



**Can Fuel Efficiency Standards Be Met Cost-Effectively?**  
The Potential for High-Octane, Low-Carbon Fuels:  
*Legal and Regulatory Issues*

BOYDEN GRAY  
& ASSOCIATES

Andrew Varcoe & Adam Gustafson  
avarcoe@boydengrayassociates.com  
gustafson@boydengrayassociates.com  
202-706-5488 / 202-955-0620

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# Overview

- 1) **A Window for Change**. EPA has restarted its Mid-Term Evaluation (MTE) of 2022-25 standards for vehicles. EPA is considering how the standards relate to high-octane fuel.
- 2) **Regulatory Opportunities: Fuel Volatility (Reid Vapor Pressure) Regulation**. EPA should apply the same fuel volatility standard to higher-ethanol fuel blends that EPA applies to E10.
- 3) **Regulatory Opportunities: Certification Fuel Approval**. A new certification fuel would remove obstacles to designing engines optimized for mid-level ethanol blends.
- 4) **Regulatory Opportunities: Other Issues**. Obscure, but important.



# **A Window for Change**

The Mid-Term Evaluation  
of EPA's Greenhouse Gas Standards  
and NHTSA's Fuel Economy Standards

# 2012: EPA and NHTSA impose vehicle greenhouse gas and fuel economy standards from 2017 to 2025

In 2012, EPA and NHTSA (DOT) finalized a joint rule requiring passenger cars and trucks to meet increasingly ambitious greenhouse gas and fuel economy standards from model years 2017 to 2025. EPA projected an increase from **35.5 mpg** in 2016 to **54.5 mpg** in 2025. EPA-420-F-12-051.

Table 1 - Projected Fleet-Wide Emissions Compliance Targets under the Footprint-Based CO <sub>2</sub> Standards (g/mi) and Corresponding Fuel Economy (mpg)										
	2016 base	2017	2018	2019	2020	2021	2022	2023	2024	2025
Passenger Cars (g/mi)	225	212	202	191	182	172	164	157	150	143
Light Trucks (g/mi)	298	295	285	277	269	249	237	225	214	203
Combined Cars & Trucks (g/mi)	250	243	232	222	213	199	190	180	171	163
Combined Cars & Trucks (mpg)	35.5	36.6	38.3	40.0	41.7	44.7	46.8	49.4	52.0	54.5

## Mid-Term Evaluation (“Reality Check”)

In conjunction with the 2012 EPA and NHTSA decision, EPA, NHTSA, and California agreed to complete a joint Mid-Term Evaluation (MTE) of the standards by April 2018 to determine whether those standards remain “appropriate.”

The Mid-Term Evaluation can be seen as a “reality check” on the feasibility and appropriateness of the standards.

## **Mid-Term Evaluation (2017): Reconsideration by New Administration**

In January 2017, EPA issued a “final determination” indicating that the existing standards remain appropriate.

In March 2017, EPA Administrator Pruitt and DOT Secretary Chao reopened this evaluation process. EPA intends to make a new “final determination” by April 1, 2018.

## Mid-Term Evaluation (2017): New Focus on Octane

Octane is a measure of the antiknock properties of a liquid motor fuel.

In its notice reopening the comment period (Aug. 21, 2017), EPA invited comment on (inter alia) “the impact of the standards on advanced fuels technology, **including but not limited to the potential for high-octane blends.**”

## Mid-Term Evaluation (2017): New Focus on Octane

EPA Administrator Scott Pruitt (Aug. 2017):

“That 15 billion gallon cap [*for conventional biofuels’ participation in the Renewable Fuel Standard program*]*—maybe it needs to be reset above that. I think we need to consider, as another example on a different topic, **high octane** with respect to CAFE standards.*”

*Audio: [www.radioiowa.com/2017/08/11/epa-chief-production-levels-demand-matter-in-rfs-decision/](http://www.radioiowa.com/2017/08/11/epa-chief-production-levels-demand-matter-in-rfs-decision/).*

## Mid-Term Evaluation (2017): New Focus on Octane

EPA's new focus on octane is significant:

- Reducing regulatory barriers to higher-octane fuels could help auto manufacturers comply with standards over the long term -- lowering greenhouse gas emissions and increasing fuel economy, while reducing compliance costs.
- Before such cost savings can be realized, the regulatory barriers will need to be removed.

## Background on Octane: Industry Observations

“Ford supports the development and introduction of an intermediate level blend fuel (E16-E50), with a minimum octane rating of 91 anti-knock index (AKI) that increases proportionally as ethanol is splash-blended on top of the base Tier 3 gasoline emission test fuel.” Ford Motor Co., Tier 3 Comments (2013).

“GM supports the future of higher octane and higher ethanol content in order to provide a pathway to improved vehicle efficiency and lower GHG emissions.” GM, Tier 3 Comments (2013).

