

## Memorandum

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From: Securing America's Future Energy

To:

Re: Fuel Economy Off Cycle Credit Program, Flexibilities and Estimated Fuel Savings

Date: June, 2018

The following document contains a set of flexibilities and technological advances that accelerate the pace of technological innovation in the transport sector. The first section describes a set of technologies that have shown promise in simultaneously improving safety and fuel economy. Cumulatively, if widely-deployed, they could yield 18-25% fuel economy savings across the vehicle fleet. We propose a real-world test of these technologies to determine their actual safety and fuel economy benefits. The second section focuses on the advanced-fuel multiplier currently set to expire in 2021. We argue this multiplier will encourage the continued development of advanced-fuel vehicles and should be extended through 2025. The final section aggregates the savings.

### Potential Savings

# 18-25%

System-wide fuel savings, when majority of vehicles employ technology

# 9,000 lives

annually when these technologies are deployed across a majority of the light-duty vehicle fleet.

### Section 1: Technology Innovation Accelerator

Given their early promise, we believe the technologies listed below should be encouraged as part of a mass-deployment initiative within the existing off-cycle credit program. The initiative would run for three to five years and be designed by a partnership between NHTSA, EPA and automakers. The initiative would create a mass-deployment of these technologies to provide a real-world test of their effectiveness across a broad range of technology platforms and vehicle types. In exchange for participating in the program and sharing the resulting data, the automakers would receive compliance credits for the years in which they participate in the program. If the promise of these technologies is demonstrated through the test, that information can be used to incorporate these technologies more formally into future compliance periods.

The technologies listed vary in how they will impact the total fuel consumption of the transportation system. Some improve the efficiency of the vehicle itself, while others streamline the system as a whole, and others contribute to fuel savings in both ways. As one example, accident-related congestion in the U.S. wastes almost one billion gallons of fuel every year. Adopting a suite of crash avoidance technologies known collectively as advanced driver-assistance systems (ADAS), can potentially mitigate the causes of 85 percent of crashes. These early results indicate that if these technologies were adopted on a wide scale, significant fuel efficiency benefits could be achieved. Included within this suite of technologies are features such as Lane Keeping Assist, Blind Spot Assist, Forward Collision Warning, braking technologies and Adaptive Cruise Control (ACC), which are explored in greater detail below. According to an industry claims filing by Mercedes-Benz, based in part on insurance industry research, using Lane Keeping Assist and Blind Spot Assist in all vehicles would reduce crashes by five percent; Forward Collision Warning and

Adaptive Brake Assist in all vehicles would reduce crashes by 15 percent; and using Emergency Braking and ACC in all vehicles would reduce crashes by 18 percent.<sup>1</sup>

However, these technologies are not currently included in vehicle fuel economy ratings because of the structural limitations of NHTSA and EPA tests. These tests run vehicles through a predetermined set of accelerations, but they lack the flexibility to account for the ability of these technologies to improve fuel economy through smoother acceleration and deceleration, avoiding congestion-causing accidents, or identifying alternative routes. Current estimates of potential fuel savings are listed below.

Such an initiative could be incorporated into two different parts of the current regulation. A detailed description is included in the appendix at the end of this memo. The changes could be made as part of the Notice of Proposed Rule Making. It is important to note that the prior administration expressly prohibited safety technologies from the off-cycle credit program. This language, a policy decision of the prior administration, would need to be amended; EPA has the authority to make such an amendment.

#### ADAS: Crash Avoidance and Automatic Braking Technologies

Automatic emergency braking technologies (AEB), also known as collision avoidance systems, are designed to prevent or reduce the severity of a collision. It is also known as a pre-crash system, forward collision warning system, or collision mitigating system. In addition to saving lives and reducing property damage, these systems reduce fuel consumption by reducing accident related congestion.

Depending on the automaker, between 20 and 50 percent of vehicles are fitted with these technologies, which are all available today for a few hundred dollars per installation. Only 19 percent of MY2017 vehicles offered these technologies as standard features. A pilot study conducted using a single company's aftermarket warning systems in cargo vans and pickup trucks observed an 86 percent reduction in collisions and at least a two percent increase in fuel efficiency.<sup>3</sup>

#### Potential Savings

**3%**

System-wide fuel savings, when majority of vehicles employ technology

**.42mpg**

2025 combined cars and trucks mpg savings

#### ADAS: Adaptive Cruise Control (ACC)

ACC allows a vehicle to slow down or speed up automatically to keep pace with the car ahead. In doing so, the need to brake or accelerate suddenly is diminished, improving fuel economy as a result. Testing has shown that ACC combined with forward collision warning technology can reduce fuel consumption by 2.8 percent on highways.<sup>4</sup> Additionally, because cars

