Order Code RL31361

"Boutique Fuels" and Reformulated Gasoline: Harmonization of Fuel Standards

Updated December 17, 2004

Brent D. Yacobucci
Specialist in Energy Policy
Resources, Science, and Industry Division

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Summary

The current system of gasoline standards in the United States is complex. Because of federal and state programs to improve air quality, and local refining and marketing decisions, suppliers of gasoline face many different standards for fuel quality. As a result, fuels are formulated to meet varying standards. State and local decisions overlap with federal requirements, leading to situations where adjacent or nearby areas may have significantly different standards. These various fuel formulations are often referred to as “boutique fuels.” In this system, supply disruptions can result if fuel from one area cannot be used to supply another area.

Because of potential supply concerns, there is interest in simplifying (harmonizing) the system so that regional or national standards are consistent. However, the competing goals of air quality, supply stability, and costs make harmonizing the system a complex process.

Adding to these complications are concerns over methyl tertiary butyl ether (MTBE), a common gasoline additive that has been detected in groundwater in numerous states. At least 17 states have passed legislation to ban or limit the use of MTBE at some future date. However, simply banning MTBE is a challenge because the additive plays a key role in the federal reformulated gasoline program (RFG). Another additive, ethanol, also plays a role in the program, and there are concerns about its future if the RFG program were modified to address MTBE concerns. Scenarios for banning MTBE could lead to increased or decreased demand for ethanol, and there is controversy in connection with ethanol use, as well.

This report discusses how gasoline composition is regulated, and explains the various federal and state gasoline standards. Next, the report presents some of the key issues with the federal RFG program. The report then presents some of the problems associated with the boutique fuels issue, as well as some of the potential effects of harmonization. Finally, the report discusses bills in the 108th Congress related to boutique fuels, RFG, and harmonization. Among these bills, H.R. 6, the omnibus energy package contains key provisions relevant to boutique fuels.

This report will be updated as events warrant.

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Introduction

Because of federal and state programs to improve air quality, and local refining and marketing decisions, suppliers of gasoline must supply fuel that meets a number of different standards. According to ExxonMobil, as of 2002 there were 18 different gasoline formulations required across the country.[1] Depending on how various overlapping standards are counted, this number can increase or decrease.[2]

The two key federal programs are the reformulated gasoline program (RFG), which aims to reduce emissions of toxic air pollutants and ozone-forming compounds, and the oxygenated fuels (Oxyfuel) program which aims to reduce carbon monoxide emissions. These programs are required by the Clean Air Act. In places where federal RFG is not required, states may "opt-in" to the program, or they may impose other fuel requirements as part of a plan to meet air quality standards. This mix of state and federal standards, along with local marketing and refinery decisions, has resulted in adjacent or nearby areas that may require gasoline with significantly different properties.

What Are "Boutique Fuels"? The term "boutique fuels" refers to the various specialized gasoline formulations made to meet air quality standards or local preferences. Besides conventional fuel,[3] refiners and marketers in a state may also have to meet requirements in different areas for one, two, or even three different formulations.

What Is the Concern over Boutique Fuels? Because requirements can vary from state to state, and within a state, if there is a disruption in fuel supply, it may be difficult for refiners to supply fuel meeting local specifications to the affected area. If this happens, prices can rise sharply, as occurred with particular severity in the Midwest in the summer of 2000.[4] The ability to move product from one area of the country to another is called "fungibility."

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[1] ExxonMobil, *U.S. Gasoline Requirements.* February, 2002.

[2] Drastically higher numbers generally imply that the number of standards has been multiplied by three, to indicate that each type of gasoline is sold at three octane levels, or "grades". Suppliers are not required by law to sell three grades of gasoline.

[3] Conventional gasoline is sold across most of the country.

[4] Major pipeline problems, along with other complicating factors, led to short supplies of gasoline in the area. Conventional gasoline supplies were low, as were supplies of the blendstock used to create RFG for the Chicago-Milwaukee area.

Why Not Simply Require One Fuel Across the Country? The existing system has evolved in response to various federal air quality standards, and resulting state standards, local refiner decisions and consumer choices. Further, many of the state formulations were designed to mitigate moderate air quality problems without requiring more stringent and more expensive measures. An attempt to group states under one regional or national standard, referred to as "harmonization," could lead to higher pump prices for areas with less severe ozone problems, or higher emissions in areas with more severe problems. Further, refiners have stranded considerable costs in tooling facilities to meet specific local requirements.

