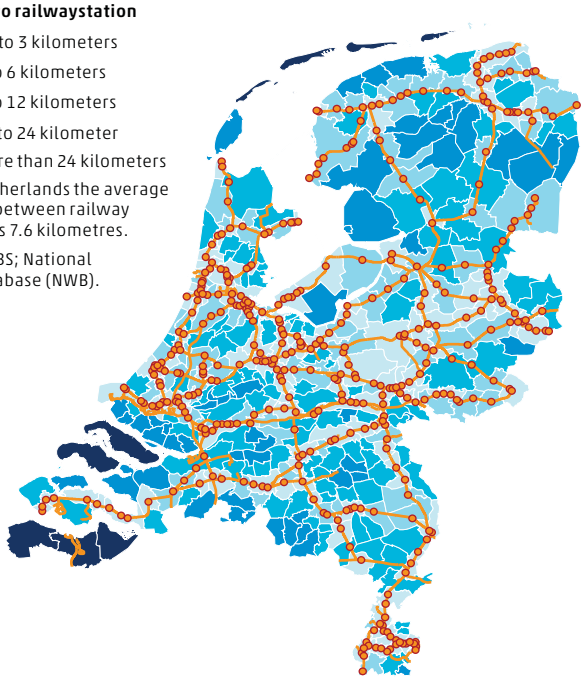
5.6.2 Proximity to train stations

Distance to railwaystation

- Up to 3 kilometers
- 3 to 6 kilometers
- 6 to 12 kilometers
- 12 to 24 kilometer
- More than 24 kilometers

In the Netherlands the average distance between railway stations is 7.6 kilometres.

Source: CBS; National Road Database (NWB).



Sources

CBS (2014a). StatLine: Bodemgebruik; uitgebreide gebruiksvorm, per gemeente.

CBS (2014b). StatLine: Kerncijfers wijken en buurten, 2009–2012.

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6. Traffic accidents

Over the last decade the number of fatal traffic accidents in the Netherlands has decreased significantly; in 2014, 570 people died in traffic, same as the year before. The number of seriously injured people meanwhile increased, especially among cyclists and pedestrians. Compared to most other countries the Netherlands is a safe country in terms of traffic.

6.1 Introduction

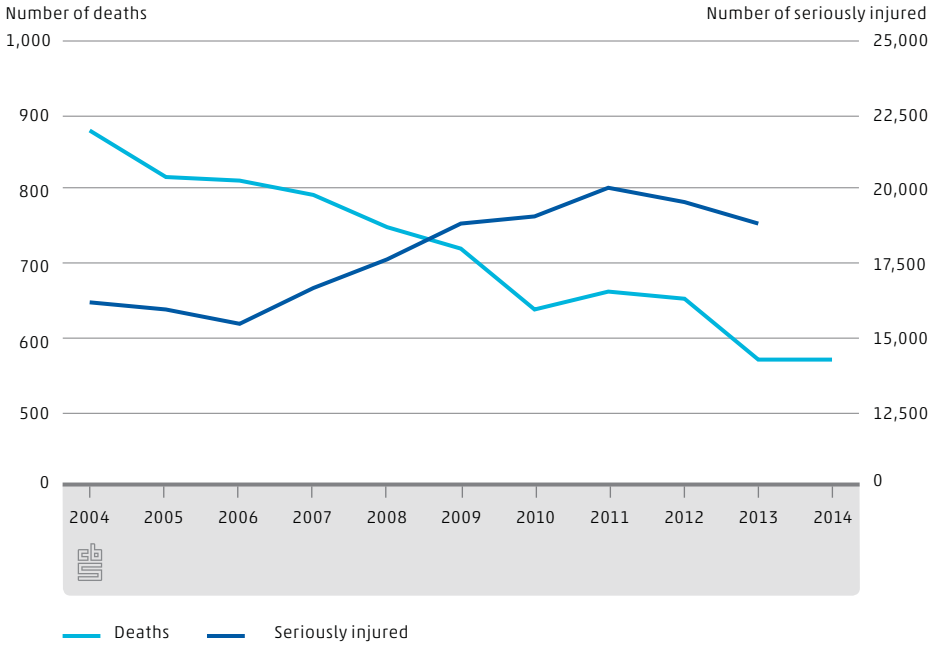
Traffic accidents usually just cause material damage, but sometimes they cause injuries and death. In this chapter we provide information about traffic deaths and serious injuries. Material damage and minor injuries cannot be considered due to the incompleteness of data concerning these topics.

6.2 Traffic accidents in the Netherlands

Fewer deaths, more serious injuries in traffic

In 2014, 570 people died in traffic, the same number as in 2013. Traffic fatalities have decreased by 35 percent since 2004 and by 56 percent compared to 1996. On the other hand, the number of seriously injured people increased in 2004–2014. Also the number of vehicles on the road and the distances covered increased in this period (see chapters 1, 2 and 4). The drop in the number of deaths was partly the result of safety measures in cars, such as the use of seat belts, child's car seats and airbags. The share of drivers wearing seat belts rose from 78 percent in 1990 to 97 percent in 2010. For front seat passengers about the same is true. The use of seat belts worn by back seat passengers rose even more spectacularly, from 20 to 82 percent (SWOV, 2012). Moreover, the infrastructure is more protective of vulnerable groups like bicyclists and pedestrians (roundabouts, low traffic residential areas, speed bumps). Also the speed limits were lowered on many roads (30 km/h and 60 km/h zones) and education campaigns and enforcement aim to reduce the use of alcohol in traffic.

6.2.1 Seriously injured and deaths by traffic in the Netherlands



Source: CBS, 2015a.

The number of seriously injured people has increased since 2004. Between 2004 and 2011 their number rose from over 16 thousand to almost 20 thousand, and then it dropped to below 19 thousand in 2013. Persons are registered as seriously injured when hospitalised after a traffic accident with an Abbreviated Injury Scale score of two or more, who do not die within 30 days. The abbreviated Injury Scale indicates how serious the injury is. The Maximum AIS (MAIS) is the most serious injury possible (Reurings, 2010).

57% of all traffic fatalities in 2014 were aged over 50

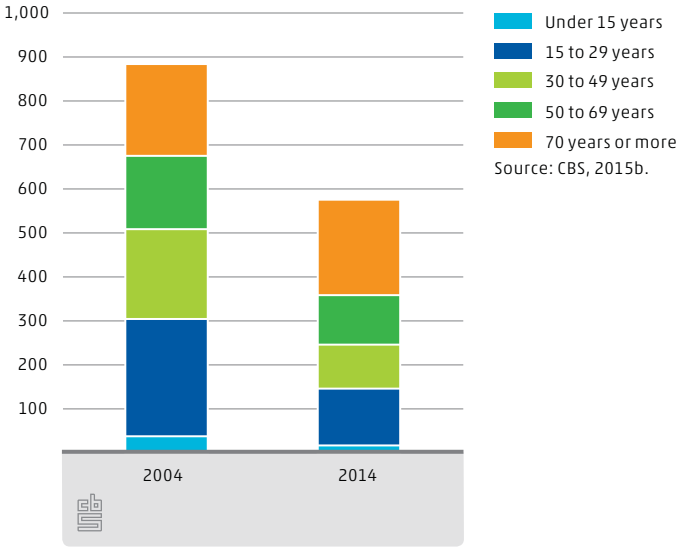
Older people are vulnerable road users

Three quarters of the people who die in traffic accidents are men. The male – female ratio has been stable for some time now, although there has been a shift in the age distribution. Most traffic participants are aged between 15 and 50 and in this group we see a strong reduction in traffic deaths. Children under 15 made up about 17 percent of the population in 2014, but were involved in less than 3 percent of the fatal traffic accidents. Their safety has increased faster than that of other groups. Children aged between 10 and 15 face the highest risks in traffic as they often participate in traffic on their own, mainly on bicycles. Out of the total distance children travel, they cover about 75 percent as car passengers and 14 percent on bicycles (independently or as passenger), see SWOV (2009).

Compared to 2004 there has been a slight increase in traffic fatalities among people aged over 70. This shift can be explained largely by the ageing of the population. Older people are more vulnerable in traffic for various reasons, such as physical vulnerability. Older people will often be more seriously injured compared to younger people when involved in an accident with the same level of collision impact. Also they often have disabilities like poor eyesight or hearing impairments. The impact of these on traffic is not shown in analysis, however.

Medication and dementia can also be risk factors for this group. As the ageing of the population is expected to continue over the next decades, the participation by older people in traffic will grow and so will the number of accidents involving them, unless measures are taken to reduce their risk.

6.2.2 Deaths in traffic by age group



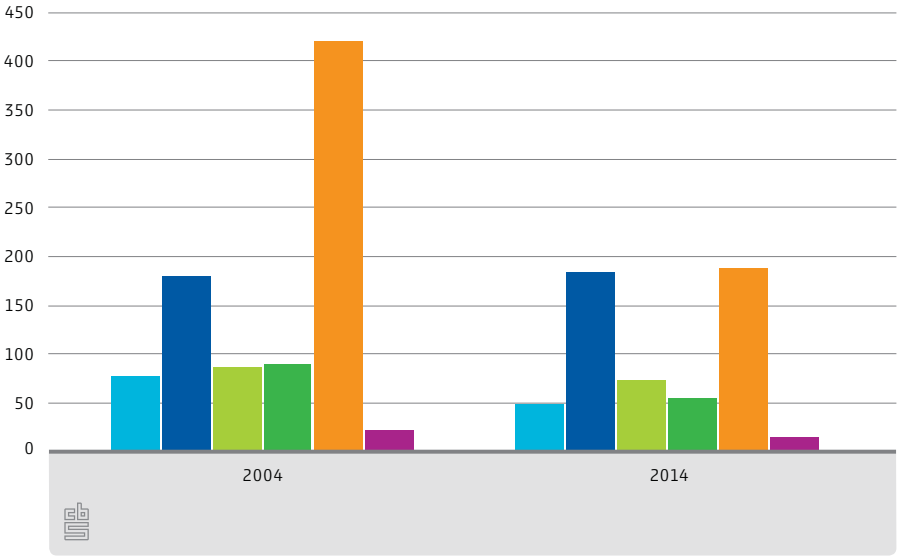
Source: CBS, 2015b.

Older people are also strongly represented among the seriously injured. Most older victims are bicyclists or pedestrians.Young people are more often injured in motorised vehicle accidents such as moped drivers aged 16 or 17 and car drivers aged 18 and 19. This is because inexperienced drivers run a higher risk of accidents. Within the group of children under 15, the 10 to 15 year-olds are most frequently injured in traffic (SWOV, 2013)

The Netherlands as bicycling country: the down side

In the period 2004–2014 the number of motorised vehicles in the Netherlands increased by over 11 percent. The distances covered increased as well (Chapter 2). Yet fatal accidents among motorised vehicle drivers and passengers did not increase. In 2014 the number of deaths among motorised vehicle drivers and passengers was almost the same as that of bicyclists, whereas it had been much higher in 2004.

6.2.3 Fatal accidents by mode of transport

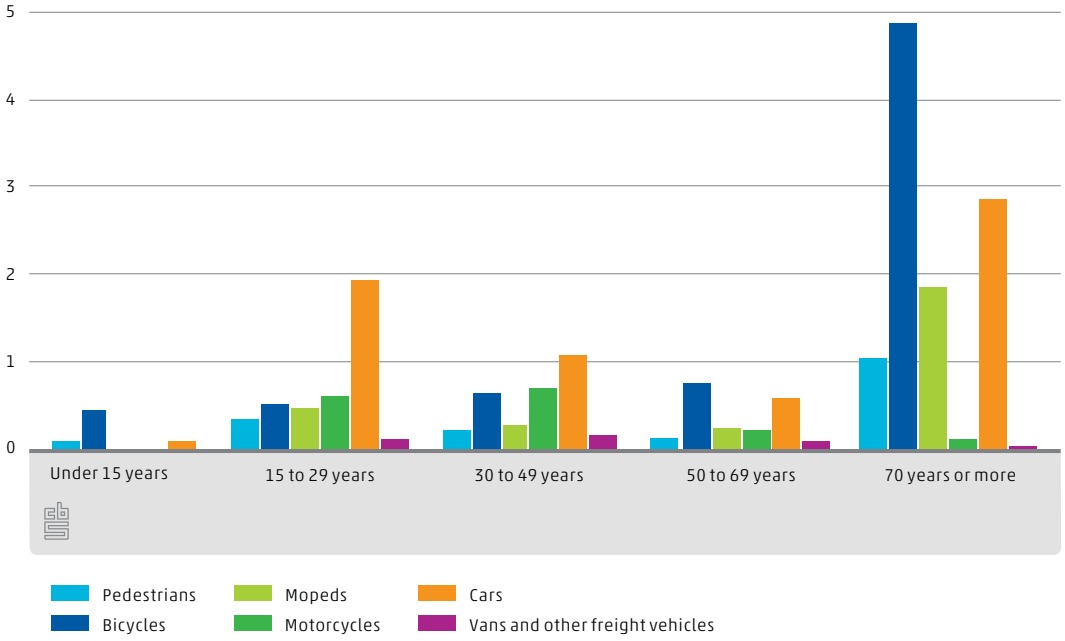


Source: CBS, 2015c.

The recent government safety measures apparently have had less impact on bicyclists and pedestrians. Because of their physical vulnerability it is more difficult to protect these groups than drivers and passengers of motorised vehicles. The safety of car drivers and passengers has improved faster thanks to safety features in cars (SWOV, 2013).

32% of all traffic fatalities in 2014 were bicyclists

6.2.4 Mortality[1] by mode of transport and age, 2014



Source: CBS, 2015d and 2015e.
[1)] Mortality = number of deaths per 100 thousand inhabitants.

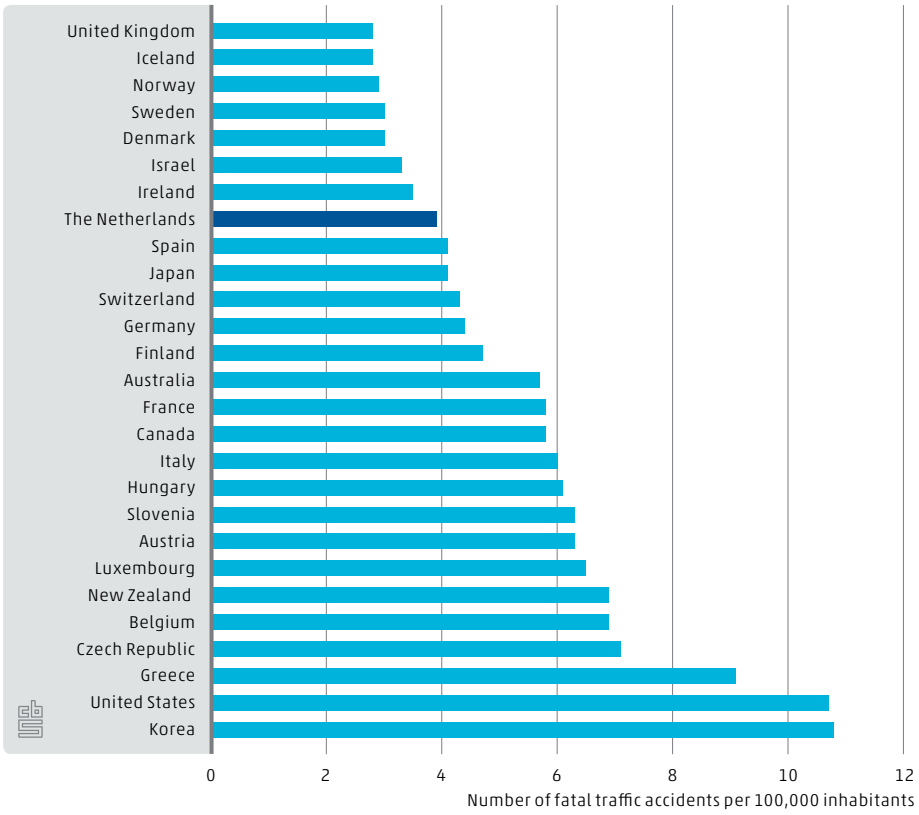
6.3 Fatal accidents in an international perspective

International decrease in fatal accidents

Traffic safety has improved in many countries. During the last decades the number of deaths has decreased significantly whereas the number of vehicles on the road and the distances covered have increased (IRTAD, 2014). To compare traffic safety between countries we use the mortality rate: the number of fatal accidents per 100 thousand inhabitants. The Netherlands used to rank fourth. In 2013 the mortality rate in the Netherlands was 3.4 per 100 thousand inhabitants. However, as the mortality rate dropped below 3 per 100 thousand inhabitants in the United Kingdom, Sweden and Denmark, the Netherlands is no longer in the top five of safest countries.

Since 2012 the number of fatal accidents has decreased less in many countries, especially for bicyclists and pedestrians. Internationally bicycling is becoming more popular and the distances covered increase. Some countries even encounter an increase of fatal accidents among bicyclists. Like in the Netherlands, the safety measures turn out to be most effective for car drivers and passengers in most other countries. And most traffic fatalities are men, also internationally (IRTAD, 2014).

6.3.1 Traffic mortality ratio in IRTAD countries, 2012

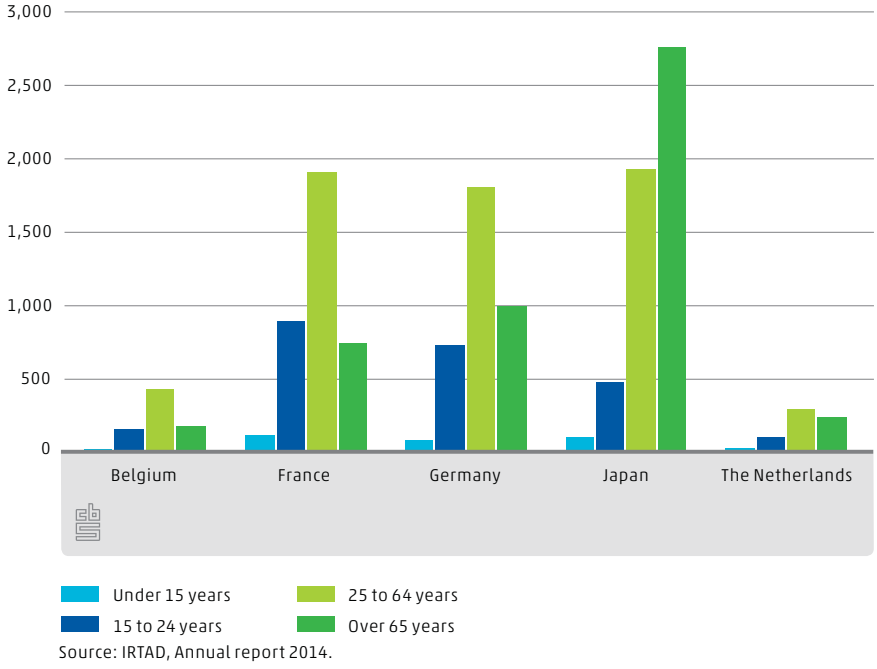


Source: IRTAD, Annual report 2014.

Ageing and traffic safety

Relatively few children are involved in fatal traffic accidents, in the Netherlands and elsewhere. Most fatal traffic accidents happen to the largest population group, aged between 15 and 65. People over 65 are a growing and vulnerable group. In strongly ageing countries like Japan, the majority of traffic fatalities is over 65. Opportunities to ensure and improve traffic safety are therefore aimed at the most vulnerable road users: older people and bicyclists.

6.3.2 Traffic deaths by age, 2012



Source: IRTAD, Annual report 2014.

Sources

CBS, 2015a: Doodsoorzaken; doden door verkeersongeval in Nederland, wijze deelname (figures 6.2.1)

CBS, 2015b: Doodsoorzaken; doden door verkeersongeval in Nederland, wijze deelname (figures 6.2.2)

CBS, 2015c: Doodsoorzaken; doden door verkeersongeval in Nederland, wijze deelname (figures 6.2.3)

CBS, 2015d: Doodsoorzaken; doden door verkeersongeval in Nederland, wijze deelname (figures 6.2.4)

CBS, 2015e: Bevolking; geslacht, leeftijd en burgerlijke staat, 1 januari (figures 6.2.4)

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7. Environmental aspects of transport

Emissions of nitrogen oxides have decreased by 42 percent and particulate matter emissions by 55 percent since 1990, despite growing traffic and transport intensity during 1990–2013. These decreases are the result of measures taken about vehicles. Carbon dioxide emissions increased by 25 percent in the same period, although there was a 2 percent decrease in 2013 on 2012.

7.1 Introduction

Traffic and transport not only bring many benefits but also certain disadvantages. The negative side effect are casualties in traffic and noise nuisance as well as the emission of harmful substances. The latter leads to the deterioration of air quality which affects public health (WHO, 2006). Moreover, emissions contribute to the greenhouse effect and climate change (KNMI, 2015).

Nitrogen oxides (NO_x) and particulate matter – or fine dust – have the greatest effect on air quality and the quality of life. Of the greenhouse gases carbon dioxide (CO_2) is by far the most crucial.

This chapter describes the share of traffic and transport in the total emissions of these three substances on Dutch territory, the share of the various means of transport, the emission trends from 1990 onwards and the trends in the emissions per vehicle kilometre of road traffic.

The graphs show road traffic broken down into passenger and goods transport. Passenger transport includes transport using cars, buses, motorcycles and mopeds. Goods traffic covers the following vehicle categories, lorries, tractor-trailers, vans and special vehicles. Passenger transport over inland waterways includes recreational sailing. Emissions by sea ships refer to ships within the national boundaries as well as on the Dutch part of the continental shelf.

7.2 Nitrogen oxides

Nitrogen oxides (NO_x) is the collective noun for nitrogen monoxide and nitrogen dioxide. NO_2 is the most harmful of the two for public health. Exposure to NO_2 can lead to respiratory complaints and diseases or aggravates them.

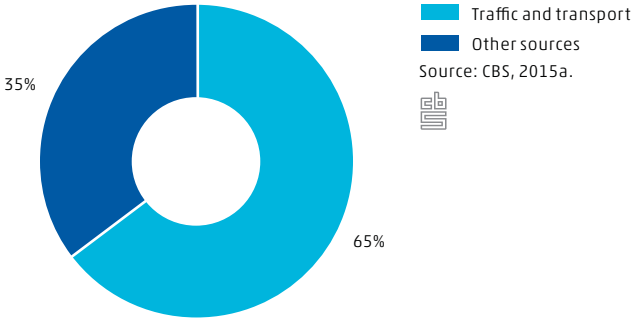
Nitrogen oxides result from the combustion of motor fuels, when nitrogen (N_2) from the ambient air is converted into NO_x under the influence of high temperatures in the engines. Air consists of nearly 80 percent nitrogen.

Catalytic converters must be used to comply with legal requirements for nitrogen oxide emissions by road vehicles. At first this only concerned passenger cars or vans running on gasoline of LPG, which have been fitted out with three-way catalytic converters since the late '80s. More recently, nitrogen oxides are also being removed from the exhausts of diesel engines using SCR catalytic converters. SCR stands for Selective Catalytic Reduction by using urea (AdBlue). Apart from SCR to reduce nitrogen oxides emission from diesel engines exhaust gas recirculation (EGR) is used. A combination of EGR and SCR is applied to comply with the most recent legal requirements.

