

Next Generation Fuels Act of 2021 – A Low Carbon Octane Standard

Section-By-Section Summary

Purpose

To promote low carbon, high octane fuels and vehicles that will improve fuel efficiency and performance, while protecting public health and the environment.

Benefits

Phasing in higher gasoline octane levels through greater use of low-carbon renewable fuels beginning with a 95 Research Octane Number (RON) standard and increasing to 98 RON would:

- 1) Reduce greenhouse gas (GHG) emissions to help decarbonize transportation.
- 2) Improve air quality for better health outcomes.
- 3) Increase vehicle fuel efficiency to meet stricter fuel economy standards.
- 4) Support rural economies with low carbon biofuel and corn demand.

High octane fuels such as 95 and 98 RON enable automakers to use advanced engine design features that increase performance and fuel economy, resulting in efficiency gains of five percent or more. This improved fuel efficiency, in turn, reduces GHG emissions.

Requiring octane boosters that result in significantly lower GHG emissions and capping toxic gasoline aromatic content further reduces emissions and improves air quality. A clean octane standard prevents use of more fossil-based octane sources, which would produce more carbon emissions, erasing the GHG reduction benefits from improved fuel economy, and result in more emissions of harmful hydrocarbon aromatics, degrading air quality and respiratory health.

Due to ethanol's high octane rating, a low carbon, high octane ethanol blend results in both additional fuel efficiency *and* significant GHG reductions. Greater ethanol content, reached by removing regulatory barriers to higher blends, would boost the GHG reductions and replace more aromatics, a cost-effective low carbon fuel win for consumers and the environment.

RON/Octane Background

RON is a measurement of gasoline properties related to how the fuel combusts in engines. Today's regular gasoline, labeled as 87 Anti-Knock Index, or AKI, at the pump, is approximately 91 RON. The RON measurement is becoming the preferred method for measuring these fuel properties in modern engines and is used in Europe and other areas.

Advanced engine design features that increase fuel efficiency are limited by current gasoline because low octane fuels cannot mitigate engine knock, or self-combustion of the fuel that limits engine power and causes damage. These advanced engine technologies require higher octane fuels to deliver the fuel efficiency benefits they are designed for. High octane fuel limits knock, enabling automakers to build affordable new vehicles with greater fuel efficiency that meet stricter vehicle emission standards.

Section 3: High Octane Vehicles

Adds the following Part D with new Sections to Title II of the Clean Air Act

- **Section 261: Definitions and Applicability**

Defines “automobile,” “research octane number,” and “manufacturer” for purposes of Part D. Part D applies to any automobile that uses gasoline and is model year (MY) 2026 or later.

- **Section 262: High-Octane Test Fuels**

This section requires automakers to use a test fuel consisting of 20 percent ethanol with a minimum 95 RON octane value to certify new vehicles for emissions and fuel economy standards, beginning with MY 2026 automobiles.

Section 262 also allows automakers to use an alternative test fuel of 98 RON and consisting of 25 to 30 percent ethanol to certify new vehicles for emissions and fuel economy. Beginning with MY 2031, automakers would be required to use the 98 RON, 25 to 30 percent ethanol test fuel to certify new vehicles for emissions and fuel economy.

Automakers are required to meet standards for fuel efficiency, measured in miles per gallon, through the **Corporate Average Fuel Economy (CAFE) regulations** and meet standards for carbon emissions through the **greenhouse gas emission (GHG) regulations**. Each automaker tests and certifies its vehicles through EPA procedures to ensure its fleet of vehicles, on average, meets the standards. Under this section, automakers would be required to use these new test fuels to certify that their new vehicles meet the applicable CAFE and GHG standards.

This section also specifies formulation of the new test fuels and updates the fuel economy equations, including updating the R-factor in the fuel economy procedures for the new test fuels to 1.0, reflecting properties of modern engines, and requiring that EPA’s test procedures be based only on measured GHG emissions from the tailpipe.