“[A] powertrain . . . optimized for a high-octane, mid-blend ethanol fuel . . . can simultaneously fulfill what the customer desires—performance and economy—while reducing the environmental impact.” Mercedes-Benz, Tier 3 Comments (2013).

# Background on Octane: EPA Observations

## EPA in 2014:

“[A] higher octane, higher ethanol content test fuel:

- “could help manufacturers who wish to raise compression ratios to improve vehicle efficiency as a step toward complying with the 2017 and later light-duty greenhouse gas and CAFE standards.
- “could help provide a market incentive to increase ethanol use beyond E10.
- “could . . . enhance the environmental performance of ethanol as a transportation fuel by using it to enable more fuel efficient engines.”

Tier 3 Final Rule, 79 Fed. Reg. at 23528-29 (2014).

## Background on Octane: Mid-Term Evaluation (2017)

Urban Air Initiative comments (Oct. 2017):

- The auto-industry needs high-octane fuel to meet the emissions and fuel economy standards. EPA understands that high-octane fuel can be a tool for future compliance. But EPA has not yet removed regulatory barriers that prevent automakers and consumers from using high-octane fuels in the most optimal fashion.
- To enable cost-effective compliance with the standards, EPA must act to remove outdated and counterproductive barriers to high-octane fuel use.

## Background on Octane: Mid-Term Evaluation (2017)

Auto Alliance comments (Oct. 2017):

- “[T]he Alliance has long advocated transition to a higher-octane gasoline (minimum 95– 98 RON). There are several ways to produce higher-octane grade gasoline, and the Alliance does not advocate any sole or particular pathway. Higher-octane gasoline enables opportunities for use of key energy-efficient technologies, including higher compression ratio engines, lighter and smaller engines, improved turbocharging, optimized engine combustion phasing/timing, and low-temperature combustion strategies.”



# **Regulatory Opportunities:** Fuel Volatility Regulation

EPA should apply the same fuel volatility (Reid Vapor Pressure) standard to higher-ethanol fuel blends that EPA applies to E10.

# Reid Vapor Pressure (RVP) Relief

Reid Vapor Pressure (RVP) is a measure of fuel volatility.

The Clean Air Act's 1 psi (pound per square inch) waiver provision “loosens” the regulatory Reid Vapor Pressure (RVP) requirement for all “fuel blends containing gasoline and 10 percent denatured anhydrous ethanol.” 42 U.S.C. § 7545(h)(4).

In the past, EPA has interpreted this statutory “RVP waiver” provision to apply only to gasoline with 9-10% ethanol (E9-E10). 40 C.F.R. § 80.27(d)(2). This historical interpretation is in tension with the text of the statute.

## Reid Vapor Pressure (RVP) Relief

The text of the law is best read to apply “*all* fuel blends containing gasoline and 10 percent denatured anhydrous ethanol,” *id.* § 7545(h)(5) – including ethanol blends above 10% (E15, E25, etc.).

This interpretation is supported by (1) the statute’s reference to “*all* fuel blends...”, as well as by (2) the statute’s affirmative defense for cases where “the ethanol portion of the fuel blend does not exceed its waiver condition under” a separate provision that could be used to authorize the use of *higher-ethanol* blends. *Id.* § 7545(h)(4).

If Congress had wanted to limit the RVP waiver to blends ***no higher than*** 10 percent ethanol, Congress would have said so. That would have required different statutory language.

## Reid Vapor Pressure (RVP) Relief

EPA acted several years ago to authorize the sale of E15 in the marketplace.

E15 is penetrating the marketplace, and is becoming available at more and more U.S. gas stations. As Growth Energy notes, more than 1,000 stations across the country are currently offering E15 to consumers.

Yet EPA's past interpretation of the RVP waiver law imposes a major obstacle to E15 sales. Every June (except in so-called RFG areas), convenience store owners and other fuel retailers are required to restrict the sales of E15 to flex-fuel vehicles. When summer driving season starts, many store owners' E15 sales "drop like a rock."

## Reid Vapor Pressure (RVP) Relief

EPA's past interpretation of the RVP waiver statute is counterproductive.

E15 and other midlevel blends have *lower RVP* (i.e., *lower volatility*) than E10. As EPA has said, “the addition of ethanol to gasoline” above 10 percent ethanol “decreases blend volatility.”

# EPA Is Reviewing the RVP Relief Issue

## EPA Administrator Scott Pruitt:

“With respect to the [RVP] issue, we are looking internally [at allowing] E15 to be sold throughout the year, a national waiver if you will . . . I very much hope that we can get there, it's just a matter of if the statute permits it or not.” [May 2017\*]

“... I have directed EPA to actively explore whether it possesses the legal authority to issue such a waiver. The Agency would welcome the opportunity to work with Congress on this important issue, including issuing definitive analysis on the Agency’s authority to issue a nationwide RVP issue for E15.” [Oct. 2017\*\*]

\* <https://www.agri-pulse.com/media/podcasts/76-daily-voice/play/8286-pruitt-has-hope-on-e15-waiver>

\*\* <https://www.grassley.senate.gov/sites/default/files/101917%20EPA%20to%20Participants%20in%20Hill%20Meeting.pdf>



# **Regulatory Opportunities: Certification Fuel Approval**

A new certification fuel would remove regulatory obstacles to designing engines optimized for mid-level ethanol blends.

