

# SOUTH KOREA FUEL ECONOMY AND GREENHOUSE GAS STANDARDS FOR NEW LIGHT-DUTY VEHICLES (2016–2020)

## ICCT POLICY UPDATES

SUMMARIZE

REGULATORY

AND OTHER

DEVELOPMENTS

RELATED TO CLEAN

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WORLDWIDE.

On December 30, 2014, the Ministry of Environment (ME) announced the new average fuel economy (FE) and greenhouse gas (GHG) standards<sup>1</sup> for light-duty vehicles (notification No. 2014-235). A nearly equivalent set of fuel economy standards will be implemented by Korea Energy Management Corporation (KEMCO) on behalf of the Ministry of Trade, Industry and Energy (MOTIE). The new standards apply to all new light-duty vehicles starting in 2016, and will be fully phased-in by 2020.

The new standards have made the passenger car fuel efficiency target more stringent, and have expanded the scope of standards to include light-commercial vehicles for the first time in Korea. The 2020 standards require a 30.7 percent reduction in the fleet average GHG emission for passenger vehicles from 2015 standards and 31.1 percent from the 2013 fleet average emissions level. Light trucks are required to reduce their CO<sub>2</sub> emissions by 15.2 percent from 2013 to 2020. Table 1 shows CO<sub>2</sub> emissions performance from 2009 to 2013, as well as the 2015 and 2020 targets.

**Table 1** 2009–2013 fleet average CO<sub>2</sub> emissions<sup>2</sup> and targets (g/km under 2-cycle test<sup>3</sup>)

	Fleet average CO <sub>2</sub> emissions					Targets	
	2009	2010	2011	2012	2013	2015	2020
<b>Passenger car</b>	158.6	151.6	147.5	140.3	140.8	140	97
<b>Light truck</b>	217.2	213.7	212.8	197.3	195.7	–	166
<b>Total</b>	166.7	160.5	154.6	148.5	149.4	–	–

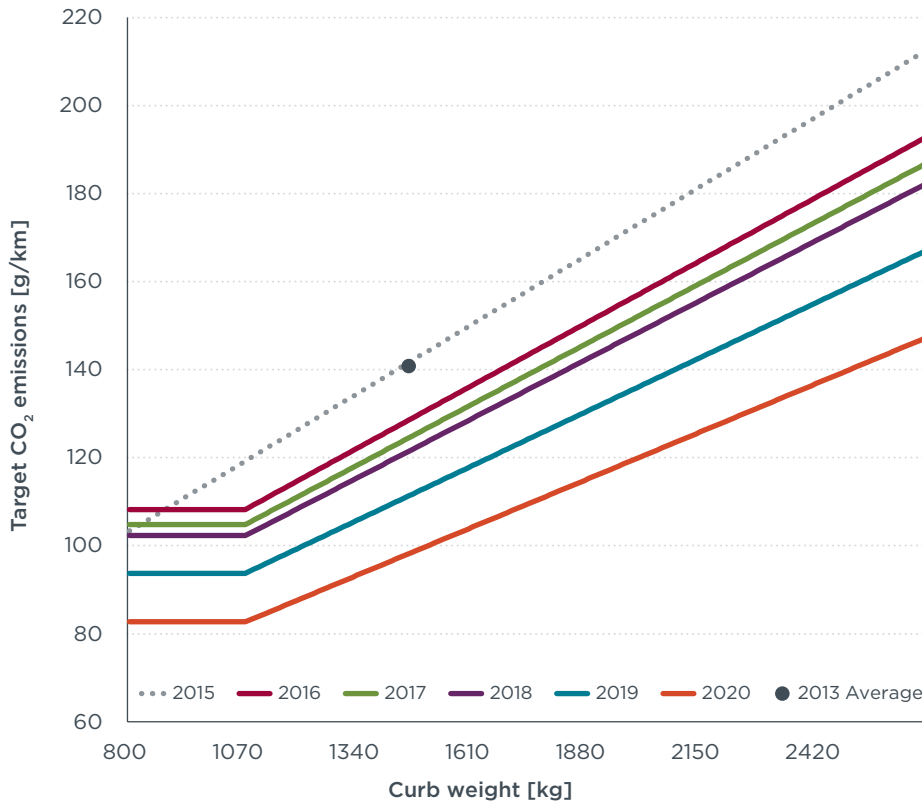
\* Note: GHG emission values from 2009–2012 were converted by the ICCT from CVS-75 (city test cycle) to 2-cycle (city and highway combined cycle) using conversion factors developed from testing Korean vehicles.

