Germany

Country spotlight

Population (million) (World Bank, 2016a):	81.4
Urban population (% of total) (World Bank, 2016b):	75%
GDP per capita (2014 USD/year) (World Bank, 2016c):	41 200
Average price gasoline and diesel (USD cent per L, 2014) (GIZ, 2015):	180; 158

Fuel tax class (2014) (GIZ, 2015): highly taxed petroleum fuels

In 2015, about 3.4 million LDVs were sold in Germany (IHS Markit, 2016). The German LDV stock amounted to 42 million cars in the same year (IEA, 2016a), resulting in a LDV ownership of around 0.51 cars per capita. Voluntary CO_2 emission standards were first introduced in the European Union in 1998 and became mandatory in 2009. By 2021, passenger cars are required to attain CO_2 emissions of 95 g CO_2/km (based on NEDC), and LCVs must reach 147 g CO_2/km (based on NEDC, TransportPolicy, 2016). In Germany cars are subject to an annual vehicle circulation tax based on engine displacement, CO_2 emissions and pollutant emission class. Furthermore, gasoline and diesel fuels are taxed differently, with diesel being on average 12% cheaper per litre at the fuel pump. New vehicles have been required to have a label showing specific fuel consumption, CO_2 emissions and efficiency class since 2004 (Ricardo AEA, 2011). In May 2016, the German government also announced a policy package to support the deployment of PHEVs and BEVs (BMWi, 2016).

Market profile and vehicle characteristics

Germany is the fourth car manufacturer globally (after China, the United States and Japan) and the main one in Europe, producing over 6 million LDVs in 2015. Germany's domestic LDV market grew from 3.2 million LDVs sold in 2013 to 3.4 million in 2015. Volkswagen, Daimler and BMW, cover almost 50% of the German LDV market.

Since 2010, the average specific CO_2 emissions of newly registered German LDVs fell substantially. The progress achieved through 2013 (IEA, 2016b) continued in 2014 and 2015, consolidating improvements after the implementation of fuel economy standards in 2009. In 2015, average emissions of new car sales in Germany reached 140 g CO_2/km. As in other European countries, 2014 and 2015 were characterised by an increasing market share of vehicles with emissions ofv90-120 g CO_2/km and a falling market share of vehicles with emissions of more than 150 g CO_2/km. The average fuel economy of newly registered LDVs reached 6.0 Lge/100 km in 2015, which is ahead of the global average of 7.6 Lge/100 km. However, Germany's average fuel consumption per km in 2015 was 7% higher than the EU average (5.6 Lge/100 km).

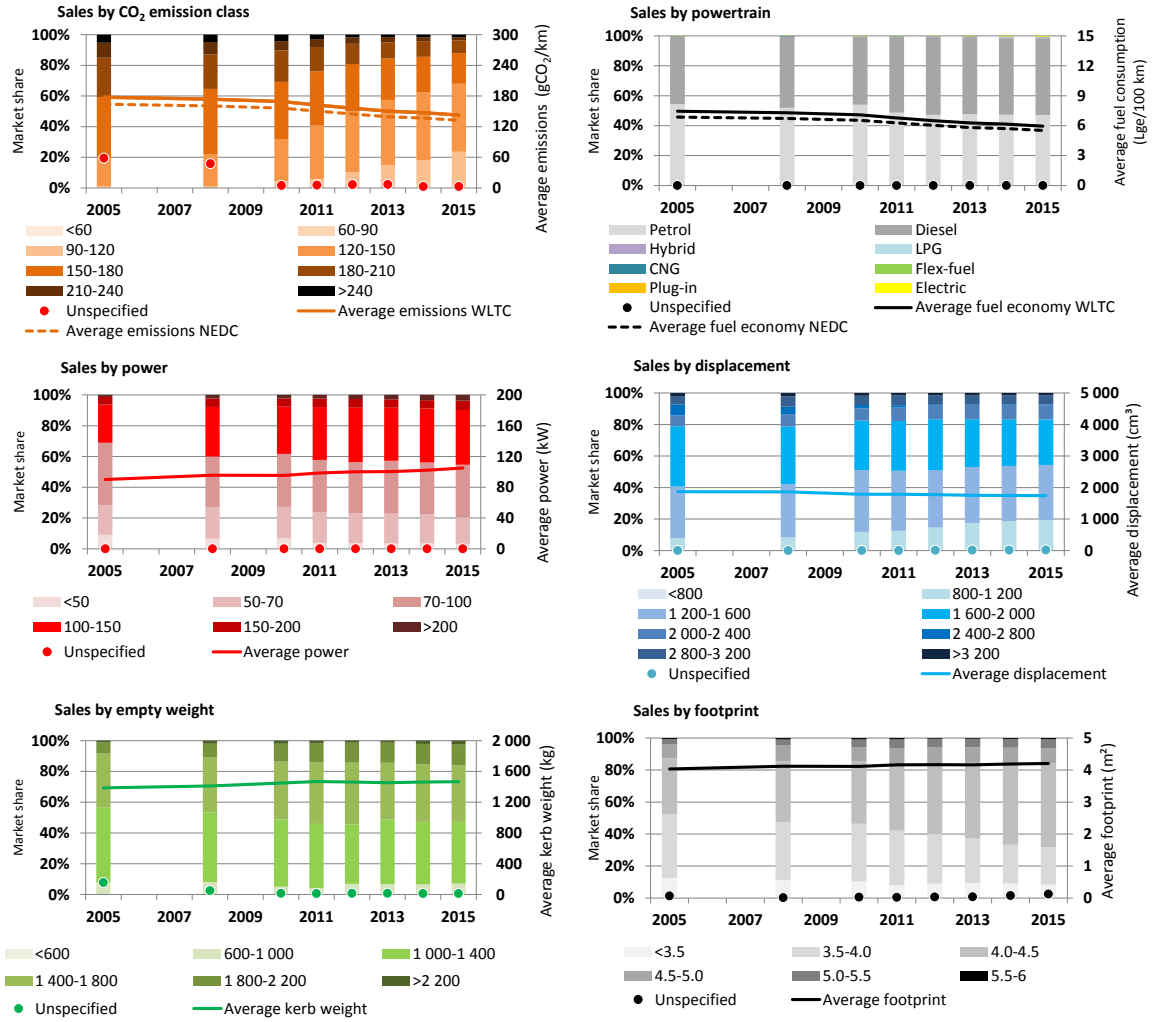
The respective market share of different powertrains has remained relatively stable over the past five years. Advanced powertrains are still far from mature and large government incentive schemes were not announced until mid-2016, following a decline in hybrid LDV sales between 2013 and 2015. Increasing shares of PHEVs and BEVs shall be taking place in the coming years, following the recent introduction of policies supporting their market deployment (BMWi, 2016).