## Certification Fuel Approval

A certification fuel (or test fuel) is used to “certify” (that is, to test) vehicles for compliance with fuel economy and emissions requirements.

The makeup of the test fuel thus determines the kinds of **engines** that car companies are able to design, build, and sell.

The makeup of the test fuel also determines the kind of **fuel** that may lawfully be sold.

## Certification Fuel Approval

When EPA approves a certification fuel, manufacturers are free to design engines optimized to use the certification fuel, and thus to be tested by EPA using that fuel.

Approval of a mid-level ethanol certification fuel would remove regulatory obstacles to designing engines optimized for mid-level blends. Such fuels and such engines would help manufacturers comply, cost-effectively, with GHG and fuel economy standards over the long term.



# **Regulatory Opportunities: Other Issues**

***Technical, Obscure, and Important***



**The R-Factor:**  
Fixing EPA's Formula  
for Fuel Economy Certification

## R-Factor (Used to Calculate Fuel Economy)

EPA should repeal and replace its outdated fuel economy formula. EPA has admitted that part of that formula – the *R-factor* – is erroneous and that it unfairly penalizes ethanol blends.

The R-factor error creates a disincentive for the deployment of high-efficiency engines that require higher octane ratings and utilize higher ethanol content.

## R-Factor (Used to Calculate Fuel Economy)

The *R-factor* is intended to ensure that fuel economy testing on today's fuel is equivalent to fuel economy testing in 1975, by adjusting for the lower energy content of ethanol. As EPA has acknowledged, the current EPA-mandated R-factor of 0.6 is erroneous, and fails to achieve its statutory purpose.

The auto industry has asked EPA to correct the R-factor to 1.0. In response, EPA has acknowledged that the current R-factor is wrong, suggesting that a corrected value might lie “between 0.8 and 0.9.”

## **R-Factor (Used to Calculate Fuel Economy)**

EPA has not yet acted to fix the R-factor problem.

However, EPA could solve the R-factor problem for any new certification fuel (for example, a new midlevel ethanol blend fuel) by approving a new fuel economy formula for the new fuel.



**Lifecycle Analysis:**  
What Are the Real-World  
Greenhouse Gas Impacts  
of Corn Ethanol?

# Lifecycle Analysis: Outdated Models Can Skew Trade and Policy Discussions

Three federal agencies have analyzed the lifecycle GHG impacts of corn ethanol. EPA's analysis from 2010 needs updating, and is in conflict with more recent analyses from DOE and USDA.

- Outdated lifecycle analyses could have adverse trade impacts. Other countries might mistakenly award U.S. ethanol inadequate “credit” for GHG benefits.
- Outdated lifecycle analyses could skew policy discussions, leading stakeholders and commenters to misapprehend the GHG benefits of U.S. ethanol production and current agricultural practices.



**Emissions Model Reform:**  
What Are the Real-World  
Air Quality Impacts  
of Ethanol Blends?

# EPA Vehicular Emissions Models: Why Do They Matter?

- EPA's vehicular emissions model, MOVES2014a ("*MOVES*" = "*MOtor Vehicle Emission Simulator*"), estimates the pollution produced by a given fleet of vehicles running on fuel with defined parameters.
- States that are in "nonattainment" with EPA air quality standards must develop state "implementation plans" (SIPs), which show how those states will "attain" the standards. SIPs which can include vehicle and fuel policies. EPA requires "nonattainment states" to use MOVES in developing SIPs.
- Errors in the model can limit a state's compliance options.

# MOVES2014a: Three big problems

Because of the following defects, MOVES2014a erroneously reports that higher ethanol concentrations increase emissions:

- 1) **Tailpipe Emission Factors**. MOVES2014a relies on a flawed study that failed to control for the confounding variables that resulted from its match-blending methodology.
- 2) **Evaporative Emission Factors**. MOVES2014a's "fuel adjustment" for ethanol's permeation emissions is wrong; the model relies on studies systematically biased against ethanol.
- 3) **Default Fuel Parameters**. MOVES2014a requires states to use default parameters that contradict real-world market surveys.

These errors make it harder for states to use ethanol as a tool to improve air quality.

## MOVES2014a: Next Steps

To correct the model's errors:

- Urban Air Initiative (UAI) filed a Request for Correction of Information (together with Kansas, Nebraska, and the Energy Future Coalition), asking EPA to fix its mistaken emission estimates for ethanol. EPA's current target due date is November 30, 2017.
- UAI is participating in EPA's MOVES Review Work Group to advise EPA on the MOVES model's errors and to suggest corrections for a revised model to be issued as early as 2018.

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