

United States

Country spotlight

Population (million) (World Bank, 2016a):	321
Urban population (% of total) (World Bank, 2016b):	82%
GDP per capita (2014 USD/year) (World Bank, 2016c):	55 800
Average price gasoline and diesel (USD cent per L, 2014) (GIZ, 2015):	86; 97
Fuel tax class (2014) (GIZ, 2015):	taxed petroleum fuels

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In 2015, about 16.6 million LDVs were sold in the United States (IHS Markit, 2016). The LDV stock totalled 204 million (IEA, 2016a). LDV ownership was slightly below 0.7 LDVs per capita. Each household in the United States owned on average 1.9 cars (US Census, 2016). Fuel economy regulations were first established in the 1970s. The CAFE standards were introduced in 1975. Fuel economy labelling of new cars was introduced as early as 1978 (ICCT, 2014c). Even if the United States pioneered their introduction, the historical evolution of regulatory limits underwent distinct phases, including decades (late 1980s, 1990s and early 2000s) of stagnation. This resulted in deteriorating fuel economy due to a market shift towards larger vehicles. In 2009, the stringency of fuel economy improvements for models entering the market between 2012 and 2016 was strengthened considerably. Compared with 2009, by 2016 average CO₂ emissions per km must be reduced by 26% (of about 4.2% per year). Targets were extended to 2025 and will require a 35% reduction in average fuel use per km from 2016 (TransportPolicy, 2016).

Market profile and vehicle characteristics

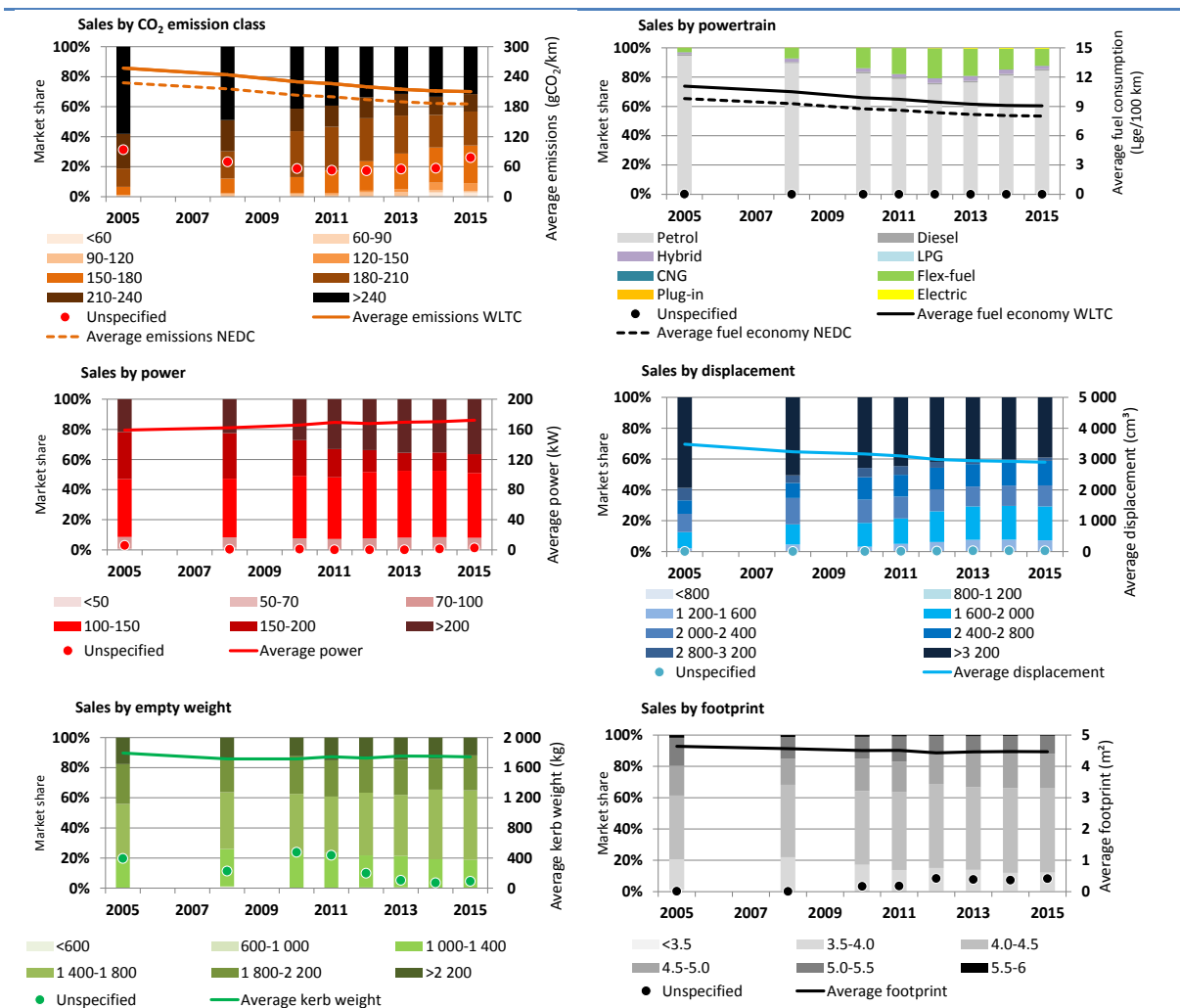
The United States is well known for its extensive vehicle stock and the high share of SUVs and pick-up trucks, accounting for almost 60% of all new LDVs. In 2015, LDV sales reached a new all-time high, with over 16.6 million new vehicle registrations (IHS Markit, 2016). Nevertheless, the US LDV market has been surpassed by China since 2010. As with registrations, domestic LDV production surged. In 2015, the United States overtook Japan as the second-largest global LDV producer. The number of vehicles produced surpassed 11.8 million in 2015, approximately half of China's production (OICA, 2016).

