

U.S. EPA/DOT Supplemental Notice of Intent Regarding Light-Duty Vehicle Standards for the 2017–2025 Model Years

On July 29th, 2011, the U.S. Environmental Protection Agency (EPA) and U.S. Department of Transportation (DOT) issued a Supplemental Notice of Intent (SNOI) on 2017–2025 Model Year Light-Duty Vehicle greenhouse gas (GHG) Emissions and corporate average fuel economy (CAFE) Standards. This SNOI reflects an agreement reached between the U.S. government, the State of California, and the auto manufacturers on a unified national program to regulate automobile GHG emissions and fuel economy. The agreement is in response to President Obama's request in May 2010 to begin developing new GHG and fuel economy standards for light-duty vehicles for the 2017–2025 model years and builds upon the Notice of Intent (NOI) issued by EPA and DOT in September 2010.

This SNOI has the potential to dramatically reduce greenhouse gas emissions and fuel consumption in the U.S. passenger vehicle fleet. EPA and DOT's current estimate is that the standards discussed in the SNOI would reduce greenhouse gases by approximately 2 billion metric tons, and would save approximately 4 billion barrels of oil, over the lifetime of the model year 2017–2025 vehicles. The specific effects are not easy to understand, as the agreement includes a substantial expansion of credit programs and the improvements are tilted such that cars are required to improve more than light trucks, especially pickup trucks.

Key Elements of the Proposed Program

Overall Stringency. The average light duty vehicle GHG emission rate would be reduced from the average model year 2016 level of 250 g CO₂e/mile to 163 g CO₂e/mile for model year 2025, a 35% reduction. Passenger vehicle fuel economy is estimated to increase from an average model year 2016 level of 34.1 miles per gallon to 49.6 miles per gallon in 2025, an increase of 45%. Annually, this would be a 4.6% reduction per model year in the average GHG emissions, and 4.25% increase per model year in miles-per-gallon fuel economy. As explained below, the regulation is expected to contain a variety of credits that may affect the overall stringency of the program.

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- *54.5 mpg*. This is what is what would occur if manufacturers met EPA's 163 g CO₂e/mile using only tailpipe CO₂ reductions, without the use of any credits. It is nearly certain that all manufacturers will take maximum advantage of the low-GWP refrigerant credits, so this number is only useful for comparing total in-use GHG reductions.
- *49.6 mpg*. This is the proposed CAFE standard for 2025. It is equivalent to 163 g CO₂e/mile plus the CO₂ credits for using low-GWP air conditioning refrigerants.
- *48.1 mpg/184 g CO₂e/mile*. Tailpipe emissions with full use of A/C credits for both low-GWP refrigerants and higher efficiency.

Credit Provisions

Emission reduction compliance credits include air conditioning system technology, flexible fuel vehicle deployment, off-cycle technologies, incentives for electric vehicles, and “game-changing” technologies installed on pickup trucks. Of these credits, only the air conditioning credits and some “off cycle” technology credits reflect real-world emission reductions that are not included on the compliance test cycles. The other credits would all reduce the overall stringency of the standards, without corresponding reductions in real world emissions.

Air conditioning technologies. EPA intends to propose A/C credits for cars of up to 18.8 g CO₂e /mile and up to 24.4 g CO₂e /mile for light trucks. The test methods used to calculate these credits would be similar to those of the MY2012–2016 program. Most of these credits are for systems with lower global warming potential (GWP) refrigerants. EPA's expected use of these refrigerant credits is the primary difference

between its GHG standards and DOT's CAFE standards. The widely quoted 54.5 mpg stringency number refers to the level that would be achieved if manufacturers did not use credits for low global warming potential air conditioner refrigerants. The other component of the A/C credit is system efficiency improvements, which reduce the amount of fuel needed to operate the A/C system. NHTSA intends to propose that the maximum A/C efficiency credit available for cars is 0.000563 gallon/mile and for trucks is 0.000810 gallon/mile.

Flexible fuel vehicles (FFVs). EPA is proposing to limit credits for E85 vehicles, capable of running on up to 85% ethanol by volume (and the rest gasoline), to the actual use of the alternative fuel. DoT is also proposing to limit credits to actual use of E85 starting with 2020. For MYs 2017–2019, DoT expects that the fuel economy of dual fuel vehicles will be determined in the same manner as specified in the MY 2012–2016 rule, and as defined by Energy Independence and Security Act (EISA).