Share of traffic and transport in total NO_x emissions in the Netherlands

Two thirds of the nitrogen oxide emissions in the Netherlands are caused by the sector of traffic and transport.

7.2.1 NO_x emissions in the Netherlands, 2013

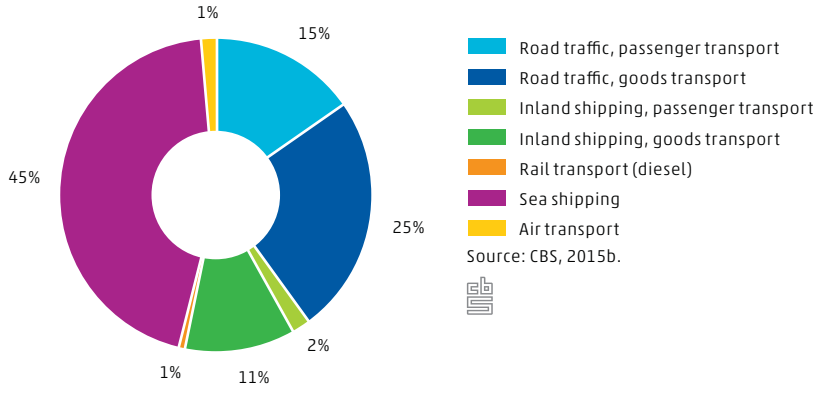


Source: CBS, 2015a.

NO_x emissions by traffic and transport according to transport mode

The nitrogen oxide emissions by traffic and transport are mainly caused by road traffic (40 percent) and sea shipping (45 percent). Inland shipping is also a major source, impacting on the air quality in the vicinity of the waterways used.

7.2.2 NO_x emissions by traffic, 2013

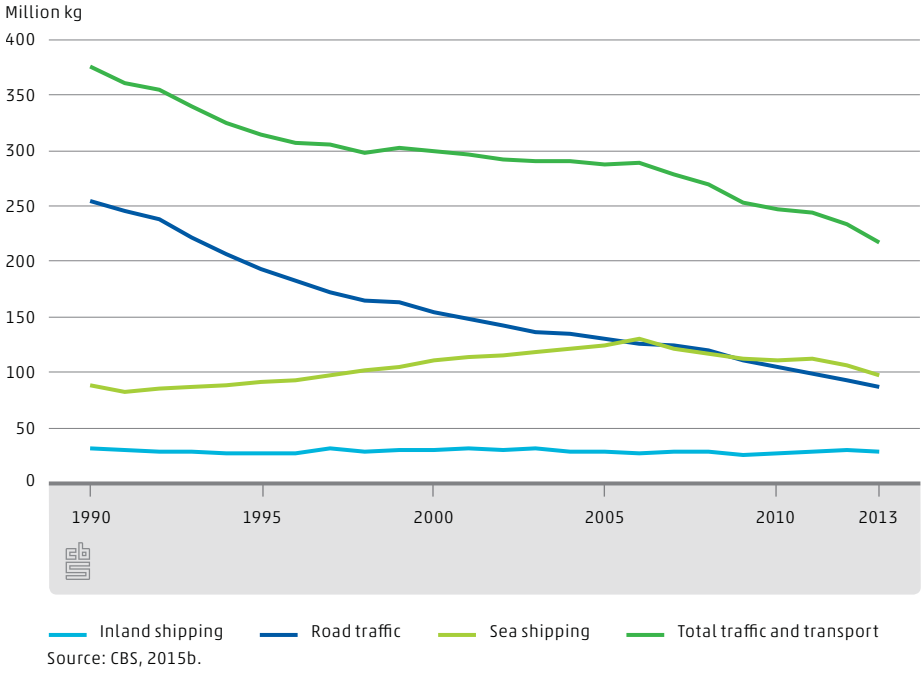


Source: CBS, 2015b.

Nitrogen oxide emissions by traffic and transport, trend

The NO_x emissions by traffic and transport fell by over 40 percent in the period 1990–2013, despite an increase in traffic. This is due to cleaner engines meeting ever more stringent European emission requirements for new vehicles. The NO_x emissions of road traffic in 2013 are a third of the emission levels in 1990.

7.2.3 NO_x emissions by traffic and transport in the Netherlands



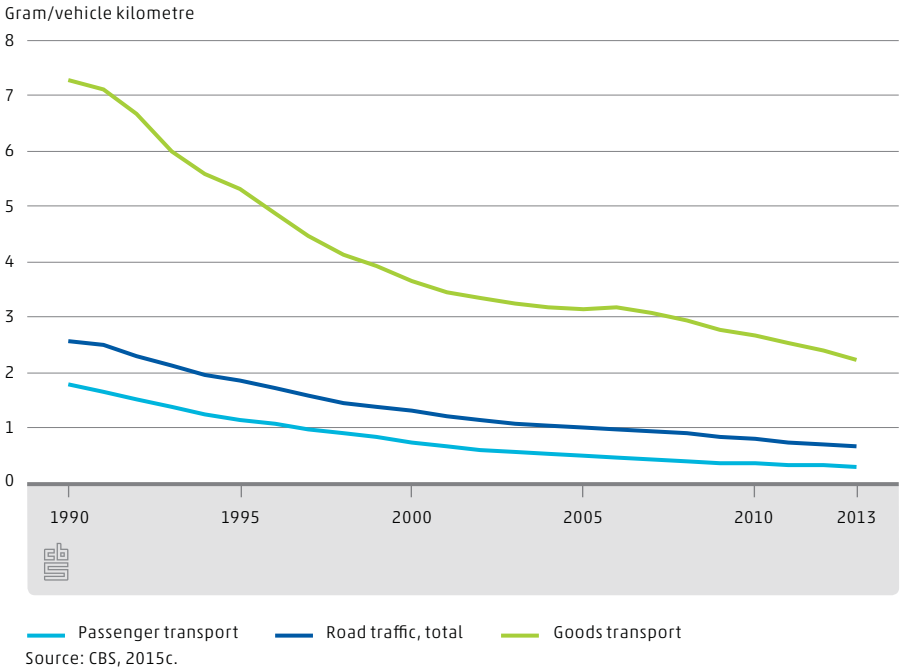
Source: CBS, 2015b.

45% of the nitrogen oxide emissions by transport are caused by sea shipping

Developments in nitrogen oxide emissions per vehicle kilometre

Due to the increasingly cleaner road vehicle engines, the average NO_x emission per vehicle kilometre has decreased by three-quarters in the period 1990–2013.

7.2.4 NO_x emissions per vehicle kilometre



Source: CBS, 2015c.

7.3 Particulate matter

Particulate matter, or fine dust, is the combination of all liquid and solid particles in the atmosphere. Previously these used to be called aerosols or floating particles. Particulate matter is often abbreviated as PM_{10} where 10 indicates the maximum size of the particles (diameter in micrometres).

Particulate matter in the atmosphere can negatively affect public health. Therefore the European Union has defined limits for particulate matter in 1999. In 2008 the

regulation was extended with limits and goals for a finer grade of particulate matter ($PM_{2.5}$).

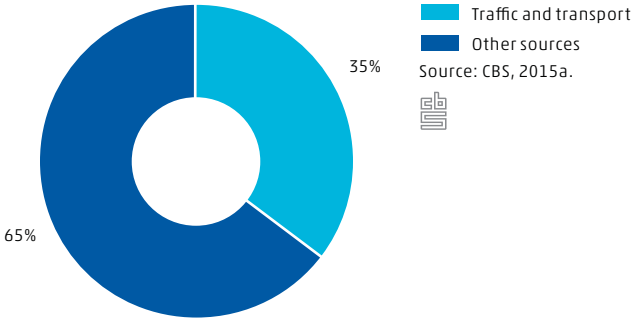
The most important sources of PM_{10} for traffic and transport are the exhaust emissions by fuel combustion, and the particulate matter that originates from the wear of tires, breaks and road surfaces.

The emissions of particulate matter (PM_{10}) by road traffic were initially mainly reduced thanks to motor engineering improvements. A further reduction, mostly after 2005, was accomplished by the introduction of particle filters (DPFs). In 2011 almost all new diesel vehicles were produced with a DPF. Many existing models have been retrofitted so that by the end of 2013 there were over 80 thousand cars and vans and nearly 27 thousand heavy commercial vehicles with retrofitted filters.

Share of traffic and transport in the total emission of particulate matter in the Netherlands

Over one third of the total emissions of particulate matter in the Netherlands is caused by the sector of traffic and transport.

7.3.1 PM_{10} emissions in the Netherlands, 2013



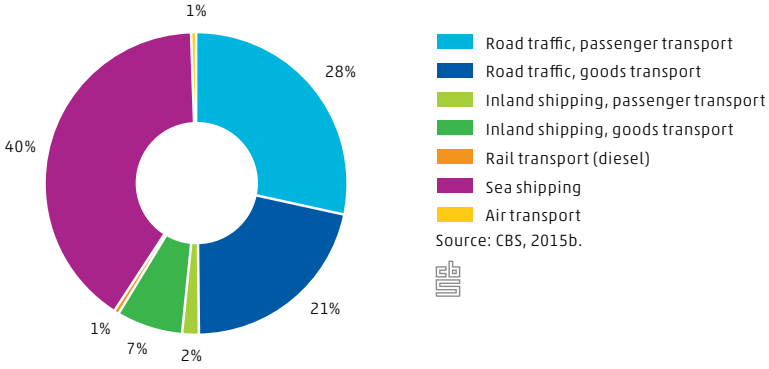
Source: CBS, 2015a.

Particulate matter emissions by traffic and transport by transport mode

Half of the particulate matter emissions by traffic and transport in the Netherlands is caused by road traffic. The share in the PM_{10} concentrations in the urban areas is large because that is where a major part of the emissions by road traffic take place.

The PM_{10} emissions by sea shipping (40 percent) mainly take place on the North Sea, so it has a relatively low impact on the inhabited areas.

7.3.2 PM_{10} emissions by traffic, 2013



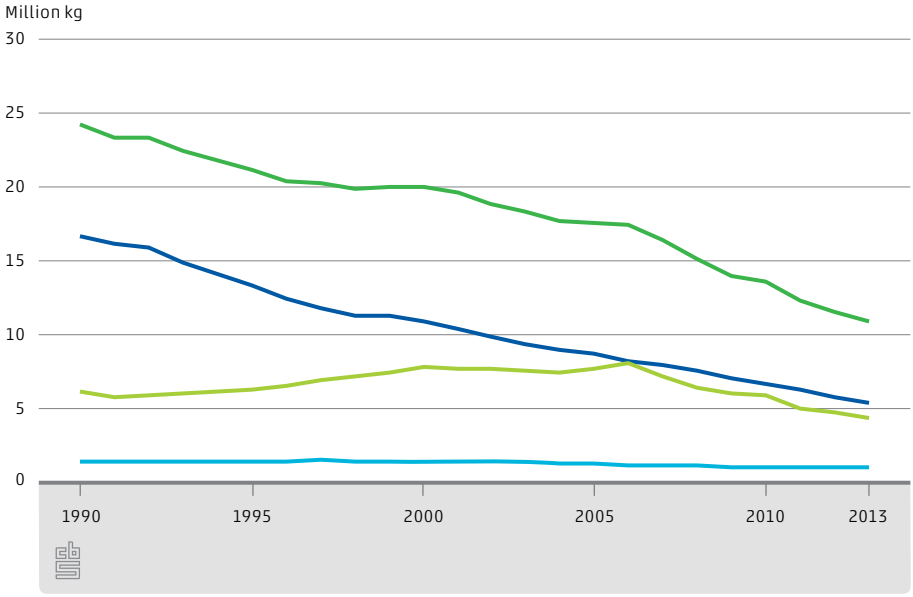
Source: CBS, 2015b.

Particulate matter emissions by traffic and transport, trend

PM_{10} emissions by traffic and transport more than halved in 1990–2013, despite the increase in traffic. This is mostly due to the application of DPFs in diesel vehicles so as to meet European emission requirements. The PM_{10} emission levels of road traffic in 2013 were a third of those in 1990.

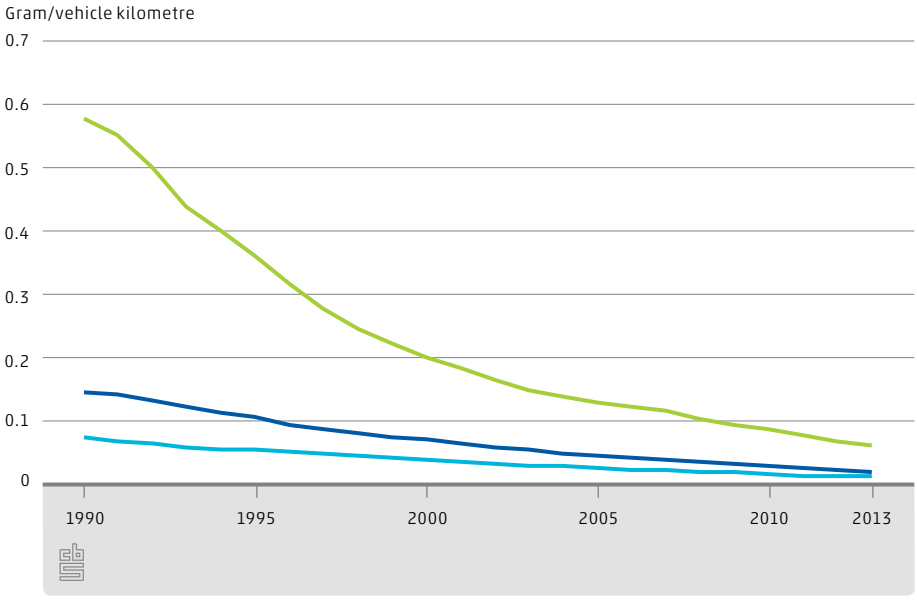
21% of particulate matter emissions by transport is caused by road haulage

7.3.3 PM_{10} emissions by traffic and transport in the Netherlands



Source: CBS, 2015b.

7.3.4 PM_{10} emissions per vehicle kilometre



Source: CBS, 2015c.

Development of particulate matter emissions per vehicle kilometre

The application of DPFs on road vehicles with a diesel engine has led to an 85 percent reduction in the average PM_{10} emission per vehicle-kilometre for 1990–2013. This reduction is completely due to cleaner exhaust gases; emissions from wear and tear on tires, brake linings and road surfaces have more or less stayed the same. Their share in the total PM_{10} emissions of road traffic has increased from 12 percent in 1990 to 47 percent in 2013.

7.4 Carbon dioxide

Carbon dioxide (CO_2) is the most important greenhouse gas after water vapour. Greenhouse gases ensure that the warmth of the sun is retained. The average temperature on earth would be -18 degrees Celsius without greenhouse gases, whereas the actual average temperature is around 12 degrees.

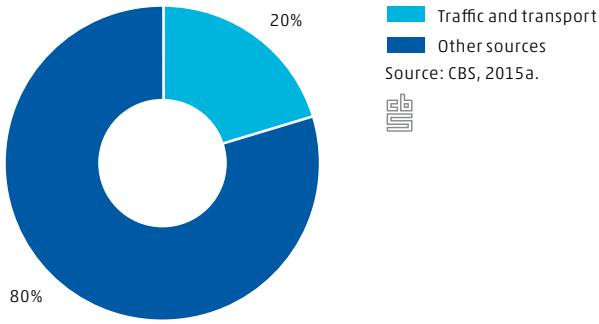
Due to the continuously increasing use of fossil fuels since the industrial revolution, CO_2 concentrations in the atmosphere have increased by about 30 percent. Researchers expect the average temperature to increase, if fuel use does not change, which could lead to significant climate changes and natural disasters. Therefore policies to reduce CO_2 emissions by human activities have been implemented. One example is to fiscally stimulate people to buy energy efficient vehicles in the Netherlands.

The figures on CO_2 emissions in this publication concern actual emissions within the Dutch territory as published on CBS Statline. Statistics Netherlands also publishes CO_2 emissions calculated according to the IPCC guidelines (CBS, 2015d) for international reports in the context of the Kyoto protocol. There is an explanation of the most important differences between the calculations of the IPCC and the actual emissions in this Statline table.

Share of traffic and transport in total CO_2 emissions in the Netherlands

About 20 percent of CO_2 emissions in the Netherlands are caused by the sector of traffic and transport.

7.4.1 CO_2 emissions in the Netherlands, 2013

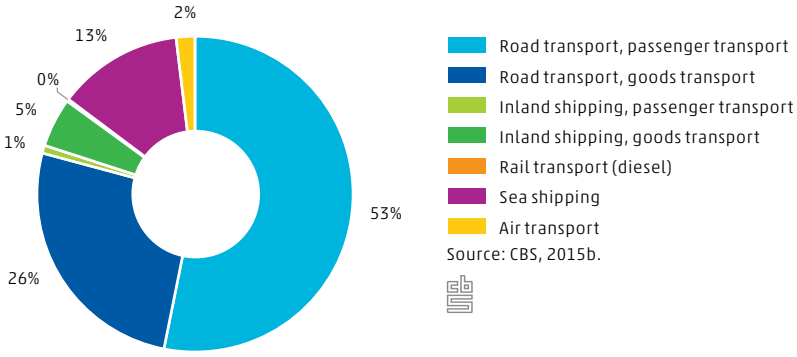


Source: CBS, 2015a.

CO_2 emissions by traffic and transport by transport mode

Nearly 80 percent of the carbon dioxide emissions by traffic and transport are caused by road traffic.

7.4.2 CO_2 emissions by traffic, 2013



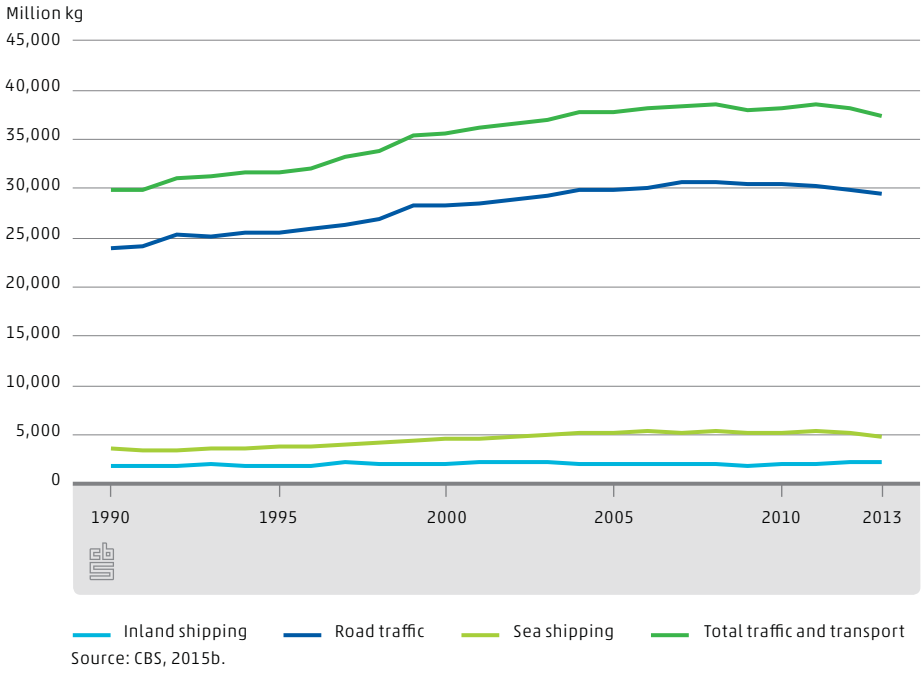
Source: CBS, 2015b.

CO_2 emissions by traffic and transport, trend

The CO_2 emission of traffic and transport has increased by nearly a quarter in the period 1990–2004. In 2005–2012 yearly emissions remained fairly stable, but there was a slight decrease in 2013.

53% **of CO_2 emissions by traffic en transport is caused by passenger transport on the road**

7.4.3 CO_2 emissions by traffic and transport in the Netherlands

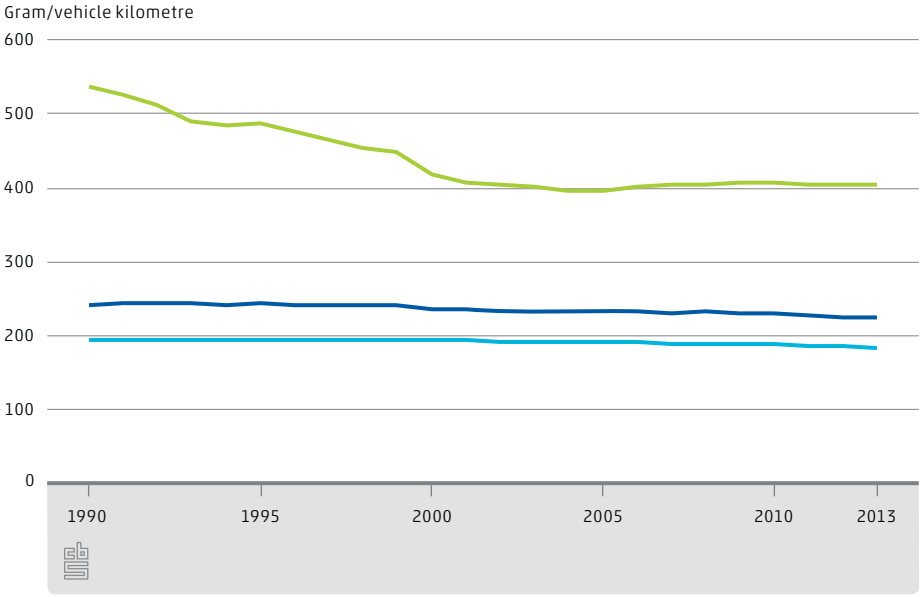


Source: CBS, 2015b.

Developments in CO_2 emissions per vehicle kilometre

The CO_2 in exhaust gases originates from the combustion of carbon in motor fuels. Because of this, emissions are proportionate to fuel consumption. In the period 1990–2005 the average emission per vehicle kilometre was fairly constant. Although engines became more efficient thanks to technical improvements, this effect was counteracted by the increased weight of the vehicles. Since 2005 the fiscal policy to stimulate people to buy energy efficient vehicles has led to a decrease in the CO_2 emission per vehicle kilometre. The considerable drop in CO_2 per kilometre of goods vehicles is caused by the large increase of delivery vans in this vehicle category. Delivery vans use far less fuel than heavy duty vehicles.

7.4.4 CO_2 emissions per vehicle kilometre



Source: CBS, 2015c.

Sources

CBS (2015a). Statline: Air pollution; actual emissions by all sources.
(figures for graphs 7.2.1, 7.3.1, and 7.4.1)

CBS (2015b). Statline: Air pollution; actual emissions by mobile sources.
(figures for graphs 7.2.2, 7.2.3, 7.3.2, 7.3.3, 7.4.2, and 7.4.3)

CBS (2015c). Statline: Air pollution; actual emissions by road traffic.
(figures for graphs 7.2.4, 7.3.4, and 7.4.4)

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8. Energy consumption by vehicles

Fuel consumption by traffic and transport rose constantly in the Netherlands up to 2009. Then it started to decrease, although there was an equal amount of traffic on the road. The gains mainly came from more energy efficient cars, and from the agreement about more environmentally friendly fuels reached within the European Union. In 2020, 10 percent of the fuels used in transport have to be renewable. To reach this goal the fuels at the filling stations have to be blended.