The **R-Factor** is part of the formula EPA uses to calculate vehicle fuel economy and is intended to adjust the formula for the energy content of the fuel. EPA’s current factor is outdated and does not reflect modern engines. Department of Energy and EPA research supports updating the R-factor in the fuel economy formula from the current value of 0.6 to 1.0. An R factor of 1.0 in the fuel economy formula for these new test fuels supports low carbon fuel use, providing automakers with greater options for innovation in meeting more stringent vehicle standards, including building high octane vehicles that require higher octane, low carbon fuels.

- **Section 263: High-Octane Vehicles**

Beginning with MY 2026, automakers are required to warrant new vehicles to operate with gasoline including up to 25 percent ethanol. The warranty requirement increases to ethanol blends up to and including 30 percent for MY 2031 and later vehicles.

Beginning with MY 2026, manufacturers are required to design new vehicles to use fuel with a 95 RON or higher and incorporate devices or elements of design to prevent the introduction of fuels that are lower than 95 RON in those vehicles. The design requirement increases to 98 RON with MY 2031, provided EPA has issued a determination that 98 RON gasoline can be readily available nationwide. EPA has a December 31, 2029, deadline to make a determination.

This section also requires fuel retailers to incorporate into the retailers' fuel dispensing equipment such devices or elements of design to ensure compatibility with the 95 and 98 RON vehicle design requirements.

Vehicle manufacturers and fuel retailers would face civil penalties for violating the design requirements.

- **Section 264: Misfueling**

This section prohibits any person from removing or making inoperable any device or element of design of either a new vehicle or fuel dispensing equipment intended to prevent misfuelling with lower octane fuel, including the manufacture or installation of any part intended to bypass or defeat any device or design element installed to prevent misfuelling with lower octane fuel.

Provides for civil penalties for violations.

- **Section 265: Octane Standard**

This section prohibits sale of gasoline marketed as 95 RON and 98 RON unless gasoline has a RON of 95 and 98 or greater, respectively, and deems distributors, blenders, marketers, retailers, and others compliant if they acted in good faith.

Effective January 1, 2025, fuel retail outlets that sold 200,000 or more gallons of gasoline in 2022 or later must offer 95 RON fuel. Alternately, a retail operator with six or more retail outlets must offer 95 RON at at least 60 percent of the operator's outlets. The requirement to offer high octane fuel increases to 98 RON effective January 1, 2030.

Provides for civil penalties for violations.

- **Section 266: Regulations**

Requires EPA to propose regulations to carry out the above sections not later than 12 months after enactment and finalize the regulations within 24 months of enactment.

- **Section 267: Liability Limitation and Preemption**

Automakers and fuel retailers that are in compliance with the requirements in the above new sections and the Petroleum Marketing Practices Act shall not be liable for damages to or caused by a new MY 2026 and later vehicle and that would not have occurred without the required use of 95 and 98 RON gasoline.

No state or local government may adopt, continue in effect, or enforce any law or regulation that requires vehicles to use gasoline of a certain octane content or requires design of fuel dispensing equipment that is not the same as the requirements of the Next Generation Fuels Act.

No state or local government may limit the concentration of ethanol in gasoline.

- **Section 268: Civil Actions; Administrative Assessment of Certain Penalties**

Applies the same civil penalty procedures as the Clean Air Act allows for violations of motor vehicle emission and fuel economy standards to violations of new Sections 263 and 264, allowing EPA to commence a civil action to recover penalties in federal district court.

Section 4: Octane Disclosure

Adds the following new Section to the Petroleum Marketing Practices Act

- **Section 206: High-Efficiency Fuel and Vehicle Marketing Requirements**

The Federal Trade Commission (FTC) is required to issue a rule requiring that fuel ratings for fuel with a 95 RON or higher be determined only by the research octane number of the fuel, changing the fuel ratings at retail fuel pumps from Anti-Knock Index (AKI) ratings to RON ratings. Currently, fuel octane ratings at the pump are AKI ratings.

