

# Technology and policy drivers of the fuel economy of new light-duty vehicles

GFEI Working Paper 12 examines trends in light-duty vehicle fuel economy and other characteristics such as vehicle dimensions, weight, fuel type, engine power and displacement for new vehicles registered from 2005 to 2013 in 25 countries, representing more than four-fifths of global sales. It also explores the impact of various government policies in industrialised and emerging economies, including differentiated taxation and limitations on vehicle dimensions.

## KEY FINDINGS

### 1. The report recommends using a combination of tax policy and regulatory measures to stimulate energy efficiency in transportation.

- **Ambitious policies to improve fuel economy and limit carbon emissions of cars and light commercial vehicles are effective in cutting average new vehicle consumption.**

In some countries, the average fuel economy of light-duty vehicles (LDVs) improved significantly (in the range of 15% to more than 25%) between the years 2005 and 2013.

- **The combined adoption of regulatory instruments, such as fuel economy standards, and fiscal incentives, such as vehicle taxes differentiated on the basis of the emissions of CO<sub>2</sub> per km, led to the highest energy savings from light-duty vehicles.**

Fuel economy standards tend to guarantee lower average fuel consumption for new vehicles sold, while the nature of taxes aimed at improving efficiency greatly influences their effectiveness: differentiated vehicle taxation (e.g. imposing higher rates on vehicles with the poorest performance and eventually including rebates for the best performers) demonstrated a good capacity to improve fuel economy.

The cases of France and Japan, where fuel economy standards are well established, demonstrate that differentiated taxation is effective in encouraging the purchase of fuel efficient vehicles, strengthening the effect of regulatory policies.

- **Differentiated vehicle taxation was effective even when not coupled with fuel economy standards, especially in markets with lower purchasing power due to low average income levels**

Differentiated taxation, which is less complex to implement than fuel economy regulations, is particularly interesting for developing regions, where the barriers to policy development may be more relevant than in developed economies. Lower average income levels also make the cost impact greater on consumer choice.

The detailed review for South Africa, for instance, suggests that differentiated taxation has cut the cost of owning more efficient vehicles while increasing the price of guzzlers; the result was greater technological development for fuel savings over size and weight increases.

- **Fuel taxes play an important role**

The report finds also that higher taxes on fuel encouraged the purchase of more efficient vehicles: countries with high fuel pump prices tended to have an above-average share of low-consumption vehicles. In the report, Turkey provides an example of a case where differentiated vehicle taxes and high fuel taxes bolstered sales of efficient vehicles even in the absence of regulatory targets.



- **Stringent targets led to the prioritisation of fuel economy improvements over other vehicle characteristics (such as weight and size) by OEMs and consumers.**

The adoption of vehicle efficiency technologies such as hybrid powertrains, turbocharged engines and transmission systems with more than five gears is significantly higher in OECD countries that have established fuel economy standards and where such technologies were feasible due to high consumer purchasing power.

## 2. The report also detected market trends towards larger and heavier vehicles in developing economies.

- **Although cars and light trucks remain substantially smaller and less powerful outside the OECD than in OECD countries, that gap is closing.**

The trend over time towards acquisition of larger and more powerful cars is more pronounced in non-OECD countries than in OECD countries. This is confirmed by the marked increase in the market diversification of non-OECD countries, as suggested by the introduction, by 2013, of a variety of models that had larger weight and footprint compared to 2005.

Not surprisingly, in countries lacking policies such as fuel taxes or efficiency regulations tended, technology developments went to weight and size rather than fuel economy, resulting in only moderate gains in fuel economy for new vehicles.



## 3. Methodological revisions in this report mean that global average fuel economy improvement rates are lower than the level found in earlier GFEI reports.

- **While previous GFEI analysis showed a global annual fuel economy improvement rate of 2.0% between 2005 and 2013, the new methodology suggests an annual improvement rate of only 1.6%. This is significantly lower than the 2.7% improvement rate necessary to achieve the GFEI target of reducing new LDV fuel consumption by 50% by 2030.**

The methodological revision includes two main components:

- a. normalisation of the results to the World Light-duty vehicle Test Cycle (WLTC), taking into account improvements in the way vehicles are tested and reducing the gap between tested and real-world fuel economy; and
- b. improved consistency in accounting for all light commercial vehicles, pick-up trucks and Sport Utility Vehicles (SUVs) across all regions.

These changes should improve the accuracy of estimates of the CO<sub>2</sub> mitigation potential of light duty vehicles. One rationale for developing the WLTC was to reduce the gap between tested and on-road fuel consumption. Adopting measurements using the WLTC therefore better reflects real-world conditions.