

# ALTERNATIVE FUELS IN CAFE RULEMAKING

Gregory Powell, Fuel Economy Division,  
National Highway Traffic Safety Administration



## Alternative Fuels and CAFE

**NHTSA has a long history of regulating fuel economy for light-duty vehicles and, more recently, medium- and heavy-duty vehicles**

- Corporate Average Fuel Economy (CAFE) under the Energy Policy and Conservation Act (EPCA) – 1975
- Energy Independence and Security Act (EISA), required developing a new fuel efficiency program for medium-duty, heavy-duty (MDHD) and work trucks – 2007
- For both programs, NHTSA incentivizes alternative fuel vehicle implementation into the U.S. Fleet

# Alternative Fuels

**The USDOT currently recognizes the following as Alternative Fuels:**

- Denatured Ethanol
- Electricity
- Natural Gas
- Liquefied Petroleum Gas
- Hydrogen
- Fuels derived from biological materials (e.g. biodiesel)
- Methanol
- Other Alcohol
- Coal Derived Liquid Fuels

Notes:

- Defined by Title 49, U.S.C. 32901
- To be considered an Alternative Fuel – alcohols need to be blended at levels of at least 85 percent of the total mixture when blended with gasoline or other fuels.
- The agency considers “neat” biodiesel (B100) to be an alternative fuel

# Alternative Fuel Incentives – Light Duty

## **Incentives apply to “dedicated” and “dual-fuel” alternative fuel vehicles as defined by the Alternative Motor Fuels Act (AMFA) of 1988**

- Generally, alternative fuel vehicles are incentivized by a 0.15 divisor
  - Liquid Fuels – E85, Biodiesel, LPG :
    - One gallon is counted as 0.15 gallon of fuel
  - Gaseous fuels – Natural Gas/Hydrogen:
    - Converted to a gallon gasoline equivalent (gge) through petroleum equivalent factors (PEF) and then the 0.15 incentive is applied
  - Electricity:
    - Converted to a gallon gasoline equivalent through the Department of Energy (DOE) Petroleum Equivalency Factor (PEF) formula. The PEF formula includes the 0.15 incentive.
- “Dedicated” or “dual-fuel” vehicle fuel economy is calculated differently, as follows

# Alternative Fuel Incentives – Light Duty

## Example alternative fuel incentive calculations

- Dedicated alternative fuel vehicle:

- Measured fuel economy on alternative fuel → 25 mpg
- Divide by Incentive amount → 0.15
- CAFE compliance amount per vehicle produced → 166.7 mpg

- Dual-fuel alternative fuel vehicle through Model Year 2019:

- Assume half of the vehicle operation is with alternative fuel, and half is with gasoline:

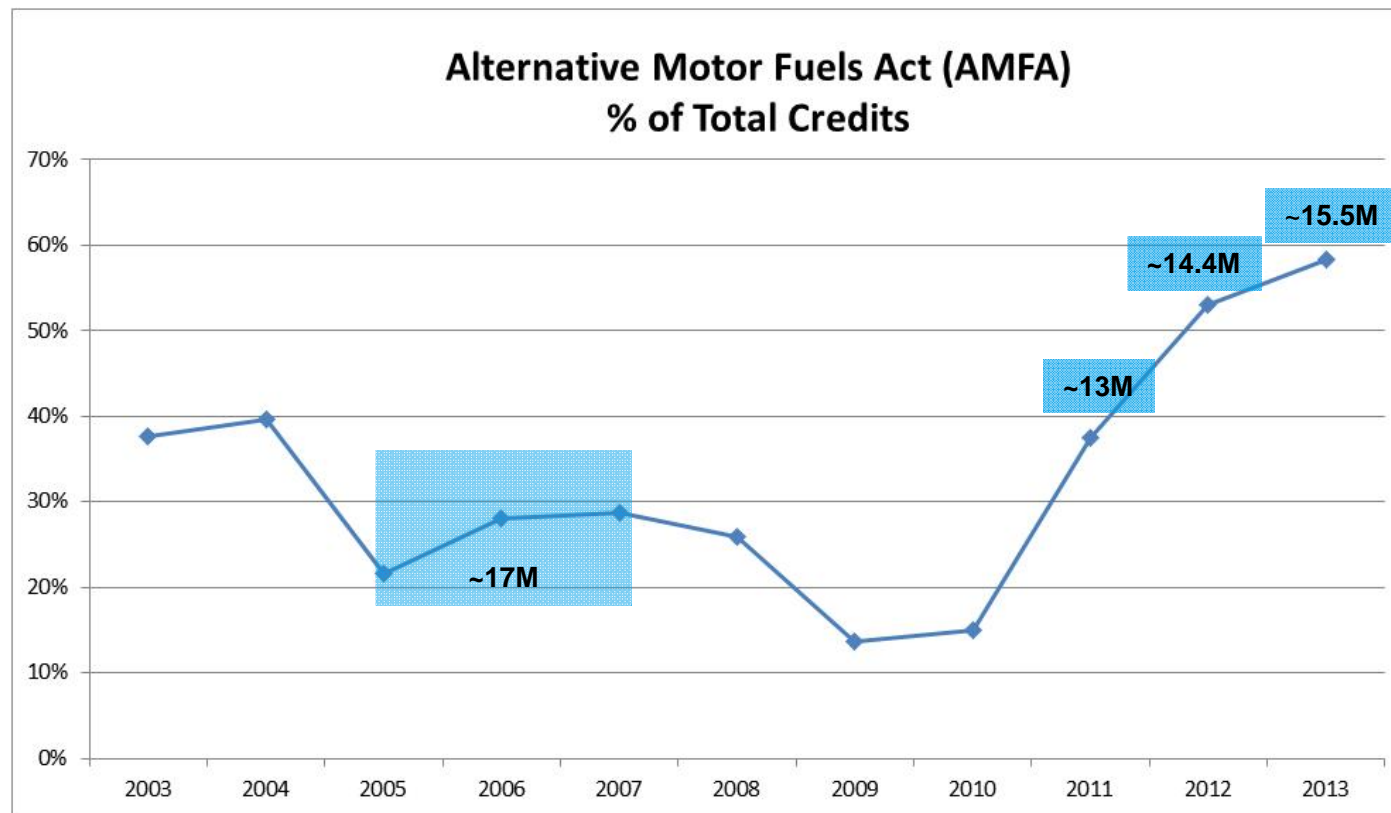
$$FE_{\text{dual}} = \frac{1}{\frac{0.5}{166.7 \text{ mpg}} + \frac{0.5}{25 \text{ mpg}}} = 43 \text{ mpg}$$

- Maximum increase in fuel economy for each fleet is capped at 1.2 mpg through MY 2014, phasing down to 0.2 mpg in 2019, except electricity has no cap.

# Alternative Fuel Credit Usage

Manufacturers have continually utilized alternative fuel credits – primarily through the sale of Flexible Fuel Vehicles (FFVs) capable of operating on E85 blends.

Recent trend indicates an increase in utilization.



AMFA Credit Source: USDOT – NHTSA Office of Vehicle Safety Compliance: January 2015

Approx. US Annual Sales in Millions (M)  
Source: Wards Auto

# Alternative Fuel Incentives – Light Duty

## **Dual-fuel alternative fuel vehicle calculation post-AMFA: Model Year 2020 and beyond**

- E85: Weighting of alternative fuel use and gasoline use is based on demonstrated/projected use in the field
- Natural Gas and Electricity
  - Shift to use of the SAE “utility factor” methodology (based on the alternative fuel range and typical daily travel mileage)
  - Utility factor determines how to proportion measured values when a vehicle is operating on gasoline or diesel fuel and operating on the alternative fuel
  - Continues the use of PEF and the 0.15 incentive for the proportion of operation on alternative fuel
- No cap on maximum increase in fuel economy for each fleet

# Alternative Fuel Incentives – Heavy Duty

## MY 2014 – 2018 HD (Phase 1) regulations incentives for alternative fuel vehicles

- Primary incentive is via measuring consumption based on vehicle CO2 emissions, instead of energy equivalency
  - For Natural Gas, yields an incentive of 20% to 30%
  - Electricity and Hydrogen, counted as no (zero) fuel consumption, because no tailpipe CO2 emissions
  - There is an additional 1.5x vehicle multiplier for Hybrid (HEV), Plug-In Hybrid (PHEV) and dedicated Electric Vehicles (EVs)



# Alternative Fuels Rulemaking Analysis

**NHTSA analysis shows manufacturers could comply with MY 2012-2016 CAFE regulations and MY 2014-2018 HD fuel consumption regulations without producing alternative fuel vehicles.**

- Overall there are a wide range of non-alt fuel technologies available for automakers to meet the upcoming standards
  - Advanced gasoline engines and transmissions, vehicle mass reduction, improved aerodynamics, lower rolling resistance tires, diesel engines, more efficient accessories, improvements in air conditioning systems
- For light-duty vehicles, the agency projects fleet production of about 1-3% for MY2025 as EVs/PHEVs\*

\*based on current projected, augural 2021-2025 CAFE standards