Advanced technology vehicle. CO₂ credits for electric (EV), the electric portion of plug-in hybrid (PHEV), and fuel cell (FCV) vehicles apply only to the EPA standards. EPA is proposing two sets of credits. EPA intends to propose an incentive multiplier for EVs and FCVs of 2.0 in MY 2017, phasing down to a value of 1.5 in MY 2021. PHEVs would start at a multiplier value of 1.6 in MY 2017 and phase down to a value of 1.3 in MY 2021. In addition, advanced technology vehicles would be credited at 0 g CO₂e/mile for their use of electricity and hydrogen.

Off-Cycle. The agencies intend to expand and streamline the 2012–2016 off-cycle credit provisions, including an approach by which the agencies would provide credit for a subset of beneficial off-cycle technologies

to encourage early penetration of these technologies. This list will include at least six defined technologies, if not more. The total g/mile credit from the predefined list would be limited to 10 g/mile (0.001125 gallon/mile). Additional credits could be generated under the general provisions. In concept, off-cycle credits are a good idea, as they should result in real world reductions. Most of the technologies on the agency's list will provide benefits on the test cycles, such as active grill shutters, high efficiency alternators, start-stop, solar roof panels for battery charging, active transmission warm-up, and engine heat recovery using thermo-electric for 100 watts. Granting off-cycle credits for these technologies could double-count the benefits, depending on how the rule is drafted.

Pickup Truck “Game Changing” Technologies. The agencies intend to propose a credit for manufacturers that employ significant quantities of hybridization on full-size pickup trucks or for pickup trucks that achieve a significant reduction below the applicable target. Mild hybrid electric (HEV) pickup trucks are eligible for a 10 g/mile (0.001125 gallon/mile) credit during 2017-2021 if the technology is used on a minimum percentage of a company's full size pickups, beginning with at least 30% of a company's full-size pickup production in 2017 and ramping up to at least 80% in 2021. Strong HEV pickup trucks would be eligible for a 20 g/mile credit (0.00225 gallon/mile) during 2017-2025 if the technology is used on at least 10% of the company's full-size pickups. The performance-based incentive credit could also be on the order of 10–20 g/mile per vehicle.

Regulatory design

The proposals use a vehicle size-based standard for two vehicle categories, following the current 2012–2016 standard framework. Separate numerical standards for vehicle size or “footprint” (i.e., the area defined by the wheelbase and average track width) are proposed for passenger cars and for light trucks. Because there are two categories, car and truck, and the standards are based on the footprint attributes of future year vehicle sales, the exact GHG and fuel economy outcome from the program is somewhat unknown and subject to the sales mix of vehicles sold in the future. Each auto manufacturer will ultimately have a different footprint-based standard based on its sales mix of vehicles at each vehicle size and its car and light truck sales mix.

Differential requirements for cars and light trucks. The proposed 2022–2025 standards would set consistent improvements for all cars and light trucks, with annual CAFE increases of 4.7% per year and annual CO₂ reductions of 5.0% per year. Both EPA and NHTSA intend to propose a lower annual rate of improvement for light-trucks in the early years of the program. EPA is proposing an annual CO₂ reduction for cars of 5%, but only 3.5% for light trucks. Similarly, NHTSA is proposing an annual fuel economy increase of 4.3% for cars, but only 2.9% for light trucks. The required reductions for light trucks are also tilted, such that the smallest light trucks have larger increases (but still less than cars), while the larger light trucks have smaller increases. Figures 1 and 2 illustrate this effect. The annual fuel economy increase from 2016 to 2025 for cars is almost flat and ranges from 4.4% to 4.5%. The annual fuel economy increase for light trucks starts at 4.3% for the smallest trucks, drops to 3.4% for larger SUVs, and falls off to only 2.2% for the largest pickup trucks. Note that the 2012–2016 standards also imposed smaller increases on

