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PIRINC has prepared the enclosed report, *MTBE at Center Stage*.

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Issues involving MTBE are far broader than simply whether or not defective product liability protection should be afforded to MTBE or renewable fuels. They involve the whole question of oxygenate mandates, the role of alternatives to MTBE, especially ethanol, and the risks to gasoline supply/demand balances, regional as well as national, of actions to ban MTBE. This report discusses these MTBE and related issues as they have been evolving and in particular, the extent to which the Energy Policy Act of 2003 attempts to address them. As for the defective product liability issue it should be kept in mind that at the time oxygenate requirements were introduced all major parties understood that, in most cases, expanded use of MTBE was the only practical way to meet the mandates.

If you have any questions or comments, please call John Lichtblau, Larry Goldstein or Ron Gold.

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Petroleum Industry Research Foundation, Inc.

3 Park Avenue • 26th Floor • New York, NY 10016-5989
Tel.: (212) 686-6470 • Fax: (212) 686-6558

MTBE at Center Stage

Summary

In late November 2003, by a narrow margin, opponents of the Energy Policy Act of 2003 succeeded in delaying further consideration of the bill until early this year and in reducing chances of eventual passage, at least in its present form. Of the over 1,000 pages of provisions of the bill, opponents highlighted a very brief segment, about a page in length, namely, Section 1502, entitled “Fuels Safe Harbor.” This section provides liability protection against defective product claims for MTBE producers. The protection would apply against all claims filed on or after September 5, 2003. Although not highlighted in the Senate debates, the provision extends the same liability safeguard to renewable fuels producers as well. The provision explicitly does not protect against other potential liabilities including liability for drinking water contamination, the most prominent current environmental concerns regarding MTBE. Indeed, at the same time as the energy bill was set aside, a multimillion dollar settlement was reached between Santa Monica and three major oil companies in the city’s lawsuit concerning the mid-1996 shut-down of wells accounting for a substantial share of its water supplies due to high levels of MTBE.

Issues involving MTBE are far broader than simply whether or not defective product liability protection should be afforded to MTBE or renewable fuels. They involve the whole question of oxygenate mandates, the role of alternatives to MTBE, especially ethanol, and the risks to gasoline supply/demand balances, regional as well as national, of actions to ban MTBE. This report discusses these MTBE and related issues as they have been evolving and in particular, the extent to which the Energy Policy Act of 2003 attempts to address them.¹ As for the defective product liability issue there is good reason to hesitate before granting such an exemption for any product which may turn out to be defective and potential harmful. But it should be kept in mind that at the time oxygenate requirements were introduced all major parties understood that, in most cases, expanded use of MTBE was the only practical way to meet the mandates that were imposed on the industry.

History and Recent Trends

Regulatory developments have played the major role in bringing significant volumes of both MTBE and ethanol to market. Beginning in 1979, a partial Federal gasoline tax exemption added to the appeal of ethanol-blended gasoline.² Both are octane boosters, which made them attractive as potential replacements for lead in gasoline, which began to be phased-out in the late 1970s. In 1978, ethanol received a waiver for use as an additive in gasoline up to 10% by

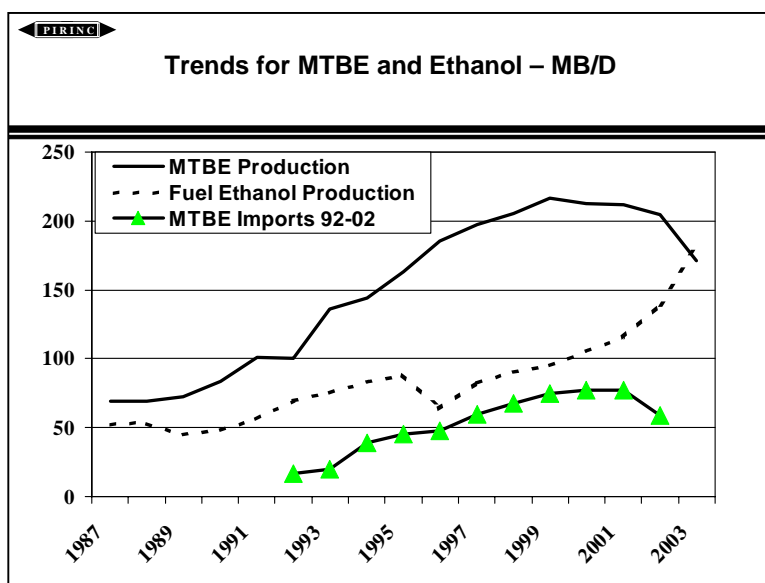
¹ For an earlier, more detailed discussion of oxygenate issues, see the PIRINC report, [MTBE, Ethanol - Sorting Through the Oxygenate Issues](http://www.pirinc.org/publications.html), released December 2001 and available at the PIRINC website, <http://www.pirinc.org/publications.html>

² Gasoline with 10% ethanol receives a 5.2 cent/gallon reduction in the Federal gasoline tax, effectively a 52 cent/gallon (\$21.84/barrel) tax credit for ethanol.

volume (3.5% oxygen by weight). In 1981, MTBE received a similar waiver for up to 11% by volume (2% oxygen by weight). The volume of MTBE allowed was increased to 15% (2.7% oxygen by weight) in 1988.³ In the late 1970s and early 80s, high oil prices added to the appeal of non oil-based additives such MTBE, derived primarily from natural gas, and ethanol derived in this country from corn.

