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GLOBAL FUEL ECONOMY INITIATIVE

ICCT: LIGHT-DUTY VEHICLE GREENHOUSE GAS AND FUEL ECONOMY STANDARDS: 2017 UPDATE

This is a short summary of some key information from GFEI partner the International Council on Clean Transportation (ICCT)'s review fuel economy standards in major markets.

Overview of Fuel Economy Standards

Fuel economy standards for light-duty vehicles (LDVs) have progressed significantly over the past decade. 10 governments—Brazil, Canada, China, the European Union, India, Japan, Mexico, Saudi Arabia, South Korea, and the United States—have established fuel economy or GHG emission standards for passenger cars. Other large markets, such as Australia, Thailand, and Vietnam, are also in the process of developing standards.

Most fuel economy standards allow manufacturers flexibilities to meet their targets. The flexibility can reduce manufacturers' cost of compliance in the short run, encourage technology innovation and early adoption, and create cost-effective pathways for greater fuel economy improvement in the long run. The approaches to create flexibilities include setting corporate average fuel economy targets; providing off-cycle credits; establishing super credits for electric-drive vehicles; and allowing credit banking and trading across years, fleets, or manufacturers. Additional flexibilities include alternative standards and treatment for small-volume manufacturers, such as in the United States and European Union.

Country or Region	Target Year	Regulated metric	Unadjusted Fleet Target/Measure	Form of target curve	Test Cycle
Brazil	2017	Energy consumption	1.82 MJ/km	Weight-based corporate average	U.S. combined
Canada	2016 2025	GHG	217 gCO_2/mi[1] N/A[2]	Footprint-based corporate average	U.S. combined
China	2015 2020	Fuel consumption	6.9 L/100km 5 L/100km	Weight-class based corporate average	NEDC
EU	2015 2021	CO_2	130 gCO_2/km 95 gCO_2/km	Weight-based corporate average	NEDC[4]
India	2017 2022	CO_2	130 g/km 113 g/km	Weight-based corporate average	NEDC for low-powered vehicle
Japan	2015 2020	Fuel economy	16.8 km/L 20.3 km/L	Weight-class based corporate average	JC08[4]
Mexico	2016	Fuel economy/ GHG	39.3 mpg or 140 g/km	Footprint-based corporate average	U.S. combined
Saudi Arabia	2020	Fuel economy	17 km/L	Footprint-based corporate average	U.S. combined
South Korea	2015 2020	Fuel economy/ GHG	17 km/L or 140 gCO_2/km 24 km/L or 97 gCO_2/km	Weight-based corporate average	U.S. combined
U.S.	2016 2025	Fuel economy/ GHG	36.2 mpg[3] and 225 gCO_2/mi 55.2 mpg[3] and 147 gCO_2/mi	Footprint-based corporate average	U.S. combined

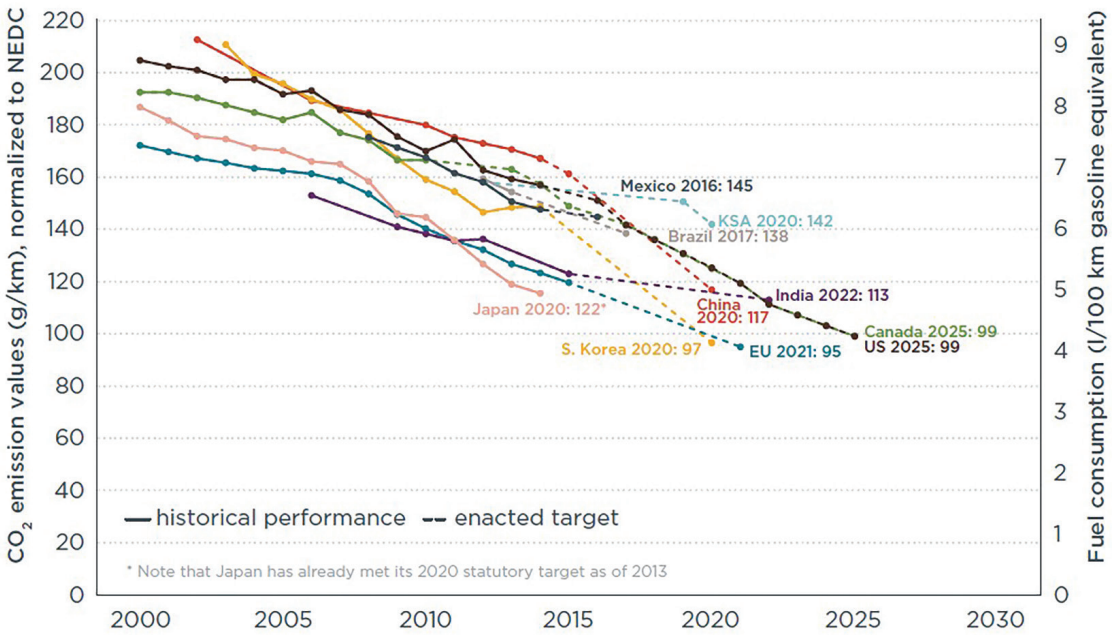
[1] In April 2010, Canada announced a target for its LDV fleet of 246 g/mi for model year 2016. The separated targets for car and light truck fleet are estimated by ICCT based on the overall target.
[2] Canada follows the U.S. standards in the proposal, but the final target value would be based on the projected fleet footprints.
[3] Assumes manufacturers fully use low-Global Warming Power (GWP) A/C refrigerants credits
[4] EU and Japan plan to switch to WLTP by 2018.