1 Vehicle fuel economy and GHG emissions standards (MY: 2020), Dec 2014, <http://www.law.go.kr/admRulLsInfoP.do?admRulSeq=2100000009634>

2 2013 Korea Vehicle Fuel Economy and CO<sub>2</sub> Emissions: Data and Analyses by KEMCO is available at [http://bpms.kemco.or.kr/transport\\_2012/main/main.aspx](http://bpms.kemco.or.kr/transport_2012/main/main.aspx)

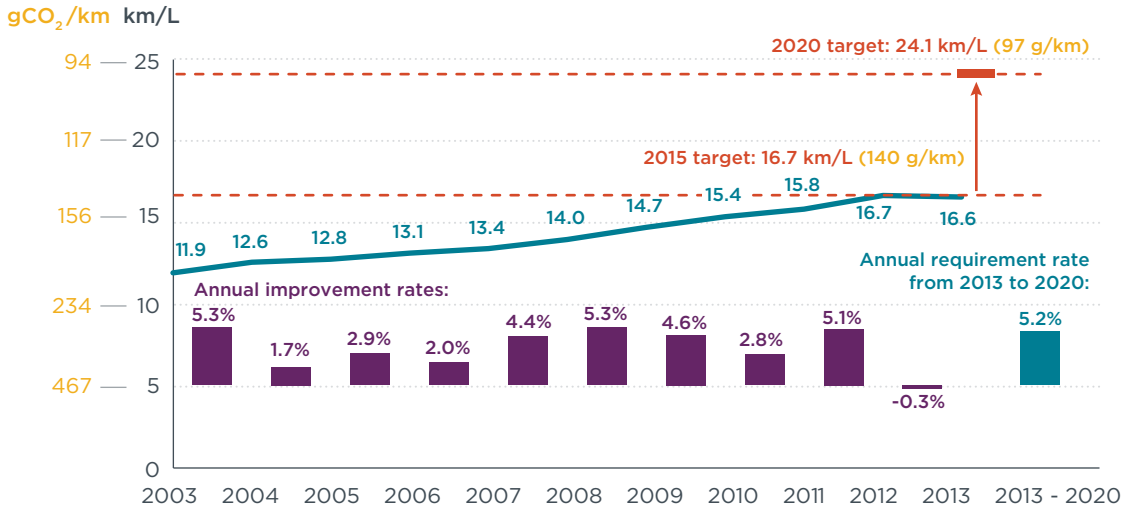
## TARGETS FOR PASSENGER VEHICLES

The standards define fuel economy in terms of km/L and GHG emissions in terms of gCO<sub>2</sub>/km. The standards are weight-based, as shown in Figure 1, and use the U.S. Corporate Average Fuel Economy (CAFE) city and highway cycles for testing purposes. The new standards will apply to new passenger vehicles with 10 seats or fewer and with a Gross Vehicle Weight (GVW) of 3.5 tonnes or less. Small-volume manufacturers (less than 4,500 vehicles in 2009) are subject to less stringent requirements, as discussed below.