Harmonizing Standards Would Be a Complex Process. Competing goals will make harmonizing standards a complex process. Gasoline supply would likely be more stable under regional or national standards. But refining costs and consumer price could increase under new standards. Further, air quality could be improved or diminished depending on how standards are combined. Any changes in the U.S. gasoline system will need to take all of these factors into account.

Organization of Report. This report outlines the current situation with boutique fuels. It discusses the various state and federal requirements, their purposes, and how they interact. Next, it discusses in detail one of the key components of the federal RFG program, and how it is likely to change in the near future. Then, the report describes some of the supply problems caused by the current system, followed by a discussion of the trade-offs associated with harmonization. Finally, the report discusses Congressional actions, as well as actions taken by the Bush Administration, that will likely affect the fuel system. This report will be updated as events warrant.

Gasoline Standards

Changing Gasoline Standards

As was stated above, the current fuel system has resulted from a mix of federal and state requirements mandated or motivated by the passage of the Clean Air Act Amendments of 1990.[5] Before 1990, fuel requirements were much simpler, with only limits on volatility in the summer months to control ozone formation. Because heat plays a key role in ozone formation, a two-tier system was established, with tighter summer volatility standards in the South.

The 1990 Clean Air Act amendments added additional requirements, producing a more complex multi-layer system. These requirements include the use of various fuel formulations targeted at specific air quality problems. In addition to federal requirements, states with less severe pollution problems may establish their own standards. These various federal and state standards lead to a patchwork of areas with, in some cases, very different standards. The fuel system is further complicated by local refining and marketing decisions to promote or limit the use of certain additives. This multi-layer system of various standards and formulations can lead to

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[5] P.L. 101-549.

supply instability if fuel from one market cannot be used in another market to meet changes in supply and demand.

General Standards

Some gasoline standards apply to all fuel, while others only apply to particular formulations. Currently, fuel may be regulated for volatility, nitrogen oxide emissions, heavy metal content, content and emissions of toxic compounds, sulfur content, and/or oxygen content. Each of these factors plays a role in pollutant emissions, and overall air quality.

Volatility. Volatility is a chemical's propensity to evaporate. Evaporative emissions of hydrocarbons such as motor fuel contribute to the formation of ground-level ozone, which leads to "smog."[6] Reid Vapor Pressure (RVP) is a measure of a fuel's volatility; lower numbers indicate lower volatility. The RVP for conventional gasoline can range from about 8 to 15 pounds per square inch (psi),[7] but is limited to 9.0 psi in the summer months. In areas where ozone is a problem, lower RVP is required.

Nitrogen Oxides (NO_x). Nitrogen Oxides (NO_x) include nitrous oxide, nitric oxide, and nitrogen dioxide. NO_x contributes to the formation of ozone. Therefore, fuel may be formulated to limit NO_x emissions.

Heavy Metals. Lead was commonly used as an octane enhancer until it was phased-out through the mid-1980s (it was completely banned in 1995), due to the fact that lead can disable emissions control devices, and because it is toxic to humans. In some areas, the use of other heavy metals (e.g. manganese) in gasoline may also be restricted.

Toxic Compounds. Some gasoline components and additives are toxic to humans. Further, fuel combustion can lead to the formation of other toxic compounds. Such compounds include benzene, acetaldehyde, formaldehyde, 1,3 butadiene, and polycyclic organic matter. Benzene is a known human carcinogen, while the other compounds can cause irritation and exacerbate asthma; some might be human carcinogens.[8] In some fuels, benzene content is limited. The overall emissions of toxic compounds may be limited, as well.

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[6] Ground-level ozone is an air pollutant that causes smog, adversely affects health, and injures plants. It should not be confused with stratospheric ozone, which is a natural layer some 6 to 20 miles above the earth and provides a degree of protection from harmful radiation.

[7] U.S. Department of Energy, Alternative Fuels Data Center, *Properties of Fuels.* [http://www.afdc.doe.gov/pdfs/fueltable.pdf].

[8] Agency for Toxic Substances and Disease Registry, *ToxFAQs*. [http://www.atsdr.cdc.gov/toxfaq.html].