Fuel economy standards: Progress and targets

The review adopts reference standards corresponding to two of the most common ways to measure and regulate fuel consumption and GHG emissions from passenger vehicles: a GHG emission standard measured in terms of grams of CO2- equivalent per kilometre measured on the EU NEDC cycle, and a fuel economy–based standard measured in terms of U.S. CAFE-adjusted miles per gallon. To compare the relative target levels of regulations accurately and fairly, each national standard has been adjusted to common reference standards by the ICCT's methodology developed in Kühlwein et al. (2014)

There is substantial room for improvement for many regions. In terms of targets, the European Union has historically outpaced the world with the lowest fleet average target of 95 g CO2 /km by 2021. However, South Korea will match, if not exceed, the European Union with a fleet target of 97 g CO2 /km in 2020. With its high hybrid percentage, Japan already reached its 2015 target of 142 g/km in 2011 and 2020 target of 122 g/km in 2013. If Japan continues to reduce CO2 emissions at the same rate as from 2010 to 2014, Japan's passenger vehicle fleet would achieve 82 g/km in 2020, far below the targets set by other countries.

FIGURE 2 Historical fleet CO_2 emissions performance and current standards (gCO2/km normalised to NEDC) for passenger cars



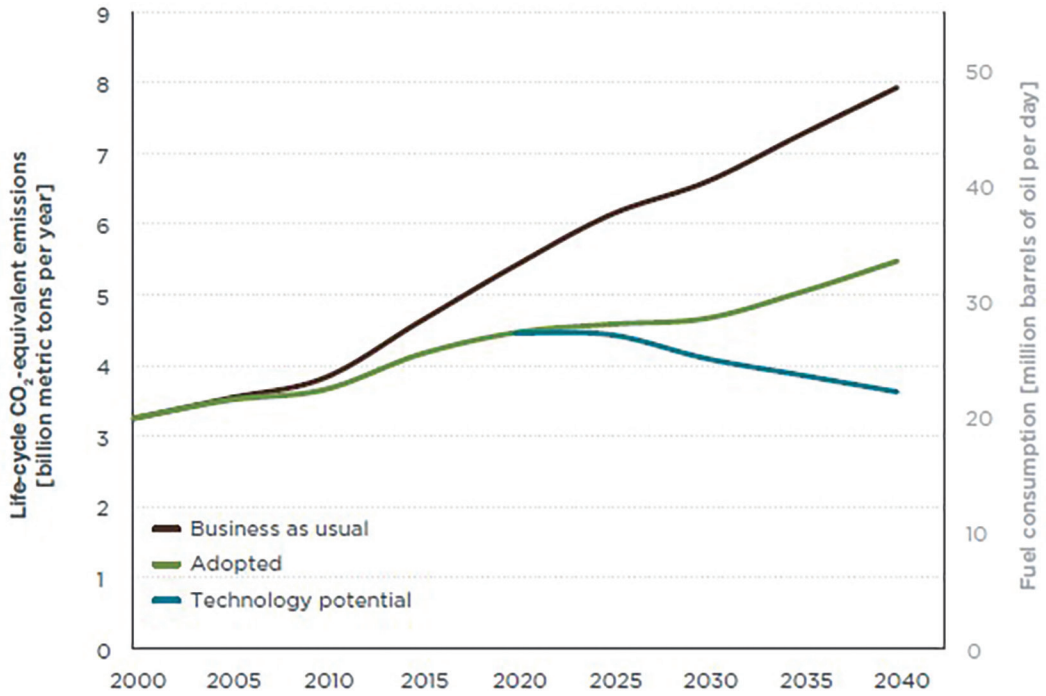
Fuel economy prospects: ICCT projection

Despite the growth of the vehicle fleet, the potential vehicle efficiency improvements could stabilize GHG emissions from the global passenger vehicle fleet around 2025 and drive reductions in GHG emissions through 2050.

The "Business as usual" line reflects what would happen if standards were frozen today and did not change in the future. The "Adopted" line reflects future standards that have already been adopted, but assumes no GHG reductions beyond the currently adopted standards. The "Technology potential" line reflects continued reduction in GHG emissions that could be achieved based on ICCT's understanding of what potential technology can deliver in the time frame, and using their Global Transportation Roadmap model.

[1] Official vs. real-world road-load parameters in EU vehicle efficiency testing. Washington, DC: The International Council on Clean Transportation. Retrieved from http://www.theicct.org/sites/default/files/ICCT_Coastdowns-EU_201605

FIGURE 3 Impact of light-duty efficiency standards on global life-cycle GHG emissions (estimated using ICCT's Global Transportation Roadmap model: ICCT, 2014). Business as usual = vehicle efficiency remains at 2015 levels.