#### Potential Savings

**7-10%**

Possible per-vehicle fuel savings, (upper bound)

**1.97mpg**

2025 combined cars and trucks mpg savings

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<sup>1</sup> Comments of Mercedes-Benz USA, LLC to Proposed Rule to Establish Light-Duty Vehicle Standards and Corporate Average Fuel Economy Standards for Model Year 2017 and OAR-2010-0799; FRL-9495-2; NHTSA-2010-0131 at A-10, A-11, (2012).

<sup>3</sup> Dish Network Data from Pilot Program; and SAFE interviews with industry; "Case Study: Dish saves fuel with Mobileye technology", *FleetOwner* (May 6, 2016).

<sup>4</sup> U.S. DOT, "Adaptive cruise control can reduce fuel consumption by 2.8 percent on highways." (Nov. 21, 2012) <https://www.itsbenefits.its.dot.gov/ITS/benecost.nsf/ID/FDC614281B2988DA85257D550068361E?OpenDocument&Query=BApp>

would be nearly-instantaneously responsive to changes in other vehicles' speeds, more cars could fit on the roads without increasing road capacity or reducing vehicle speeds. Significant adoption of ACC could enable smoother traffic flow, which would also improve both individual vehicle efficiency and highway capacity.

### Additional Stop/Start Reductions

Stop/start technologies save fuel by cutting the engine when a vehicle comes to a complete stop. In congested conditions, when vehicles frequently come to a standstill, the fuel savings with this technology are cumulative. Under average driving conditions, between three and five percent of fuel can be saved.<sup>5</sup> However, with increased stops and traffic lights that stay red for longer periods of time, savings can rise to ten percent.<sup>6</sup> The technology is relatively inexpensive for automakers to install, and analysts estimate that 65 percent of vehicles will be equipped with stop/start technology in 2021.<sup>7</sup>

### V2V, V2I Information Sharing

Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) technology shares information between vehicles and roadway infrastructure in close proximity to each other, which can augment the performance of other technologies, particularly ACC. V2X improves the effectiveness of ACC by monitoring what is happening several cars ahead, and subsequently direct a vehicle on a route that cuts congestion, reduces idling and saves fuel should an accident be identified further ahead. Furthermore, V2V has the potential to prevent 592,000 crashes and save over 1,000 lives per year.<sup>8</sup> Removing these crashes from U.S. roadways every year will subsequently remove the congestion experienced in the aftermath of these incidents, and forego the fuel wasted idling in traffic jams.

## Section 2: Advanced-fuel Vehicle Multiplier

Advanced fuel vehicles are powered by a diverse array of fuel types, from battery-powered electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) to vehicles powered by hydrogen fuel cells or natural gas. These vehicles are critical for U.S. energy security, as they provide a demand-side solution to U.S. oil dependence by opening up a wider range of fuel choices

<sup>5</sup> Eric Taub, "Start-Stop Technology Is Spreading (Like It or Not)" (Apr 7, 2016) New York Times <https://www.nytimes.com/2016/04/08/automobiles/wheels/start-stop-technology-is-not.html>

<sup>6</sup> Ibid.

<sup>7</sup> Melissa Burden, "Stop-start systems rolling out on more cars" (Nov 3, 2016) Detroit News <https://www.detroitnews.com/story/business/autos/2016/11/03/stop-start-systems-rolling-cars/93271604/>

<sup>8</sup> National Highway Traffic Safety Administration, "U.S. Department of Transportation Issues Advance Notice of Proposed Rulemaking to Begin Implementation of Vehicle-to-Vehicle Communications Technology," (Aug. 18, 2014) <https://www.nhtsa.gov/press-releases/us-department-transportation-issues-advance-notice-proposed-rulemaking-begin>

### Potential Savings

**3-5%**

per-vehicle fuel savings, when deployed 100% on highway driving

**1.6mpg**

2025 combined cars and trucks mpg savings

### Potential Savings

**1-4%**

Possible per-vehicle fuel savings (upper bound)

**.58mpg**

2025 combined cars and light trucks mpg savings

### Potential Savings

**1.7mpg**

2025 combined cars and light trucks mpg savings

for consumers. This greater fuel choice is crucial for both U.S. national and economic security, as 92 percent of the U.S. transportation system currently relies on petroleum fuels—a dependence on oil that harms consumers and businesses when prices spike, and reorders U.S. foreign policy priorities. Ultimately, increasing fuel diversity and consumer choice will counter the ability of a cartel to manipulate the price of transportation fuel.

