



## AUTOMOTIVE ENGINEERING

# FACT SHEET



## PREMIUM FUEL RESEARCH

### BACKGROUND

In the United States, gasoline is typically available in three grades: 87 octane (regular), 89 octane (mid-grade) and 91/93 octane (premium). Higher octane fuels are formulated to be compatible with specific engine designs that are typically found in high-performance or luxury vehicles. Currently, fewer than 20 percent of vehicles on the road require high octane fuel, while the vast majority of vehicles are designed to operate on regular gasoline.

Due to its name, consumers may confuse “premium” gasoline for “better” gasoline. In the past 12 months, AAA’s research shows that 16.5 million Americans ignored manufacturer recommendations for regular gasoline and instead used premium fuel in their vehicle.

AAA conducted primary research to better understand the benefits, if any, of using premium fuel in vehicles that require regular gasoline.

To better understand whether premium fuel provides any benefit to vehicles that require regular fuel, AAA pursued three lines of inquiry:

1. Does an engine designed to operate on regular fuel produce more horsepower when operated on premium gasoline?
2. Are there any improvements in fuel economy when using premium gasoline in an engine designed to run on regular fuel?
3. Does an engine designed to operate on regular fuel produce fewer tailpipe emissions when operated on premium gasoline?

### KEY FINDINGS

- For vehicles designed to run on regular-grade fuel, using premium gasoline did not produce more horsepower, result in better fuel economy or produce fewer tailpipe emissions.
- Seven in 10 (70 percent) U.S. drivers currently own a vehicle that requires regular gasoline, while 16 percent drive vehicles that require premium fuel. The remaining 14 percent own a vehicle that requires mid-grade gasoline (10 percent) or uses an alternative energy source (4 percent).
- In the past 12 months:
  - 16.5 million U.S. drivers used premium gasoline in a vehicle designed to operate on regular fuel at least once.
  - U.S. drivers used premium gasoline in a vehicle designed to run on regular fuel more than 272 million times.
  - U.S. drivers unnecessarily spent more than \$2.1 billion using premium-grade gasoline in a vehicle that is designed to run on regular fuel.

## AAA RECOMMENDATIONS

- Follow the vehicle owner's manual to determine which type of gasoline is required for your vehicle.
- For optimal vehicle performance, AAA urges vehicle owners to keep their vehicle's maintenance up-to-date by following the manufacturer's recommended schedule.
- Drivers whose vehicles require regular gasoline and want a higher quality fuel should select a TOP TIER™ gasoline, not a higher-octane one. Previous AAA research found that gasoline meeting TOP TIER standards resulted in 19 times fewer engine deposits than non-TOP TIER fuel.



## METHODOLOGY

To assess the effects of using premium fuel in vehicles that require regular gasoline, AAA conducted a comprehensive evaluation at the Automotive Club of Southern California's Automotive Research Center in Los Angeles, California, using an industry-standard chassis dynamometer, emissions test equipment and Environmental Protection Agency driving cycles.

For testing, AAA used 87-octane (regular) and 93-octane (premium) gasoline in vehicles equipped with V-8, V-6 and I-4 engines that are designed to operate with regular fuel. All gasoline used for testing was EPA Tier III certification fuel with 10 percent ethanol content in both regular and premium octanes. Certified test fuel was used to remove variability in fuel quality and additives. Each vehicle was tested on a dynamometer, which measures horsepower, and emissions testing equipment to determine fuel economy and tailpipe emissions when using both fuel types in a variety of driving conditions.

To calculate the total annual cost of upgrading to premium gasoline when not required by the vehicle manufacturer, AAA created a formula that includes a U.S. consumer survey, Federal Highway Administration data, per-gallon costs of premium gasoline and regular gasoline, and the average number of fill-ups annually.

For the consumer survey, the sample consisted of 1,011 adults (18 years old and older) living in the continental United States and is proportionally representative of the U.S. adult population. The margin of error for the sample of 1,011 is +/- 3 percent at the 95 percent confidence level.