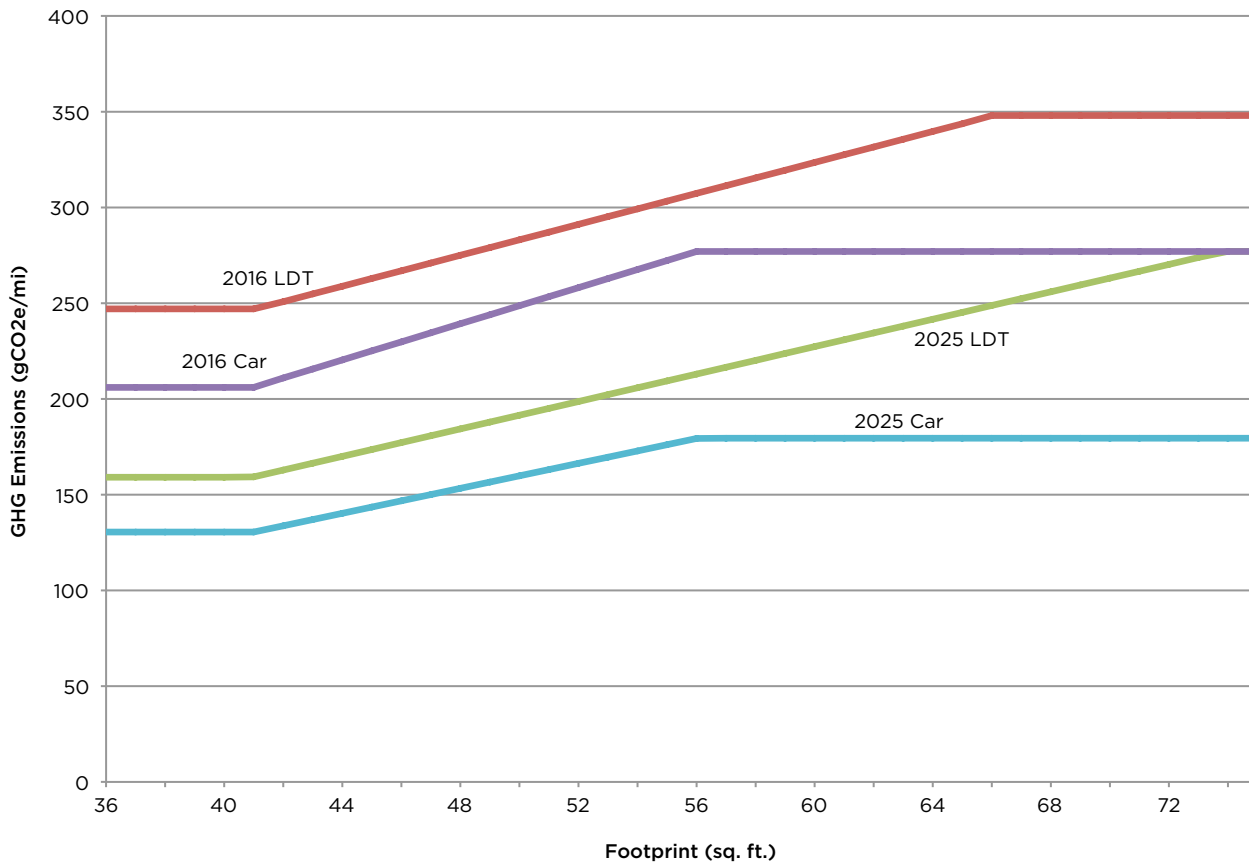


Figure 1. GHG standards illustrated in SNOI: 2016 vs. 2025.

the larger vehicles than they did on smaller vehicles.

Footprint systems are designed to encourage the use of lightweight materials (unlike weight-based standards) without affecting the mix of vehicles sold in the market. Under a footprint-based system, reducing vehicle weight helps meet the standard, but selling more small vehicles does not necessarily help manufacturers meet the standards, as smaller vehicles are subject to more stringent targets. However, the slope of the footprint curve and the difference between the car and light truck curves matter. The steeper the slope of the footprint curve, the more incentive manufacturers have to increase the size of their vehicles. And the larger the difference between the car and light truck curves, the more incentive a manufacturer has to add

four-wheel drive and jack the car up just enough to meet the ground clearance criteria so that the vehicle can be reclassified as a light truck. These are perverse incentives, as increasing the size of the vehicle or reclassifying cars as light trucks make it easier for a manufacturer to meet the requirements while also increasing the fuel consumption and CO₂ emissions from the vehicle. The tilt in the increase in light truck stringency increases the incentive for manufacturers to increase the size of light trucks, especially pickup trucks. More importantly, the lower requirements for all light trucks would increase the incentive to reclassify cars as light trucks. The 2012–2016 standards and the 2022–2025 standards have almost no impact on the relationship between the stringency of the car and the light truck targets. However, the proposed 2017–2021 standards would

