RFA
RENEWABLE FUELS ASSOCIATION

Opportunities for Octane

The data are clear: automakers and consumers alike want more octane. The share of gasoline sales represented by premium grade hit a nearly 20-year high in 2021, as automakers continued to favor turbocharged, higher-compression engines in which the use of high-octane gasoline is recommended or required. While the wholesale price spread between premium and regular grades of gasoline fell to a more historically consistent level, the retail price spread remained elevated after spiking higher during the pandemic.

These continuing dynamics in the automobile and fuel markets highlight the need for ethanol as a clean, affordable source of octane—a need that will only intensify as automakers contend with more stringent fuel economy requirements moving forward.

Ethanol's blending octane rating of 114 is significantly higher than the ratings of the main petroleum-based components. Moreover, aromatic hydrocarbons such as benzene worsen air pollution and are toxic.

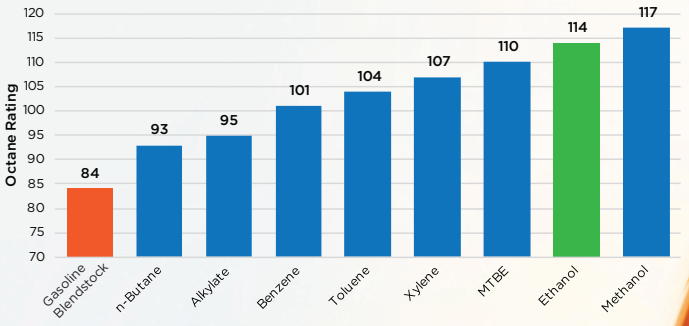
Refiners have largely optimized their processes to take advantage of ethanol's properties. Today, most regular gasoline in the U.S. is produced using blendstock with an octane rating of 84, which is then upgraded to a rating of 87 by adding 10 percent ethanol. This allows refiners to increase throughput of hydrocarbon blendstock at a lower cost.

Demand for sources of octane is expected to continue to grow, driven by the utilization of advanced vehicle engines, tighter gasoline specifications, and the expansion of E15. It could be propelled further by the need for midlevel ethanol blends (e.g., E25-E30) to meet future fuel economy and emissions standards. While the Biden administration's new greenhouse gas emissions standards for model year 2023-2026 vehicles did not leverage the potential of high-octane, low-carbon fuels, RFA remains highly engaged with policymakers on the issue. We're optimistic that there will be an expanded future role for high-octane, low-carbon ethanol once the benefits of such fuels are fully recognized—especially as ethanol moves toward net-zero emissions.

WHAT IS OCTANE AND WHY IS IT IMPORTANT?

A fuel's OCTANE RATING is the measure of its ability to resist "knocking" in the engine, which is caused when the air/fuel mixture detonates prematurely during combustion. According to the U.S. Department of Energy, "Using a lower octane fuel than required can cause the engine to run poorly and can damage the engine and emissions control system over time. It may also void your warranty."

BLENDING OCTANE RATINGS OF VARIOUS GASOLINE OCTANE BOOSTERS



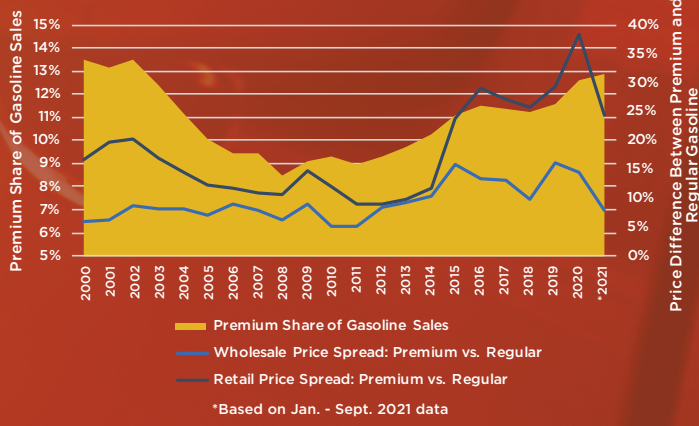
Source: U.S. Dept. of Energy

NEXT GENERATION FUELS ACT

In August 2021, Rep. Cheri Bustos (D-IL) and a bipartisan group of cosponsors introduced the Next Generation Fuels Act of 2021. Specifically, the bill would:

- **Establish high-octane (95 and 98 RON) certification test fuels containing 20-30 percent ethanol, while requiring automobile manufacturers to design and warrant their vehicles for the use of these fuels beginning with model year 2026.**
- **Specify that the source of the octane boost must reduce lifecycle greenhouse gas emissions by an average of at least 40 percent compared to a 2021 gasoline baseline, as measured by the Department of Energy's GREET model.**
- **Restrict the aromatics content of gasoline, ensure parity in the regulation of gasoline volatility (Reid vapor pressure), correct key variables used in fuel economy testing and compliance, require an update to the EPA's MOVES model, ensure infrastructure compatibility, and address other regulations impeding the deployment of higher octane blends at the retail level.**

PREMIUM GASOLINE: SHARE OF SALES AND PRICE DIFFERENCE VS. REGULAR



Source: U.S. Dept. of Energy