8.1 Introduction

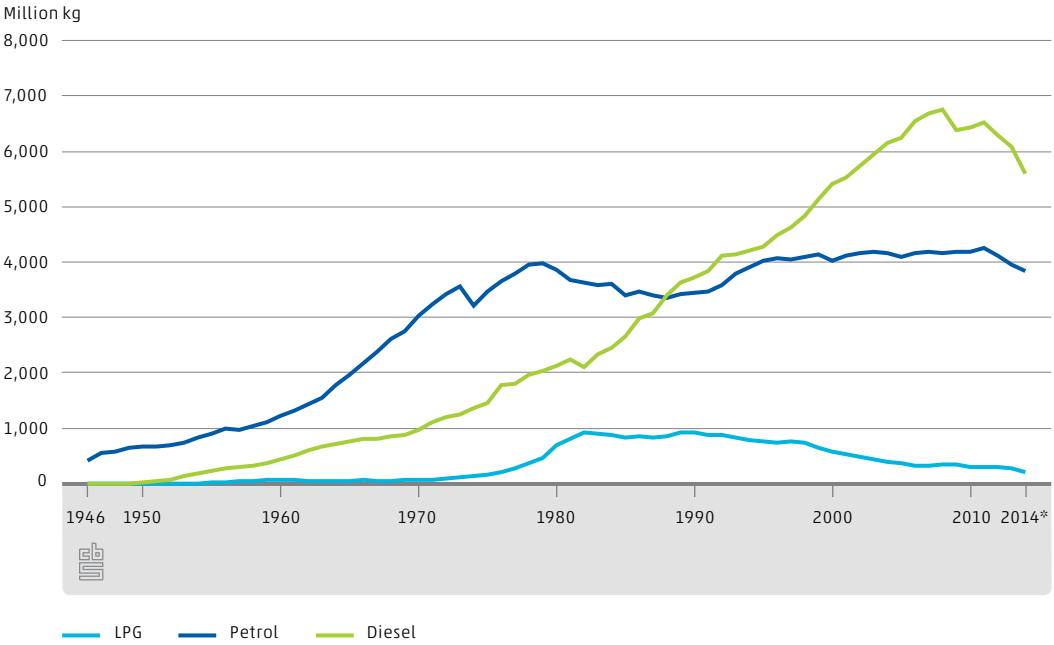
Transport and energy are inseparable. Cars, ships and aircraft need energy to move. In the Netherlands almost eight million passenger cars are registered and over two million commercial vehicles. Besides, thousands of inlands ships are operative and over a thousand airplanes take off every day. Many vehicles use oil products as fuels, and various means of transport, such as trains and trams, run on electricity.

8.2 Road transport

Road transport comprises the transport of passengers and goods. Although most cars run on petrol, diesel forms the larger part of fuel consumption. This is because freight transport almost exclusively uses diesel as do most commercially owned cars.

LPG is no longer as popular as it used to be, because diesel has become more economically attractive for the business market. Diesel engines have become much more fuel efficient in the last decade. The disadvantages of an LPG installation in a car are less space for luggage and the termination of the manufacturer's warranty when LPG is used.

8.2.1 Motor fuels for road vehicles



Source: CBS, 2015a.

Motor fuel sales rose constantly until 2008, but then there has been a downward trend ever since. This is caused by many facts, the most important being the decline in diesel sales due to the economic downturn since 2009 and the rise in sales of very fuel efficient cars as a result of tax incentives since 2006. The most fuel

efficient cars are almost tax exempt. Therefore new cars sold in the Netherlands are the cleanest of all EU countries. Most countries provide fewer tax incentives (Ministry of Finance, 2014).

Alternative fuels

Biofuels

The directive of the European Union (EU, 2009) states that the share of renewable energy for the transport sector must be 10 percent by 2020. Dutch regulations require that, from 2007 onwards, a growing percentage of the energy of the total consumption of petrol and diesel for transport must be renewable. This is called the blending requirement. It means that all fuel supplied to the market in the Netherlands must contain a certain percentage biofuel, which increases every year (8.2.2).

8.2.2 Blending requirement for petrol and diesel

	2015	2016	2017	2018	2019	2020
	%					
Share of renewable energy	6.25	7	7.75	8.5	9.25	10

For 2015 the required share of renewable energy is 6.25 percent. This share will gradually increase to 10 percent in 2020.

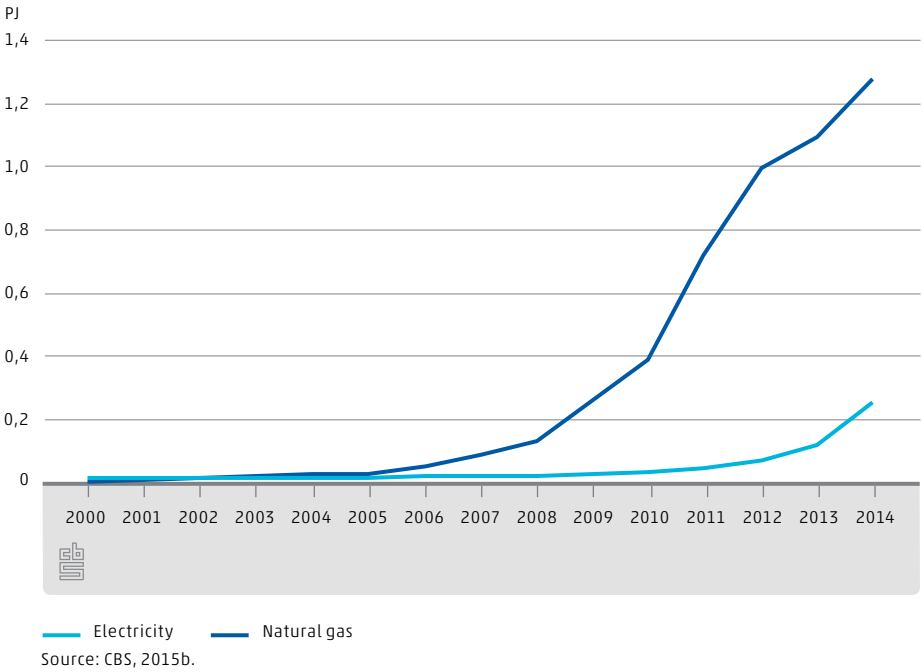
Ever since the introduction of the blending requirement there has been a discussion about how sustainable biofuels actually are, because farmland is needed for their production for which forests are often cut. Furthermore growing crops for biofuels competes with growing food crops over scarce arable land, causing higher food prices. This has led to tighter regulations for blending requirement. Technically and environmentally improved biofuels were developed that count double in the required percentage. One example is discarded cooking oil that can be transformed into bio diesel. The share of double counted fuels has risen quickly to about 70 percent of the total.

Natural gas and electricity

Electric cars are rapidly gaining popularity, partly because of the tax incentives. The top ten in car brands sold in 2014 included plug-in hybrids, cars with a petrol engine and an electric motor that can be charged at a charging point. Cars or

lorries can be converted to bi-fuel vehicles running on compressed natural gas (CNG). The advantages are the low purchasing cost of natural gas and the low CO_2 emissions. The disadvantages are the limited availability and low energy density, requiring a larger tank to cover the same driving distance. The latest development is the possibility to use liquid natural gas (LNG), which requires a less voluminous tank. Although the share in the total sales is not yet large (0.35%), the sales of electricity and natural gas for road traffic are growing fast.

8.2.3 Motor fuels for transport; natural gas and electricity



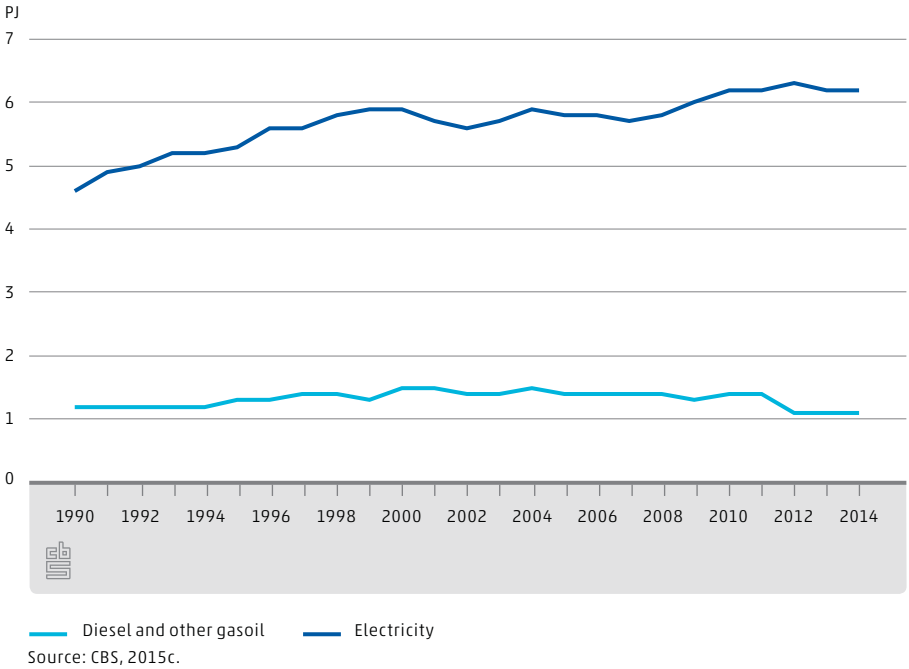
Source: CBS, 2015b.

8.3 Rail traffic

Since the first Dutch railway came into use in 1839, trains have used energy: steam trains using coal at first and then, after World War II, trains running on diesel and electricity. Diesel or gasoil is still used for shunting locs and for routes where electrification is unprofitable. Electric trains have operated in the Netherlands

since 1909. To illustrate: electricity consumption increased from 4.3 thousand kWh in 1909 (Rotterdam-The Hague-Scheveningen railway) to 48 thousand kWh in 1929 (Randstad railways) and 140 thousand kWh in 1938. Current electricity consumption by rail traffic amounts to 1.7 billion kWh.

8.3.1 Energy use by rail traffic



Source: CBS, 2015c.

8.4 Shipping

The Dutch shipping sector is huge, thanks to the country's location near the North Sea and its many inland waterways. Coal-fired steam ships operated until the 1950s, but other oil-based fuels have been used ever since.

The river Rhine connects the Netherlands with the hinterland, and carries a great deal of freight. Inland ships mainly use (excise duty free) sulphur-free diesel because of environmental requirements. Several EU regulations lay down

conditions fuels have to meet in order to reduce the emission of sulphur dioxide. In the guidelines the sulphur content was limited to a maximum of 10 ppm per January 2010 in coastal waters, ports and inland waterways (EU, 1999; IenM, 2015).

The Port of Rotterdam is a large international sea port, receiving many ships that go on to travel the world. Rotterdam is used as a fuelling station where ships bunker diesel and fuel oil (see Bunkering). The latter is a cheap, high viscosity liquid crude oil product used to generate power in very large engines. A fraction of the fuel oil bunkered is used within the Netherlands, but most is used in international waters. Fuel oil is impure, containing lots of sulphur and other contaminations.

Bunkering

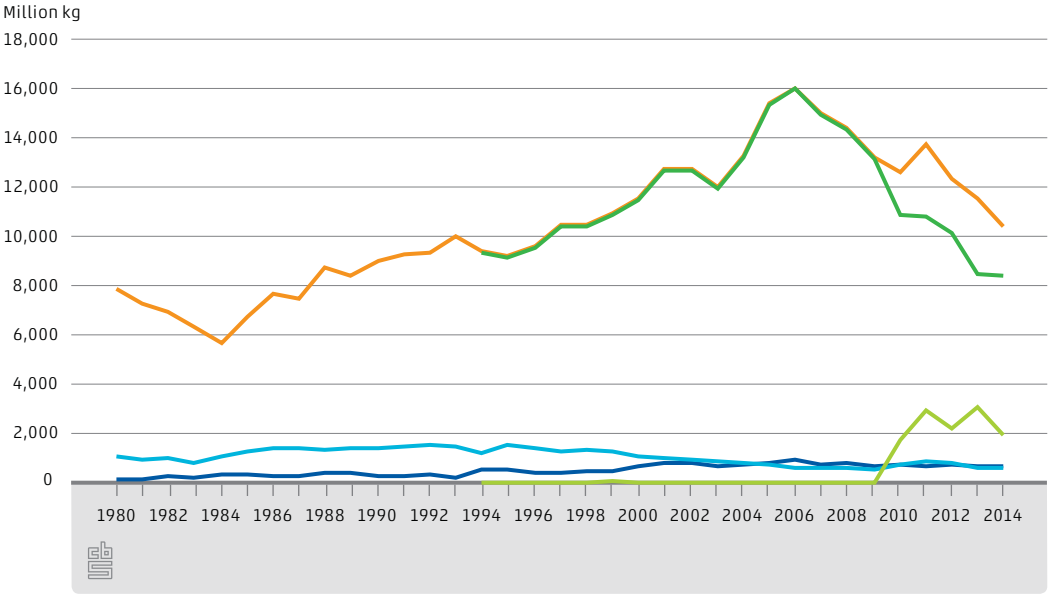
Bunkering is the delivery of fuel for the international shipping and aviation. This concerns ships and aircraft departing from Dutch ports and airports to destinations elsewhere. In the energy balance bunkering is seen as exports because the fuel is not available for domestic consumption.

The result of the increasingly stringent regulations on sulphur emissions by ships is that more ships use low sulphur fuel oils.

In annex VI of the Marpol Treaty (Marpol=Maritime Pollution), the international shipping organisation IMO (International Maritime Organisation) agreed a sulphur limit of 0.1 percent for fuels used in the Emission Control Areas (ECA: North Sea and Baltic Sea) as per 2015 (IMO, 2014). This is a tightening of the regulations by a factor ten compared to the 2010 regulations. These rules do not yet apply in international waters. Marine fuels used outside the ECA may contain up to 3.5 percent sulphur. Future legislation after 2020 will require cleaner fuels in international waters as well (see ILT, 2014).

A new development in maritime fuels is the use of liquified natural gas (LNG).

8.4.1 Bunkering sea and inland shipping



Source: CBS, 2015d.

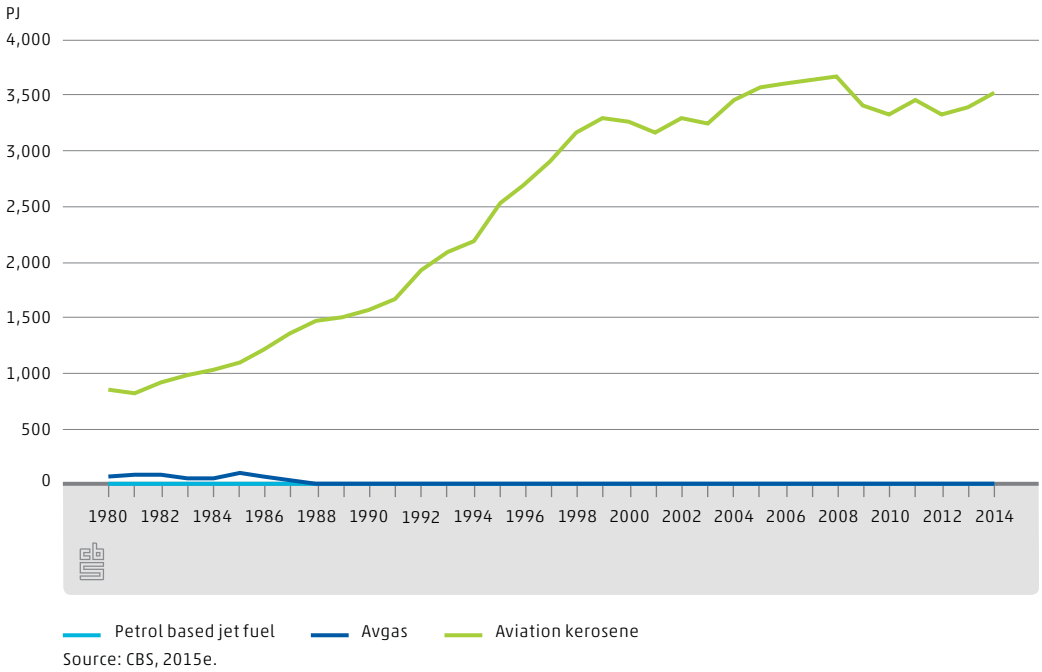
8.5 Aviation

Aircraft use kerosene to power their jet engines. Kerosene must meet very high demands. Aircrafts have to be able to take off from a +50 °C hot runway in Qatar and climb to a 10 km altitude where the temperature is –60 °C. The strong increase in the international air traffic is clearly shown by the figure on kerosene sales. In 2004 the cause was the new runway at Amsterdam Schiphol Airport (Polderbaan).

Jet fuel and aviation gas

Jet fuel based on petrol is a lighter kerosene no longer sold since 1988. Avgas is used by piston engine powered aircraft. This type of engine resembles a car engine and is mainly used in small (private) aircraft.

8.5.1 Use of aviation fuel



Source: CBS, 2015e.

The number of inland flights has been stable for years and the amount of fuel used has decreased thanks to more efficient engines.

For aviation it is more difficult to switch to alternative fuels than for other modes of transport because a low take-off weight is essential and the energy density of kerosene is high. In the future biofuels will be used in aviation but because of the great demands made on aviation fuels these will have to be thoroughly tested first.

Sources

CBS (2015a). StatLine: Motor fuels for transport (figures 8.2.1)

CBS (2015b). StatLine: Motor fuels for transport (figures 8.2.3)

CBS (2015c). StatLine: Motor fuels for transport (figures 8.3.1)

CBS (2015d): StatLine: Petroleum products balance sheet (figures 8.4.1)

CBS (2015e). StatLine: Motor fuels for transport (figures 8.5.1)

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9. The economic value of traffic and transport

The Netherlands has been a trading country since its Golden Age in the 17th century and Dutch companies are still exporting and importing many goods. Exports are the driving force behind the Dutch economy. International trade generates a large volume of traffic and transport, as do domestic industrial activities. The transport activities these generate relate to production, construction, wholesale and retail trade, hotels and restaurants, agriculture and many services.
People need transport as nearly every activity requires it in some form or another, whether going to work or visiting a zoo. Passenger transport – public or private – is of great importance for the Dutch economy. The value added of all transport activities in the Netherlands reached 53 billion euros in 2013, close to 8.5 percent of GDP, while nearly 800 thousand people were employed in transport related jobs.

8.5% of GDP is transport related

9.1 Introduction

All passenger and goods transport make use of modes of transport and infrastructure. The construction and maintenance of roads, waterways and train tracks generates a great deal of economic activity. Large sums of money are involved in the trade and the upkeep of vehicles and vessels, ensuring employment for thousands of people.
The government is deeply involved in traffic and transport by spending money on the construction and maintenance of infrastructure, road safety and the reduction of the environmental impact. It also generates income through taxes and excises on fuel, vehicles and infrastructure.

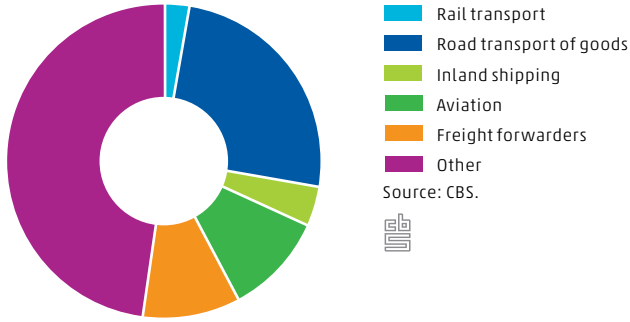
This shows that traffic and transport in all their forms contribute significantly to employment and prosperity in the Netherlands.

9.2 The great economic significance of the transport sector

In 2014 the sector transport and storage contributed 29.3 billion euros to the Dutch economy. GDP reached nearly 655 billion, so the sector added 4.5 percent to GDP. The sector employed close to 500 thousand people in 2013. This equalled 383 thousand full-time jobs spread across the 35 thousand companies that are active in the sector.

The transport sector also accounts for a significant part of corporate investments. In 2012 nearly 8 billion was invested in the sector, which equals 11 percent of total investments.

9.2.1 Share of transport in GDP, 2014



Source: CBS.

Transport has strong international features, as a large part of the Dutch transport sector operates internationally. Nearly 32 billion euros were earned abroad in 2014, while foreign transporters earned 18 billion euros by offering their services to Dutch companies and individuals.
Many companies outside the traditional transport sector undertake transport activities, such as companies involved in manufacturing, construction and agriculture. According to a broader, more functional approach, the value added of all transport activities in the Netherlands amounts to 53 billion euros, almost 8.5 percent of GDP. In 2013 nearly 800 thousand people were employed in transport related jobs, equalling 650 thousand full-time jobs.

The economic significance of transport: two definitions

In order to calculate the economic value of transport in the Netherlands, the scope must be defined. The results of specialist transport companies have to be measured. These companies are categorised in the sector 'transport and storage'. Their economic value is expressed in several indicators such as their contribution to the economy and employment. This is called the sectorial approach.

Goods transport in the Netherlands is also provided by private companies outside the transport sector. The economic value of this is hidden in the results of other sectors. Examples are the logistic and transport activities of retail, manufacturing or wholesale. A unique study on the top sector logistics made an estimate of the total economic value of transport in the Netherlands. This approach is also called the functional approach. For more information on these two approaches see sources.

Apart from the economic value of companies that use transport, there are also companies that make money in infrastructure, means of transport and environmental effects. For example road construction companies, car dealers and mechanics, insurance companies, driving instructors etc. When these companies are included, the economic value of transport is even greater.

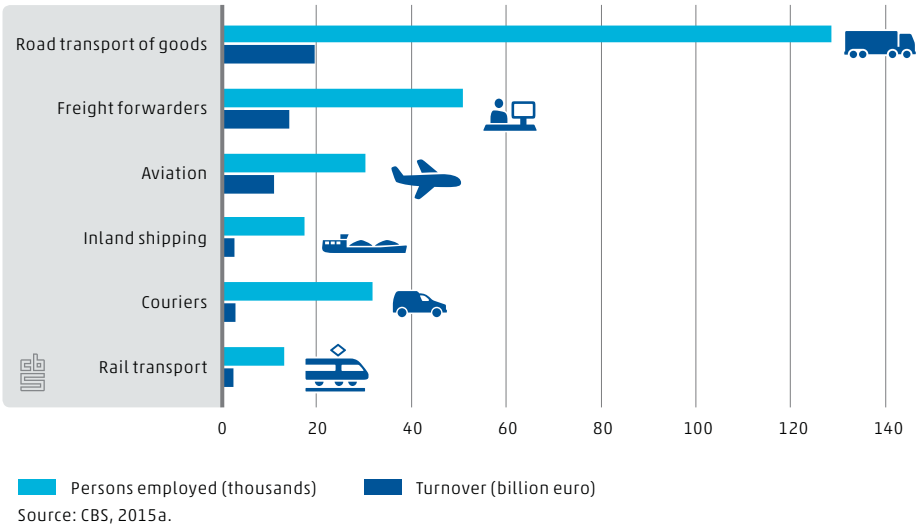
9.3 The Netherlands as a major transport country

Most goods are hauled by road in the Netherlands, followed by inland shipping, then railways and aviation. The position of the Netherlands in Europe makes it an attractive location for European distribution centres. The well-designed road and river networks add to this.
Transport in the Netherlands is provided by professional transporters, who have transport as their main activity and constitute the transport sector and private companies. The latter provide their own transport outside the sector. For example, supermarket chains or production companies with their own lorries. This group is not included in the transport sector but is part and parcel of transport.

