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“Boutique Fuels” and Reformulated Gasoline: Harmonization of Fuel Standards

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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 25 states have passed legislation to ban or limit the use of MTBE.

On August 8, 2005, President Bush signed the Energy Policy Act of 2005 (P.L. 109-58). Among other provisions, P.L. 109-58 addressed several boutique fuels issues. As a result of P.L. 109-58, a key component of the federal reformulated gasoline (RFG) program was eliminated May 6, 2006. This requirement, which gasoline suppliers asserted was a de facto MTBE requirement, was used by gasoline suppliers as a defense against liability for MTBE contamination. Therefore, while P.L. 109-58 actually gives the industry more flexibility, the industry moved quickly to eliminate MTBE from the gasoline supply in spring 2006. This increased pressure on already tight refining capacity. The loss in volume and energy from eliminating MTBE increased demand for gasoline, as well as ethanol. Exacerbating the supply problem was the fact that the industry was making the transition from winter gasoline to more stringent summertime air quality specifications, which adds competition for the highest-quality gasoline components. These pressures, along with historically high crude oil prices, led to historically high gasoline prices. Further, some localized areas faced short-term supply disruptions as refineries made the transition.

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. Some of the problems associated with boutique fuels are discussed, as well as some of the potential effects of harmonization. Finally, congressional actions in the 109th Congress related to boutique fuels, RFG, and harmonization, including the passage of P.L. 109-58, are discussed.

This report will be updated as events warrant.

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“Boutique Fuels” and Reformulated Gasoline: Harmonization of Fuel Standards

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 2000⁴ and in the wake of Hurricanes Katrina and Rita.

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.

The ability to move product from one area of the country to another is called “fungibility.”

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, presumably, more expensive measures. An attempt to group states under one regional or national standard, referred to as “harmonization,” might lead to higher pump prices for areas with less severe ozone problems, or higher emissions in areas with more severe problems. Further, refiners may have made considerable investments 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 distribution would likely be more uniform under regional or national standards. But refining costs and consumer price could increase under new standards.⁵ 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, a component eliminated by the Energy Policy Act of 2005 (P.L. 109-58). 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 1990.⁶ Before 1990, fuel requirements were much simpler, with only limits on volatility in the summer months to control ozone formation. Because temperature plays a key role in ozone formation, a two-tier system was established, with tighter summer volatility standards in the South.

⁵ It is difficult, however, to distinguish the effects of any one change on the costs of refining and distribution, or on consumer prices. Both the costs to supply gasoline, and pump prices, respond to a wide range of variables.

⁶ P.L. 101-549.

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. Gasoline supply and distribution 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 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."⁷ 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),⁸ 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

⁷ 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.

⁸ U.S. Department of Energy, Alternative Fuels Data Center, *Properties of Fuels*. [<http://www.afdc.doe.gov/pdfs/fueltable.pdf>].

be human carcinogens.⁹ In some fuels, benzene content is limited. The overall emissions of toxic compounds may be limited, as well.

Sulfur. Sulfur in gasoline can interfere with on-board emissions control devices. Catalytic converters are especially vulnerable.¹⁰ 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 began phasing in new national limits for sulfur in gasoline. Effective January 1, 2006, most gasoline is limited to a sulfur level of 30 parts per million (ppm).¹¹ 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 octane enhancers that may be more toxic (such as benzene). As discussed below, a key oxygen standard for federal reformulated gasoline was eliminated by P.L. 109-58.

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

⁹ Agency for Toxic Substances and Disease Registry, *ToxFAQs*. [<http://www.atsdr.cdc.gov/toxfaqs.html>].

¹⁰ For more information on issues relating to sulfur in gasoline, see CRS Report RS20163, *Sulfur in Gasoline*, by Stephen Thompson and James E. McCarthy.

¹¹ This sulfur restriction is part of a larger whole-system approach by EPA to limit vehicle emissions. Starting in model year 2004, automobile manufacturers are facing 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.

