EPA's Regulatory Authority to Address Octane

MSTRS Meeting

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EPA Fuels Regulatory Authority

- Congress has given EPA regulatory authority for motor vehicle and nonroad fuels
  - Contained in Title 2 (Mobile Sources) of the CAA, Section 211
    - Major revisions in 1990
    - Several subsequent amendments
  - Specific requirements and general authority
  - Fuels and fuel additives only – not lubricants
  - No other Federal agencies have authority (FAA has authority over aircraft fuels tied to an EPA finding of need)

- EPA's authority is primarily limited to vehicle and engine emissions in order to protect public health and welfare and emissions control devices
  - NOT vehicle and engine performance issues
  - Market has relied on ASTM, NCWM, API standards to protect gasoline quality for performance objectives

- Until Octane became an emissions issue with CO2, it remained outside EPA's purview

CAA Fuel Authorities

- 211(a)&(b) – Fuel and Fuel Additive Registration
- **211(c) – Broad and General Authority**
- 211(f) – Fuel must be substantially similar to the fuel used in vehicle certification
- 211(h) – Gasoline volatility (RVP)
- 211(k) – Reformulated gasoline (RFG) and Antidumping for conventional gasoline
- 211(l) – Gasoline Detergents
- 211(o) – Renewable Fuel Standard (RFS)
- 211(q) – 1st RFS Anti-backsliding study requirement
- 211(v) – 2nd RFS Anti-backsliding study requirement
- 211(i) – 500 ppm std for highway diesel (now moot)
- 211(j) – Lead substitute gasoline additives
- 211(m) – Wintertime oxy fuels (essentially over)
- 211(n) – Lead prohibition for highway use
- 211(r) – clarifying that fuel manufacturer includes importers
- 211(s) – Conversion assistance for cellulosic fuels 2006-8
- 211(t) – Allowance for ethanol commingling
- 211(u) – Standards for biodiesel

Fuel Standards

(Effective Dates)

1974	Unleaded Gasoline
1979	E10 Ethanol Subsim Waiver
1980	Gasoline Sub-Sim
1989	Phase 1 Gasoline Summer RVP Limits
1991	Phase 2 Gasoline Summer RVP Limits (7.8, 9.0, 1-psi E10 waiver)
1992	Winter Oxyfuels Program (39 cities)
1993	Highway diesel fuel sulfur control (500 ppm)
1995	Phase 1 RFG and Anti-dumping
1995	Gasoline Detergent Additives Fuel and Fuel Additives Registration
1996	Prohibition on lead
2000	Phase 2 RFG
2002	Mobile Source Air Toxics (MSAT1)
2004	Tier 2 Gasoline Sulfur Control (30 ppm avg, 80 cap)

Red = General Authority
Black = Other

Fuel Standards (cont.)

2006	EPAct 2005 – RFS1 Default Rule
2006	Removal of RFG Oxy Mandate
2006	Ultra-low Sulfur Highway Diesel Fuel (15 ppm)
2006	Boutique Fuels List
2007	Nonroad, Locomotive and Marine Diesel Fuel (500 ppm)
2007	RFS1 Finalized/Implemented; EISA passed requiring RFS2
2010	Ultra-low Sulfur Nonroad Diesel Fuel (15 ppm)
2010	Renewable Fuels Standard 2 Finalized/Implemented
2011	MSAT2 -Gasoline benzene
2012	E15 Subsim Waiver/Misfueling Mitigation Rule
2012	Ultra-low Sulfur Locomotive and Marine Diesel Fuel (15 ppm)
2012	Low Sulfur Bunker Fuel in ECA (10,000 ppm)
2015	Low Sulfur Bunker Fuel Sulfur (1000 ppm)
2011-14	Annual RFS Rules
2017	Tier 3 -Gasoline Sulfur

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Black = Other

What About Octane?

- Considerable interest is being expressed in raising US gasoline octane levels
  - The U.S. lags much of the world
  - We've had an influx of high octane ethanol
- Raising octane levels may allow higher compression engines, improving fuel efficiency and reducing GHG emissions
  - Enabling LDGHG standards that go beyond the 2025 standards
- Now that EPA can regulate CO2, can't EPA just require higher octane?
- Of the various authorities our broad and general section 211(c) authority is the likely means to allow us to get at octane

Statutory Authority: General Fuel Stds

- CAA 211(c): **EPA may limit or prohibit F/FAs**:
  - (1)(A) "if in the judgment of the Administrator, any fuel or fuel additive or any emission product of such fuel or fuel additive **causes or contributes to air pollution** or water pollution… that may reasonably be anticipated to endanger the public health or welfare," or
  - (1)(B)"if **emission products** of such fuel or fuel additive will **impair** to a significant degree the performance of any **emission control device** or system which is in general use, or has been developed to a point where in a reasonable time it would be in general use were such regulations to be promulgated"
- (A) is focused primarily on emission benefits from the existing fleet
- (B) is focused primarily on emission impacts on vehicle technology