Goods transport

There are 35 thousand transport companies in the Netherlands employing a total of nearly half a million people. Together these companies generate about 77 billion euros in turnover. With 130 thousand employees, goods haulage by road is by far the largest employer. The sector realises a 19 billion euro turnover.

9.3.1 Major transport sectors by turnover and persons employed, 2014



Source: CBS, 2015a.

Inland shipping

An alternative for goods transport on the road is transport by inland waterways. Dutch inland skippers transport around 370 million tonnes of goods a year. These are mostly bulk goods like ore, sand, gravel and grain. They carry large shiploads that would otherwise fill a whole line of lorries. But the barges are slow and cannot reach addresses as well as lorries can. Inland shipping employs about 18 thousand people who generate about 3 billion euros worth of turnover a year.

Public transport and aviation

Railway transport and aviation focus mainly on passenger transport. The Netherlands has the most crowded railway system in Europe. Apart from passenger transport by train, many passengers take buses, metros or trams. Over 1 million people use the public transport system every day. Passenger transport is also the main activity for aviation, generating the most turnover. Dutch airports process nearly 170 thousand passengers a day.

Logistics

Apart from goods and passenger transports, logistic services are very important in transport. The actual goods transports are visible, such as lorries on the road or ships at sea. Transport is enabled by service providers such as freight forwarders who ensure that goods are transported from A to B by selecting the proper transportation modes.
Goods can also be stored by storage companies, which make several kinds of space available for temporary storage of goods. These vary between conditioned storage spaces (coolers and freezers), tanks (liquids), warehouses and outside storage for bulk goods (sand, gravel and ores). The Netherlands also has multimodal transhipment stations. These hubs are used to shift goods – often containers – to another mode.

Freight forwarders

Freight forwarders or logistic service providers form a link between shippers (who send the goods) and transporters (for example an airline). Freight forwarders undertake many activities to maintain a smooth flow of goods such as license applications, customs clearance, invoicing, payments etcetera. The importance of freight forwarders in the logistics chain is shown by their turnover. With 14 million euros they have the second largest turnover in the transport sector and their 2700 companies offer employment to around 50 thousand people.

Couriers

Consumers increasingly shop online, and these purchases must be delivered. So couriers are receiving more orders. This is manifest in their turnover, which has been increasing for four years in a row; the turnover level of 2014 was about 23 percent higher than in 2010. The courier sector employs over 30 thousand people.

Other companies

Beyond the activities mentioned, the transport sector also includes companies that provide their own transport or are linked to it. For example, taxi companies where 40 thousand people are employed, companies in railway allocation, ensuring the railway safety, parking facility operators, removal and storage companies. The diversity of transport-related companies and activities is enormous, and thousands of people are employed in them.

Consumers spend heavily on transport

Households spend nearly 14 percent of their budget on transport. This amounts to 40 billion, out of a total consumption of 284 billion euros. More than half of the 40 million euros goes to privately owned vehicles including fuel, insurance and tax. Over 6 billion euros a year is spent on new vehicles and over 5 billion euros on transport services provided by third parties, such as public transport by bus, tram, metro, and train and flights.

14% of household budgets are spent on transport

Government: costs and benefits

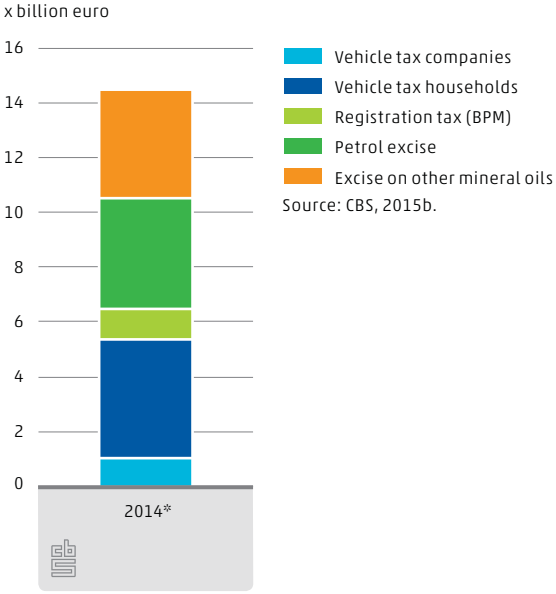
Costs

Infrastructure development, maintenance and safety are public services. The Dutch government spends a total of 15 billion euros on traffic and transport. Over 6 billion euros is spent through the infrastructure fund in order to finance large infrastructural investments. The remaining 9 billion euros go to government consumption of traffic and transport including smaller amounts spent on maintenance etcetera mainly by provinces and municipalities.

Benefits

The government also receives income from traffic and transport by way of taxes, which total up to 14 billion euros. The benefits can be broken down by excise on fuels (about 8 billion euros) and taxes on buying and owning a motorised vehicle. The BPM tax on buying a car or motorcycle yields over 1.1 million and the motor vehicle tax nearly 5.5 billion. One fifth comes from commercially owned vehicles and the rest from households. The government also receives a quarter of a billion euros for the rights to use the railway system.

9.3.2 Government income (taxes and excise) traffic and transport, 2014*



Source: CBS, 2015b.

Sources

CBS, 2015a: Enkele belangrijke vervoertakken naar omzet en aantal werkzame personen (figures 9.3.1)

CBS, 2015b: Overheidsinkomsten verkeer en vervoer, 2014* (figures 9.3.2)

Literature

CBS (2014). Monitor topsectoren 2014, Statistics Netherlands, The Hague/Heerlen.

10. Transport and the economic crisis

The economic crisis, which started in 2008, left deep scars. By 2014, six years after the crisis started, turnover in the transport sector still had not returned to 2008 levels.

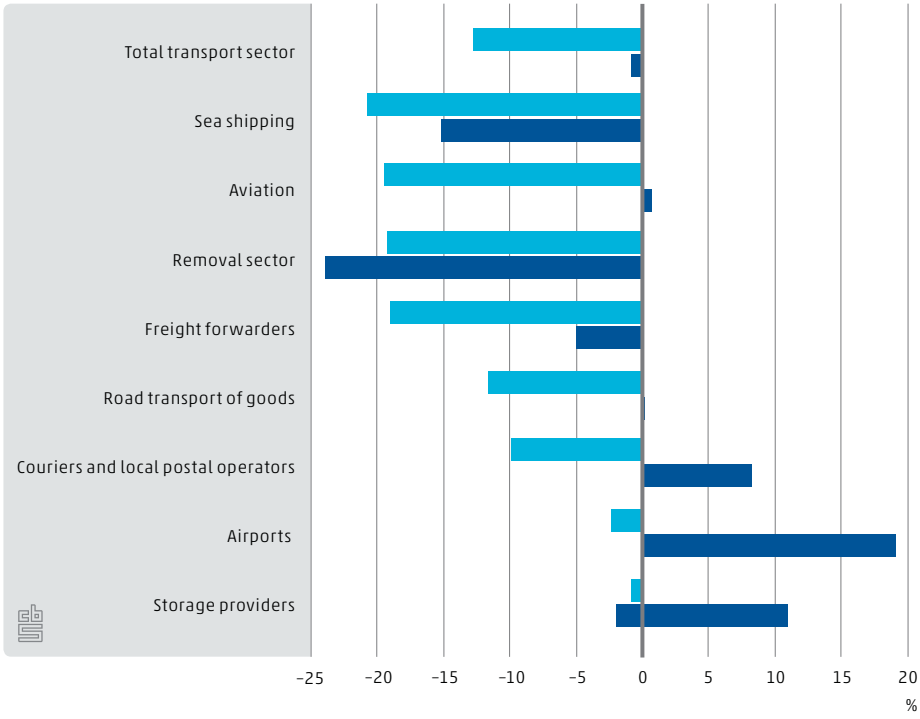
10.1 Introduction

In 2008 the economy faced a major downturn. What started in the US as a banking crisis soon spilled over to Europe. Banks in the Netherlands were sucked in and by the end of 2008 the Netherlands found itself in economic crisis. Many markets saw their turnover dip. Freight volumes and tariffs fell sharply as international trade and industrial activities went in decline. Construction orders faltered and hence demand for construction materials. Some sectors faced extra overcapacity as a result of investments in 2008.
The amount of work decreased in the Netherlands which led to bankruptcies and rising unemployment. This all took place after a period of prosperity and economic growth. The double dip in the period 2011–2013 caused an extra setback in consumption. The decrease in national consumption had a negative effect on domestic transport.

10.2 Economic crisis: turnover dip in transport

Turnover in the transport sector fell by almost 13 percent in 2009, the largest decrease in many years. Goods transport, and many related sectors including freight forwarders faced major setbacks. Worst hit were maritime shipping, aviation, removal companies and freight forwarders. Consumer service providers were least affected by the crisis, with the exception of aviation.

10.2.1 Turnover changes of 2009 and 2014 on 2008

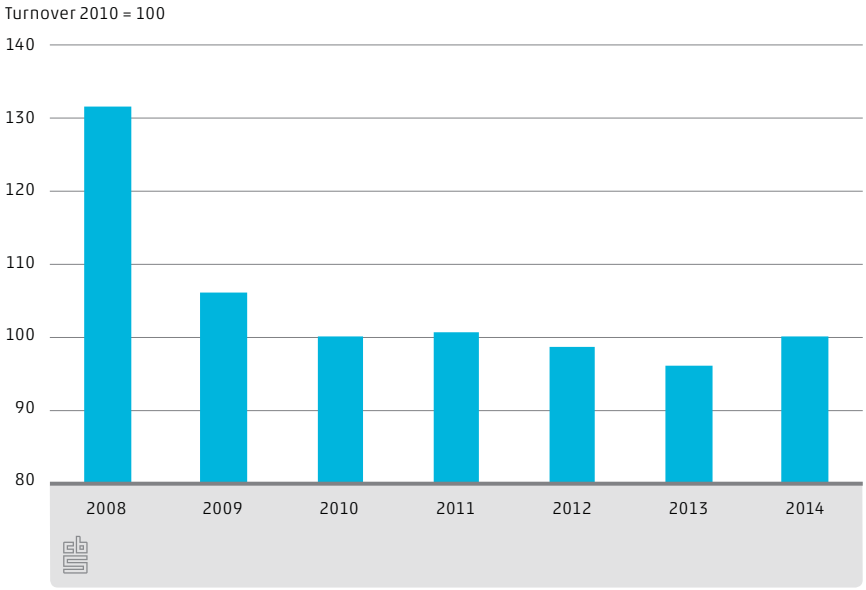


Source: CBS, 2015a.

Removal companies in free fall

The removal sector was one of worst hit, because as mortgages became more difficult to obtain, fewer houses were built and house sales plummeted. This led to less work for the removal companies, which faced lower turnovers from the start of the crisis until 2013. This goes for project as well as consumer removal companies. Only by the end of 2013 came the first signs of recovery, but the removal sector kept lagging behind the rest of the transport sector. In 2014 turnover was still 24 percent lower than in 2008.

10.2.2 Turnover removal sector



Source: CBS, 2015b.

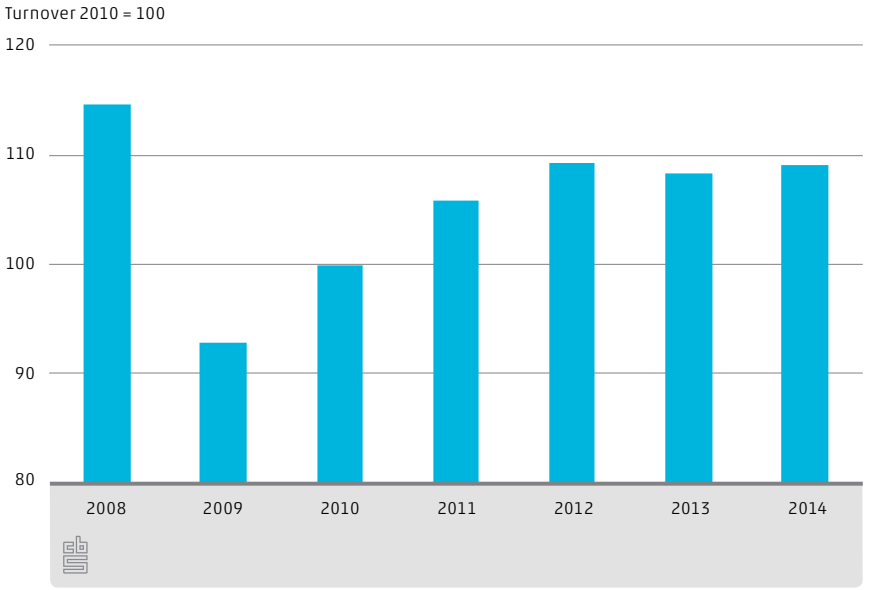
No credit, less economic activity

Banks suffered greatly from the crisis, some even relied on government support. New regulations were forced on the banking sector. As a result banks became more reluctant to supply loans and credit to businesses and consumers. This caused corporate investments to decrease and affected economic activity.

Freight forwarders lag behind

The returns of freight forwarders, mediators in transport, decreased by 19 percent in 2009 on 2008. They suffered greatly from the loss in transport volume in road haulage, aviation and inland shipping. The decreasing demand for freight forwarders services negatively affected turnover. Although loading volumes slowly increased recently, freight forwarders did not benefit, because transporters had started to cut costs by providing a wider range of logistic services. This trend also affected freight forwarders businesses negatively and turnover in 2014 was 5 percent lower than that of 2008.

10.2.3 Turnover freight forwarders



Source: CBS, 2015c.

Strong recovery for airports

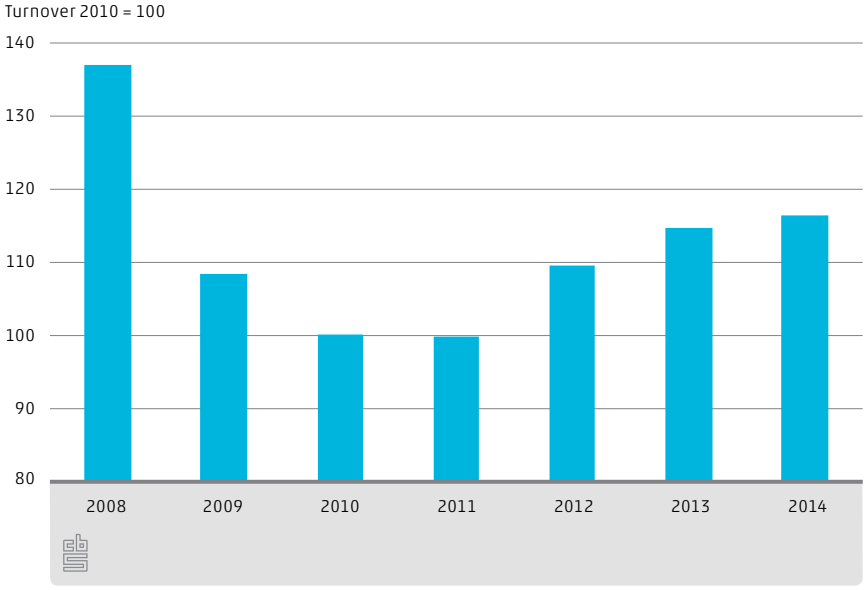
Service providers in aviation saw their turnover decline in the first years of the crisis, though losses were limited. Their decline had to do with cargo handling, but mainly with processing passengers. In 2009 passenger numbers in airports fell by 8 percent to 46.5 million but then reached a record level of 61 million in 2014. Turnover had started to recover by 2011 and immediately exceeded pre-crisis levels. In the following years returns kept increasing making airports the fastest climbers in the transport sector.

Sea shipping not yet at pre-crisis level

The transport by sea/coastal shipping showed the biggest drop in turnover at the start of the crisis. As the downturn was evident all over the world, this was reflected in sea shipping. Economic activities decreased in many large trading and production countries, slowing demand for transport capacity. Shipping companies had focused on operating larger new ships with more capacity, to lower the cost

per transported container. To further reduce costs, they introduced slow steaming for cheap cargo shipping where speed is of no concern. As competition increased, some of the 'older' usually smaller ships received fewer orders. Since 2012 turnover in sea shipping started to rise slowly but not enough to reach pre-crisis levels.

10.2.4 Turnover sea shipping

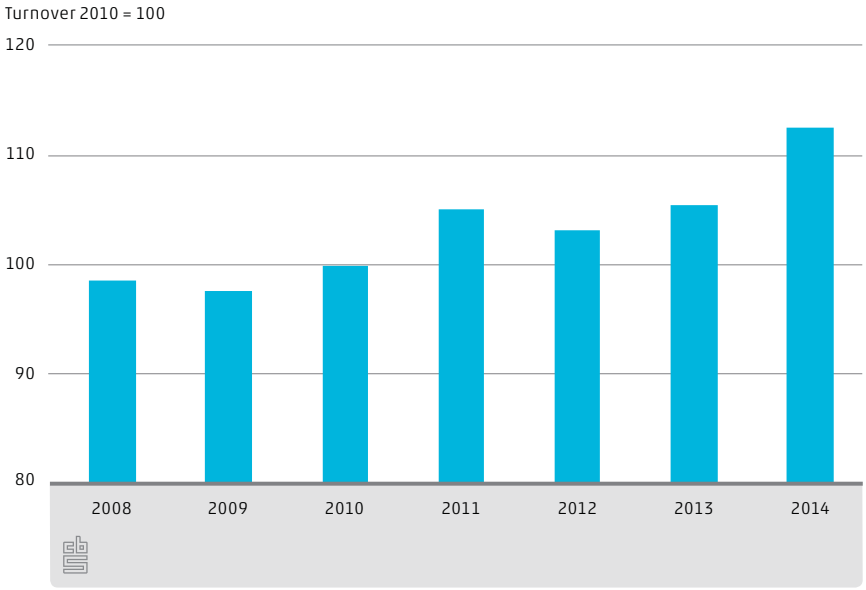


Source: FAOSTAT (16-09-2013).

Storage providers kept their workload

The storage sector experienced a minimum of inconvenience from the crisis. The sector faced one of the slightest drops in turnover in 2009, just 1 percent less than in 2008. Due to the decreasing demand in goods, stockpiles increased and demand for storage grew. Raw materials became cheaper in 2009 which led to more raw material purchases for reselling in better times. Turnover fell because of overcapacity, which put pressure on prices. The overcapacity was created by investments in storage space. From 2010 onwards turnovers almost continuously increased under the influence of higher prices and increased import. In 2014 turnover was over 14 percent higher than in 2008.

10.2.5 Turnover storage providers

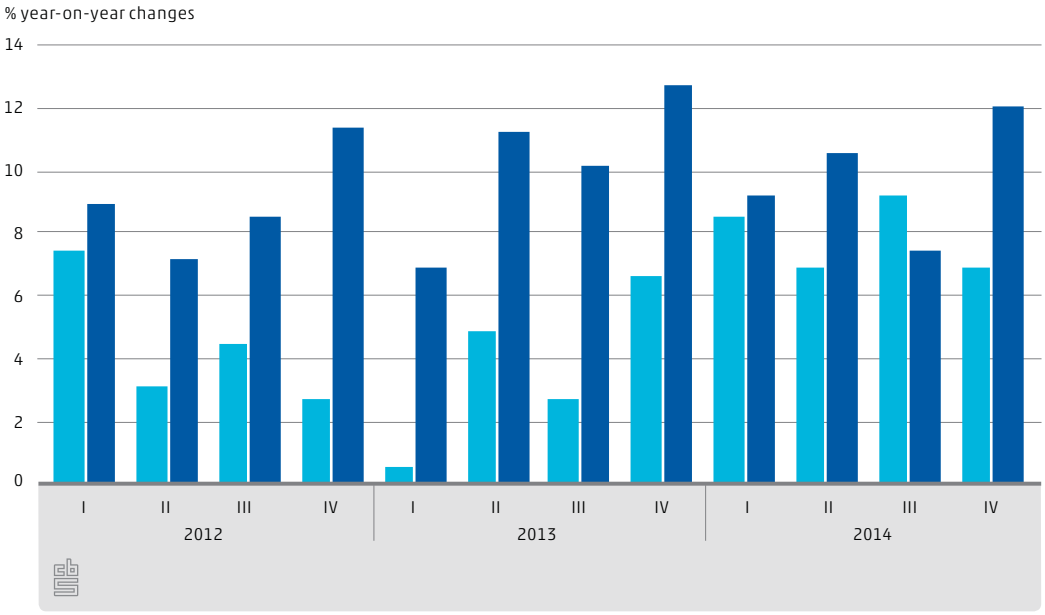


Source: CBS, 2015e.

Couriers delivered

In 2014 turnover of the couriers sector had increased by more than 8 percent since the start of the crisis. The sector was hit hard in 2009, but after decreasing seven quarters in a row turnover started to pick up again in the fourth quarter of 2010. The growing demand for courier services is linked to increasing online purchases. In 2013 some 80 percent of the Dutch population sometimes bought products and services online, compared to 50 percent in 2006. So there has been an upward trend in turnover of internet shops and mail order companies for several years. Most of these products are transported by couriers. Furthermore, four years of increasing prices for courier services have added to the turnover growth.

10.2.6 Turnover webshops and couriers



Source: CBS, 2015f.

2014

Six years have passed since the crisis started and still not all sectors have recovered from their diminishing returns. In 2014, total turnover of the transport sector remained 1 percent below the 2008 level. Due to the economic downturn and all its effects, several markets have changed permanently and companies have had to adapt to survive.

Sources

CBS, 2015a: Omzetontwikkeling 2009 en 2014 ten opzichte van 2008 (figures 10.2.1)

CBS, 2015b: Omzet verhuisbranche (figures 10.2.2)

CBS, 2015c: Omzet expediteurs (figures 10.2.3)

CBS, 2015d: Omzet zeevaart (figures 10.2.4)

CBS, 2015e: Omzet opslagbedrijven (figures 10.2.5)

CBS, 2015f: Omzetontwikkeling webwinkels en koeriers (figures 10.2.6) (figures 10.2.6)

Definitions

Freight forwarder
The organiser of goods shipments: apart from the actual transport, the freight forwarder also takes care of processing logistic activities. This may include administrative formalities such as license applications, price comparisons, booking shipments, organising road haulage, storage of goods, etc.