Newly registered LDVs had CO₂ emissions per km exceeding those of most other countries, reaching 210 g CO₂/km in 2015. However, serious improvements were observed, highlighted by the 19% difference in average fuel economy between 2005 and 2015. From 2010, vehicles in the segments under 180 g CO₂/km gained market share and even the market share of low-emission vehicles (less than 60 g CO₂/km) reached 2-3% after 2013, although the results are uncertain due to a relatively high number of unspecified vehicles. Regarding powertrains, flex-fuel lost its popularity after 2012 and hybrids' market share also diminished. In 2015, gasoline engines represented over 85% of total registrations, while diesels did not exceed 1%. Overall, between 2010 and 2015, average fuel economy of newly registered LDVs improved by almost 10% to 9.1 Lge/100 km.

Newly registered LDVs in the United States had significantly more power than in most OECD economies. Between 2005 and 2015, average power increased even further, from 160 kW to 170 kW, which was more than 60% higher than new LDVs in Germany. Vehicles in the highest power class (>200 kW) gained most market share, fuelled by a growing popularity of medium and large SUVs. A clear downward trend was noticed in engine displacement, implying engine technology advancement in the United States. Nevertheless, US LDV engines were among the largest in the world, reaching 2.9 L on average in 2015. The largest engine size category (>3.2 L) lost market share to smaller engines (1.6-2.0 L).

As in many other OECD countries, weight has been a relatively stable factor, fluctuating between 1 750 kg and 1 800 kg in the period between 2010 and 2015. In the last three years, heavy vehicles (>2 200 kg) and light vehicles of 1 000-1 400 kg lost market share to the middle segment. With an average footprint of over 4.5 m² in 2015, newly registered US LDVs were more than 10% larger than in other OECD countries. Between 2010 and 2015, almost no change in footprint was observed.

Figure 1 • LDV market by g CO₂/km, powertrain, power, displacement, weight and footprint, United States, 2005-15



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

Analysis of fuel economy trends

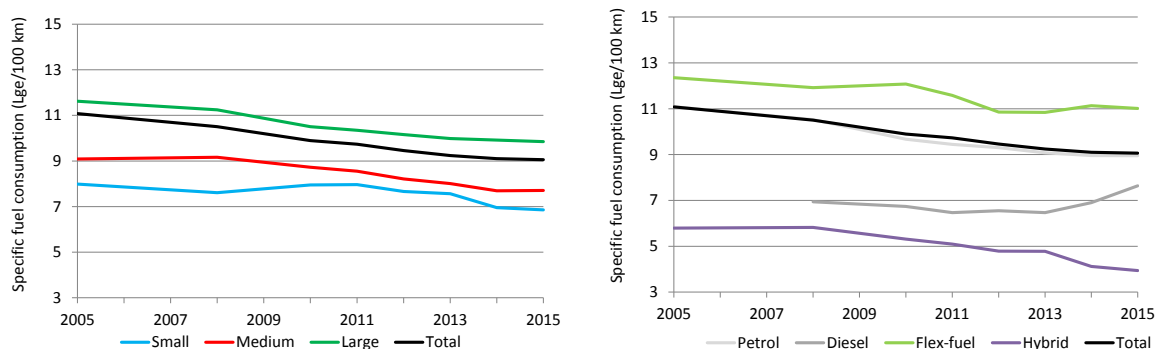
The total fuel economy trend (Figure 2) shows that large vehicles dominate the US LDV market. Large and medium-sized vehicles saw a steady improvement in average fuel economy from 2005 to 2014, experiencing a flattening line between 2014 and 2015. Small LDVs saw an improvement in their average fuel economy between 2008 and 2011 and improved until 2015, although the average fuel consumption is two-thirds higher than the EU average and closer to countries such as Brazil.