The 2x credit multiplier for automakers is currently in place until 2021. Retaining the credit beyond this date will spur further production of advanced fuel vehicles at a key moment for the technology's adoption, as production costs fall and consumer acceptance grows. Retention of the multiplier is expected to save 1.7 miles per gallon across the U.S. vehicle fleet. Even if these savings are not fully realized, greater production of advanced fuel vehicles is still an important goal because of their economic benefits: Maintaining higher levels of advanced fuel vehicle production ensures the U.S. does not cede global leadership of a rapidly growing industry to international competitors—particularly China—and electric vehicles in particular are the preferred powertrain for autonomous vehicles, which hold the potential for significant safety, mobility and energy security benefits for the U.S.

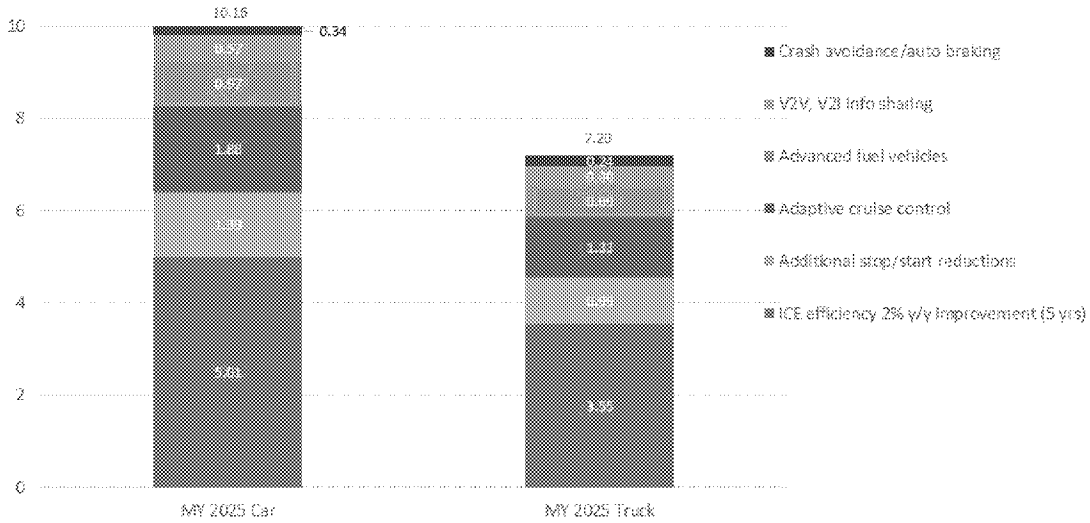
Through the regulatory review process currently underway, the EPA has the authority to eliminate the phase-out provision and extend the multiplier out to 2025. In the 2012 Final Rule the EPA formally disagreed with commenters that wanted to extend the multiplier beyond 2021. The Agency will need to explain its rationale for the change and acknowledge that it is a shift from the prior administration's policy. (See the appendix below for more details.)

### Section 3: Aggregated Benefits

SAFE commissioned Air Improvement Resource to model the potential fuel economy savings if these technologies were widely deployed in the U.S. vehicle fleet. A review of two dozen studies underpinned the analysis, and identified the savings summarized in the table below. The majority of these savings are additive and together identify the potential to reduce fuel consumption by 18 to 25 percent if deployed throughout the fleet.

The chart below outlines the estimated fuel economy benefits if there was widespread adoption of the technologies described above. The graph assumes an annual efficiency gain in the internal combustion engine of 2.0 percent per year between 2022 and 2025. This would lead to improvements of 5.01 miles per gallon (mpg) in cars and 36 in light trucks respectively. Additional start/stop improvements that the industry could adopt readily would add an additional 1.4 mpg for cars and 1 mpg for trucks. Adaptive cruise control, vehicle-to-vehicle (V2V) and crash avoidance has the potential account for another 2.8 mpg for cars and 2.0 mpg for trucks. Finally, further production of advanced fuel vehicles induced by the extension of the advanced fuel multiplier could contribute 1.7 mpg collectively. Altogether, this approach could provide 10.16 mpg compliance for cars and 7.2 mpg compliance for light trucks.

