Heavy-duty vehicles: overview

An economic and ecological classification of heavy-duty vehicles in Europe
Trucks are the backbone of the European economy.

Hardly any truck is like another.

Customers demands push fuel efficiency.

CO₂ emissions of heavy duty vehicles are continuously on the decline.

Trucks have become still more efficient and cleaner.

Trucks are essential for the delivery of all goods to their final destination.

Commercial vehicles are becoming even more efficient.

It will take an "integrated approach" to raise all CO₂ reduction potentials.

Long trucks and innovative vehicle concepts are key factors leading to more efficiency in freight transport on the road.

Rapid renewal of the fleet reduces existing CO₂ emissions.
Trucks are the back bone of the European economy

In Europe trucks transport most of the goods. Rail and inland waterway address completely different market segments than the truck.
Trucks keep the economy going

<table>
<thead>
<tr>
<th>Country</th>
<th>Share of road in total transport performance in 2015</th>
<th>Change versus the year 2008 in percentage points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprus</td>
<td>100,0</td>
<td>0,0</td>
</tr>
<tr>
<td>Malta</td>
<td>100,0</td>
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<td>Ireland</td>
<td>99,0</td>
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<td>Greece</td>
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<tr>
<td>Luxembourg</td>
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<td>Spain</td>
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<tr>
<td>Denmark</td>
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<td>-4,1</td>
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<td>Slowakia</td>
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<tr>
<td>Germany</td>
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<tr>
<td>Belgium</td>
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<td>Rumania</td>
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</tr>
<tr>
<td>Netherlands</td>
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<tr>
<td>Austria</td>
<td>52,5</td>
<td>-6,1</td>
</tr>
<tr>
<td>Latvia</td>
<td>43,7</td>
<td>+5,0</td>
</tr>
</tbody>
</table>

Road freight transport has a market share of 75.8% in the EU28

Sources: Eurostat, 2017
Trucks and trains complement each other

The five most important types of cargo freights of trucks and rail in 2015

The five largest freight groups represent three quarters of railway and two thirds of road transport volume.

A ton transported by rail covered an average of 256 km, on the road only 122 km.

Transport volume of the road is dominated by construction sites and food supplies.

* Excluding Italy, Belgium (data confidential); Malta, Cyprus (no rail transport); Denmark, Luxembourg as of 2013
Source: Eurostat
Hardly any truck is like another

Commercial vehicles are highly specialized – there are particular versions for every transport task.
Commercial vehicles are implements for mostly high mileage. Low fuel consumption and low (fuel-) costs are an indispensable competitive advantage for operators.
Commercial vehicles are implements that need to pay off

Long-distance traffic vs. local transport
Cost structure in Germany in Dezember 2016

In long-distance transport, consumption per kilometre is crucial in order to be competitive as a transporter.

In local transport, that is the case with the efficient use of drivers.

Variable operating costs are crucial when it comes to buying a heavy truck.

Source: BGL
CO$_2$-emissions of heavy duty vehicles are continuously on the decline

While in the EU28 the share of commercial vehicles in total CO$_2$ emissions has gained a growing importance and main drivers for this are light commercial vehicles, total emissions of road transport have been decreasing since 2007 in Europe.
Greenhouse gas emissions in the EU 28
Data for 2015, in per cent of CO$_{2}$EQ

*For information only; **Without international air and maritime transport. These are not considered national emissions within the frame of the Kyoto protocol.
Source: EEA, 2017, v20
Commercial Vehicles: CO$_{2\text{EQ}}$ emissions have been on the decline in Europe since 2007


Source: EEA, 2016
Trucks have become more efficient and cleaner

Today's heavy duty vehicles drive more fuel-efficiently and much cleaner than in the past – under real road conditions (proven by RDE testing).
Visible progress in the practical test

Scientifically accompanied road test with comparable trucks of different construction years, on different routes grouped by manufacturer\(^1\)

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Total difference of emissions between Old and New (different construction years)</th>
<th>Reduction of emissions per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daimler DEKRA</td>
<td>1996: 436 PS</td>
<td>2016: 450 PS</td>
<td>-22%</td>
<td>-1,10%</td>
</tr>
<tr>
<td>Scania AVL</td>
<td>1992: 500 PS</td>
<td>2016: 500 PS</td>
<td>-25%</td>
<td>-1,04%</td>
</tr>
<tr>
<td>Volvo AVL</td>
<td>1991: 405 PS</td>
<td>2016: 460 PS</td>
<td>-19%</td>
<td>-0,76%</td>
</tr>
<tr>
<td>MAN TÜV Süd</td>
<td>1994: 402 PS</td>
<td>2016: 460 PS</td>
<td>-31,5%</td>
<td>-1,45%</td>
</tr>
<tr>
<td>Iveco AVL</td>
<td>1994: 514 PS</td>
<td>2016: 571 PS</td>
<td>-21%</td>
<td>-0,95%</td>
</tr>
</tbody>
</table>

1) It is not allowed to compare results of reduction of different providers, because test tracks and setting (weather etc.) had not been standardized.