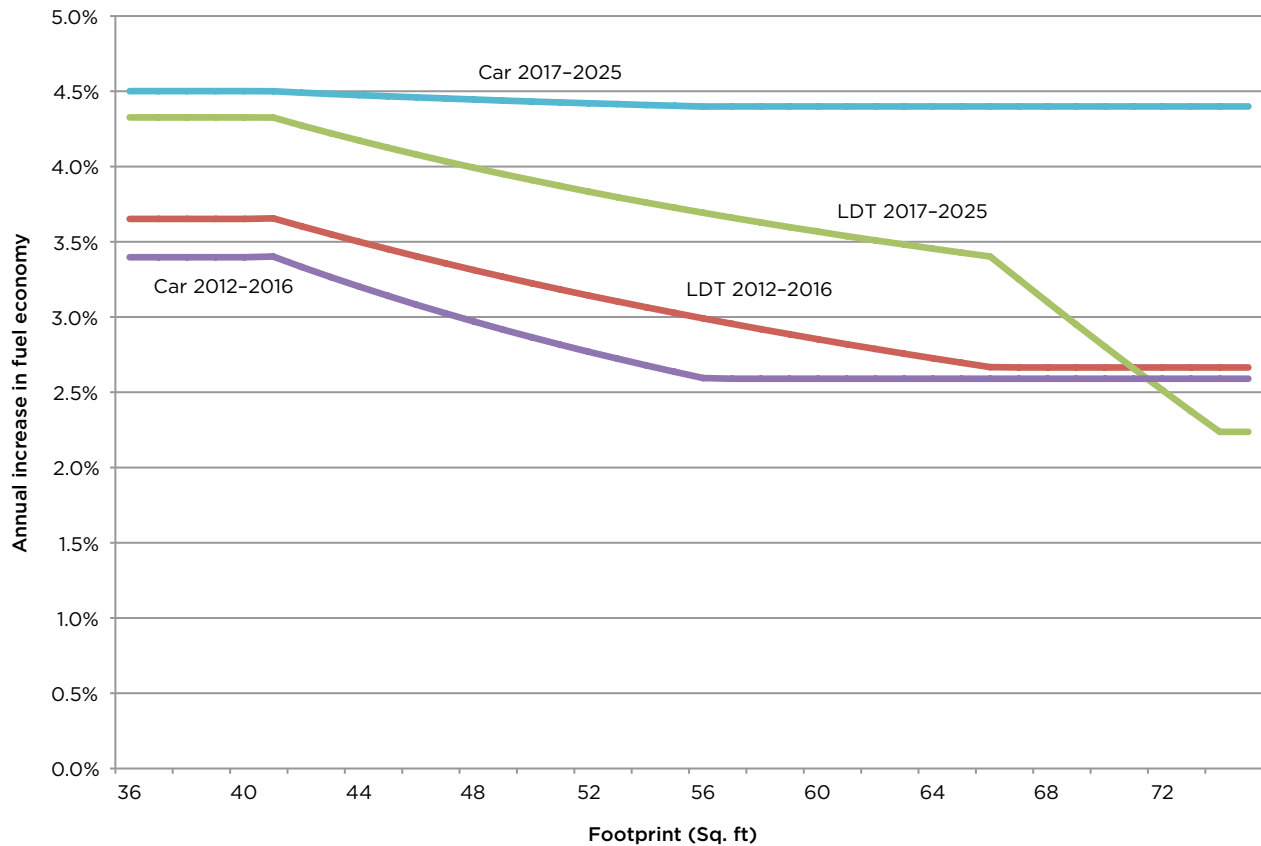


Figure 2. Percent annual increase in CAFE target, 2021 vs. 2016 and 2016 vs. 2012.

increase the incentive to reclassify cars as light trucks, with a small additional incentive for the smallest cars and gradually increasing for larger cars. Fortunately, few cars have a footprint larger than about 54 sq. ft at present.

any adjustments to the standards will be made with the participation of California Air Resources Board (CARB) and in a manner that ensures continued harmonization of state and Federal vehicle standards.