Sulfur. Sulfur in gasoline can interfere with on-board emissions control devices. Catalytic converters are especially vulnerable.[9] To improve the performance of emissions controls, the sulfur content of gasoline may also be limited by state or federal regulations. Currently, Alabama, California, Georgia, and Nevada require lower-sulfur gasoline. Starting January 1, 2004, EPA is phasing in new national limits for sulfur in gasoline. By January 1, 2006, most gasoline will be limited to a sulfur level of 30 parts per million (ppm).[10] Before the new standards, gasoline sulfur content averaged around 300 ppm.

Oxygen. Because oxygen can improve combustion (and thus limit the emissions of certain compounds), a minimum oxygen content may be required. Because pure oxygen cannot be added directly to gasoline (it would simply escape from the fuel), an oxygen-bearing compound called an "oxygenate" is added. Typically ethers, such as methyl tertiary butyl ether (MTBE), or alcohols, such as ethanol, are used to enhance the oxygen content of gasoline. These oxygenates are also high-octane compounds, and reduce the need for other additives that may be more toxic (such as benzene).

Federal Fuels

The Clean Air Act requires the use of special fuels in areas that are in nonattainment of the National Ambient Air Quality Standards (NAAQS) for ozone or carbon monoxide. Federal reformulated gasoline (RFG) must be used in severe or extreme nonattainment areas for ground-level ozone. Other areas with less serious ozone problems may opt-in to the RFG program to help them attain or maintain compliance with the NAAQS. In carbon monoxide nonattainment areas, federal oxygenated fuel (oxyfuel) is required in winter months.

Conventional Gasoline. As was stated above, conventional gasoline is the fuel sold across most of the country. It is the least stringently regulated fuel, with a summertime limit on RVP of 9.0 psi, a prohibition on the use of lead, and a limit on the level of manganese (a heavy metal). Because gasoline blended with 10% ethanol ("gasohol") has a higher volatility, the RVP limit is raised by 1 psi, to 10.0 psi (the "one pound waiver").[11] In summer months, conventional gasoline accounts for approximately 49% of U.S. gasoline consumption.[12]

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[9] For more information on issues relating to sulfur in gasoline, see CRS Report RS20163, *Sulfur in Gasoline.*

[10] This sulfur restriction is part of a larger whole-system approach by EPA to limit vehicle emissions. Starting in model year 2004, automobile manufacturers will face more stringent emissions standards for their vehicles. To enable the use of more advanced emissions control devices, the sulfur content of gasoline must be limited, as well.

[11] There are other benefits to using ethanol in gasoline that counterbalance its higher volatility.

[12] U.S. Environmental Protection Agency (EPA), Office of Transportation and Air Quality (OTAQ), *Staff White Paper: Study of Unique Gasoline Fuel Blends ("Boutique Fuels"), Effects on Fuel Supply and Distribution and Potential Improvements.* October, 2001.

Reformulated Gasoline (RFG). In areas with major ozone problems, federal RFG is required. Other areas with less severe problems may also opt-in to the program. Currently, major metropolitan areas in 17 states and the District of Columbia use RFG. The program has several requirements, including a minimum oxygen content of 2.0% by weight, a benzene cap of 1.0% by volume, limits on NO_x and toxic emissions, and a cap on RVP. In the summer months, the RVP limits are more stringent than in the winter months, and are more stringent for southern areas than for northern areas.[13] Federal RFG accounts for about 28% of summertime gasoline consumption.[14]

Low Volatility Conventional Gasoline. The Environmental Protection Agency (EPA) requires that certain ozone non-attainment areas (that are not required to use RFG) use a lower volatility fuel in the summer months. Instead of the 9.0 RVP conventional fuel required across most of the country, RVP is capped at 7.8 for these areas, which include parts of states in the South and West. The "one pound waiver" for gasohol still applies. Low-volatility gasoline accounts for about 7% of summertime gasoline consumption.[15]

Oxygenated Fuel (Oxyfuel). In carbon monoxide nonattainment areas, the Clean Air Act requires the use of oxygenated fuel in the winter months. As of October, 2001, 16 areas were implementing the program.[16] The Oxyfuel program requires a minimum oxygen content of 2.7% by weight. Because of the nature of carbon monoxide pollution, most carbon monoxide nonattainment areas are not ozone nonattainment areas.[17] The only exception is the Los Angeles area, which is in nonattainment for both pollutants. The program has been largely successful, with fewer than half of the original participants in the program still required to use the fuel.[18] As the number of participating areas has dropped, so has Oxyfuel consumption as a share of winter gasoline consumption.