11. Time saving in rush hour traffic to and from the major cities

On an average working day in the period 2010–2013 car drivers spent less time in rush hour traffic than in the period 2004–2007. The evening rush hour was less congested, requiring 5 percent less travel time. In the morning rush hour time was cut by 3 percent. The peak in the evening no longer takes more time than the morning rush hour, as was the case before.
This is shown by a mobility study at Statistics Netherlands based on the OViN survey (*Onderzoek Verplaatsingen in Nederland*) and Mobiliteitsonderzoek Nederland (MON). These figures represent national averages. Outside the major cities, rush hour traffic hardly takes longer than off-peak traffic, so that at the national level the rush hour problem does not seem too bad. However, in the regions around the major cities rush hour traffic encounters serious delays, although usually less than before (2004–2007).

11.1 Introduction

The OViN survey, commissioned by the Dutch Ministry of Infrastructure and the Environment, is carried out by Statistics Netherlands. In this survey, respondents report their movements on a certain day in the year: time of departure, time of arrival, distance covered, mode of transport and travel motive. This information is used to develop and test government traffic and transport policy goals. At Statistics Netherlands we derived information on travel times and door-to-door car journeys from the OViN survey, which covers travel times related to the complete Dutch road infrastructure. The OViN survey gives no information on congestion. Data on the seriousness of congestion are registered by Rijkswaterstaat and the ANWB, but they refer only to the national roads system (motorways mostly).

Rush hour traffic in the OViN survey

The analysis in this chapter focuses on private cars. Commercial traffic including vans and lorries (freight transport, taxi drivers, courier services and so on) is excluded.
An average working day is taken over a four-year period, so as to gather enough sufficiently reliable data for regional details. The period 2010–2013 is compared to 2004–2007.

Rush hours are defined as follows: a car ride on a working day is part of the morning rush hour if departure fell between 7 and 9 and of the evening rush hour if departure fell between 4 and 6.

11.2 Regional rush hour travel times

Regional differences in car travel times during rush hour vary widely. Heavy rush hour traffic is found mainly in the Randstad, but also in Oost-Groningen, Arnhem/ Nijmegen and Flevoland. However, congestion was often less heavy in 2010–2013 than in 2004–2007.

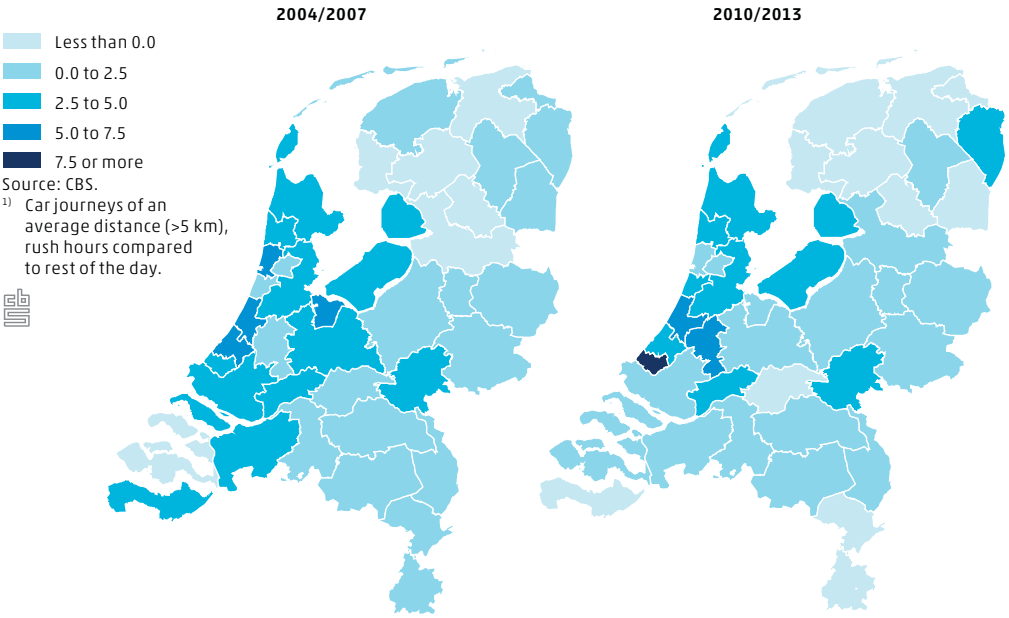
Still heavy rush hour traffic around major cities despite improvements

The Hague, Amsterdam, Utrecht and Flevoland still have heavy rush hours. Peak traffic around The Hague is still heavy in the mornings, requiring over 4 minutes extra travel time. In the evenings it takes an additional 6 minutes to cover the average distance, compared to the rest of the day. Still travel times during the rush hours have improved around The Hague as well: the morning rush hour is two minutes shorter, the evening rush hour half a minute. This refers to an average travel distance of 25 km around The Hague, small distances under 5 km are not included.
In Amsterdam travelling in the evening rush hour is now almost as fast as travelling outside rush hours, whereas 6 years before there was an extra travel time of 4.5 minutes. The extra travel time in the morning rush hour decreased by a minute to 3.5 minutes.
In some heavy rush hour areas, travelling by car is no faster than 6 years before. For example Groot-Rijnmond, the area around Rotterdam, still has a heavy evening rush hour with six minutes extra travel time. In the morning rush hour, car drivers now reach their destination slightly faster, with 2.5 minutes of extra travel time instead of the almost 4 minutes it used to be. Some areas saw no time savings at all though, for example in Eastern-Groningen, Delft en Westland and Arnhem/ Nijmegen.

Extra travel time in rush hours (OViN)

In this chapter we show how much extra travel time a car driver needs on an average working day to cover the average distance compared to the travel time outside rush hours. This is done at the national as well as the regional level. The focus is on door-to-door car journeys over 5 km on all Dutch roads. This is computed as follows. At the national level, travel time outside the rush hours is 31.6 minutes for an average distance of 26.9 km, which is 1.18 minutes/km. In the morning rush hour the average travel time is 33.4 minutes for 26.7 km, which is 1.25 minutes/km. So, the morning rush hour is 6 percent slower than the average (1.25 versus 1.18). Outside rush hour the average distance would be covered in 31.5 minutes so the extra travel time in the morning rush hour is 33.4 – 31.5 = 1.9 minutes. This is the extra travel time in the morning rush hour as a national average. In the same way we computed the extra travel time for the evening rush hour.

11.2.1 Extra travel time in the morning rush hour[1)] on an average working day



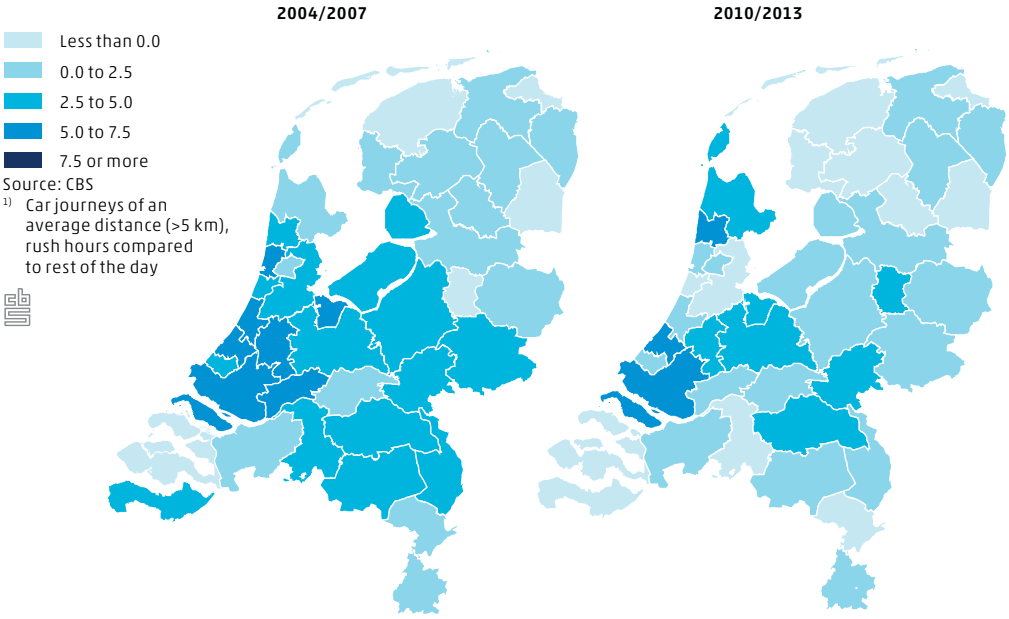
Source: CBS.

[1)] Car journeys of an average distance (>5 km), rush hours compared to rest of the day.

Heavy rush hour traffic in regions concealed in the national figures

At the national level, travelling during peak hours does not take much longer than off-peak. In the period 2010–2013 a car driver would spend 1.9 minutes more in the morning as well as in evening rush hours than at other times. In the period 2004–2007 the extra travel times were 2.7 and 3.1 minutes respectively. So nationally the traffic flows improved especially in the evening rush hours. On an average working day, a car driver in 2010–2013 arrived one minute earlier at work than in 2004–2007. These are national figures, regionally there is still heavy rush hour traffic. Off-peak car drivers travelled faster than six years earlier, although just 1 percent was gained in terms of time.

11.2.2 Extra travel time in the evening rush hour[1] on an average working day



11.3 Rush hour traffic and congestion on the main roads

How do these results compare to the data about the main road network on congestion? Rijkswaterstaat and KiM report about the national roads system. In their publication Mobiliteitsbeeld 2014, KiM concludes the same regional trends for traffic during rush hours as mentioned above for door-to-door journeys: travel time in Noord-Holland and Utrecht decreased in 2010–2013 whereas it did not change much in Zuid-Holland. KiM observed major local differences within the regions, however.

Heaviness and length of congestion

Rijkswaterstaat reports on traffic on the national roads including freight transport. Rijkswaterstaat states that the total distance covered on the main roads has increased since 2000, but to a lesser extent from 2007 onwards (Publieksrapportage Rijkswegennet 3e periode 2013). In contrast, congestion has decreased below the year 2000 level. Since 2010 congestion has declined mainly due to the construction of additional lanes (KiM, 2014).
Rijkswaterstaat recently reported an increase in congestion for the first quarter of 2015 on the first quarter of 2014. Weather conditions strongly influence congestion, and they were poorer than in the first quarter of 2014.

Concerning the rush hour traffic on the main roads, Rijkswaterstaat reports more traffic during and somewhat less traffic outside rush hours. The length of congestion decreased: congestion in the evening rush hour used to be heavier than in the morning rush hour, as was the case with the travel times from the OViN survey on the entire road infrastructure. The difference between evening and morning rush hour congestion did not disappear in the same way it did for the travel time from the OViN survey. In the evening rush hour traffic jams are still 20 percent longer than in the morning rush hour.

Government goals

In their annual budget plan, the Dutch government announced that it seeks a reduction in door-to-door travel times by 10 percent in the period 2015–2017, especially in busy areas during rush hours. This goal is not restricted to main roads: the total travel time of car journeys has to come down.

11.4 Travel motives during and outside rush hour

Most longer car journeys during rush hours are commutes

Morning rush hour sees an average of 2.4 million cars on the road, of which 1.7 million travel more than 5 km. For the evening rush hour this is 2.8 million

cars, of which 1.8 million travel more than 5 km. Car journeys of more than 5 km in rush hour are usually commuter trips: in the morning rush hour that share is even close to 80 percent. In the evening rush hour that share is slightly over 50 percent, outside it is a third. The car drivers during rush hours are therefore mainly working people and rarely retired people aged over 65, who prefer to travel off-peak.

Rush hour drivers alone in their cars during long car journeys

Car drivers tend to travel alone on journeys of more than 5 km during rush hour: 88 percent in morning rush hours and 80 percent in the evening rush hour do so. Outside rush hours 72 percent of the drivers make their longer car journeys alone. In longer morning rush hour journeys there is just 0.1 passenger, whereas outside morning rush hour this is an average of 0.3. Over 60 percent of the passengers in longer journeys are family members. This is true for the entire working day, so there is not a great deal of carpooling.

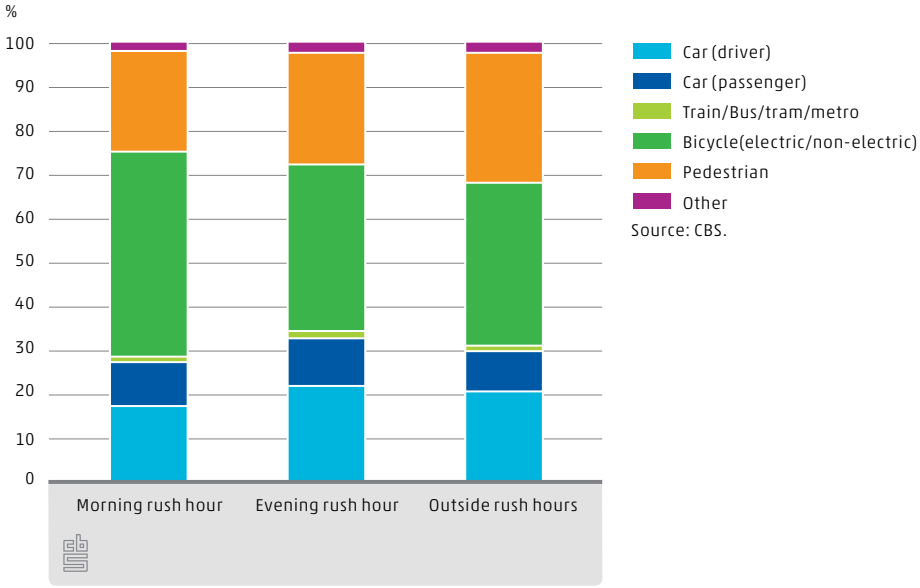
Short rush hour car journeys often with family members

Throughout the entire working day, there are more people in cars on short journeys (of less than 5 km) than on long journeys. Yet nearly two thirds of the drivers are alone in their cars. This is slightly less in morning rush hours, when an average of 0.6 passengers join the driver, usually family members (over 90 percent). Usually they are the children or partners who are taken to day care, school or work. In the evening rush hour, drivers are joined by an average of 0.5 passengers, also mainly family members, whereas off peak the average is 0.4 passengers. Again three out of four are family members. The short journeys are usually not commutes, although commutes constitute 40 percent of all short journeys in the morning rush hours. So carpooling is rather limited on short journeys too.

Bicycles most popular for short journeys

Bicycles are far more popular than cars for short distances, throughout the working day. During morning rush hours nearly half of all Dutch people take their bicycles for short journeys and outside the morning rush hour nearly 40 percent do so. Over a quarter walks short distances, more often outside than during rush hours.

11.4.1 Means of transport in journeys under 5 km, in percentages of the total number of journeys on an average working day 2010-2013



Source: CBS.

For further information see

CBS: Onderzoek Verplaatsingen in Nederland (OViN)

CBS: Mobiliteitsonderzoek Nederland (MON)

Literature

Kennisinstituut voor Mobiliteitsbeleid (2014), Mobiliteitsbeeld 2014

Rijksoverheid (2014), Publieksrapportage Rijkswegennet 3e periode 2013

Rijksoverheid (2014), Miljoenennota

Rijksoverheid (2015), Publieksrapportage Rijkswegennet 3e periode 2014

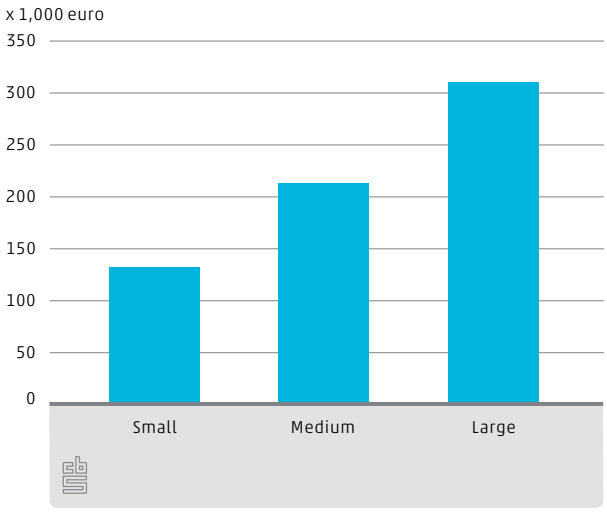
12. The Netherlands and inland waterways

Inland shipping is very important for Dutch goods transport. No less than one fifth of all domestic goods transport makes use of inland waterways. This share is unique within Europe and is a logical consequence of the geographic location of the Netherlands.
The years following the economic crisis were hard on the inland skippers and barge captains. Before the crisis many had purchased larger ships which, when they became operational, led to overcapacity in the market. And although demand for goods transport has recently started to pick up again it is not enough to compensate for the overcapacity. This has put pressure on the margins.

12.1 Introduction

Inland shipping has traditionally played a key role in Dutch goods transport. The Netherlands has an advanced infrastructure and the largest inland fleet in Europe. The inland shipping sector employs about 18 thousand people divided over more than 4 thousand companies. Some 97 percent are classified as small companies; together these generate 55 percent of total turnover. In small companies, returns per person employed amount to over 130 thousand euros, for medium and large companies this is 210 and 310 thousand euros respectively.

12.1.1 Return per person employed (FTE) by company size

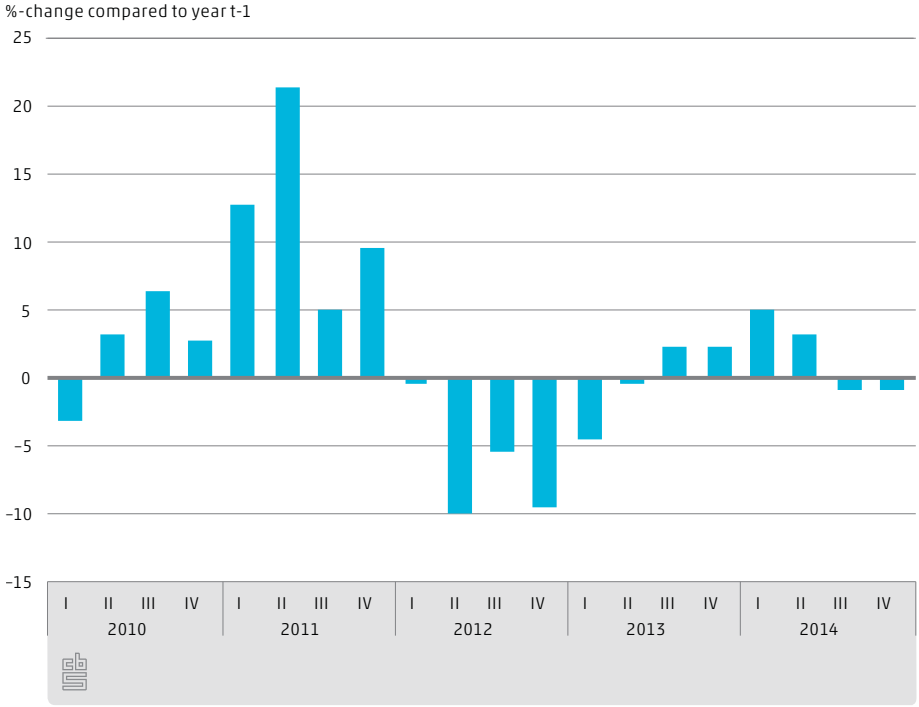


Source: CBS.

12.2 Slight slowdown in 2014

Inland shipping returns increased in 2010 and 2011, followed by a slowdown that lasted 18 months. By the second half of 2013 returns had started to increase again, but within a year the modest recovery seems to have come to an end. The year 2014 ended with a 1 percent turnover increase. Prices were under pressure while costs rose, so returns for the skippers fell. Their expectations about returns in 2015 are cautiously optimistic: returns equalling or exceeding 2014.

12.2.1 Turnover in inland navigation

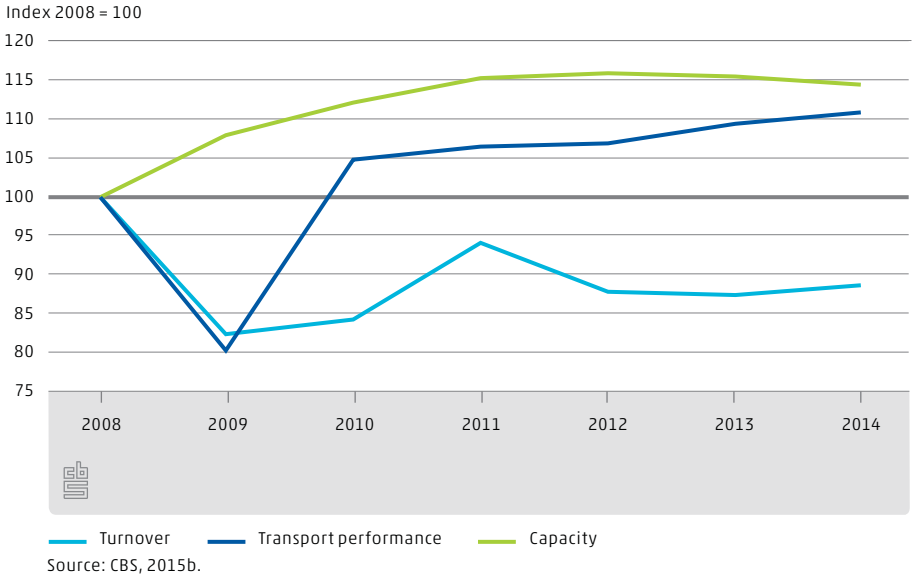


Source: CBS, 2015a.

12.3 Overcapacity wreaks havoc

In the pre-crisis years Dutch skippers ordered many large ships, compared to other countries. These ships became operational between 2008 and 2011. In 2014 capacity was up by 11 percent on 2008, whereas turnover had fallen to 11 percent below the 2008 level.
Demand for goods transport in 2014 was 6 percent higher than in 2010, but this was not enough to compensate for the overcapacity. This put pressure on the margins and made it hard for many shipping companies to survive.

12.3.1 Turnover, performance and capacity



Source: CBS, 2015b.

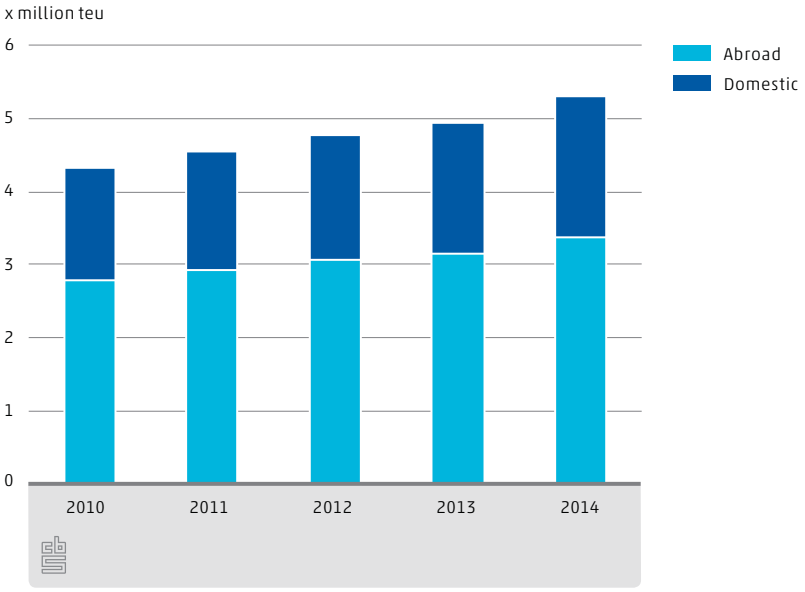
12.4 Inland shipping: big for a small country

Inland shipping provides about one third of goods transport in the Netherlands. Out of all EU countries, the Netherlands carries the most goods via inland waterways. Considering its geographical location, it is fairly logical that inland shipping plays such an important role.