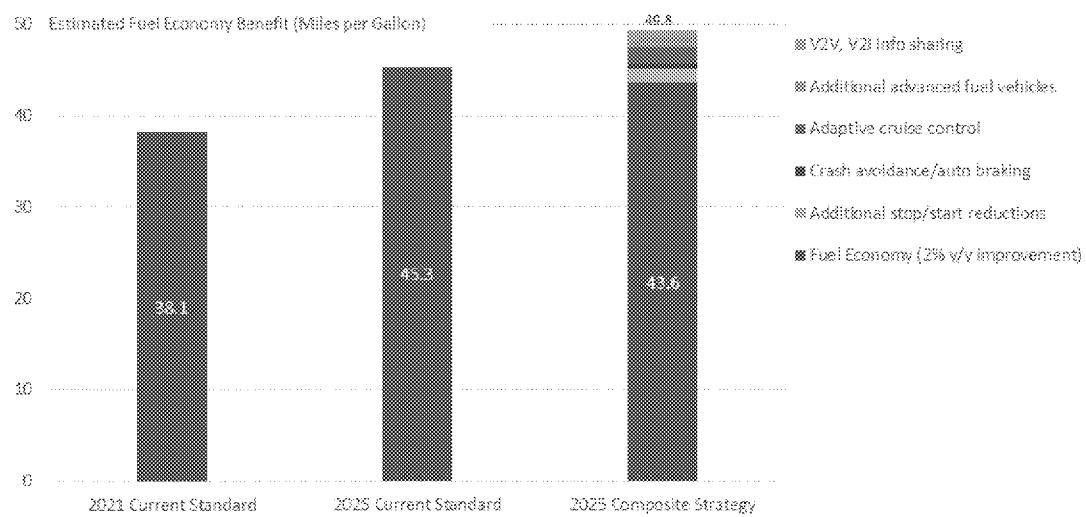
### Potential Fuel Economy Savings in 2025



Source: Air Improvement Resource, Inc.

The second chart combines the benefits of cars and trucks from the previous chart in order to show the relative impact of the measures contained in our proposal. The current standard calls for an improvement in overall fleet fuel economy from 38.1 mpg in 2021 to 45.3 mpg in 2025. If such measures were fully implemented and their benefits fully realized, it would allow the standards to achieve 49.8 mpg in 2025, ten percent higher than the current 2025 obligation but with greater flexibility for industry.

### Potential Fuel Economy Improvement in 2025



Source: Air Improvement Resource, Inc.

## Appendix: Incorporation into existing regulatory structure

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### 1. *Incorporating a pro-innovation initiative within the off-cycle credit program*

- EPA adopted the Off-Cycle Credit Program pursuant to Section 202(a) of the Clean Air Act (42 U.S.C. § 7521(a)) as it relates to greenhouse gas (GHG) emissions, and pursuant to the Energy Policy and Conservation Act (“EPCA”) (specifically 49 U.S.C. § 32904) as it relates to fuel economy standards.
  - Section 202(a) of the Clean Air Act gives EPA broad authority to regulate GHGs from mobile sources, and the prior Administration concluded that it had the authority to offer credits for emission reducing technologies under the off-cycle program.
  - Section 32904 of EPCA gives EPA the authority to measure fuel economy for vehicles and calculate average fuel economy for manufacturers. Pursuant to this statutory provision, in 2012, the prior Administration concluded that it had the authority to give credit for fuel economy improving technologies under the off-cycle program as a part of the fuel economy calculation process, and offered this credit starting in FY 2017. See 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards, 77 Fed. Reg. 62,624, 62,628, 62,649-50, 62,961, 63,125 (Oct. 15, 2012) (“2012 Final Rule”).
- The current Off-Cycle Credit Program is located at 40 C.F.R. § 86.1869–12 (“CO<sub>2</sub> credits for off-cycle CO<sub>2</sub>–reducing technologies”). A new initiative for autonomous vehicle/safety technologies could be inserted in this regulation, or in a separate regulation in 40 C.F.R. Part 86, Subpart S (“General Compliance Provisions for Control of Air Pollution from New and in-Use Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Vehicles”). In addition to the Off-Cycle Credit Program, EPA’s regulations crediting other efficiency improvements (e.g., air conditioning efficiency) are also included in this subpart. Depending on where the new provisions are inserted, changes may also need to be made to 49 C.F.R. § 531.6, which allows for off-cycle credit for the fuel economy program by cross-referencing EPA’s off-cycle regulation at 40 C.F.R. § 86.1869–12. Any new regulation would need to also be cross-referenced here.
- The current regulation contains a limitation that restricts the eligibility of safety technologies for off-cycle credit: “Off-cycle credits may not be approved for crash-avoidance technologies, safety critical systems or systems affecting safety-critical functions, or technologies designed for the purpose of reducing the frequency of vehicle crashes. Off-cycle credits may not be earned for technologies installed on a motor vehicle to attain compliance with any vehicle safety standard or any regulation set forth in Title 49 of the Code of Federal Regulations.” 40 C.F.R. § 86.1869-12(a).
  - This language would need to be amended. However, the agencies are permitted to change their prior position in a notice-and-comment rulemaking (as long as they

acknowledge the change and provide an explanation for it) and can amend this regulation to allow for credit to be provided for safety-related technologies. See *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 514-15 (2009).