State Fuels

In areas that have less serious ozone problems (in contrast to severe or extreme nonattainment areas), states may establish their own fuel standards as a strategy for mitigating emissions, if they do not to opt-in to the RFG program. The Clean Air Act

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[13] Heat is a catalyst for the reactions that produce ozone. That is why ozone tends to be more serious in the summer months. Therefore, in warmer areas, and during warmer times, ozone-forming emissions are more tightly controlled.

[14] EPA, OTAQ, op. cit.

[15] EPA, OTAQ, op. cit. 7.8 RVP gasoline actually accounts for about 13% of gasoline consumption, but 6% of this is a result of state, not federal requirements. See the section below on "State Fuels."

[16] EPA, OTAQ, op. cit.

[17] Carbon monoxide emissions tend to increase at colder temperatures, and carbon monoxide pollution tends to be worse at higher elevations.

[18] Of the 16 areas implementing the program, 13 are for attainment purposes and 3 for maintenance purposes. In 1992, 36 areas were implementing the program. EPA, OTAQ, op. cit.

gives the EPA the authority to permit reductions in the allowable RVP of fuel in the summertime. Most states require only a lower RVP (at 7.0, 7.2, 7.8, or 8.5 RVP); in all other ways the requirements are identical to conventional gasoline. However, some states go further and require a lower sulfur content (e.g. Georgia), or limit the use of certain additives (e.g. Texas).[19] Further, Minnesota requires a minimum of 2% ethanol in all gasoline sold in the state. These various fuels account for about 12% of summer gasoline consumption.[20]

California Cleaner-Burning Gasoline (CBG). In addition to giving states leeway on setting fuel standards, the Clean Air Act allows California to set its own standards, as long as those standards are more stringent than the federal standards. California requires the use of "Cleaner-Burning Gasoline" (CBG), with generally stricter requirements than those for federal RFG. Sulfur is restricted to 30 ppm, benzene is limited to 0.8% by volume, and performance standards are tighter for VOC, NO_x, and toxic emissions. However, there is no oxygen standard for California CBG. In areas of the state where federal RFG is required, gasoline must meet all the standards for RFG as well as CBG.[21] Arizona and Nevada have state programs that mimic the California standards. California CBG accounts for approximately 4.5% of summertime gasoline consumption.[22]

Meeting Oxygen Standards

There are two common ways to meet the oxygen requirements for RFG and Oxyfuel. Methyl tertiary butyl ether (MTBE) — until recently the most widely used — is produced from natural gas or as a by-product of the petroleum refining process. Ethanol, an alcohol produced from agricultural products, mainly corn, is another. Both have their advantages and disadvantages for blending with gasoline.

MTBE. In addition to oxygen blending, MTBE is also used in conventional gasoline to boost octane and extend gasoline stocks.[23] MTBE's chemical properties make blending with gasoline relatively easy, and shipping MTBE-blended gasoline is no more complicated than shipping unblended gasoline.

A key concern is that MTBE has contaminated groundwater. Contaminated (underground) wells have been found in numerous states especially in the Northeast

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[19] MTBE is used to add oxygen, boost octane, and extend gasoline stocks. However, there are concerns about its use. These concerns will be discussed below, in the section on "Meeting Oxygen Standards."

[20] EPA, OTAQ, op. cit.

[21] For example, while federal RFG requires a minimum oxygen content, California CBG does not.

[22] EPA, OTAQ, op. cit.

[23] For more information on MTBE, see CRS Report 98-290ENR, *MTBE in Gasoline: Clean Air and Drinking Water Issues.*

and California.[24] While most detected levels are not thought to be a health concern, even in low concentrations MTBE can make water noxious and undrinkable. MTBE reportedly makes water smell and taste "like turpentine." Because of concerns over contamination, an EPA Blue Ribbon Panel recommended a substantial reduction in the use of MTBE.[25]

Because MTBE finds it way into groundwater, 17 states have passed legislation or taken executive action to ban or limit its use, and there have been congressional proposals to ban the additive as well. However, a ban on MTBE could have substantial effects on the gasoline supply. Approximately 3.1 billion gallons of MTBE were produced in the United States in 2002, or about 2% to 3% of total gasoline consumption.[26]

Energy Loss. Replacing the energy lost from this production would require about 2.7 billion gallons of gasoline per year, or about 4.1 billion gallons of ethanol.[27] Elimination of MTBE would likely require increases in petroleum production or imports, increases in refinery efficiency, and/or increases in ethanol production.