Average power increased between 2010 and 2015, reaching 105 kW in 2015. Moreover, the market share of 100-150 kW vehicles slowly rose at the expense of 50-70 kW vehicles. In 2015, average power was 17% higher than in 2005, growing another 5% compared with 2013. Average displacement modestly decreased from 2013 to 2015. In 2015, average displacement was 1.7 L, which was 13% larger compared with the average engine size of LDVs sold in France. However, technological advancements have allowed cars to have smaller engines with equal power, partially offsetting further fuel economy deterioration due to increases in engine power.

This summary is taken from GFEI Working Paper 15. For more complete information and references, see https://www.globalfueleconomy.org/data-and-research/publications/gfei-working-paper-15

Since 2010, average LDV weight has fluctuated between 1 450 kg and 1 470 kg. The average footprint of newly registered LDVs slowly rose to 4.2 m^2 in 2015, surpassing the worldwide average.

Figure 1 ● LDV market by g CO_2/km, powertrain, power, displacement, weight and footprint, Germany, 2005-15

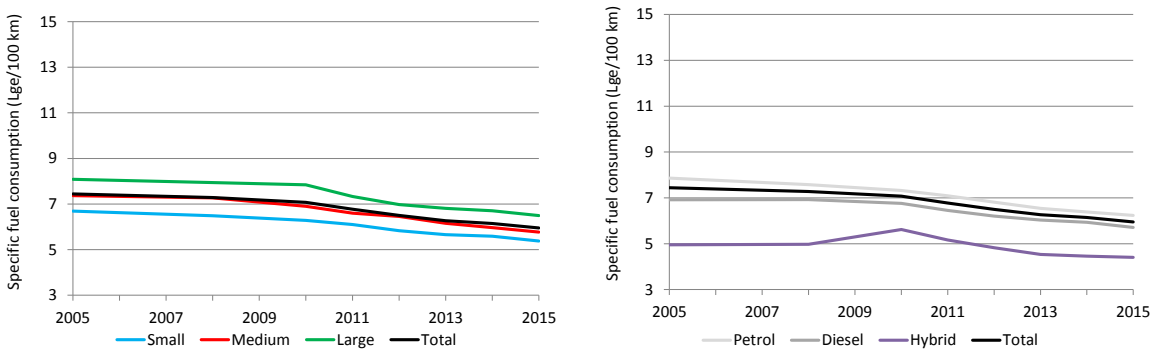


Source: IEA elaboration and enhancement for broader coverage of IHS Markit database.

Analysis of fuel economy trends

A trend of improving average fuel economy has been evident for all vehicle sizes, with a slight acceleration between 2014 and 2015 (Figure 2, left). As for other EU members, results confirm the continued effectiveness of European fuel economy standards enacted in 2009. Advancement in fuel economy by powertrain has seen parallel developments for gasoline and diesel LDVs, with a small advantage for diesel. However, the average fuel economies of diesel and gasoline are closer to each other than in France, which can be explained by the higher share of diesels in the large vehicle segment compared with the LDV market in France. Improvement in hybrid fuel economy slowed between 2013 and 2015, but was still far ahead of conventional powertrains.