“one pound waiver”).¹² In summer months, conventional gasoline accounts for approximately 49% of U.S. gasoline consumption.¹³

Reformulated Gasoline (RFG). In areas with major ozone pollution 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 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.¹⁴ Before P.L. 109-58, summertime RVP limits were also more stringent for southern areas than for northern areas; that law set a single standard at the more stringent (southern) level. Federal RFG accounts for about 28% of summertime gasoline consumption.¹⁵ Prior to May 6, 2006, RFG was also required to contain 2% oxygen by weight, a requirement that was eliminated by P.L. 109-58.

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.¹⁶

Oxygenated Fuel (Oxyfuel). In carbon monoxide nonattainment areas, the Clean Air Act requires the use of oxygenated fuel in the winter months. As of November, 2005, 12 areas were implementing the program.¹⁷ 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.¹⁸ The only exception is the Los Angeles area, which is in nonattainment for both pollutants. The program has been largely successful, with

¹² There are other benefits to using ethanol in gasoline that counterbalance its higher volatility.

¹³ 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.

¹⁴ 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.

¹⁵ EPA, OTAQ, *op. cit.*

¹⁶ 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.”

¹⁷ EPA, OTAQ, *State Winter Oxygenate Fuel Program Requirements for Attainment and Maintenance of CO NAAQS*, November 2005.

¹⁸ Carbon monoxide emissions tend to increase at colder temperatures, and carbon monoxide pollution tends to be worse at higher elevations.

fewer than half of the original participants in the program still required to use the fuel.¹⁹ As the number of participating areas has dropped, so has Oxyfuel consumption as a share of winter gasoline consumption. The Oxyfuel program should not be confused with the oxygen standard in RFG (see above), which was eliminated by P.L. 109-58.

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 opt-in to the RFG program. The Clean Air Act 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 these state fuel 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). Further, Minnesota requires a minimum of 10% 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. 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

Elimination of the Federal RFG Oxygenate Standard Under P.L. 109-58

Before amendment by the Energy Policy Act of 2005, the Clean Air Act required that RFG contain at least 2% oxygen by weight. Refiners met this requirement by adding a number of ethers or alcohols, any of which contain oxygen and other elements. Until recently, the most commonly used oxygenate was MTBE. In 1999, 87% of RFG contained MTBE, a number reduced to about 46% in 2004, according to EPA. MTBE has also been used since the late 1970s in conventional

¹⁹ Of the 12 areas implementing the program, 5 are for attainment purposes and 7 for maintenance purposes. In 1992, 36 areas were implementing the program. EPA, OTAQ, op. cit.

²⁰ EPA, OTAQ, *Staff White Paper*.

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

²² EPA, OTAQ, op. cit.

gasoline as an octane enhancer. As a result, gasoline with MTBE has been used throughout the United States and elsewhere in the world, whether or not an area has been subject to RFG requirements.

MTBE leaks, generally from underground gasoline storage tanks, have been implicated in numerous incidents of groundwater contamination. The substance creates a perceptible taste and odor in water at very low concentrations, and some animal studies indicate that it may pose a potential cancer risk to humans. For these reasons, 25 states have taken steps to ban or limit its use, according to the Renewable Fuels Association.²³ The most significant of the bans (in terms of the amount of fuel affected) took effect at the end of 2003 (California and New York), leading many to suggest that Congress revisit the issue to modify the oxygenate requirement and set more uniform national requirements regarding MTBE and its potential replacements, principally ethanol.

The Debate Over the RFG Oxygen Standard. Support for eliminating the oxygenate requirement on a nationwide basis was widespread among environmental groups, the petroleum industry, and states. In general, these stakeholders concluded that gasoline can meet the same low emission performance standards as RFG without the use of oxygenates. But agricultural interests presented a potential obstacle to enacting legislation to remove the oxygen requirement. According to the U.S. Department of Agriculture, roughly 13% of the nation's corn crop is used to produce the competing oxygenate, ethanol. Supporters of ethanol argued that as MTBE use was phased out, with the oxygen requirement still in effect, ethanol use would soar, increasing demand for corn. (In fact, according to EPA, ethanol demand has grown substantially as MTBE has been phased out as a result of state bans and refinery decisions.) Conversely, if the oxygen requirement were waived by EPA or through legislation, not only would MTBE use decline, but so, likely, would demand for ethanol. Thus, some Members of Congress and governors from corn-growing states took keen interest in MTBE legislation and related oxygenate requirements.