Octane Loss. MTBE is also a common octane booster. An MTBE ban would require increased use of other high-octane blending components such as ethanol, other ethers, or alkylates.[28]

Oxygen Loss. Complicating this issue is the requirement that RFG contain oxygen. Unless the Clean Air Act is amended to eliminate the oxygen requirement, or provide waivers, the lost oxygen from MTBE must be replaced. If the oxygen standard remains, and MTBE is banned, ethanol production would need to be increased to meet total demands for oxygenates across the country. Production capacity is currently expanding, and there are plans for further growth in the industry. While production capacity is a concern, there are potential producers and importers who could quickly enter the market if they were more certain about the direction of the ethanol market. In addition to production concerns, there are additional concerns with the use of ethanol as an oxygenate, which will be discussed below.

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[24] Because MTBE can travel farther than, and separately from, other components of gasoline, groundwater can be contaminated with MTBE even if other gasoline components are not detected in the water.

[25] EPA Blue Ribbon Panel on Oxygenates in Gasoline, *Achieving Clean Air and Clean Water*. September 15, 1999. p. 86.

[26] U.S. Department of Energy, Energy Information Administration, *Monthly Oxygenate Telephone Report.* January 2003.

[27] MTBE has a higher energy content (i.e. there is more energy per gallon) than ethanol. Therefore a greater volume of ethanol is necessary to supply the same amount of energy. Gasoline has a higher energy content than MTBE, so less volume is needed.

[28] In some cases, MTBE facilities may be modified to produce isooctane, an alkylate. Although alkylates can boost octane and extend gasoline stocks, they contain no oxygen, and cannot be used as an oxygenate.

If MTBE were banned, the use of other oxygen-enhancing ethers, such as ethyl tertiary butyl ether (ETBE)[29] and tertiary amyl methyl ether (TAME), might increase. Because these ethers have similar properties to MTBE, they too might cause water contamination and their use might prove unworkable.

Because of concerns regarding the acceptability of ethers and the supply of ethanol, there is interest in granting waivers from the oxygen requirement, or eliminating the oxygen requirement altogether. The EPA Blue Ribbon Panel recommended action to eliminate the oxygen standard, to provide gasoline suppliers with more flexibility in dealing with an MTBE ban.[30]

Toxics and "Backsliding". Environmentalists are concerned that eliminating the oxygen requirement would lead to further air quality problems. This is because oxygenates, in addition to adding oxygen, displace other, more toxic blending agents such as benzene. Currently, most RFG producers are reducing toxic content and emissions substantially more than required. Environmentalists fear that an elimination of the oxygen standard would lead to the production of fuel that, while compliant with the RFG requirements, contains more toxic compounds than current RFG. This situation is referred to as "backsliding."

Opponents of the oxygen requirement counter that gasoline can be made that meets all of the performance requirements of RFG without the use of oxygenates. Their claim is bolstered by the fact that California CBG is as stringent, if not more stringent than federal RFG, without the use of oxygenates.[31]

On March 29, 2001, EPA issued a final rule on mobile source air toxics (MSATs). In addition to other provisions, the rule requires new emissions baseline requirements that maintain the current level of over-compliance on toxics.[32] According to EPA, the new requirements should be feasible and incur negligible costs because they do not require the use of new equipment or technologies. In addition to EPA's regulatory action, there are congressional proposals to amend the Clean Air Act to legislate the anti-backsliding provisions.

Ethanol. In addition to MTBE, another common oxygenate is ethanol. Because ethanol is produced mainly from corn, it is used primarily in the Midwest, where most U.S. corn is grown.[33] RFG in Milwaukee and Chicago, as well as all gasoline in the state of Minnesota contains ethanol. Further, most areas under the wintertime Oxyfuel program use ethanol to meet the oxygen requirement. Wholesale ethanol prices tend to be higher than those for gasoline, but ethanol-blended gasoline

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[29] ETBE is produced from ethanol, so ethanol production capacity would still need to increase, even if ETBE were chosen over ethanol as an oxygenate.