CAA 211(c)(1)(A) – Cause or Contribute

- **First requires an EPA finding that emissions from a F/FA causes or contributes to air pollution that endangers public health and welfare**
  - To date we have not done so for GHG under 211(c) - fuels
  - Only for motor vehicles under 202(a)

- We would likely have to show how raising gasoline octane will reduce GHG emissions from the existing fleet

- 211(c)(2)(A) requires that prior to setting a F/FA standard, **must first consider other technologically or economically feasible means** of achieving the vehicle and engine emission standards
  - If something other than octane could achieve the reductions and get them as economically then we must pursue those first

- To get the rule through the administrative process we would have to show how the benefits of raising gasoline octane would justify the cost

CAA 211(c)(1)(B) – Impair

- Control of octane would appear to be aimed at facilitating vehicle emission control technology (e.g., higher compression ratios) which is addressed under 211(c)(1)(B)

- To utilize 211(c)(1)(B) authority for octane, EPA would be required to show a tie to emission products associated with fuels with higher or lower octane
  - "if **emission products** of such fuel or fuel additive will **impair** to a significant degree the performance of any emission control device or system"

- In the past when we have used 211(c)(1)(B) authority the connection has been clear
  - The emission products of burning lead and sulfur in the fuel were clearly impairing catalyst emission performance
  - For octane, the emission products of burning high octane fuel might have to be tied to engine compression ratios

CAA 211(c)(1)(B) – Impair (cont.)

- In addition, when regulating under 211(c)(2)(B), prior to setting a standard
  - EPA **must first consider** **"available scientific and economic data," including** **a "cost benefit analysis" comparing the emission control systems that do and don't require the fuel change**

- EPA would need to justify why technologies enabled by higher fuel octane are more beneficial than other technology options
  - E.g., light-weighting, hybridization, etc.
  - Including consideration of options such as phasing in a high octane standard with a new vehicle fleet

CAA 211(c)(1)(A) or (B)

- EPA recently finalized MY2017-2025 LDGHG standards
  - Based on projected use of:
    - Advanced gasoline engines and transmissions
    - Vehicle mass reduction
    - Improved aerodynamics, lower rolling resistance tires
    - Diesel engines
    - More efficient accessories, improvements in air conditioning systems
    - Electric technologies such as start-stop systems, mild and strong hybrids, plug-in hybrids, and all electric vehicles in limited numbers
  - Actual technology used will vary; left up to the market

- To use 211(c)(1)(B) to raise gasoline octane we have to be looking at LDGHG standards beyond 2025 levels

CAA 211(c)(2)(C) New Fuel Not Worse

- Can only exercise 211(c)(1) authority to prohibit a F/FA upon publishing a finding:
  - That the control of the fuel or fuel additive in question **will not cause the use of another fuel or fuel additive which will endanger public health and welfare** the same or worse

- In the case of a high octane fuel standard it could require:
  - Test data on vehicles that are designed for the higher octane fuel
  - Test data on the in-use fleet with and without the new fuel
  - Evaluation of vehicle emission performance for all pollutants, not just GHG

CAA 211(c)(4) – State Limitations

- **States (other than CA) cannot set standards for F/FA** for the purposes of emission control if EPA has controlled it or found it shouldn't be controlled
  - To date EPA has taken no action wrt octane

- Due to Boutique fuel concerns 211(c)(4)(C)(v) was added - limiting new State fuel programs to expansions of existing Boutique fuels

- However, 211(c)(4) does not restrict states from setting fuel standards for reasons other than air quality
  - States can and do have ethanol, biodiesel requirements

Tier 3 as a Case Study

- The time frame to complete all the steps could be ~10 years as in the recent Tier 3 rule
  - Initial scoping began in 2004; initial data gathering in 2005
  - Rule not finalized until 2014
  - Rule not fully phased in until 2020
- The hurdle for octane may be significantly higher
  - Tier 3 was <1¢/gal and <$100/vehicle
- A longer phase-in for octane may be required
  - Tier 3 provided significant benefits to the existing fleet which is not currently evident with octane
  - To limit costs, ease implementation, and meet benefit/cost requirements Tier 3 was phased in from 2014-2020

Conclusions

- CAA 211(c) provides EPA with broad and general authority to regulate fuels and fuel additives
- This authority could be used to either “control” or “prohibit” the octane level of gasoline
- To exercise this authority for octane EPA would have to meet a number of CAA requirements
- Even if the rule were initiated now it would likely be a number of years before it could be implemented
  - Likely phased in over an extended period of time

Thank You