One concern voiced by ethanol supporters over the elimination of the RFG oxygen standard is that it had provided a major impetus for ethanol demand. To fill a potential void in ethanol demand left by an elimination of the oxygen requirement, there were legislative proposals to develop a renewable fuels standard (RFS). A renewable fuel is one that can be produced from renewable resources, such as solar energy, agriculture products, or waste material. In general, renewable fuels are those produced from animal or vegetable matter. Ethanol is the most common renewable fuel; approximately 3.9 billion gallons were produced in the United States in 2005.²⁴ The next most common renewable fuel is biodiesel, a synthetic diesel fuel made from

²³ Renewable Fuels Association, *New Jersey Becomes 25th State to Ban MTBE*, August 19, 2005.

²⁴ Renewable Fuels Association, *From Niche to Nation: Annual Industry Outlook 2006*, February 2006.

vegetable oils (mainly soy) or recycled grease; approximately 75 million gallons of biodiesel were produced in 2005.²⁵

As enacted, the Energy Policy Act of 2005 (P.L. 109-58) contains numerous provisions relevant to MTBE and ethanol.²⁶ Most notably, P.L. 109-58 repeals the Clean Air Act requirement to use MTBE or other oxygenates. In place of this requirement, the bill establishes an RFS. To prevent “backsliding” on air quality, the bill requires that reductions in emissions of toxic substances achieved by RFG be maintained; it also authorizes funds for MTBE cleanup.²⁷

P.L. 109-58 established an RFS of 4.0 billion gallons in 2006, increasing yearly to 7.5 billion gallons in 2012. Supporters argue that a renewable fuels standard will foster agricultural production, promote domestic energy sources, and lead to cleaner air. Critics argue that it will raise gasoline prices, artificially inflate demand for ethanol, and add one more layer of requirements to an already complex gasoline supply system. Further, some critics argue that a renewable mandate will result in “corporate welfare” for a few large ethanol producers. Some critics question the net energy saving from fuel ethanol, because the production of corn and ethanol requires significant fossil fuel inputs.²⁸

Issues in the Spring of 2006: MTBE Phase-Out and Ethanol Supply.

As a result of P.L. 109-58, the oxygen requirement for RFG was eliminated as of May 6, 2006. The elimination of the oxygen standard was supported by various states with MTBE contamination and by the refining industry as a way to simplify gasoline supply. However, the oxygen requirement, which gasoline suppliers asserted was a de facto MTBE requirement, has been used by gasoline suppliers as a defense against liability for MTBE contamination.²⁹ P.L. 109-58 did not ban MTBE use; rather, it actually gives the industry more flexibility in making RFG with or without oxygenates. But because of liability concerns, the industry moved quickly to eliminate MTBE from the gasoline supply in spring 2006. This increased pressure on already tight refining capacity, because higher grades of gasoline blendstock were

²⁵ National Biodiesel Board, *Estimated U.S. Biodiesel Production*, May 2006.

²⁶ For a more detailed discussion of MTBE and ethanol provisions in P.L. 109-58, see CRS Report RL32865, *Renewable Fuels and MTBE: A Comparison of Selected Provisions in the Energy Policy Act of 2005 (H.R. 6)*, by Brent D. Yacobucci, Mary Tiemann, James E. McCarthy, and Aaron M. Flynn.

²⁷ Not included in the final version was a particularly controversial provision in an earlier version of the bill, a “safe harbor” from product liability lawsuits for producers of MTBE, ethanol, and other renewable fuels (product liability lawsuits have been used to force petroleum and chemical companies to pay for cleanup of ground and surface water contaminated by releases of fuels containing MTBE). A disagreement over the safe harbor provision for MTBE is seen as one of the issues that led to the failure an energy bill in the 108th Congress.

²⁸ For a more detailed discussion of the energy balance of corn ethanol, see CRS Report RL33290, *Fuel Ethanol: Background and Public Policy Issues*, by Brent D. Yacobucci.