[30] EPA Blue Ribbon Panel on Oxygenates in Gasoline, op. cit.

[31] Al Jessel, Chevron Products Company, *Testimony before the House Science Committee Subcommittee on Energy an d Environment.* September 20, 1999.

[32] *66 Federal Register 17229-17273.*

[33] For more information on ethanol, see CRS Report RL30369, *Fuel Ethanol: Background and Public Policy Issues.*

receives a partial a tax incentive that makes ethanol price competitive with gasoline at the pump, and promotes its use as a blending agent.[34] The current incentive is a credit of 51 cents per gallon of ethanol used in blending. This credit will expire after 2010.

Ethanol separates from gasoline in the presence of water, presenting marketing and transportation problems. Because the U.S. pipeline system is a "wet" system (i.e. some water is always present in the lines), ethanol must be transported by truck, rail, or barge, and blended with gasoline near the point of sale. Greater distance from the ethanol producer to the blending terminal increases the cost of ethanol. This is a key reason for the localized nature of ethanol consumption. Because MTBE-blended gasoline does not have the same problems, it is preferred by many marketers, especially those in areas farther from ethanol producers.

Ethanol and RFG. Ethanol-blended RFG differs in several ways from RFG with MTBE. Ethanol has a higher oxygen content per gallon than MTBE, meaning less ethanol must be used to meet the oxygen requirement. However, it is also more volatile than MTBE, contributing to more ozone formation. To counter the higher volatility of ethanol, the gasoline blendstock used in ethanol RFG must have a lower volatility. This low-RVP blendstock is more expensive than the blendstock for RFG with MTBE.

The higher volatility of ethanol-blended gasoline is the reason for the "one pound waiver" for conventional fuel. While ethanol-blended RFG is not granted such a waiver, on July 17, 2001 EPA granted flexibility to Chicago and Milwaukee which allows for slightly higher VOC emissions because those areas use ethanol-blended RFG exclusively.[35]

The oxygen requirement for RFG creates additional demand for ethanol. Because of this, ethanol producers and corn growers are concerned that an elimination of the oxygen requirement associated with a ban on MTBE would lead to a drop in demand that could severely harm the ethanol industry. This would ultimately lead to lower corn prices, as well.

Ethanol and Groundwater Contamination. Ethanol is biodegradable, and relatively non-toxic, except at very high concentrations. Therefore, there are few concerns about ethanol itself contaminating groundwater. However, ethanol has shown the propensity to carry other toxic gasoline components, such as benzene, farther than they would have otherwise traveled. Although there has been little study of this issue, there is the potential that ethanol-blended gasoline could also contribute to more water contamination than conventional gasoline.[36]

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[34] For more information on the tax treatment of ethanol, see CRS Report 98-435E, *Alcohol Fuels Tax Incentives.*

[35] Under the Clean Air Act, EPA has the authority to use its discretion to consider the costs of achieving air quality standards, and may grant regulatory flexibility. *66 Federal Register 37156-37165.*

[36] Susan E. Powers, David Rice, Brendan Dooher, and Pedro J. J. Alvarez, "Will Ethanol-
(continued...)

Renewable Fuels Standard. To fill the void in ethanol demand left by an elimination of the oxygen requirement, there have been legislative proposals to develop a renewable fuels standard. A renewable fuel is one that can be produced from renewable resources. In general, renewable fuels are those that are produced from animal or vegetable matter. Ethanol is the most common renewable fuel; approximately 2.8 billion gallons were produced in 2003. The next most common renewable fuel is biodiesel, a synthetic diesel fuel made from vegetable oils (mainly soy) or recycled grease; less than 100 million gallons of biodiesel were produced in 2003.

Among the options considered in the 108th Congress, a renewable fuels standard would require that all motor fuel in the United States contain a certain percentage of renewable fuel, or require that a set amount of renewable fuel be sold in a given year. The Conference Report on the energy bill, H.R. 6, would have required the use of 5.0 billion gallons per year of renewable fuel by 2012. This would mean roughly a doubling of renewable fuel use. And because ethanol is the most common renewable fuel, ethanol consumption will have also doubled in all likelihood.