- It is important to note that the prior Administration’s decision to disallow off-cycle credit for safety technologies was framed as a policy decision, rather than a decision based on a lack of statutory authority. Part of the logic for this previous limitation was that these technologies improve the fuel economy of other vehicles (or the fleet as a whole) rather than the efficiency of the specific vehicle on which they are installed. See 2012 Final Rule at 62,732-33. However, fuel economy standards apply to manufacturer fleets, rather than specific vehicles, so this should not disqualify safety technology from being eligible for credit—especially in light of the fact that EPA applies the off-cycle improvement value at the fleet level. See 2012 Final Rule at 62,839 (“The [fuel economy] improvement value for off-cycle improvements will be determined at the fleet level[.]”). Other reasons for the prior Administration’s failure to recognize the benefits of safety technologies were related to its ability to quantify the benefit provided, and that it thought that such technologies were better promoted under NHTSA’s safety authority. The new administration is free to revisit these policy choices. This is the purpose of the proposed “test” program as opposed to a final or permanent credit.

## 2. *Extending the multipliers for advanced fueled vehicles*

- Pursuant to its authority under Section 202 of the Clean Air Act, EPA adopted multipliers for advanced fuel vehicles during the FY 2017-2025 timeframe. See 2012 Final Rule at 62,812-62,816.
- EPA’s regulation at 40 C.F.R. § 86.1866-12(b) provides the authority for these multipliers for the purposes of credit under EPA’s GHG emissions program, and reduces credits from 2017 to 2021, when they are phased out.
  - EPA can amend this phase-out provision through notice and comment rulemaking to extend these multipliers past 2021.
  - Note, that in the 2012 Final Rule, EPA stated that “EPA disagrees with those commenters that support higher multipliers and/or multipliers of longer duration, as we believe that such incentives could lead to a significant reduction in program GHG savings, particularly if EV/PHEV/FCV sales increase significantly after MY 2021.” See 2012 Final Rule at 62,813. EPA has thus previously stated that multipliers should only extend to 2021. As noted above, EPA is permitted to change its position, but it should be sure to explain its rationale and acknowledge its prior statements on the issue if it reverses its prior rulemaking.

- It is important to note that, under the prior Administration, NHTSA has interpreted its authority to offer advanced fuel incentives more narrowly and did not offer multipliers for fuel economy purposes. See 2012 Final Rule at 62,628 (“NHTSA currently interprets EPCA and EISA as precluding it from offering incentives for the alternative fuel operation of EVs, PHEVs, FCVs, and NGVs, except as specified by statute, and thus did not propose and is not including incentive multipliers comparable to the EPA incentive multipliers.”); see also *id.* at 62,651.
  - 49 U.S.C. §§ 32904, 32905, 32906 are statutory provisions that contain specific fuel economy incentives for various kinds of alternative fuel vehicles. The prior Administration thus concluded that these provisions should govern the incentives provided to such vehicles. As NHTSA has explained: “Because 49 U.S.C. 32904(a)(2)(B) expressly requires EPA to calculate the fuel economy of electric vehicles using the Petroleum Equivalency Factor developed by DOE, which contains an incentive for electric operation already, 49 U.S.C. 32905(a) expressly requires EPA to calculate the fuel economy of FCVs using a specified incentive, and 49 U.S.C. 32905(c) expressly requires EPA to calculate the fuel economy of natural gas vehicles using a specified incentive, NHTSA believes that Congress’ having provided clear incentives for these technologies in the CAFE program suggests that additional incentives beyond those would not be consistent with Congress’ intent. Similarly, because the fuel economy of PHEVs’ electric operation must also be calculated using DOE’s PEF, the incentive for electric operation appears to already be inherent in the statutory structure.” *Id.* at 62,651 n.87.
  - Under NHTSA’s prior interpretation, a statutory amendment may be necessary to provide certain types of fuel economy incentives to alternative fuel vehicles.