NOx: Heavy duty vehicles are clean

In road traffic, trucks and buses clearly undercut the limit values.

Limit values for heavy duty vehicles are based on the engine power.

For heavy trucks, continuous road tests (RDE) are already mandatory.

All vehicles have been tested several times and the average emissions have been calculated.

Average emissions of heavy duty vehicles and buses tested: 210 mg/km

Source: ICCT / VTT, 2017
Trucks are essential for the delivery of all goods to their final destination

Building materials, food and beverages as well as light and high-value goods dominate the volume of trucks. Only in a few segments road competes directly with the rail.
Traffic volume of the road 2015 by groups of goods

This was the percentage of tonnes transported by one commercial vehicle...

Source: Eurostat
Truck traffic in the EU – especially on short-haul routes

TRANSPORT PERFORMANCE
It will take years before the level of 2007 is regained.
1995 = 100, forecast from 2014

TRANSPORT WIDTH
A ton of cargo does not travel far by truck in Europe.
Average transport distance in kilometres

Economic growth and the increase in transport performance are now developing in line with one another. Truck transports are generally short. As a rule, freight is only moved over a few kilometres, especially for high-volume freight groups.

Commercial vehicles are becoming even more efficient

Vehicles are becoming more efficient. Important potentials still lie with tyres, aerodynamics and in operation.
Progress in efficiency despite structural changes

More efficient transport on the road: Since 2000 energy consumption per tonne-kilometre (kgoe/tkm) has fallen by about 10 per cent.

Drivers for the increase in efficiency are modern technology and modern logistics concepts that lead to higher vehicle occupancy.

There are structural changes that counteract the efficiency gains. Utilization of vehicles (tkm/veh) decreases as soon as shipments in local traffic are becoming increasingly smaller (online trade) and because of the fact that the economic crisis in southern Europe makes it difficult to get return freights in the long-distance traffic.

Source: Odyssee Database 2017
It will take an “integrated approach” to raise all CO₂ reduction potentials

With joined forces industry, logistik und politics can still raise considerable efficiency reserves.
Integrated Approach: Effectively reduce CO₂-emissions

Potentials by 2020

In an integrated approach, more than the double amount of CO₂ can be saved, compared to a purely vehicle-based regulatory approach. There is a need for different tools to effectively exploit the potential.

Source: ACEA
Long trucks and innovative vehicle concepts are key factors leading to more efficiency in freight transport on the road.

As for trucks, the load volume is usually already exhausted before the permissible total weight is reached. Larger-volume trucks and innovative trailers can further gain in transport efficiency.
Two long trucks carry as much cargo as three standard trucks.

- Loadvolume comparison:
  - Standard truck 1: 100, +50%
  - Standard truck 2: 100, +50%
  - Standard truck 3: 100
  - Long truck 1: 100
  - Long truck 2: 100

Long truck run more efficiently than other trucks. The result: less fuel consumption per load.

- Conventional semitrailer: 16.5 m, -10% CO₂
- Extended semitrailer: 17.8 m, -25% CO₂
- Long truck: 25.25 m
Rapid fleet renewal reduces existing CO\textsubscript{2} emissions

The majority of approved commercial vehicles have less than 3.5 tonnes gross vehicle weight. Heavy trucks represent only a small portion of the stock, but due to their high mileage they account for the majority of CO\textsubscript{2} emissions from freight traffic. On the other hand, heavy trucks are on average much more modern than light duty vehicles, so that innovation quickly prevails here.
Age structure of commercial vehicles in Germany: hardly old semitrailers

On average caliper brackets are only 4.4 years of age, cars almost 9 years. As they achieve very high mileage per year, they are quickly replaced. Trucks with the highest CO₂ emissions are renewed fastest. Technical progress has a much faster effect on inventory than with cars.

* With sinks without indirect emissions

Source: KBA, 2017
Heavy duty vehicles are used intensively and usually renewed after a few years.

Shares of new vehicles in stock

Long-distance trucks are the first to be replaced by new vehicles. Heavy duty vehicles of the construction industry are operating longer due to their small mileage.

Source: ACEA, 2014; VDA, 2015