Supporters argue that a renewable fuels standard would foster agricultural production, promote domestic energy sources, and lead to cleaner air. Critics argue that it would raise gasoline prices and artificially inflate demand for ethanol. Further, critics argue that a renewable mandate would result in "corporate welfare" for a few large ethanol producers. They add that greater ethanol consumption would lead to reduced fuels excise tax receipts, and that a renewable standard would add one more layer of requirements to an already complex system.

Gasoline Supply Issues

The multiple standards, along with the use of various fuel additives, have led to supply incompatibility. Before 1990, the U.S. gasoline system was relatively fungible. Product could be moved from one market to meet diminished supply in another. Currently, gasoline used in one area may not necessarily meet the standard of another. For example, in the summer, fuel produced for the Charlotte, NC area cannot be used in Norfolk, VA (RFG), or Atlanta, GA (lower RVP and sulfur cap). However, fuel from either Norfolk or Atlanta could be shipped to Charlotte. In many cases, the system is essentially one-way, giving suppliers the ability to move product from more stringent areas to less stringent areas, but not vice-versa.

Adding to this problem is the fact that U.S. refiners and fuel pipelines are currently operating at or near capacity, reducing the flexibility to produce and ship a multiplicity of formulations, or respond to a change in local market needs. Any supply disruption (caused by a refinery fire, pipeline rupture, or other incident) can lead to price volatility, even with more fungible conventional gasoline. Adding

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[36] (...continued)
Blended Gasoline Affect Groundwater Quality?," *Environmental Science and Technology.* January 1, 2001. p. 24A.

localized requirements creates an even more complex situation where excess supply in one area may not be moved to the affected area because of emissions standards.

Harmonizing Gasoline Standards

Because of the complex nature of various gasoline standards, there is interest in harmonizing the standards. This would entail requiring one set of standards across a region (or even across the country). Potential scenarios include requiring that within an area, only one low RVP fuel could be used in addition to conventional gasoline and RFG. In the above scenario with Norfolk, Charlotte, and Atlanta, while Norfolk would still use RFG, the standards for Charlotte and Atlanta would be identical. Another, more drastic, scenario would require that all fuel be conventional gasoline or RFG. Some of the key issues involved in harmonization would be production costs, consumer prices, production capacity, supply stability, and air quality.

Production Cost. Depending on the way standards are harmonized, production costs could increase dramatically. While fewer standards across the country would seem to benefit refiners, it could create a need for expensive refinery modifications to meet the harmonized standards. Because refiners made investments in tooling their plants to meet the local requirements, changes could be costly. However, a less drastic harmonization, where some of the low-RVP fuels are harmonized, but not eliminated, could mitigate some of these difficulties.

Production Capacity. Most U.S. refiners are operating at or near capacity (86% nationally in 2001). Limited production capacity will always lead to higher price, especially if there is a disruption in production from a major refiner. Harmonization could further exacerbate this problem, depending on how it is implemented. New standards could lead to higher or lower supply levels. For example, very stringent volatility standards could require refiners to limit the use of some gasoline components. The loss of volume from cutting back on these components would require increased supply in the form of petroleum, ethanol, or other blending components.

Supply Stability. Because the main goal of harmonization would be to improve the fungibility of the system, supply disruptions might be reduced. Fewer standards make it more likely that product could be moved from one area of the country to another to meet local needs. However, it must be noted that supply disruptions can never be completely eliminated because there are so many factors outside of fuel standards that play a role in supply. These include levels of crude oil supply, petroleum imports, refining capacity, seasonal fluctuations in demand, and weather patterns (which may influence demand for fuel).

Air Quality. A key concern in any discussion of harmonization is the effect on air quality. Many of these "boutique fuels" standards were created specifically to mitigate the unique air quality problems in a metropolitan area. The standards were devised as part of a State Implementation Plan (SIP) for ozone. SIPs are based on models showing that particular fuels requirements will lead to projected reductions

in pollutant emissions. More stringent requirements, while more costly, lead to greater emissions reductions. Therefore, an effort has been made in the SIPs to balance air quality goals with producer and consumer concerns about cost.

Any harmonization would necessitate that certain state fuels be chosen over others. What must be resolved is the question of which standards should apply to all states in a region. The most stringent? The least stringent? Some compromise standard? Any standard less stringent than an SIP's current standard would require the state to identify other emissions reductions. Any standard more stringent than a state's current standard would likely lead to higher consumer prices.