The FTC is required to set requirements for on-vehicle labeling by the manufacturer to inform the ultimate purchaser that MY 2026 or later vehicles are only warrantied to use 95 RON or higher gasoline and gasoline containing up to 25 percent ethanol, and MY 2031 or later vehicles are only warrantied to use 98 RON or higher gasoline and gasoline containing up to 30 percent

ethanol. Labeling must also inform purchasers that use of lower RON fuel will result in reduced fuel economy, increased emissions, and possible engine damage.

Similar labeling is required of fuel retailers at the point of sale of fuel to the consumer. The FTC rules must be cost-effective for fuel retailers and understandable to fuel purchasers and owners of MY 2026 and later vehicles.

FTC must issue the proposed labeling rule by January 1, 2024 and issue a final rule by July 1, 2025.

Section 5: Advertisement of Price of High-Octane Automotive Fuel

Requires fuel retailers selling automotive fuel that is rated 95 RON or higher to display the total price per gallon of the high octane fuel in their retail pricing display and gives the FTC two years from the date of enactment of promulgate rules to implement and enforce this requirement.

Section 6: E40 Retail Infrastructure Standard

Section 6 requires all new refueling infrastructure to be compatible with higher ethanol blends of at least 40 percent to support the transition to high octane fuels, effective January 1, 2024.

Fuel dispensers from major manufacturers are already designed and certified for ethanol blends up to 25 percent, and major manufacturers are now certifying dispenser systems for ethanol blends up to 40 percent following new testing. A recent U.S. Department Agriculture grant program for infrastructure to dispense higher blends of biofuels required infrastructure in funded projects to meet a minimum compatibility level. This infrastructure requirement applies to new infrastructure and does not require retailers to change or update existing infrastructure.

Consistent with a rule EPA proposed in early 2021 to ease paperwork requirements, Section 6 also allows retailers and underground storage tank owners and operators to demonstrate the compatibility of underground storage tanks with any blend of ethanol through the use of secondary containment systems.

Section 7: Registration Testing, Reid Vapor Pressure, and Substantially Similar Waivers

Registration Testing Waiver

Removes a barrier to the sale of higher blends by streamlining EPA registration of ethanol blends up to E30.

Streamlining registration of higher ethanol blends ensures fuel blenders have the flexibility to use low-cost higher blends to meet the 95 and 98 RON fuel octane standards and bring these new low carbon, high octane fuels to the marketplace.

Reid Vapor Pressure (RVP)

This update to the law ensures all ethanol blends greater than 10 percent receive the same RVP treatment as 10 percent blends currently receive (and as 15 percent blends received prior to the July 2, 2021, DC Circuit Court decision).

RVP is the measurement in pounds per square inch of evaporative emissions from vehicle fuel; evaporative emissions refers to emissions from fuel vapors when fuel evaporates. Despite ethanol's low RVP, blending low levels of ethanol with gasoline increases fuel RVP, but RVP begins to decrease after about 12 percent ethanol blending. Therefore, blends such as E15 and mid-level blends such as E20 and E30 have lower evaporative emissions than E10. These blends should be allowed to enter the market on the same terms as E10, and EPA already recognized this parity for 15 percent blends in a 2019 final rule. Codifying RVP parity for all blends greater than 10 percent removes an unnecessary and outdated regulatory barrier preventing additional high octane, low carbon blends from entering the market.

Substantially Similar

Clarifies that blends of ethanol that do not exceed the warranted ethanol levels in this legislation (25 percent for MY 2026 and later vehicles and 30 percent for MY 2031 and later vehicles) may be sold under the Clean Air Act's "substantially similar" provisions as long as those blends meet the "substantially similar" requirements applicable to gasoline.

Section 8: Clean Octane Standard

Section 8 limits the aromatic hydrocarbon content of all gasoline, including both current market gasoline and new 95 and 98 RON gasoline, on an average annual basis to 17.5 percent by volume beginning January 1, 2025. Section 8 also sets new caps on aromatic content so it does not exceed 30 percent volume in any gasoline by 2025, lowering the cap to 25 percent by 2030.