**Figure 1** Yearly CO<sub>2</sub> emissions targets for passenger vehicles

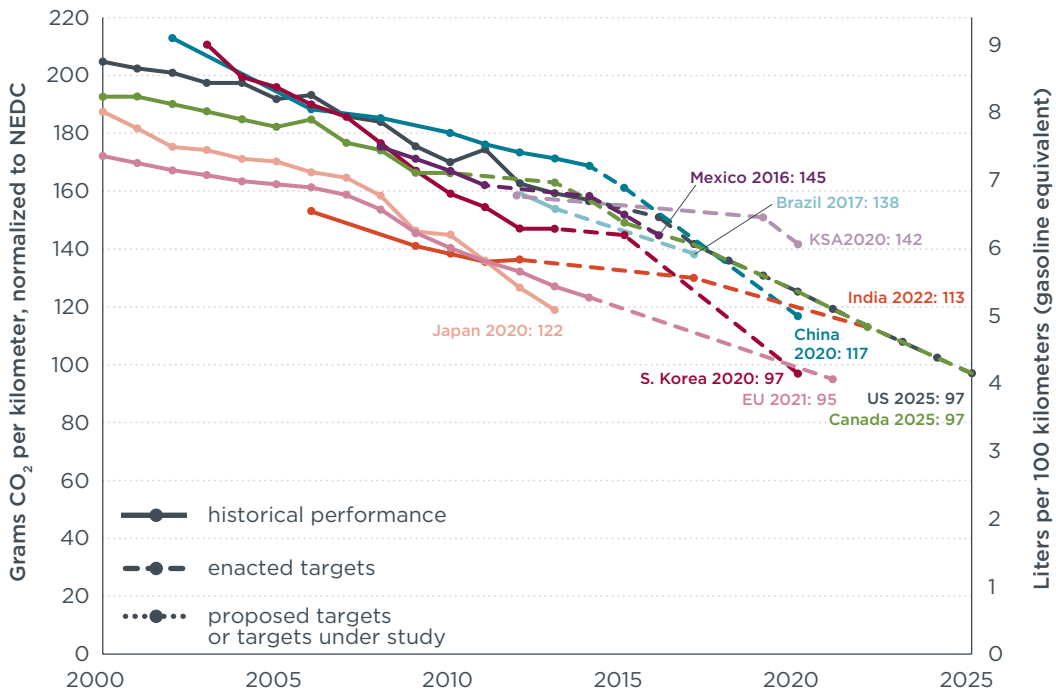
The new fuel economy and GHG targets for new passenger vehicles are 24.3 km/L and 97 gCO<sub>2</sub>/km by 2020. It is equivalent to a 30.7% reduction from the 140 g/km fleet average target for model year 2015. The annual reduction rate is 7.1% per year compared to the 2015 targets and 5.2% per year compared with the 2013 fleet average.



**Figure 2** Annual fuel efficiency and CO<sub>2</sub> emissions improvement rates and future target for passenger vehicles

\* Note: The annual requirement rates can be different, since the 2020 CO<sub>2</sub> target for curb weight corresponds to the 2013 fleet.

Figure 3 shows South Korea's 2020 target in comparison to other passenger car fuel efficiency standards globally. The Korea 2020 target is nearly as stringent as the EU 2020/2021 target, and the required annual improvements from 2015 to 2020 are over twice the rate required in the EU.