12.5 Container transport increases

Goods transport via inland shipping is increasingly by container. The number of TEU (twenty foot equivalent unit) containers transported by inland shipping increased by over 22 percent between 2010 and 2014. In domestic transport, container shipments increased by 25 percent.

12.5.1 Transported containers by inland shipping

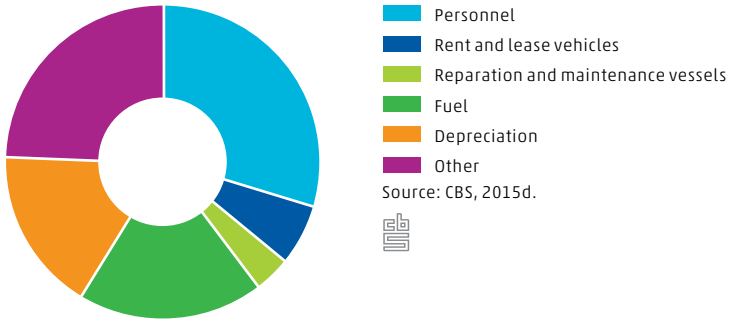


Source: CBS, 2015c.

12.6 Ships form major cost item

Ships constitute the largest cost item for inland shipping. Nearly a quarter of the total cost goes to operation and maintenance such as fuels, rent, insurance and repairs and furthermore depreciation. In road haulage operational costs for means of transport form around one fifth of the total (excluding depreciation and interest).
Inland shipping has fewer personnel expenses than road haulage; more than 20 versus more than 30 percent. Many shippers are captain owners operating their ships themselves, so they employ fewer people and spend less on personnel costs.

12.6.1 Costs division inland shipping



Source: CBS, 2015d.

12.7 Margins have decreased significantly

Although turnover has increased, results have not kept pace. Returns in 2008 reached 548 million euros. This was a quarter of total turnover, or 140 thousand euros per company. By 2012 this amount had nearly halved, and returns came to merely 13 percent of turnover. By 2013 returns had increased to 92 thousand euros per company (383 million euros: 14 percent).

Sources

CBS, 2015a: Transportbedrijven; omzetontwikkeling: index 2010=100 (figures 12.2.1)

CBS, 2015b: Meer goederen vervoerd door binnenvaart in 2014, omzet blijft achter (cijfers bij figuur 12.3.1)

CBS, 2015c: Binnenvaart; goederenvervoer, vervoerstroom, goederensoort (cijfers bij figuur 12.5.1)

CBS, 2015d: Transportbedrijven; arbeids- en financiële gegevens, per branche (cijfers bij figuur 12.6.1)

13. Does environmental pressure increase when road vehicle numbers grow?

The number of vehicles on the road has increased considerably since 1990. There are 55 percent more cars and the number of freight vehicles has doubled. The total distance covered on Dutch roads has increased by a third. Measures to reduce emissions to air have led to a 70 percent decrease in nitrogen oxide (NO_x) and 80 percent in fine dust (PM_{10}) emissions. The carbon dioxide (CO_2) emissions by road traffic kept increasing until 2009, but more fuel efficient cars have led to a downward trend.

13.1 Introduction

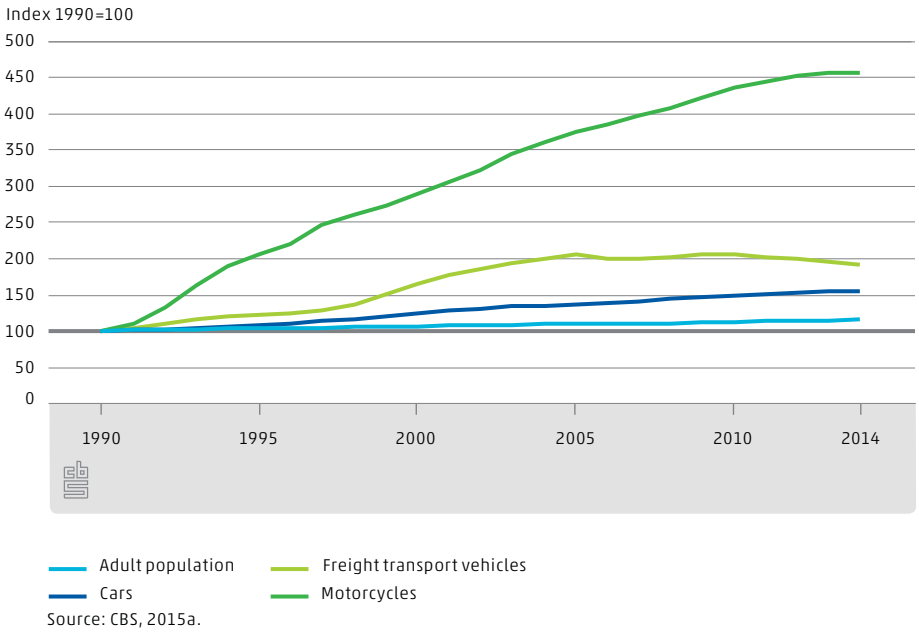
Road traffic in the Netherlands causes considerable environmental pressure by contributing greatly to nitrogen oxide and fine dust concentrations in ambient air. These substances are harmful to humans. Road traffic produces a substantial part of the total greenhouse gas emissions. Since 1990, the number of vehicles has increased by about two thirds and the distances covered by one third. But did this result in a proportional increase in environmental pressure?
We analysed the changes in the period 1990–2013 on the basis of computed vehicle kilometres and emission and consumption factors per kilometre, and studied road traffic emissions of nitrogen oxides (NO_x), fine dust or particulate matter (PM_{10}) and carbon dioxide (CO_2) and how they contributed to the total domestic emission of these substances.

13.2 More people, more households, more cars, motorcycles and mopeds

Between 1990 and 2014 car numbers expanded by 55 percent to 7.9 million. This is partly due to the growth in the adult population, the labour force and the number of households. In 2013 seven in ten households had at least one car. Almost one in four households owned two or more cars. This means that more people have access to a car, lowering occupation ratios. The growth in car numbers can also be attributed to the positive appreciation of cars as they offer convenience, independence and flexibility (Harms 2011). People have also become more dependent on cars, because 40 percent of car journeys people make are next to impossible to make by other means (Jeekel 2011).

Between 1990 and 2014 the number of motorcycles and mopeds rose even faster multiplying by no less than 4.5 times. Other motorised two-wheelers strongly increased in number as well. Registered mopeds (mopeds, light mopeds and micro cars) saw an over 55 percent increase to more than a million in the period 2007–2014. As registration was not required for these vehicles prior to 2007 there is no reliable statistical information on earlier years.
Freight transport vehicles (pickup trucks, lorries, road tractors for semi-trailers and special vehicles) almost doubled to over a million in a quarter of a century.[1)]

13.2.1 Motor vehicles and adult population 1990-2014



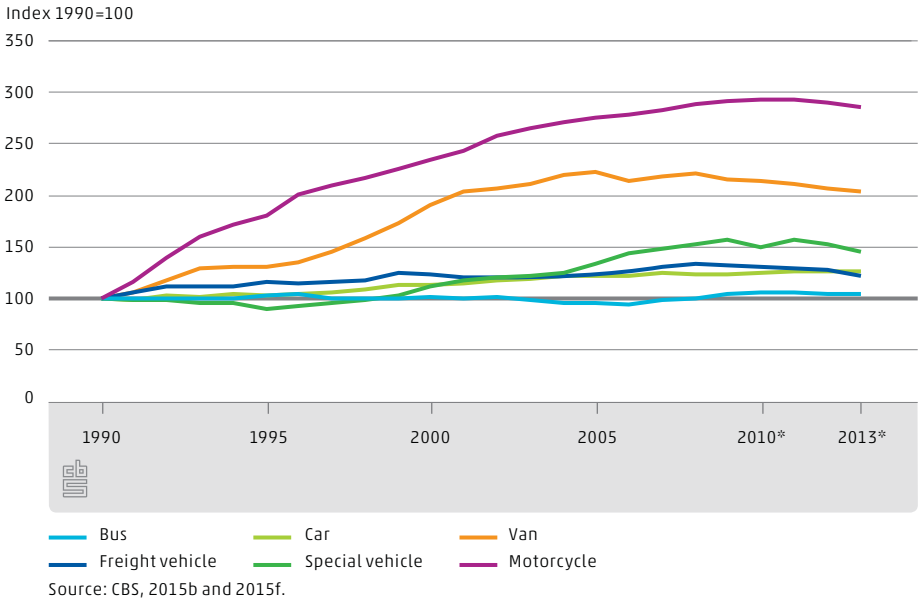
Source: CBS, 2015a.

[1)] This refers to motor vehicles on 1 January, excluding vehicles that are part of the company stock, or registered as demolished or exported.

13.3 More cars, more traffic

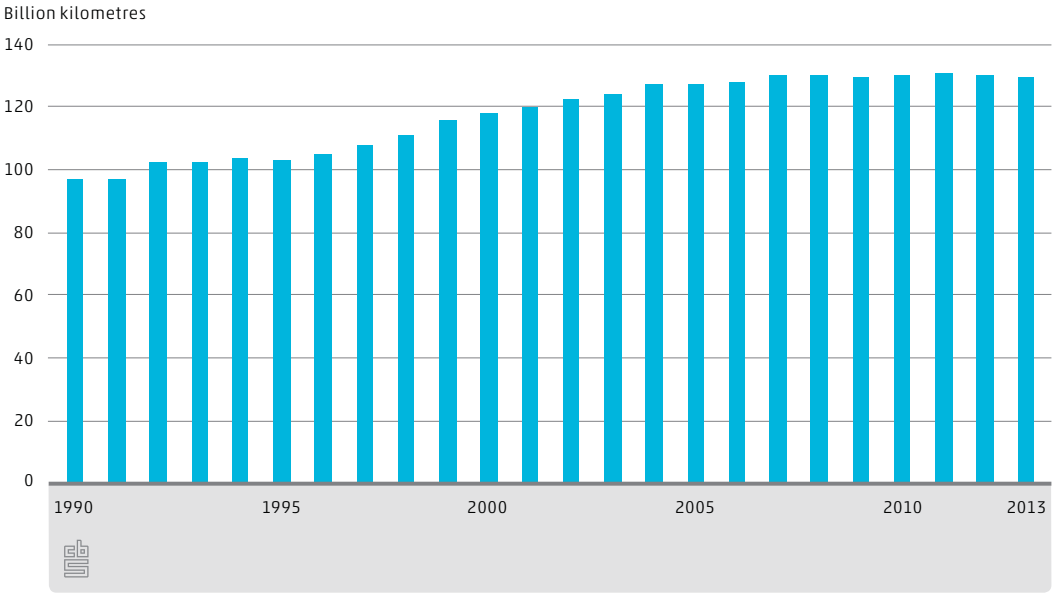
Growing vehicle numbers have led to more traffic. The total distance covered by road traffic (traffic performance) on Dutch territory since 1990 has increased by over one third to almost 132 billion vehicle kilometres. These refer to the 120 billion kilometres mentioned in Chapter 1, plus the kilometres by foreign vehicles. Cars make the vast majority of the vehicle kilometres: 78 percent of all kilometres on Dutch roads in 2013. Lorries and road tractors covered over 5 percent. In recent years the distance covered has stabilized or decreased, depending on the vehicle category. This theme is elaborated further in Chapter 1.

13.3.1 Traffic performance in the Netherlands



Source: CBS, 2015b and 2015f.

13.3.2 Total traffic performance of road traffic in the Netherlands

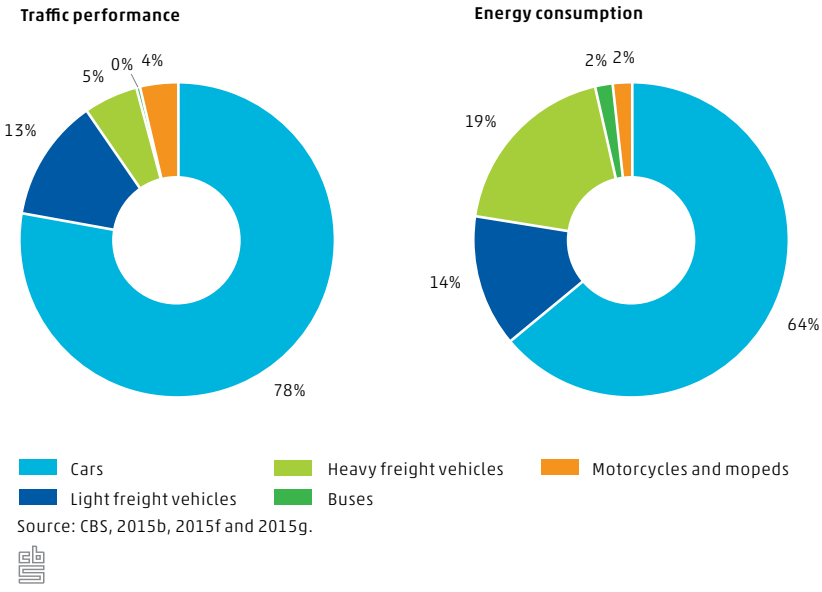


Source: CBS, 2015b and 2015f.

13.4 Energy use slowing down

The increase in vehicle kilometres greatly affected fuel consumption and emissions. Energy use by road traffic went up by about 25 percent in 1990–2008. Between 2009 and 2013 it fell by 3.5 percent, while the traffic performance stayed more or less the same. This was partly due to the tax incentives to buy more energy efficient cars.

13.4.1 Traffic performance and energy use by vehicle category, 2013

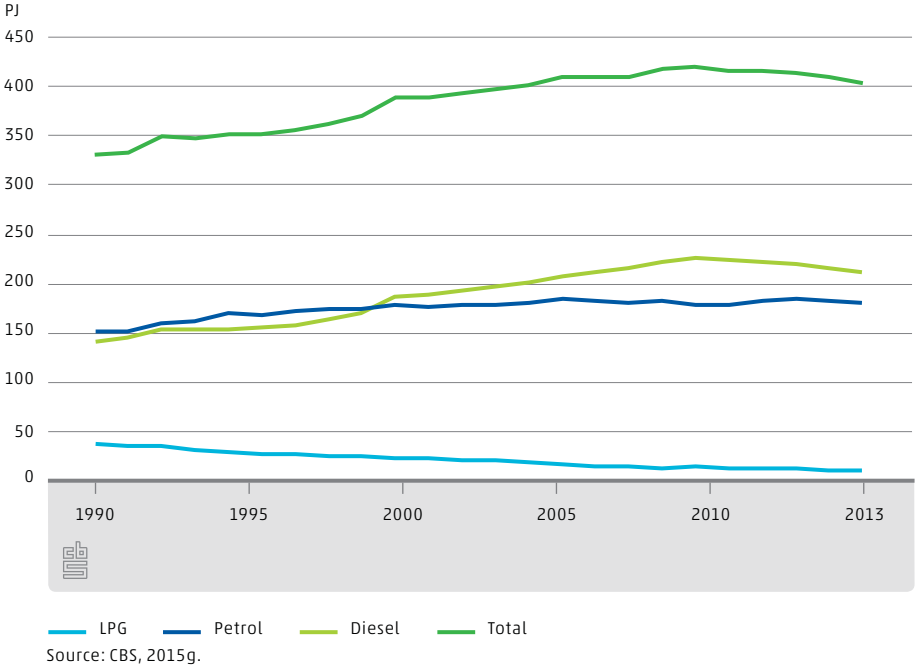


Source: CBS, 2015b, 2015f and 2015g.

Shift in fuel categories

The use of fuel categories has also changed. Up to 1999 petrol was most commonly used, but then diesel became more important. There was a 60 percent increase in the use of diesel between 1990 and 2013. In 1990 one in six vehicles was diesel powered; by 2013 this had reached one in four. This was caused by growth in freight traffic and by more cars – mostly company – using diesel.
Hybrids are the latest in fuel efficient cars purchased. Most have an electric motor and a petrol engine. Cars account for about two thirds of total domestic consumption of motor fuels.

13.4.2 Energy use by road traffic in the Netherlands



Source: CBS, 2015g.

European emission standards for motor vehicles

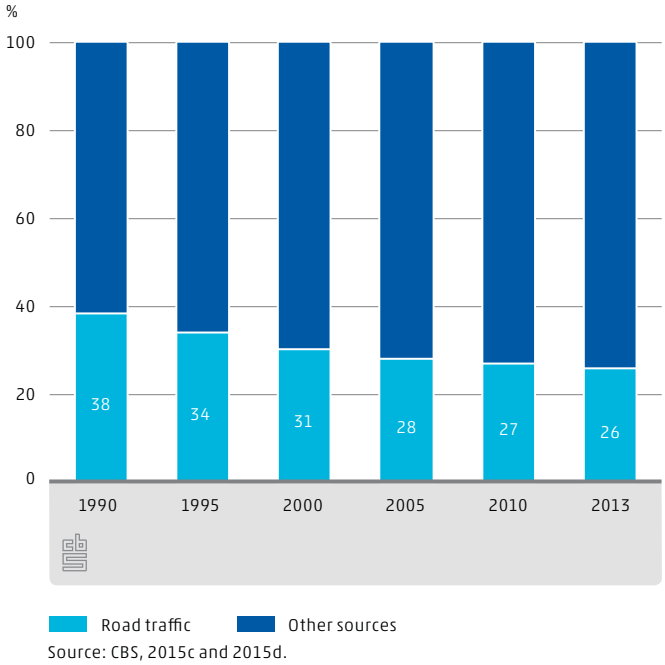
Road vehicles have to meet European emission standards before they are allowed to enter the market. These were introduced in the early 1970s and have become more stringent ever since. They involve type standard requirements, verified by measurements on a chassis dynamometer simulating different set patterns (emissions at different speeds and stationary, etc.).

Currently the Euro6-standards apply for new motorised vehicles. For more information on European regulations and their implementation dates see the EU directive.
http://eur-lex.europa.eu/homepage.html?locale=en

13.5 Catalytic converters help decrease NO_x emissions

Nitrogen oxides (NO_x) refers to nitrogen monoxide (NO) and nitrogen dioxide (NO_2). Of these two components NO_2 is the most harmful for humans. Nitrogen oxides are produced by the combustion of (motor) fuels, where high engine temperatures transform nitrogen (N_2) into nitrogen oxides (NO_x). For the European type standard requirements to be met, only the use of catalytic converters can adequately remove nitrogen oxides from the exhaust gases. More information can be found in Chapter 7 on environmental aspects.

13.5.1 Share of road traffic in total NO_x emissions in the Netherlands



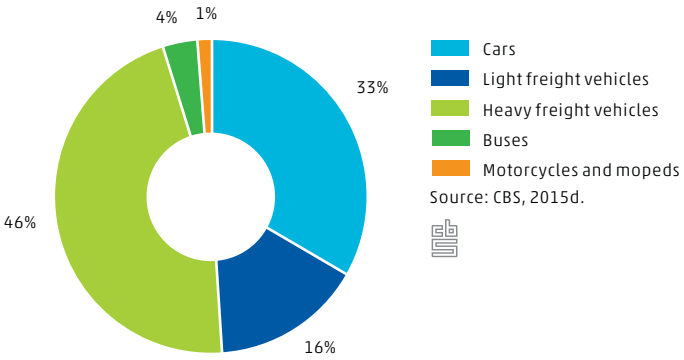
Source: CBS, 2015c and 2015d.

Road traffic is one of the two largest sources of nitrogen oxide emissions in the Netherlands, the other one being sea shipping. It causes one quarter of total emissions, which occur at the level where people actually live and mostly in built environments. This makes it the main cause of high concentrations of nitrogen oxides in urban areas. Other major sources like power plants and chemical industries often emit from high chimneys and like agriculture they are outside

urban zones. Most emissions from sea shipping within the Dutch territory, including the Dutch part of the continental shelf, occur at sea.

Cars were the biggest source of NO_x emissions in road traffic until the year 2000. But because freight traffic (diesel) covers more distance and cars have become more energy efficient the biggest source of NO_x emissions in road traffic is now heavy freight traffic.

13.5.2 NO_x emissions by road traffic, vehicle categories, 2013

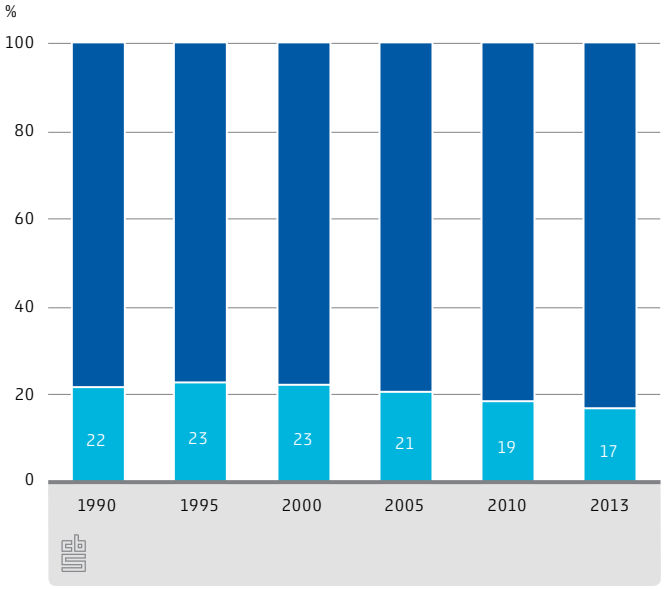


Source: CBS, 2015d.

13.6 PM_{10} emissions mostly by diesel vehicles

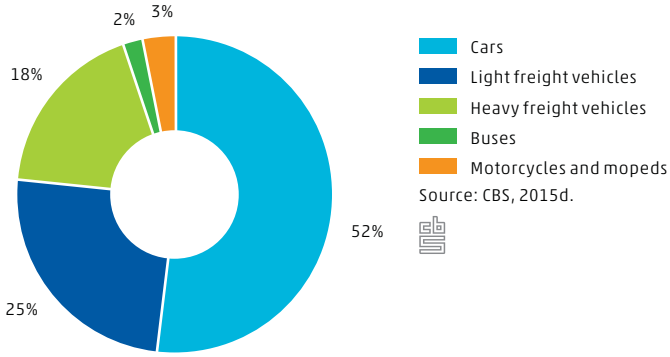
Particulate matter (PM_{10}) in the air is the collective of all solid and liquid particles floating in ambient air. Particulate matter, or fine dust, can have adverse health effects. Exhaust gas from the combustion of motor fuels is the main source of PM_{10} in road traffic, especially from diesel and far less from petrol and LPG powered vehicles. Moreover fine dust particles come from the wear and tear of tires, brakes and road pavement. More information on fine dust or particulate matter can be found in Chapter 7 on environmental aspects.