²⁹ Petroleum Industry Research Foundation, Inc., *Rising Gasoline Prices: Made in the USA*, May 2006.

required to make the transition away from MTBE-blended fuel. In 2005, U.S. MTBE production was approximately 2 billion gallons, representing roughly 1.5% of U.S. gasoline demand. The loss in volume and energy due to eliminating MTBE increased demand for gasoline (refined from petroleum), crude oil for the production of feedstocks, and ethanol.

In response to P.L. 109-58, in spring 2006, many refiners began producing gasoline blendstock for ethanol-blended RFG.³⁰ For use in RFG areas, ethanol cannot be blended with conventional gasoline but requires a specific, low-volatility gasoline blendstock. This blendstock, called Reformulated Blendstock for Oxygenate Blending (RBOB), tends to be more difficult and costly to produce, and it requires the use of more high-quality gasoline blending components. Further, a sharp increase in demand for ethanol for gasoline blending strained ethanol supplies. Also, during the transition from MTBE- to ethanol-blended gasoline, in many cases refiners, terminals, and retailers had to halt operations to purge their tanks of the old fuel.

A potential issue with the transition between RFG with and without the oxygen requirement is one of timing. During the transition, some refiners had eliminated MTBE-blended RFG before the May 6 transition to non-oxygenated RFG. However, between the time they eliminated MTBE and May 6, RFG was still subject to the oxygen standard. Therefore, some gasoline suppliers, who may in the future make the transition to non-oxygenated RFG, needed to supply ethanol-blended RFG during the transition. The ultimate demand for ethanol in RFG will depend on gasoline refiners' and suppliers' decisions about whether to market ethanol-blended or non-oxygenated RFG.

Exacerbating the supply problem was the fact that the industry was making the transition from winter gasoline to more stringent low-volatility summertime specifications, which adds competition for the highest-quality gasoline components. These pressures, along with historically high crude oil prices, have led to historically high (nominal) gasoline prices. Further, some localized areas faced short-term supply disruptions as refineries made the transition.

Renewable Fuels Standard. Some detractors of the RFS have claimed that high gasoline prices in spring 2006 are partly due to the enactment of the RFS. However, while the short-term increase in ethanol demand from the elimination of the oxygenate standard has certainly played a role in the spring 2006 gasoline situation (see above), the effects of the RFS on high gasoline prices are less evident. For 2006, the RFS requires the use of 4.0 billion gallons in gasoline, roughly equivalent to U.S. ethanol use in 2005. Therefore, while the increasing RFS could put pressure on ethanol supplies and gasoline prices in coming years, it seems less likely that the RFS has played a role in the current situation.³¹

³⁰ Statement of A. Blakeman Early, American Lung Association, before the Senate Committee on Environment and Public Works, March 29, 2006.

³¹ It should be noted that when gasoline prices are relatively high, ethanol prices tend to track with gasoline prices (when taxes are factored in). Ethanol blended into gasoline is (continued...)

Harmonizing Gasoline Standards

The multiple gasoline 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 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.

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.³² 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.

³¹ (...continued)

subject to a 51-cent-per-gallon tax credit. Therefore, ethanol tends to sell for roughly 50 cents higher per gallon than conventional gasoline. For example, on March 30, regular unleaded gasoline sold for approximately \$2.00 per gallon wholesale, while ethanol spot prices were \$2.47 to \$2.51, a difference of between 47 and 51 cents. Oil Intelligence Link, "Key Spot Product Prices," *The Ethanol Monitor*, April 3, 2006.

³² It should be noted that refinery production costs are only one factor among many that play a role in determining pump prices.

Production Capacity. Most U.S. refiners are operating at or near capacity; U.S. refiners have operated at or above 90% nominal capacity for over a decade.³³ Limited production capacity can lead to higher prices, especially if there is a disruption in production on in the flow of gasoline and gasoline inputs. It is possible that harmonization could 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, some of which are imported.

Supply Stability. Presumably, a main goal of harmonization would be to improve the fungibility of the system, reducing the possibility of supply and distribution problems. 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 specific 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.