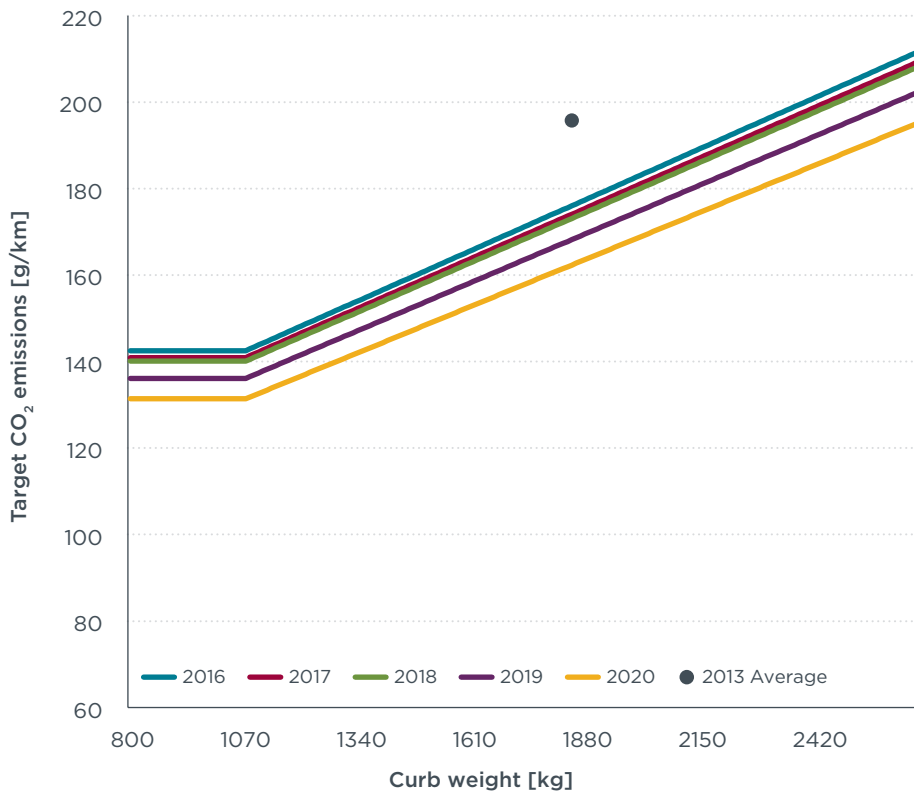
\* Note that Japan has already exceeded its 2020 statutory target, as of 2013.

**Figure 3** Global CO<sub>2</sub> emissions standards for passenger vehicles

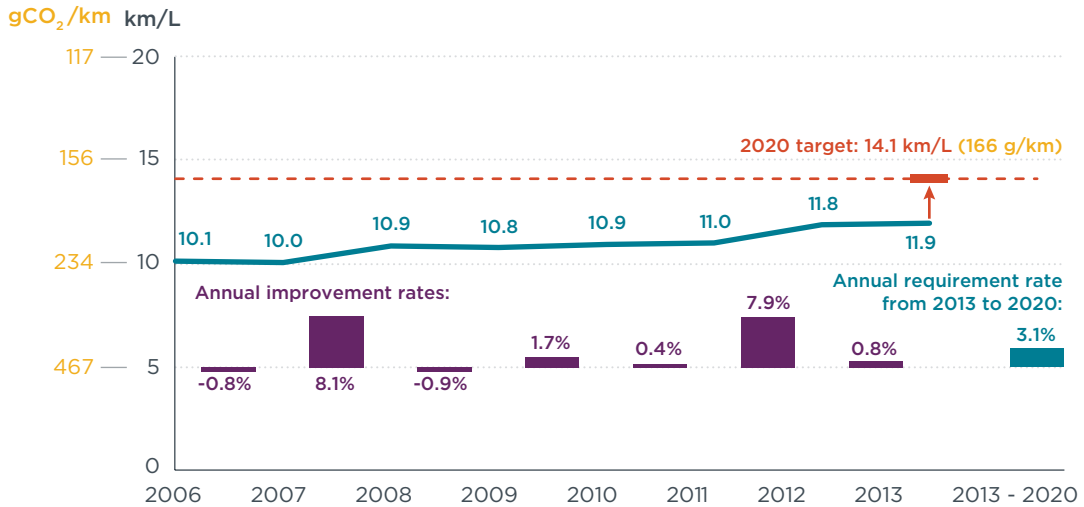
## TARGET FOR LIGHT TRUCKS

The first-ever light commercial vehicle fuel efficiency standard applies to light trucks with 15 seats or fewer and with a GVW of 3.5 tonnes or less. Small volume manufacturers with sales of less than 4,500 vehicles in 2009 are exempted from the standards.