13.6.1 Share of road traffic in total PM_{10} emissions in the Netherlands



Source: CBS, 2015c and 2015d.

13.6.2 PM_{10} emissions by road traffic, vehicle categories, 2013



Source: CBS, 2015d.

13.7 CO_2 emissions down slightly

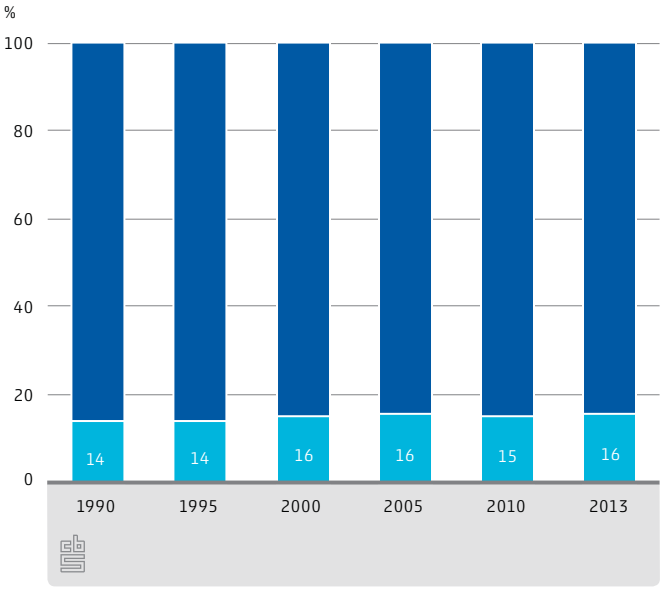
Carbon dioxide (CO_2) is the most important greenhouse gas after vapour. Greenhouse gases ensure that the warmth of the sun is retained. Without greenhouse gases the average temperature would be –18 degrees Celsius on earth, whereas the actual average is +12 degrees.
Due to the continuously increasing use of fossil fuels since the industrial revolution, CO_2 concentrations in the atmosphere have increased by about 30 percent. Researchers expect the average temperature to increase further if fuel use does not change, which could lead to significant climate changes and natural disasters. Therefore policies to reduce CO_2 emissions by human activities have been implemented. For example, the fiscal incentives in the Netherlands to buy fuel efficient vehicles.

Actual emissions versus emissions following the Kyoto protocol

The figures on CO_2 in this publication refer to actual emissions within the Dutch territory, as do the figures on NO_x and PM_{10}. CO_2 emissions are calculated per vehicle category and environmental classification on the basis of distances covered in the Netherlands and consumption factors (Staats, 2014), (Willems, 2014), (Kruiskamp, 2015). The consumption factors (km/litre) are largely based on recent vehicle measurements by TNO. This method enables monitoring developments in CO_2 emissions by purchase of fuel efficient vehicles. Statistics Netherlands also publishes data on emissions of CO_2 calculated in accordance with the IPCC guidelines (CBS, 2015e). The IPCC (Intergovernmental Panel on Climate Change) accompanies the scientific implementation of the Kyoto protocol intended for international reports within the Kyoto protocol framework. The aim of the guidelines is to make emissions internationally comparable so they can be added up to a reliable global figure. In road traffic this emission figure is based on the domestic sales of motor fuels. This is less adequate in showing the national emissions figure, it includes motor fuelled domestically and used abroad and vice versa. Therefore this figure is sensitive to fuel prices, so that Luxembourg with its low prices has an extremely high IPCC figure relative to its actual domestic CO_2 emissions.

The share of road traffic in total CO_2 emission in the Netherlands hovered between 14 and 16 percent during the whole period 1990–2013. The share in the Dutch IPCC emission was 19 percent in 2013, which is higher because international shipping and air traffic are not included in the national total figures for the Kyoto protocol.

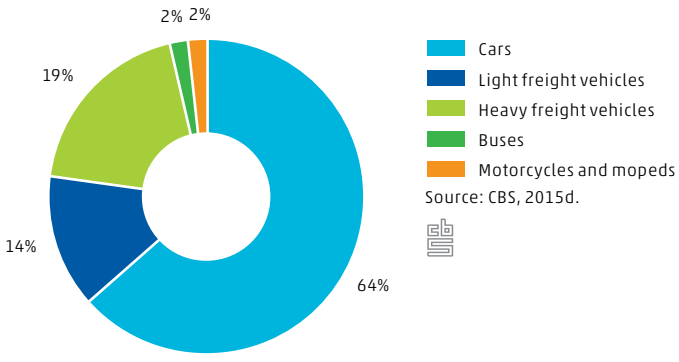
13.7.1 Share of road traffic in total CO_2 emissions in the Netherlands



Source: CBS, 2015c and 2015d.

Cars have by far the largest share in motor fuel consumption of road traffic, so this vehicle category is the largest source of CO_2.

13.7.2 CO_2 emissions by road traffic by vehicle category, 2013

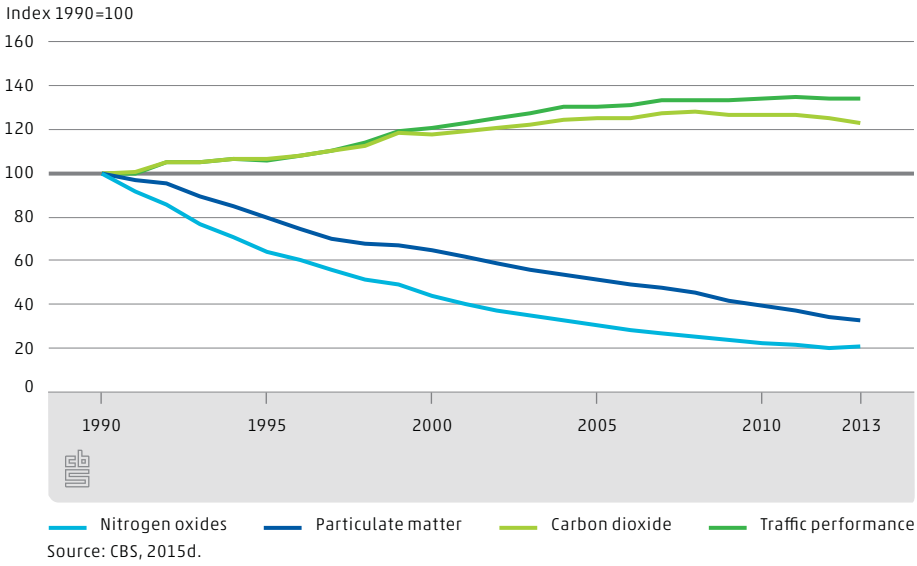


Source: CBS, 2015d.

13.8 Strong decrease in NO_x and PM_{10} emissions by road traffic

The distance covered by road traffic in the Netherlands increased by one third between 1990 and 2007. Since then annual traffic performance has remained more or less constant. In spite of the large increase in distance covered there has been a sharp fall in emissions of nitrogen oxides (80 percent) and particulate matter (70 percent) on 1990. This is the result of the use of catalytic converters, exhaust gas recirculation and diesel particulate filters. CO_2 emissions by road traffic kept increasing until 2009 after which a slight downward trend was caused by purchases of fuel efficient cars, including hybrids.

13.8.1 Emissions by road traffic in the Netherlands

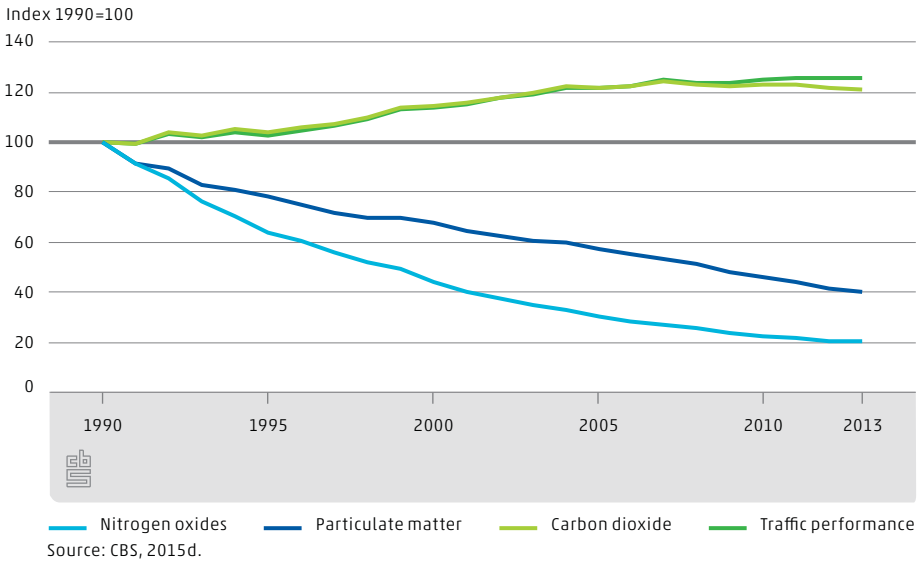


Source: CBS, 2015d.

13.9 CO_2 emissions by cars no longer increase

For cars the trend of CO_2 emissions kept pace with the traffic performance trend. CO_2 emissions fell by 2 percent, while the traffic performance remained more or less stable. Emissions of NO_x are down 80 percent on 1990 and of PM_{10} 60 percent.

13.9.1 Emissions by cars in the Netherlands

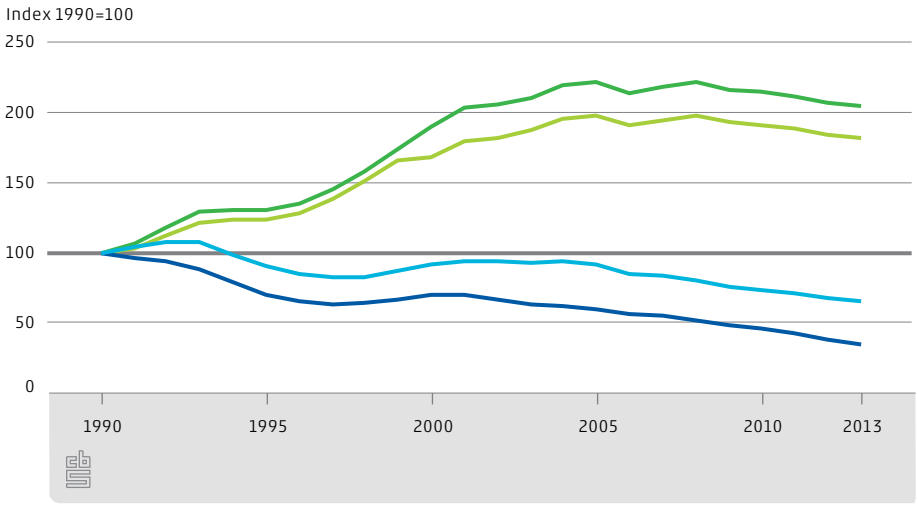


Source: CBS, 2015d.

13.10 CO_2 emissions of light freight vehicles down after 2005

The number of light freight vehicles (95 percent vans) more than doubled during the period 1990–2005, as did their traffic performance. CO_2 emissions increased less than the distances covered, compared with 1990. This is because use shifted during the nineties from within to outside urban areas. Outside urban areas vehicles consume less fuel per kilometre.

13.10.1 Emissions by light freight vehicles in the Netherlands

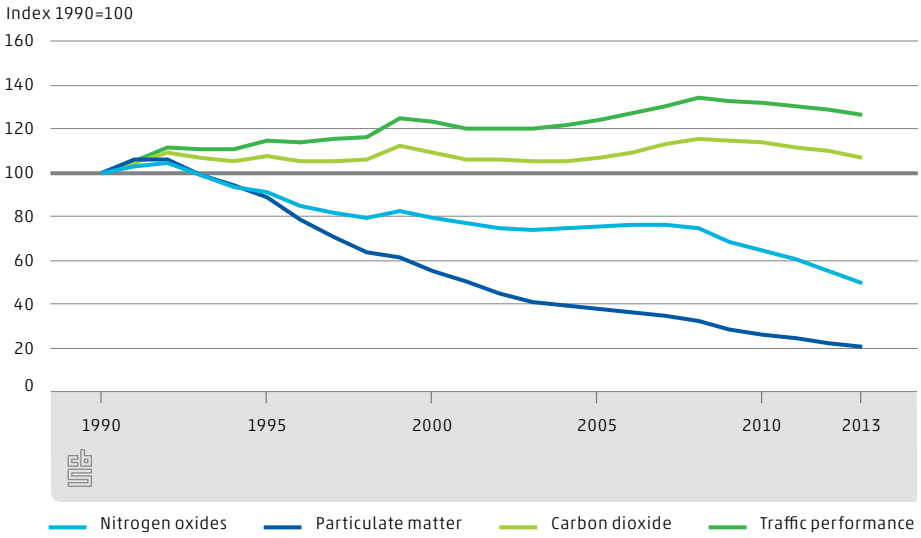


Source: CBS, 2015d.

13.11 Strong decrease in NO_x emissions by heavy freight vehicles after 2009

There is a pronounced decrease in NO_x emissions and also to a lesser extent in fine dust particles after 2009. This is thanks to the introduction of Euro5 and Euro6 diesel engines with application of exhaust gas recirculation (EGR) and/or selective catalytic reduction (SCR) and diesel particulate filters.

13.11.1 Emissions by heavy freight vehicles in the Netherlands

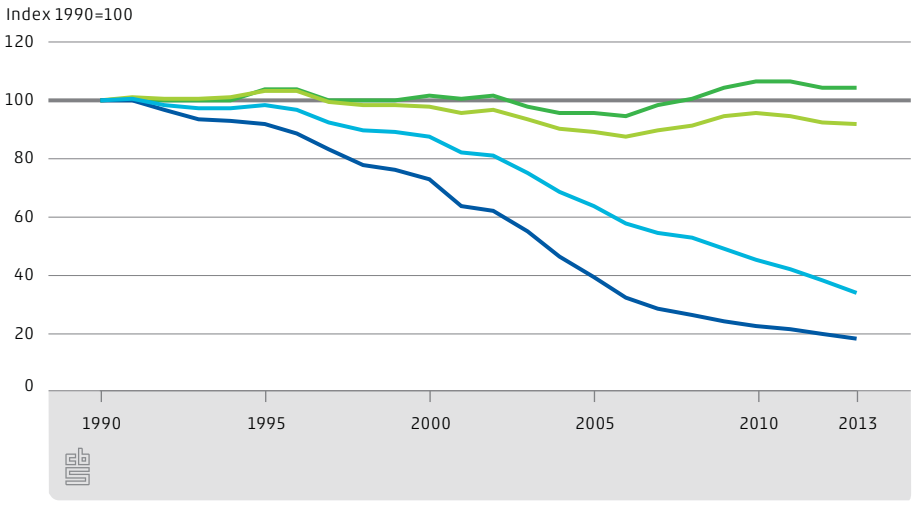


Source: CBS, 2015d.

13.12 Far lower NO_x and PM_{10} emissions by buses

The progress of emissions of buses since 1990 resembles that of heavy freight vehicles. Traffic performance and related CO_2 emissions were rather constant during the period 1990–2013, except a few minor ups and downs. The trend line of CO_2 emissions is below the traffic performance line, due to the fact that diesel engines became more efficient. NO_x and PM_{10} emissions by buses decreased strongly thanks to the application of SCR and EGR. Another development is the use of natural gas buses in public transport: in 2013 almost 10 percent of the total distance covered by scheduled bus services was on natural gas. Many buses have been replaced by newer and cleaner ones with over half now meeting the Euro 4 emission standard or higher.

13.12.1 Emissions by buses in the Netherlands



Source: CBS, 2015d.

13.13 Serious emissions by motorcycles and mopeds in urban areas

Compared to 1990 the distance covered by motorcycles tripled. The use of mopeds, including light mopeds and micro cars, increases in the last few years by 2 à 3 percent yearly. Their share in total domestic emissions is small and gradually decreasing. It should be noted that in urban areas mopeds and light mopeds can though contribute considerably to the concentrations of fine dust in the open air.

Sources

CBS (2015a). StatLine: Motorvoertuigenpark; inwoners, type, region, 1 januari. (figures graph 13.2.1)

CBS (2015a). StatLine: Motorvehicles; type, age class, 1 January. (figures graph 13.2.1)

CBS (2015b). StatLine: Verkeersprestaties motorvoertuigen; kilometers, voertuigsoort, grondgebied. (figures graphs 13.3.1, 13.3.2, 13.4.1)

CBS (2015c). StatLine: Luchtverontreiniging, feitelijke emissies door alle bronnen. (figures graphs 13.5.1, 13.6.1, 13.7.1)

CBS (2015c) StatLine: Air pollution, actual emissions by all sources. (figures graphs 13.5.1, 13.6.1, 13.7.1)

CBS (2015d). StatLine: Luchtverontreiniging, feitelijke emissies door wegverkeer. (figures graphs 13.5.1, 13.5.2, 13.6.1, 13.6.2, 13.8.1, 13.9.1, 13.10.1, 13.11.1, 13.12.1)

CBS (2015d). StatLine: Air pollution, actual emissions by road traffic (figures graphs 13.5.1, 13.5.2, 13.6.1, 13.6.2, 13.8.1, 13.9.1, 13.10.1, 13.11.1, 13.12.1)

CBS (2015f). Verkeersprestaties motorfietsen (maatwerktabel) (figures graphs 13.3.1, 13.3.2, 13.4.1)

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CBS (2015f). Verkeersprestaties motorfietsen (maatwerktabel). CBS, Den Haag/Heerlen.

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14.

‘Modal split’ and ‘modal shift’ in freight transport

Goods from the Dutch mainports are mostly transported to the hinterland by road, inland waterways and rail. European and Dutch government policy aims to make optimal use of these different modes of transport in order to improve traffic flows and reduce emissions. The three modes of transport to the hinterland differ in type of goods, distance covered and locations from which and to where goods are transported. The ratio of inland shipping plus rail transport to road transport has remained stable over the last twenty years in terms of transported weight, but has increased in distance covered.

14.1 Introduction

Goods arriving at sea ports for the hinterland are mainly transported by road, inland waterways and rail. Therefore road transport, inland shipping and rail transport are often analysed in conjunction. Inland shipping and rail transport are seen as fairly sustainable alternatives to road transport. The targets the European Commission (EC, 2011) has formulated are that at least 30 percent of the road journeys over 300 kilometres have to be shifted to transport by rail or water by 2030. In 2050 this has to be over 50 percent. This way the European Commission aims to realise a competitive transport system for the EU and a reduction of the greenhouse effect. To reach these targets major investments in infrastructure are planned so as to remove bottlenecks: deepening waterways, raising bridges and constructing extra rail tracks (EC, 2013).

In 2010 the 'top sector policy' was launched to further strengthen the sectors in which the Netherlands already excels. Logistics is one of them (www.topsector.nl/logistiek). Goods transport is booming worldwide, and customers have become very demanding about transport quality and logistic services. Transport must be as sustainable and as fast as possible. The top sector logistics seeks to contribute to better accessibility and lower CO_2 emissions by optimally using the different modes of transport (road, inland shipping, rail) for connections to the Dutch mainports: the port of Rotterdam and Amsterdam Schiphol airport.

In this chapter we discuss the *modal split* and the *modal shift* for goods transport in the Netherlands. The modal split shows the shares of inland shipping, rail transport and road transport in total goods transport. The modal shift shows changes in the

modal split over time. The description of the modal split also covers a comparison with other EU member states. We look into the specific character of each of the three modes of transport, which differ in essential aspects.

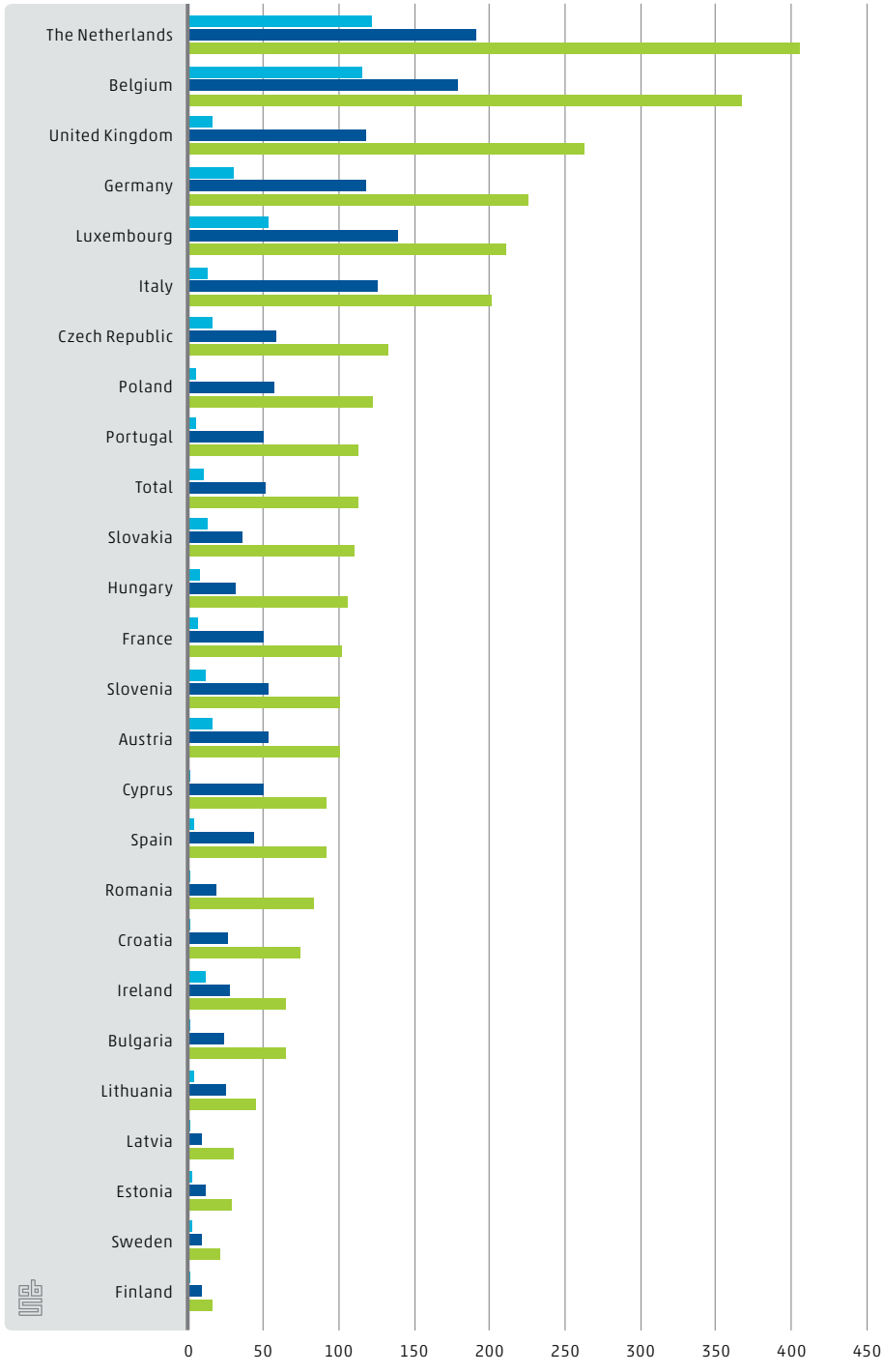
14.2 Goods transport infrastructure in the Netherlands and the EU

The Netherlands: many busy motorways

The Netherlands is the most densely populated country in the European Union with more than 400 people per square kilometre. Almost one in two people owns a car so that the Netherlands, after Malta, has the highest number of cars per square kilometre. Four fifths of the total distance covered by motorised vehicles in the Netherlands is done by car. Heavy freight traffic is responsible for a six percent share. The rest is covered by buses and vans.