State Fuel Requirements. In addition to the above concerns about harmonization, 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 in gasoline across the state. Under harmonization, would states be allowed to set such a standard, or would they be precluded?

³³ U.S. Department of Energy, Energy Information Administration, *Oil Market Basics*. Chart: U.S. Refining Capacity, Crude Runs, and Utilization Rate, 1973-2004. [http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/Ref_image_Crude_runs.htm]

The Energy Policy Act of 2005 and Harmonization

The Energy Policy Act of 2005 (P.L. 109-58) contained four key provisions aimed at addressing boutique fuels issues.

- First, as was stated above, Section 1504(a) eliminated the oxygen standard for federal RFG. This standard was a key motivation for the use of MTBE in gasoline.
- Second, Section 1504(c) eliminated the distinction between summertime RFG in northern and southern areas. Starting in May 2006, all RFG areas will use the more stringent southern RFG in summer months.
- Third, Section 1541(b) capped the number of state boutique fuels at the number as of September 1, 2004. EPA must publish a list of these fuels and may not approve a State Implementation Plan that establishes a new state fuel, if that would increase the number of fuels on EPA's list. If a listed fuel is no longer used, it may be delisted; EPA may then approve a new fuel to take its place on the list.
- Fourth, Section 1509 requires EPA to study the potential effects of comprehensive harmonization of fuel standards across the country. On May 4, 2006, EPA Administrator Stephen L. Johnson launched a task force to study potential harmonization. EPA plans to submit the report to the President in July 2006.³⁴

In addition to the above provisions, Section 1501 established a renewable fuels standard (RFS) that requires the use of 7.5 billion gallons of renewable fuel in gasoline by 2012.

Administration Action on Harmonization

As part of the Bush Administration's action on its National Energy Policy,³⁵ 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

³⁴ EPA, *EPA Administrator, Governors to Review Boutique Fuels*, May 4, 2006. [<http://yosemite.epa.gov/opa/admpress.nsf/68b5f2d54f3eefd28525701500517fbf/8f5536a5e3ba331f852571640071d496!OpenDocument>]

³⁵ 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*.

disruptions.³⁶ More drastic measures, the study finds, would lead to a simplified supply system, but might lead to higher prices and major reductions in gasoline production capacity.

As was stated above, on May 4, 2006, EPA Administrator Stephen L. Johnson announced a task force to study potential harmonization, and report to the President in July 2006.

Congressional Action

The most notable congressional action on boutique fuels in the 109th Congress was the passage of the Energy Policy Act of 2005 (P.L. 109-58). As stated above, P.L. 109-58 eliminated the oxygen standard for RFG, eliminated the distinction between northern and southern summertime RFG, limited the number of state boutique fuels, required the study of fuel system harmonization, and established a renewable fuels standard.

Other bills have been introduced in the 109th Congress addressing boutique fuels from various angles. H.R. 3807 (Ney) would eliminate all boutique fuels, including federal RFG and Oxyfuel, requiring the use of conventional gasoline across the country. S. 1859 (Burr) would make some boutique fuels provisions of P.L. 109-58 more stringent. For example, the bill would not allow new fuels to be added to EPA's list of allowable state boutique fuels after a fuel is delisted. Language similar to H.R. 1459 (Blunt) and H.R. 1493 (Blunt) on limiting state fuels and studying comprehensive harmonization was included in P.L. 109-58. All of these bills have been referred to committee.

Among other provisions, H.R. 3893 (Barton), the Gasoline for America's Security Act of 2005, would significantly limit the number of boutique fuels across the country. Other than California, all states would be limited either to conventional gasoline, federal RFG, or one of two low-RVP gasolines, in addition to two blends of diesel fuel. H.R. 3893 passed the House October 7, 2005, on a 212-210 vote. It has been referred to the Senate Committee on Energy and Natural Resources.

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 shortages and price spikes if an area facing supply disruptions cannot import fuel from another area. Adding to these complications is the fact that MTBE use has largely been phased-out by states and refiners, and the demand for blending components to replace MTBE has increased.

³⁶ EPA, OTAQ, *Staff White Paper*. p. 47.

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 additional fuels legislation, fuel standards will continue to be a major issue.