The new fuel economy and GHG targets for new light trucks are 15.6 km/L and 166 gCO<sub>2</sub>/km for 2020. Figure 4 shows the weight-based standards for light trucks. The new standards reduce the fleet average GHG emissions of new light trucks by 15.5% from 2013 to 2020, a reduction of 2.3% per year. Figure 5 shows the historical fuel consumption and GHG emissions for light trucks, as well as the 2020 target FE and GHG for new light trucks.



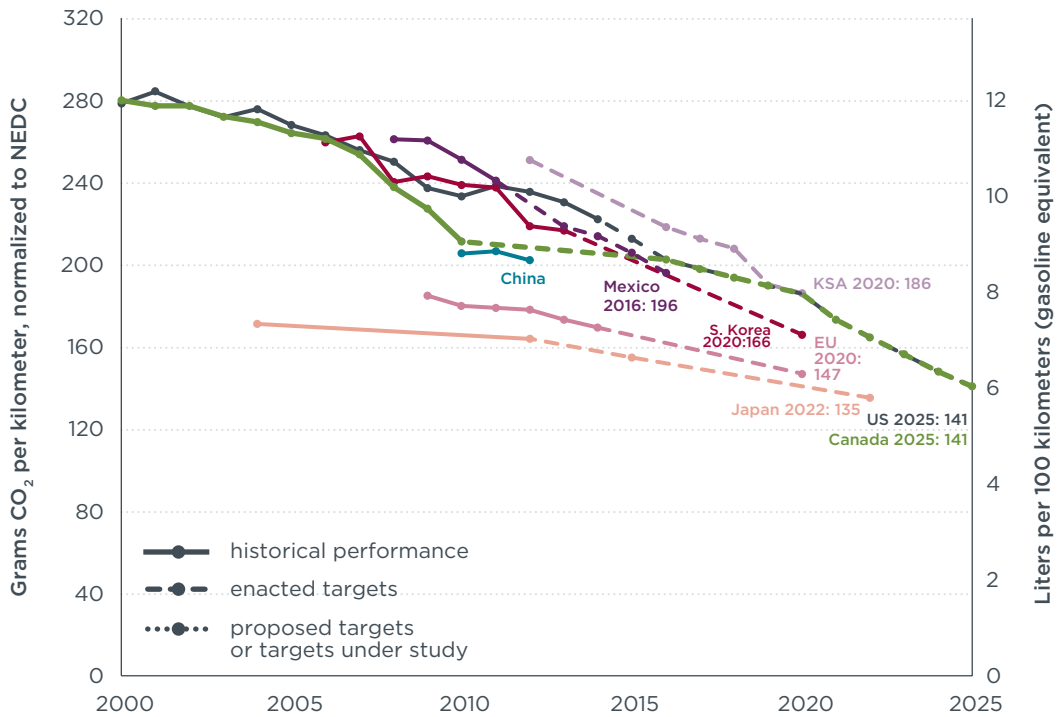
**Figure 4** Yearly CO<sub>2</sub> emissions targets for light trucks



**Figure 5** Annual fuel efficiency and CO<sub>2</sub> emissions improvement rates and future target for light trucks

\* Note: The annual requirement rates can be different, since the 2020 CO<sub>2</sub> target for the curb weight corresponds to the 2013 fleet.

As shown in Figure 6, compared to other countries South Korea's standard for light trucks is not as stringent as its passenger car standard. However, it still falls in the middle of the standards adopted by other countries, and the annual improvement rate is similar.



**Figure 6** Global CO<sub>2</sub> emissions standards for light trucks

## TEST PROCEDURE

The fuel economy is tested by combined city and highway fuel economy tests, which are assigned weights of 55% and 45%, respectively. Both city (CVS-75) and highway (HWFET) test cycles are identical to the corresponding test cycles in the United States. The calculated fuel consumption of LPG vehicles will be adjusted by multiplying 1.26 times the test fuel consumption, but diesel vehicles won't be adjusted.