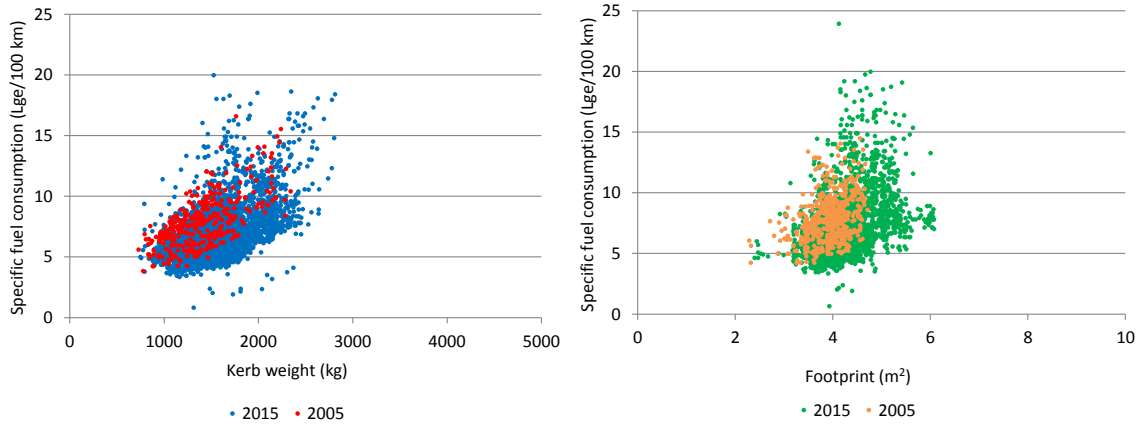
Figure 2 ● Average new LDV fuel consumption per km by vehicle segment and powertrain, Germany, 2005-15



Source: IEA elaboration and enhancement for broader coverage of IHS Markit database.

A clear distinction between models sold in 2005 versus 2015 is evident when comparing weight with specific fuel consumption (Figure 3). The cloud of LDVs moved slightly to the right and substantially down, implying a shift to heavier but more efficient vehicles. Footprint plotted against specific fuel consumption shows even more horizontal movement, indicating larger LDV models being sold in 2015 compared with 2005.

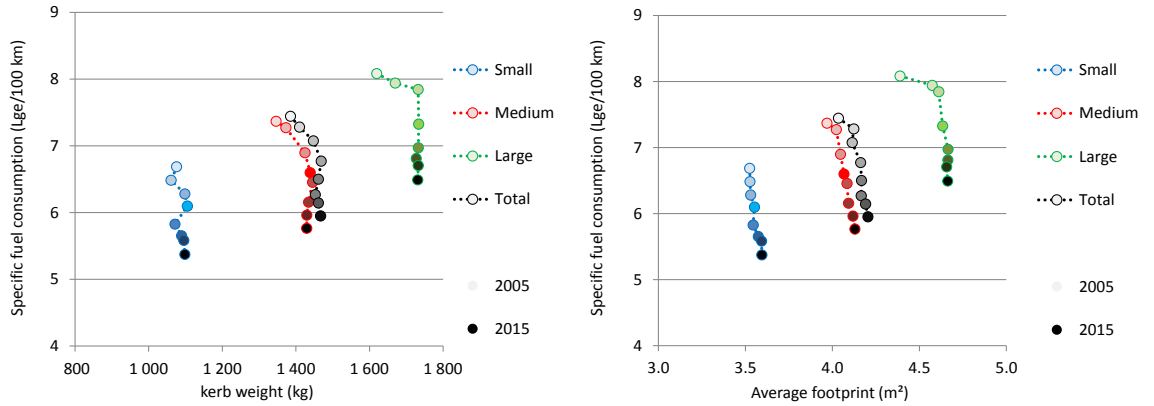
Figure 3 ● Fuel consumption per km of new LDVs plotted against vehicle weight and footprint, Germany, 2005 and 2015



Source: IEA elaboration and enhancement for broader coverage of IHS Markit database.

From 2009 onwards small and medium vehicles gradually became heavier (Figure 4, left), but nonetheless clear fuel economy improvements were seen in all segments. Since 2013, the rate of specific fuel consumption improvement has been slowing down in all segments. The average footprint of small LDVs increased slightly, while the footprint of medium and large LDVs grew more substantially. The increase in the average footprint and weight of large vehicles taking place prior to 2010, and stopping after that, suggests that the introduction of mandatory fuel economy standards in the EU (which started in 2009) had a significant impact in the prioritization of design features of new vehicles in this class, leading to a greater relevance of fuel economy improvements over size and weight increases.

Figure 4 ● Average new LDV fuel consumption per km by segment plotted against vehicle weight and footprint, Germany, 2005-15



Source: IEA elaboration and enhancement for broader coverage of IHS Markit database.

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