EPA's Fuel Trends Report shows that as ethanol blending has increased from around one percent in 2000 to today's standard 10 percent, the average annual content of aromatic compounds in gasoline has dropped from nearly 25 percent to 19 percent by volume. These compounds include benzene, toluene, ethylbenzene, and xylene. Currently, except for benzene, there is no federal limitation or cap on aromatics. Limiting aromatic content on an average annual basis for all gasoline to 17.5 percent by volume, combined with the new caps, would reduce negative health outcomes from exposure to fine particulate matter (PM_{2.5}) resulting from aromatic hydrocarbon emissions.

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Section 8 also requires that fuel additives used to produce 95 RON or higher fuel must result in at least 40 percent fewer GHG emissions than baseline gasoline. By requiring fuel additives to raise octane to result in at least 40 percent lower GHG emissions than gasoline, the legislation will further decrease GHG emissions, advance low carbon liquid fuels and prevent backsliding from the use of more fossil fuel octane sources.

Emissions for both the low carbon octane sources and unblended gasoline will be measured by the Department of Energy's Argonne National Laboratory Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) model, which is regularly reviewed and updated, making it the gold standard globally for lifecycle GHG accounting. [Argonne's most recent analysis](#) shows that ethanol's carbon intensity is 44 to 52 percent lower than gasoline's, and ethanol's carbon intensity declined 23 percent between 2005 and 2019. Updating the gasoline baseline ensures low carbon octane sources are accurately compared to current market gasoline. In contrast to ethanol, which has a declining carbon intensity, gasoline's carbon intensity is increasing.

Section 9: New Fuel Effects Study

This section requires EPA to carry out a new study of the emission effects of ethanol-blended fuels for the purposes of updating EPA's **Motor Vehicle Emissions Simulator (MOVES) model** and specifies requirements for the study to ensure the fuels and vehicles tested are representative of those in the marketplace.

EPA currently uses the MOVES model for vehicle emissions modeling, but MOVES is based on a flawed fuel effects study that did not use standard fuels available in the marketplace. As a result, the MOVES model incorrectly characterizes the air pollution effects of blending ethanol in gasoline, effectively penalizing higher blends of ethanol. For proper emissions modeling, EPA must replace the current model with one that accurately represents real-world fuels and vehicles, requiring a new fuel effects study.

Section 10: Dual-Fueled Automobile Default Utilization Factor

Section 10 updates the fuel efficiency and GHG emissions weighting factor for flex fuel vehicles to 0.21, supporting production of more vehicles that run on low carbon alternative fuel like E85 and supporting greater use of low carbon alternative fuel.

Automakers are required to meet standards for fuel efficiency, measured in miles per gallon, through the federal CAFE regulations and meet standards for carbon emissions through the GHG regulations. Each automaker tests and certifies its vehicles through EPA procedures to

ensure its fleet of vehicles, on average, meets the standards. Increasing the utilization factor in the formula for flex fuel vehicles reflects the lower GHG emissions when alternative fuel is used in flex fuel vehicles and is based on a forward-looking projection for E85 use from the Energy Information Administration.

This change encourages production of vehicles that could also use high octane, low carbon fuel, supporting the transition to new high octane vehicles and fuel.

Section 11: Transfers of Credits for Exceeding Average Fuel Economy Standards

Section 11 increases the maximum cap on credit transfers under the federal fuel economy program, reducing costs for automakers while maintaining the same fuel economy performance standards.

Section 12: Extension and Expansion of Alternative Fuel Vehicle Refueling Property Credit (Section 30 C tax credit)

Section 12 extends the tax credit for fuel retailers for installation of alternative fuel refueling infrastructure until 2027 and expands qualifying fuels under the credit from E85 fuels to fuel blends with at least 20 percent ethanol. This tax credit extension and expansion helps retailers with the transition to low carbon, high octane 95 and 98 RON fuels and meeting the requirements for new infrastructure in the legislation.