The data confirm the dominance of gasoline LDVs and show large gaps between the efficiency of gasoline, diesel and hybrid vehicles (Figure 2, right). Newly registered hybrids had an average fuel economy that was almost 65% better than gasoline-driven vehicles. From 2013 to 2015, diesels saw a worsening in their average fuel economy, indicating that diesels were increasingly sold in the larger

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

size segments. Flex-fuel LDVs showed the worst performance of any powertrain, finishing more than 20% above the total average fuel economy in 2015.

Figure 2 • Average new LDV fuel consumption per km by vehicle segment and powertrain, United States, 2005-15

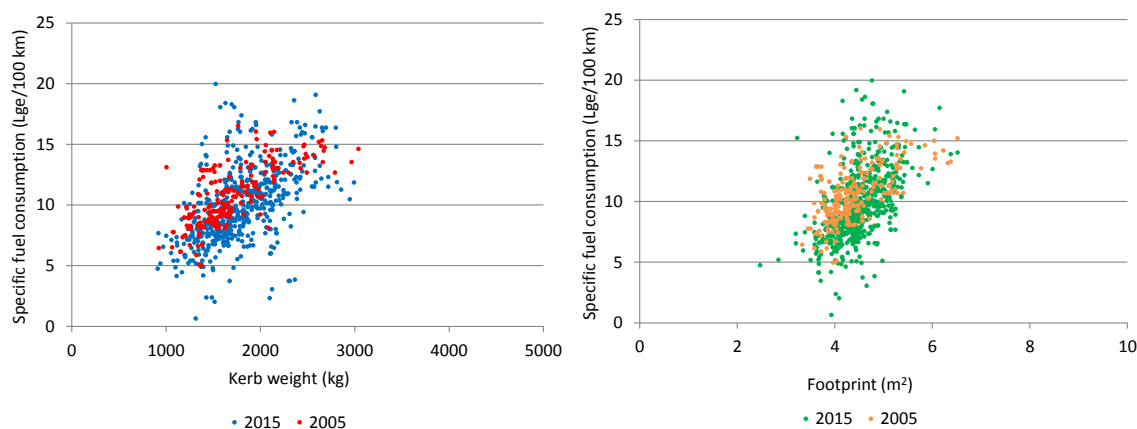


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Source: IEA elaboration and enhancement for broader coverage of IHS Markit database.

Weight and specific fuel consumption of new LDVs were more dispersed in 2015 than they were for new models in 2005 (Figure 3). An improving specific fuel consumption is apparent when weight or footprint is kept stable (both have changed little since 2013), given the higher frequency of 2015 records at the bottom of each plot in Figure 3.

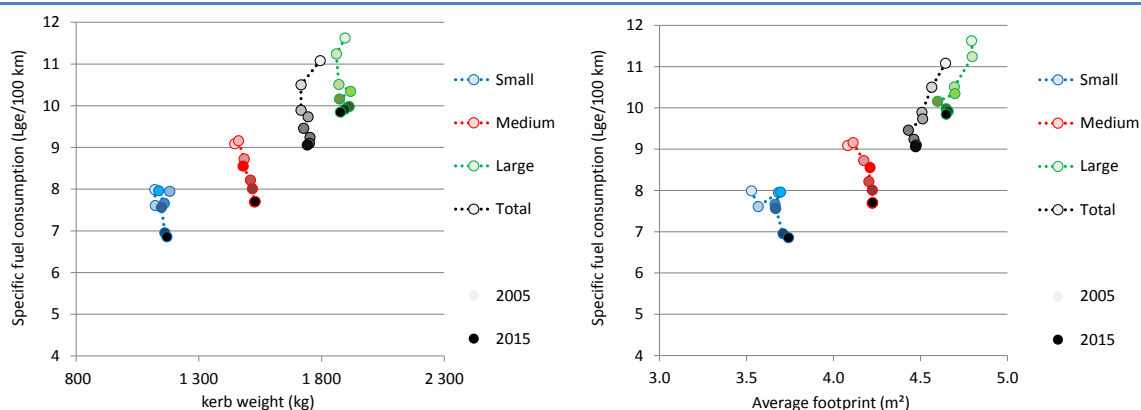
Figure 3 • Fuel consumption per km of new LDVs plotted against vehicle weight and footprint, United States, 2005 and 2015



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

All vehicle segments experienced fuel economy improvements with limited increase in weight (Figure 4). The large vehicle segment has been the most important in determining total average fuel economy. The CAFE standards are set in a way that assigns different targets to vehicles of different sizes, except for vehicles exceeding a maximum and minimum threshold. These vehicles are subject to an upper and lower limit that, in a given year, is independent on their size. This makes it more difficult to meet the target values for very large vehicles, and makes compliance easier for smaller ones. As already pointed out in IEA (2016a), Figure 4 suggests that this resulted in a tendency to reduce the average vehicle footprint in the large market segment, and in an increase in the small segment. Changes in the average size were not accompanied by major variations of vehicle weight in any of the market segments.

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



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

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