Compared to business as usual, the standards that have already been adopted will significantly reduce GHG emissions. However, to offset the impact of a growing number of vehicles and increases in total vehicle kilometres travelled over the long term, regulation must spread beyond the 10 regions discussed in the report. Governments around the world must work together to continue progress toward a more efficient global LDV fleet.

The increasing gap between real-world and official fuel economy/CO2 emission value is a growing concern because it compromises the actual benefit of standards and undermines their legitimacy. Improving test protocol and establishing effective compliance-and-enforcement mechanisms will be the key to addressing this problem.

Fuel economy prospects: ICCT projection

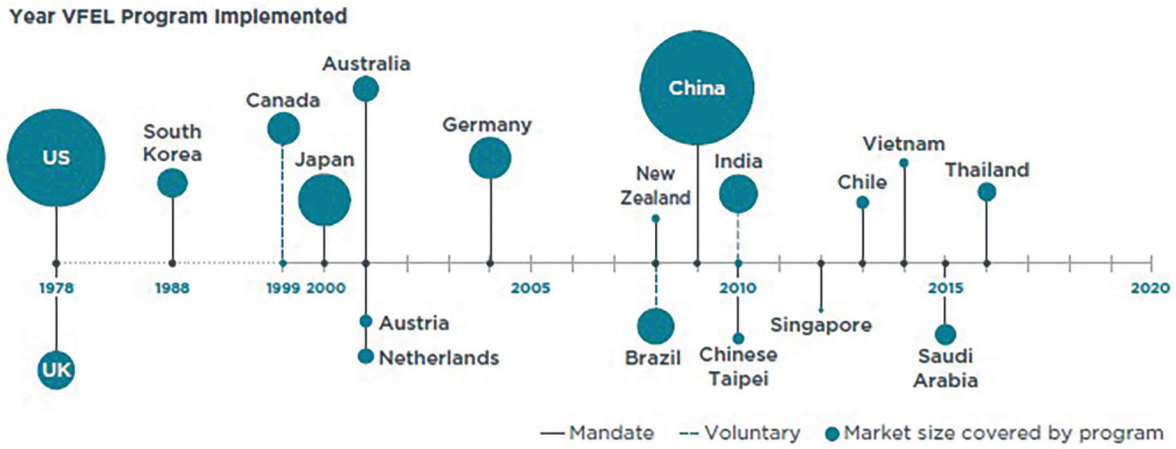
Vehicle taxation based on vehicle CO2 emission or fuel economy encourages consumers to choose fuel-efficient vehicles to reduce the purchase cost. Vehicle taxation based on parameters that are linked to CO2 emissions (e.g., engine displacement, vehicle size and weight) also indirectly influence consumer purchase choice, although such taxes are not as effective as direct taxation based on CO2. High fuel taxation drives up the operating cost because of the higher fuel cost, therefore incentivizing consumers to buy vehicles that burn less fuel per mile of driving and reduce the annual driving distance. In addition, many regions provide a direct subsidy or tax reduction for purchasing electric vehicles, which generally create less CO2 than conventional vehicles (depending on how the electricity is generated).

	Direct CO_2 tax	Indirect CO_2 tax	Fuel tax*	Electric vehicle incentive
Australia	Yes (L)	Displacement, weight	+	
Brazil		Displacement	+	
Canada	Partly		+	
China		Displacement	+	Subsidy and tax reduction
France	Yes	Engine power	++	Subsidy and tax reduction
Germany	Yes	Displacement	++	Tax reduction
India		Displacement, engine power (L)	+ (G) – (D)	Subsidy
Indonesia		Displacement	+ (G) – (D)	
Italy		Engine power	++	Subsidy and tax reduction
Japan		Displacement, weight	++	Tax reduction
Russia		Engine power	+	
South Africa	Yes		+	
South Korea		Displacement	++ (G) + (D)	Subsidy and tax reduction
Turkey		Displacement	++	
UK	Yes		++	Subsidy
U.S.	Partly	Weight (some states)	+	Subsidy

* + fuel taxation, ++ high fuel taxation, – fuel subsidies, (G) gasoline, (D) diesel, (L) local policy

Vehicle fuel economy labelling aims to provide vehicle fuel economy information to consumers to increase demand for more fuel-efficient vehicles. A well-designed labelling program not only presents the fuel economy–related information, but also highlights the benefit of purchasing a fuel-efficient vehicle. Vehicle fuel economy labelling programs have been adopted widely across the world. The labelling program collects fuel economy information of the fleet, which will pave the way to create other fuel economy–related policies, and reinforces the effectiveness of fuel economy standards and fiscal policies if they are already in place.

FIGURE 5 Year of implementation of vehicle fuel economy labeling programs



Reference: Yang and Bandivadekar (2017) Light-duty vehicle greenhouse gas and fuel economy standards. Global update 2017. ICCT http://www.theicct.org/sites/default/files/publications/2017-Global-LDV-Standards-Update_ICCT-Report_23062017_vF.pdf

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