Mid-Term Review

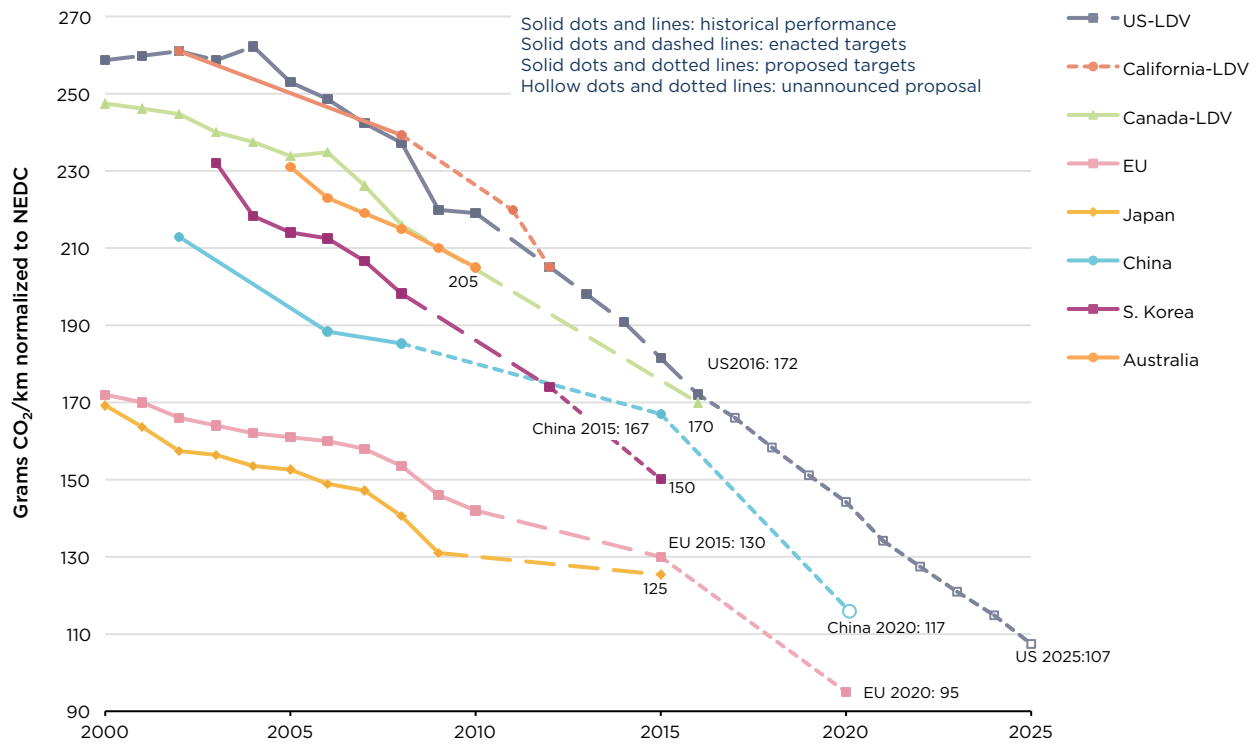
EPA and NHTSA intend to propose a comprehensive mid-term evaluation and agency decision-making for MY 2022–2025. This reflects the long time frame in setting standards for MY2022–2025 and NHTSA’s obligation under EISA to set standards for a maximum of 5 years. Up to date information will be developed and compiled for the evaluation, including public notice and comment. The Agencies fully expect that

International context

The ICCT has updated its chart that compares the GHG emission and fuel economy standards of major regulatory programs to reflect the new 250 g CO₂e/mile standards described in the notice. The chart converts all regulatory programs to the European test cycle, so the U.S. agreement for 250 g CO₂/mile is equivalent to about 172 g CO₂e/km when miles are converted to kilometers and adjusted to the European driving cycle. The 2025 standard of 163 g CO₂e/mile is similarly

equivalent to 107 g CO₂e/km as shown in Figure 3. Note that the US light-duty standard is composed of passenger cars as well as light-duty trucks. When passenger cars alone

are taken in to account, the 2025 standard is equivalent to 91 g CO₂e/km when adjusted for European driving cycle.



[1] China's target reflects gasoline fleet scenario. If including other fuel types, the target will be lower.
 [2] US and Canada light-duty vehicles include light commercial vehicles.

Figure 3. Comparison of the US target scenarios in the SNOI with standard proposals in other countries, in terms of NEDC gCO₂/km.