Dutch motorways are the busiest in the EU countries. The Netherlands has the most kilometres of highway per square kilometre and the highest number of cars per square kilometre. Because the Netherlands is a trading country, many goods are transported across the Dutch territory. Per square kilometre Dutch companies export 12 times as much as the average company in the EU. There are specific bottlenecks in the infrastructure hampering goods transport to the hinterland. There is the A15 connector road of the Port of Rotterdam and the hinterland, where congestion leads to delays in transport and hence to economic and environmental damage. To smoothen the transport flow and reduce these economic and environmental problems, investments are made in infrastructure, and initiatives are taken to harmonise transport to the hinterland by inland waterways, rail and road (Topteam Logistiek, 2011).

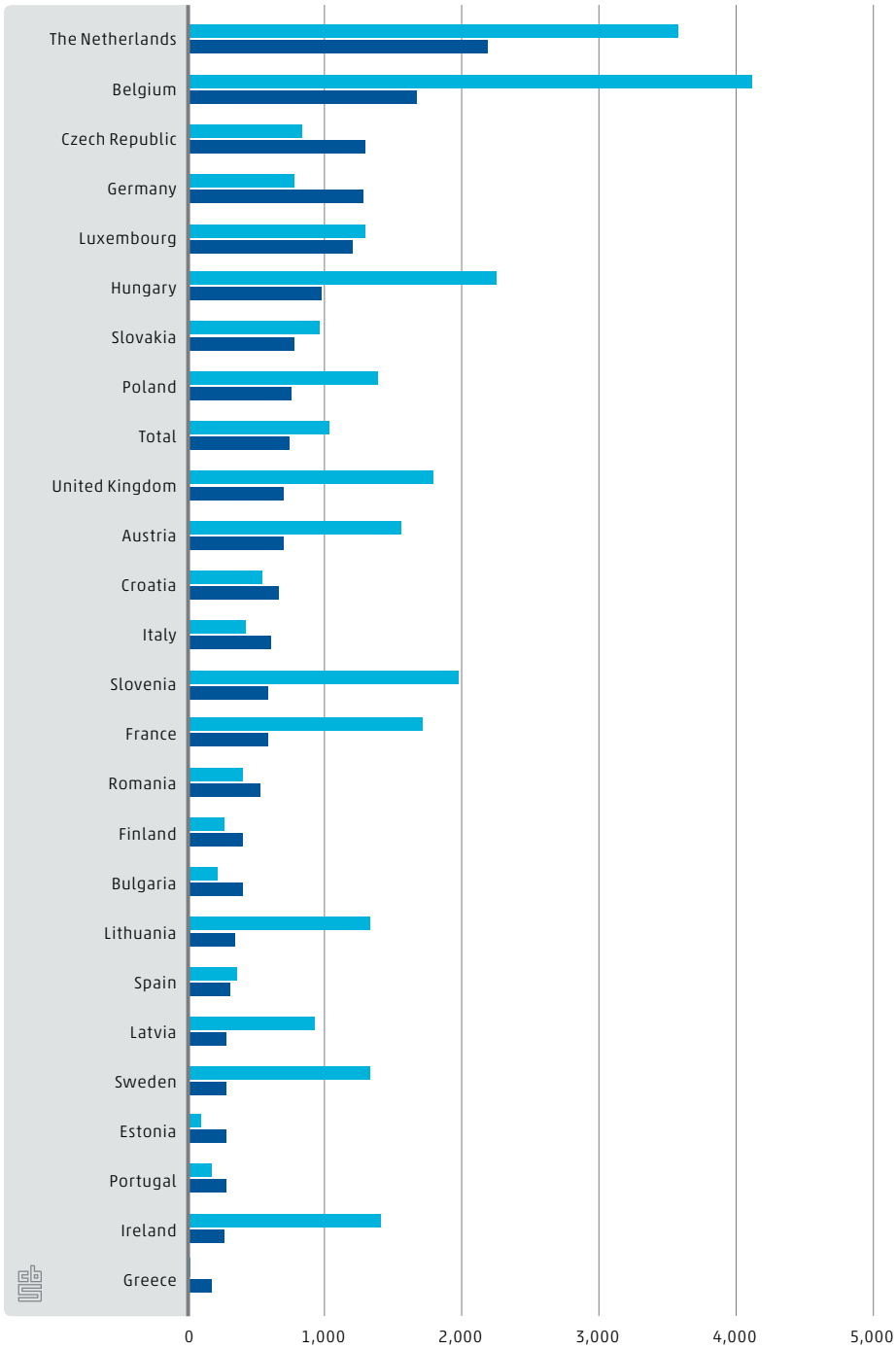
14.2.1 EU member states[1], key figures per square kilometre



Source: Eurostat.

[1] Data on Denmark, Greece and Malta are missing.
Data on exports and number of inhabitants are from 2013 and 1 January 2014 respectively.
Data on passenger cars are from 2011 with the exception of France (2012), Austria (2010) and Luxembourg (2009).

14.2.2 Infrastructure EU member states[1)], 2012



Source: Eurostat.

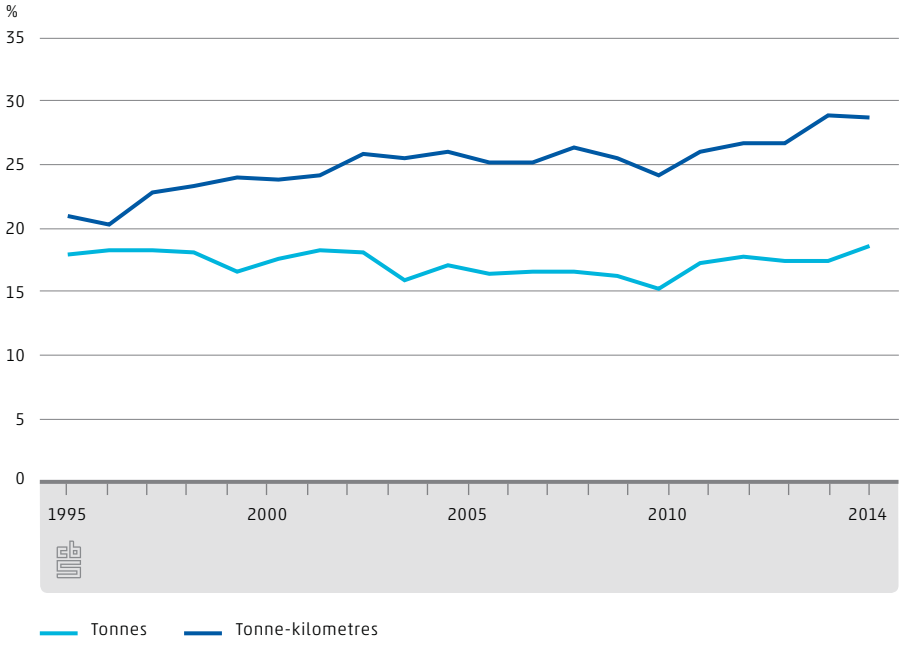
[1)] For Belgium data on 2012 were not available; estimation was made based on the most recent available data.

14.3 Modal split and modal shift in the Netherlands and the EU

Road haulage retains its share in transported weight but distances decrease

In the last twenty years the ratio between road transport on the one hand and inland shipping plus rail transport on the other hand did not change much in terms of weight loaded and unloaded within the country. One explanation is that heavy freight vehicles are still used for supply and transit. If we look at weight and distances covered (weight x kilometre), the common share in transport of inland shipping and rail transport has gone from 21 percent in 1994 to 29 percent in 2014, with fluctuations from one year to the next. In 2009, during the economic crisis, the share of inland shipping plus rail transport decreased in tonnes as well as in tonne kilometres, because road transport still benefited from construction activities that had not yet dwindled. Relatively many construction materials are transported by road (see also 14.4.4).

14.3.1 Inland shipping and rail transport in total domestic transport



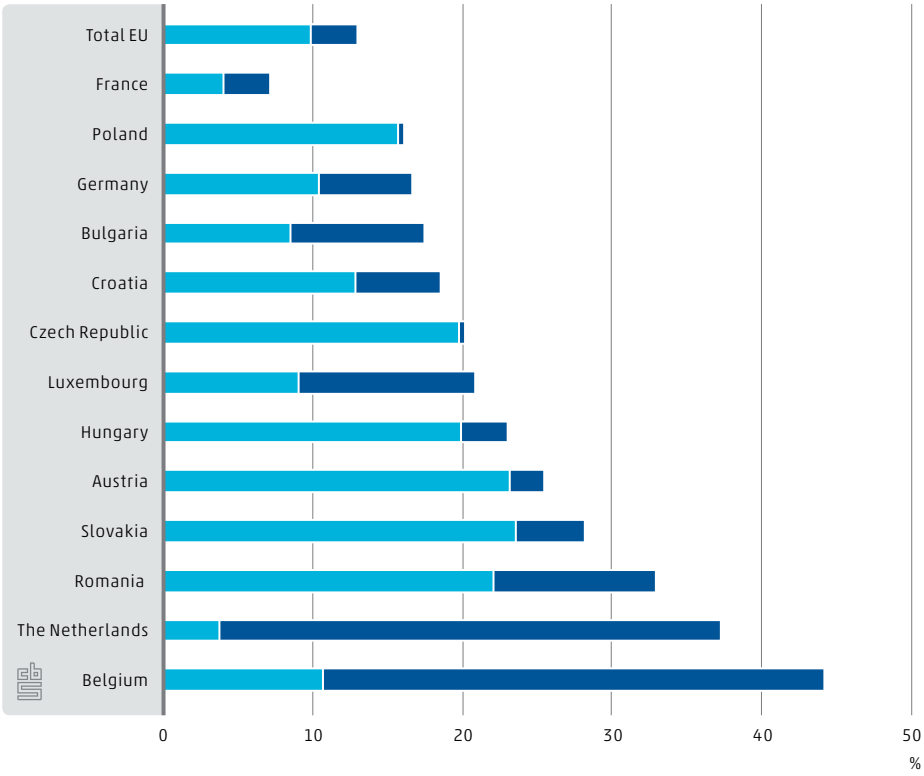
Source: CBS, processed statistics on inland shipping, rail and road transport.

The Netherlands and Belgium have the highest EU shares in inland shipping

The Netherlands has an extensive network of inland waterways and railways; together with Belgium the two countries possess the most kilometres per square kilometre in the EU.

Of all countries through which major rivers flow, the Netherlands and Belgium transport by far the most freight by inland waterways: 34 percent. In rail transport the Netherlands scores relatively low with 3.8 percent. This share is only lower in Luxembourg, Greece and Ireland, whereas France, Poland and Germany have the highest shares.

14.3.2 Share of inland shipping and rail transport in total transport, Rhine and Danube countries, 2013

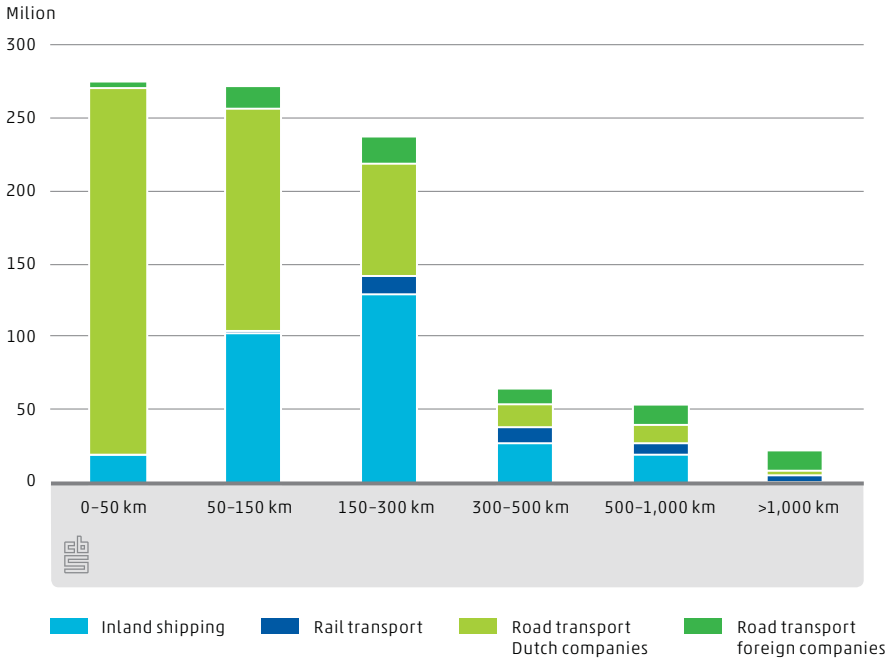


Source: Eurostat.

14.4 Modal split: distance and final destination

Over a billion tonnes of goods are annually transported on Dutch roads, inland waterways and railways. Ninety percent of the goods loaded in the Netherlands on road vehicles, inland ships or trains travel less than 300 kilometres. Road transports are often short distance (up to 150 kilometres), and are mainly carried out by Dutch transporters. The longer the distance, the larger the share of foreign vehicles. Rail transport and inland shipping together have a bigger share of middle distances (150 to 1,000 kilometres).

14.4.1 Modal split of freight by distance, 2012



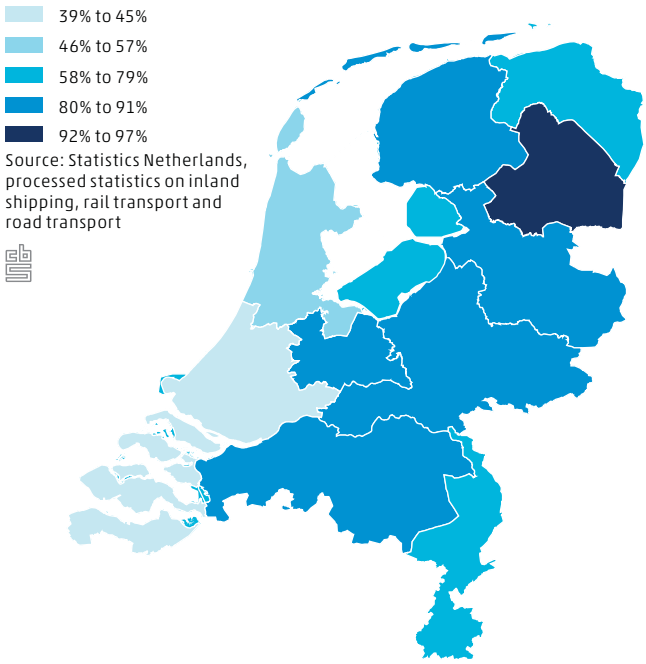
Source: Statistics Netherlands, processed statistics on inland shipping, rail transport and road transport.

Goods for rail and inland shipping mainly loaded in seaports

Goods transported by rail and inland waterways are mainly loaded in the Rotterdam and Amsterdam sea ports. Over sixty of every hundred tonnes of goods loaded on an inland ship in the Netherlands are loaded there. For trains this is more than eighty tonnes of every hundred tonnes loaded, for heavy freight vehicles less than twenty.

Most goods are loaded on trains and inland ships in the coastal provinces. In Zuid-Holland and Zeeland transport by rail and inland shipping is even more important than road transport. In Noord-Holland and Flevoland road transport has a 57 and 69 percent share respectively. In the other provinces it is more than three quarters, except for Drenthe where almost all goods are transported by road (97 percent of the weight loaded).

14.4.2 Share of road transport in weight loaded by province, 2013

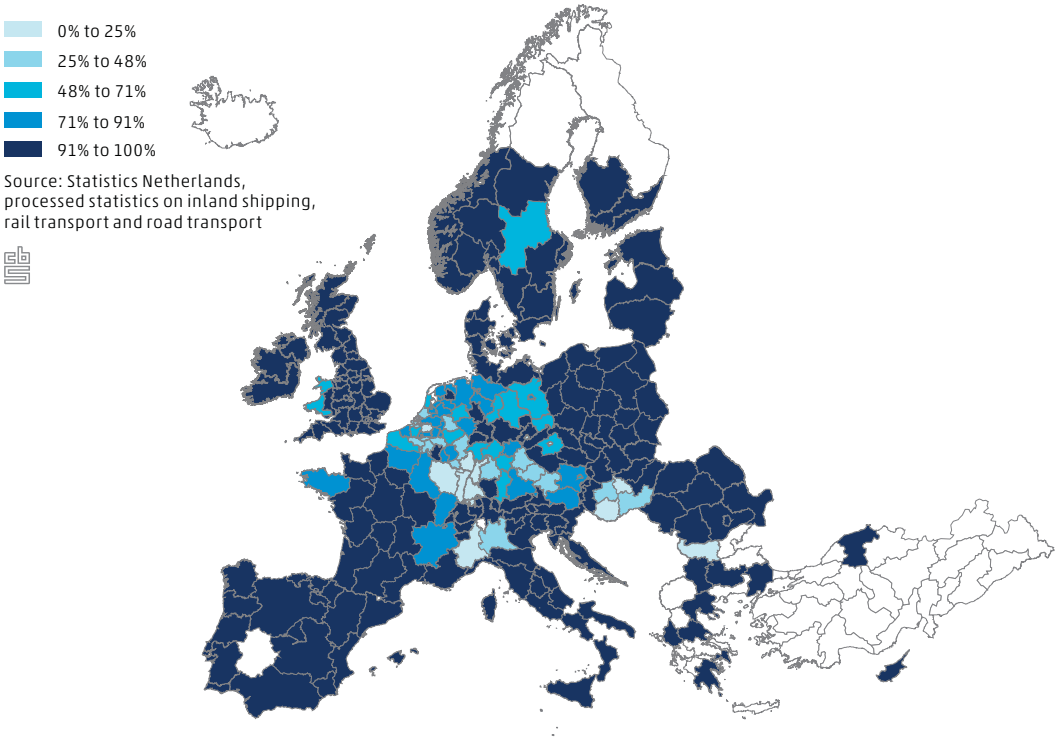


Source: Statistics Netherlands, processed statistics on inland shipping, rail transport and road transport

Goods from the Netherlands often transported by road to the rest of the EU

Almost half of all European countries receive goods transported from the Netherlands directly by road only. Transport by inland shipping is most commonly destined for Switzerland and Germany (Rhine) and Belgium (Scheldt), followed by France and Luxembourg (Rhine and Moselle) and Austria and Hungary (Danube). Italy on the other hand receives over 60 percent of all goods transported directly from the Netherlands to Italy by train.

14.4.3 Share of road transport in weight from NL to European regions, 2012[1)]



Source: Statistics Netherlands, processed statistics on inland shipping, rail transport and road transport

[1)] White areas: insufficient data available.

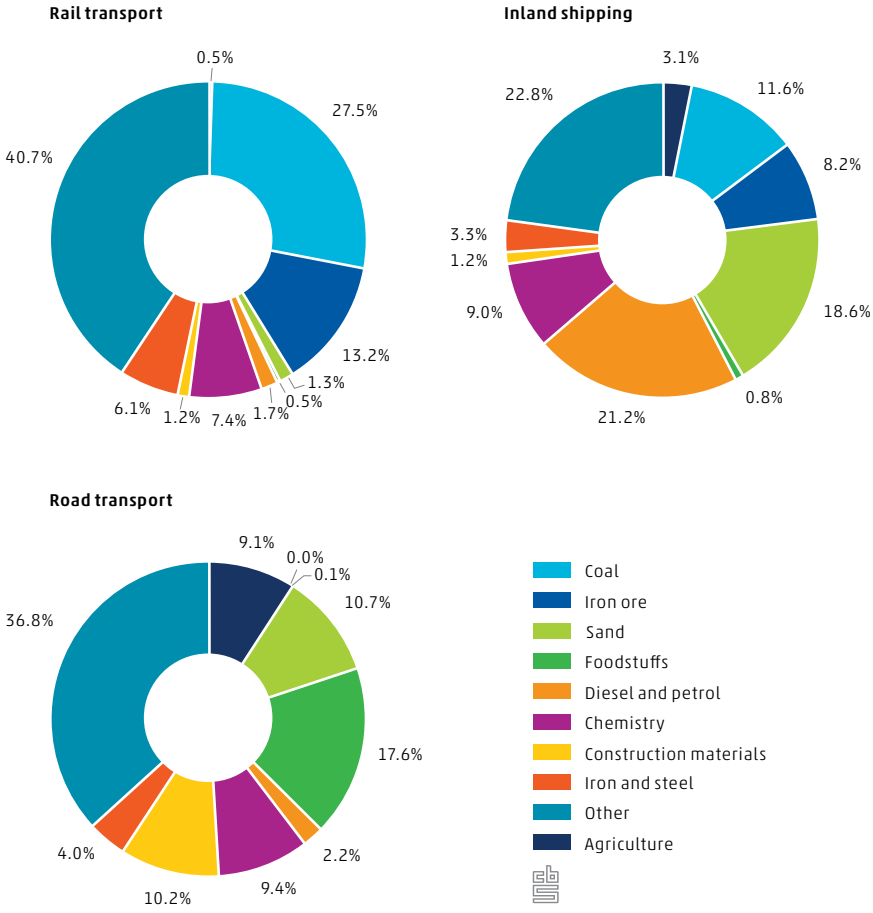
Germany is the most important unloading destination for inland shipping, rail and road transport. There are considerable differences in unloaded quantities between the modes of transport. In 2013, 81 percent of all goods transported by rail went there; for inland shipping this was 62 percent and for road transport 45 percent. After Germany, Belgium is the most important country of unloading for road transport as well as for inland shipping, each accounting for about one third. Italy is the most important country of unloading for rail transport, with a 7 percent share. Belgium receives 3 percent via rail.

Inland shipping and rail: mostly bulk goods

Final destinations for road transport are also different from those of transport by inland waterways and rail. The latter two are used to bring raw materials and goods to distribution centres, industrial plants (chemical and steel industry) and power plants. Roads are used to supply shops, wholesale and supermarkets, and to a lesser extent manufacturing plants. The collection of agricultural crops, milk from farms and household waste are also typical road transport flows, as are products and materials for construction (roads and houses). However, sand and gravel related to construction often are transported by inland ships.

The difference in final destination is reflected in the type of goods transported by different modes. Almost three quarters of all goods transported by inland ships are bulk goods: coal, iron ore, diesel and petrol, iron and steel, chemical raw materials and chemical products. In rail transport this is almost half, in heavy freight transport by road a quarter. Other major goods transported by road include food and agricultural products and construction materials.

14.4.4 Weight transported by type of goods, 2013



Source: Statistics Netherlands, processed statistics on inland shipping, rail transport and road transport. The category 'other' consists of among others container goods, piece goods, textiles, waste, machinery, furniture and vehicles.

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