Fuel economy from laboratory testing can differ from performance in real driving conditions. Hence, the adjusted 5-cycle test formula has been used to determine the vehicle fuel economy labeling value in Korea since 2012.<sup>3</sup> The five cycles CVS-75, HWFET, US06, SC03, and cold CVS-75 are identical to the US test cycles.

## COMPLIANCE AND FLEXIBILITIES

*Compliance structure.* Compliance with the 2020 corporate average standards will be determined in a manner similar to the 2015 standards. In order to achieve compliance, the sales-weighted average fuel economy and average emissions for each manufacturer must be better than the target values corresponding to the sales weighted mass.

*Phase-In.* Manufacturers can choose either a sales ratio target or a yearly target for passenger cars and light trucks. The yearly targets are illustrated in Figures 1 and 4. If a manufacturer chooses the sales ratio target, the target will be phased in over a five-year period from 2016 to 2020: 10 percent of cars sold by automakers are required to meet the 2020 targets by 2016, 20 percent by 2017, 30 percent by 2018, 60 percent by 2019 and 100 percent by 2020.

*Multipliers.* Low-emission vehicles can be credited with a multiplier, meaning they are weighted as more than one new vehicle in the calculation of a manufacturer's average fuel economy or GHG emissions. Credit multipliers can be awarded to vehicles running on gasoline, diesel, or LPG vehicles that emit fewer than 50 g/km, as well as all zero-emission vehicles, vehicles with manual transmissions, and mini vehicles.

**Table 2** 2016–2020 Multipliers

Multiplier	2011	2012	2013
<b>3</b>	Zero-Emission Vehicle		
<b>1.3</b>	Manual Transmission		
<b>1.2<sup>4</sup></b>	Mini Vehicle <sup>5</sup>		
Multiplier	FE (km/L)		GHG (g/km)
<b>2</b>	Gasoline Vehicle	> 44.7	< 50
	Diesel Vehicle	> 51.8	
	LPG Vehicle	> 34.4	

3 Korea vehicle fuel economy labeling information, [http://bpms.kemco.or.kr/transport\\_2012/system/institution.aspx](http://bpms.kemco.or.kr/transport_2012/system/institution.aspx)

4 If mini vehicle emissions are less than 50 g/km, the multiplier of 2 will be applied, instead of the multiplier of 1.2.

5 "Mini vehicle" is a South Korean class of vehicles with engine displacement below 1000 cc, overall length of 3.6 m or less, overall height of 2.0 m or less, and overall width of 1.6 m or less.

*Technology Credits.* The regulation includes credits (similar to the off-cycle credits in the U.S. regulation) of up to 14 g CO<sub>2</sub>/km for technologies that have proven GHGs reduction and fuel energy efficiency benefits<sup>6</sup>.

*Credit banking, borrowing, and trading.* If the targets are exceeded, the additional credits can be carried forward for up to three years. Additionally, manufacturers will be able to trade credits with other automakers for year-by-year compliance, with the exclusion of small volume manufacturers. Credits can also be borrowed for a period of up to three years.

*Small-volume manufacturers.* The standards for manufacturers that sold fewer than 4,500 vehicles in 2009 will be eased by 19% for 2016, by 16% for 2017, by 13% for 2018, by 10% for 2019, and by 8% for 2020, compared to the larger-volume manufacturers' standards. In addition, ME and MOTIE will decide the 2020 fuel efficiency and GHG emission standards for manufacturers that sold fewer than 500 vehicles in 2009 separately.

## EXPECTED IMPACTS

The Ministry of Environment announced that it expects the standards to bring both social and economic benefits equivalent to 59,000 billion won (around \$52,970 million) over the five year period from 2016 to 2020. As calculated by the ICCT, the standards will reduce the South Korean petroleum demand by 127.6 million liters cumulatively for 5 years.

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6 The list of technologies has not been specified yet.