Other Issues. In addition to the above concerns about harmonization, some other issues remain. One of these has to do with local marketing decisions and state requirements unrelated to air quality. If these factors are not addressed, the system could still remain quite complex. For example, Minnesota requires the use of ethanol across the state. Under harmonization, would states be allowed to set such a standard, or would they be precluded?

Another key issue is the role of MTBE. Several states have banned or limited the use of the additive. If MTBE is not banned nationwide, this could lead to even more complexity in the system, with some states allowing its use and others precluding it. Non-MTBE states would be unable to import fuel from MTBE states.

Administration Action on Harmonization

As part of the Bush Administration's action on its National Energy Policy,[37] EPA is currently studying the potential effects of harmonization. In a preliminary report, EPA studied various scenarios and attempted to analyze the effects of those scenarios. Recognizing that its study is the first step in a much longer process, EPA found that depending on the scenario, standards could be harmonized without major cost increases, increases in emissions, or reductions in gasoline supply. The study states that even though some of the harmonized areas have not faced supply disruptions in the past, harmonization could reduce the potential for future disruptions.[38] More drastic measures, the study finds, would lead to more stability, but could lead to much higher prices and major reductions in gasoline production capacity.

Congressional Action

Because of the federal and state issues involved with "boutique fuels," there has been considerable interest in the topic. Legislation was introduced in the 108th Congress on MTBE reductions and bans, elimination of the RFG oxygen

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[37] National Energy Policy Development Group, *National Energy Policy.* May 2001. For a detailed discussion of the National Energy Policy, see CRS Report RL31096, *Bush Energy Policy: Overview of Major Proposals and Legislative Action.*

[38] EPA, OTAQ, *Staff White Paper.* p. 47.

requirement, renewable fuels standards, and studies of harmonization. Most notably, on November 17, the conference committee on the energy bill (H.R. 6) issued its report (H.Rept. 108-375). The House approved the conference report on November 18; a cloture motion on the bill was rejected in the Senate on November 21.

H.R. 6 (Conference Version). The conference committee report on the energy bill would have established a renewable fuels standard of 3.1 billion gallons in 2005, increasing to 5.0 billion gallons by 2015. This version also directed EPA to establish a system for generating and trading renewable fuels credits among gasoline suppliers. The conference report would have banned MTBE and eliminated the RFG oxygenate requirement. However, the conference report would have granted the President the authority to void the MTBE ban. This version would have also provided funds for MTBE cleanup and for MTBE producers to convert their facilities to produce other chemicals. In addition, it granted a "safe harbor" from defective product litigation for producers and blenders of renewable fuels and MTBE. Finally, it would have required EPA to study the feasibility of harmonizing fuel requirements.

H.R. 6 (House Version). The House version of the energy bill would have established a renewable fuels standard of 2.7 billion gallons in 2005, increasing to 5.0 billion gallons by 2015. While the House version of H.R. 6 would not have banned MTBE, it would have eliminated the RFG oxygenate requirement. Further the House version would have provided funds for MTBE cleanup and for MTBE producers to convert their facilities to produce other chemicals. The House version of the safe harbor provision would have protected producers and blenders of both renewable fuels and MTBE. Finally, the House version would have required EPA to study the feasibility of harmonizing fuel requirements.

H.R. 6 (Senate Version). The Senate version of the energy bill contained several provisions similar to those in the conference and House versions. However, the Senate version would have required a 5.0 billion gallon standard in 2012, three years earlier than the House version. The Senate version would have also banned the use of MTBE. Further, the safe harbor provision in the Senate version would have only applied to producers and blenders of renewable fuel; the safe harbor did not apply to MTBE. Similar to the other two versions, the Senate version would have eliminated the RFG oxygen standard, and required EPA to study the feasibility of harmonizing fuel standards.

Conclusion

The current system of gasoline standards in the United States is complex. State and local decisions overlap with federal requirements, leading to adjacent or nearby areas that may have significantly different requirements. These various fuel formulations can lead to problems if an area facing supply disruptions cannot import fuel from another area. Adding to these complications are actions to ban MTBE in light of groundwater contamination, and the effects of such a ban on other parts of the RFG program.

The competing goals of air quality, supply stability, and costs will make harmonization a complex process. Even with regional or national standards, factors such as local marketing decisions and the use of ethanol will complicate the system. For these reasons, whether or not Congress passes fuels legislation, fuel standards will continue to be a major issue.