United States Environmental Protection Agency
Air and Radiation
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Office of Mobile Sources

Emission Facts

Reformulated Gasoline

Reformulated gasoline (RFG) is gasoline blended to burn cleaner and reduce smog-forming and toxic pollutants in the air we breathe. About 75 million people are breathing cleaner air because of RFG. The second phase of the RFG program, which will begin in 2000, will achieve even greater reductions in air pollution than Phase I RFG.

History of RFG

Despite tremendous progress in reducing U.S. air pollution since the Clean Air Act was passed almost 30 years ago, cars and trucks are still a major source of pollution because the number of cars and trucks and the number of miles driven keeps growing.

One way to reduce air pollution from cars and trucks is to use a gasoline that is designed to burn cleaner. This cleaner burning gasoline, called reformulated gasoline or RFG, is required by the Clean Air Act in cities with the worst smog pollution, but other cities with smog problems may choose to use RFG. The federal RFG program was introduced in 1995; RFG is currently used in 17 states and the District of Columbia. About 30 percent of gasoline sold in the U.S. is reformulated. Each oil company prepares its own formula that must meet federal emission reduction standards.

The RFG program is a significant step toward cleaning the air we breathe, and a significant component of the country's smog reduction strategy. RFG's air quality benefits, combined with other industrial and transportation controls aimed at smog reduction, together are responsible for the long-term downward trend in U.S. smog.

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Air Quality Benefits of RFG

The first phase of the RFG program was designed to reduce the air pollution that causes smog by 64,000 tons per year in the areas that use RFG, compared to conventional gasoline—the equivalent of eliminating the smog-forming emissions from over 10 million vehicles.

When the more stringent standards of Phase II RFG replace Phase I in 2000, the program is designed to reduce smog pollutants by an additional 41,000 tons per year in RFG areas, for a combined equivalent of eliminating the smog-forming emissions from about 16 million vehicles.

The RFG program also reduces emissions of toxic air pollutants such as benzene, a known human carcinogen. Phase I and Phase II RFG combined reduce toxic pollutants by about 24,000 tons per year in RFG areas, the equivalent of eliminating the toxic emissions from over 13 million vehicles.

A study by the Northeast States for Coordinated Air Use Management, an organization of state air quality experts, shows that Phase I RFG reduced cancer risk from gasoline by about 12 percent, and Phase II RFG is expected to reduce cancer risk by 19 percent.

Analysis of fuel data submitted to EPA by industry for compliance purposes shows that emission reductions from the RFG program have been more than the program requires each year since the program's introduction in 1995.

Performance and Fuel Economy

EPA conducted a fleet testing program in 1998 to evaluate car and truck performance with Phase II RFG, compared to Phase I RFG. Testing took place in Boston, Chicago, and Houston. The test fleet drove over one million miles with Phase II RFG. Performance testing was also conducted in 1998 with utility, lawn, and garden equipment, and with motorcycles and marine engines. In addition, EPA sponsored fuel economy testing with Phase II RFG, compared to Phase I RFG.

All available data indicate that no difference in car or truck performance or fuel economy is expected when Phase II RFG replaces Phase I RFG. In addition, no difference in performance is expected with utility, lawn, and garden equipment, or with marine engines or motorcycles.

Note that changing from conventional gasoline to RFG, which is oxygenated, results in a one to three percent fuel economy loss; that is less than one mile per gallon for a vehicle that gets 25 miles per gallon. However, there is no additional oxygenate in Phase II RFG compared to Phase I, so there is no additional fuel economy loss.

Production Cost and Retail Price

Prior to the introduction of Phase I RFG, EPA estimated that the cost to industry to produce the fuel would be about three to five cents per gallon more than conventional gasoline. The Lundberg survey, conducted by an independent market research firm, concluded in October 1997 that RFG's retail price has been about three cents per gallon more than conventional gasoline. The retail price does not necessarily reimburse all production expenses.

EPA estimates that Phase II RFG will, on average, cost one to two cents per gallon more to produce than Phase I RFG. In some parts of the country and for some refiners, production costs could be higher. It is not possible to accurately predict the retail price of Phase II RFG in the year 2000 because it will be influenced by many factors, including production costs, weather, crude oil prices, taxes, and local and regional market conditions. It is important to note that, at the start of the Phase II RFG program, retail prices may be higher or fluctuate more.

Oxygen Requirement

In the Clean Air Act, Congress specified that RFG contain oxygen — two percent by weight. MTBE (methyl tertiary butyl ether) and ethanol are the two most commonly used substances that add oxygen to gasoline. Oil companies decide which substance to use to meet the law's requirements.

Leaking storage tanks are the number one cause of gasoline contamination of water. Small spills and improper disposal are also sources of contamination.

Many chemicals in gasoline—including MTBE—can be harmful in water. MTBE is highly soluble and travels faster and farther in water than other gasoline components.

MTBE has a strong taste and odor, so even small amounts of MTBE in water can make a water supply distasteful. In most cases where MTBE has been detected, MTBE concentrations are below levels of public health concern. At high levels, MTBE may pose a public health threat. EPA's MTBE advisory level for taste and odor is 20 to 40 parts per billion.

EPA is concerned about the presence of MTBE in ground and surface water. In November 1998, EPA established a panel of independent scientists and other experts to examine MTBE's performance in gasoline, its presence in water, and alternatives to its use. Panel recommendations made to EPA in July 1999 include:

- Ensure no loss of current air quality benefits from RFG.

- Reduce the use of MTBE, and seek Congressional action to remove the oxygen requirement in RFG.

- Strengthen the nation's water protection programs, including specific actions to enhance the Underground Storage Tank, Safe Drinking Water, and private well protection programs.

EPA has announced its intention to work with Congress to provide a targeted legislative solution that maintains the air quality benefits of RFG while allowing reductions in the use of MTBE. EPA will also protect water supplies by improving gasoline leak protection and remediation programs.

For more information

Additional documents on RFG are available electronically on the Office of Mobile Sources Internet site at:

http://www.epa.gov/oms/rfg.htm

Document information is also available by writing to:

U.S. Environmental Protection Agency
Office of Mobile Sources
NVFEL Library
2000 Traverwood Drive
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