Nonetheless, the main growth in MTBE volumes came in the early 1990s while the surge in ethanol has been more recent.

The chart on the right summarizes production trends for MTBE and fuel ethanol from 1987 through the first 11 months of 2003. The chart also shows for a more limited period, MTBE imports. Imports of ethanol are not shown since except for Canada and a limited Caribbean Basin allowance, they are subject to what for all intents and purposes is a prohibitive tariff equivalent to the effective tax credit granted to ethanol.



In 1987, MTBE production amounted to about 70 MB/D. The exact level of imports for that year is not known but they are generally considered to have been minimal. By 1995, production reached nearly 165 MB/D while imports reached about 45 MB/D. A few years later, production exceeded 200 MB/D while imports exceeded 70 MB/D. Growth in fuel ethanol production was far less spectacular despite the large Federal (and certain state) subsidies. Output rose from 50 MB/D in 1987 to about 90 MB/D in 1995. Thus, ethanol was not a practical option for most states. Unlike MTBE, ethanol is not a fungible petroleum product and must be blended out the last stage of the distribution system.

The big push for MTBE and to a lesser extent ethanol came from two sets of oxygenate requirements contained in the Clean Air Act Amendments of 1990. The first, and currently least important, is the winter oxygenate program begun in November 1992 as means of reducing carbon monoxide (CO) emissions in areas of the country that were not in attainment of national ambient air quality standards for CO. The program requires a minimum of 2.7% oxygen in

³ Under the Clean Air Act Amendments of 1977, the introduction or increase in additives that were not “substantially similar” to those used in gasoline used to certify 1975 or later model year vehicles were prohibited. The EPA could grant waivers for additives that don’t cause or contribute to failure of emissions control devices that were first introduced in that model year.

gasoline by weight (achievable with 15% MTBE or 7.4% ethanol by volume) during the winter season. In 1991, the EPA designated 41 areas with a total population of over 80 million as being in CO nonattainment. As of August 2003, the number of nonattainment areas had fallen to 11, with a total population of about 19 million. This substantial progress has been accompanied by a sharp decline in the importance of the oxygenated gasoline program. In 1994, two years after the program began, oxygenated gasoline accounted for nearly 10% of total gasoline sales. In 2002, its share was down to 3% as advances in automotive technology (especially fuel injection and three-way catalysts) cut CO emissions without requiring oxygenates.

The second, 2.1% by weight average oxygenate requirement (corresponding to 11.7% MTBE or 5.8% ethanol by volume), applies to reformulated gasoline, required to be sold in the nine most serious ozone nonattainment areas beginning in 1995. Other areas have “opted in” to the program. In 2002, nearly one-third of all gasoline sold was reformulated, versus 26% in 1995, the first year of the Federal mandate. The massive growth in MTBE use since the early 1990s has come in response to this mandate. There are compelling reasons why, with limited exceptions, MTBE was the only product of practical choice to meet the mandate. As the California Environmental Protection Agency noted in its 1997 briefing paper on MTBE:

There are other oxygenates available for use as gasoline blending components. They include ethanol and other ethers/alcohols (ethyl tertiary butyl ether [ETBE], tertiary amyl methyl ether [TAME], and tertiary butyl alcohol [TBA]). Some of these are used in limited amounts in California. However, no other oxygenate has MTBE’s unique combination of price and supply, gasoline blending, and transportation properties.⁴

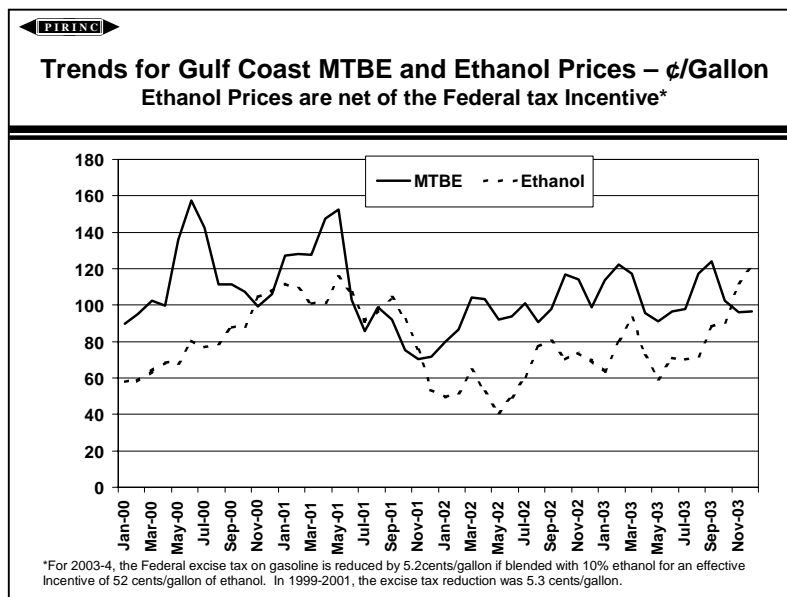
There are two reformulated areas that did not ultimately choose MTBE, Chicago and Milwaukee. Both instead use ethanol. Both are in the mid-west, where nearly all (over 99%) of the country’s fuel ethanol is produced. The logistics issues involved in using ethanol in reformulated gasoline--particularly the need to blend it with a unique RBOB at the terminal rather than blending at the refinery---would be least difficult to manage where ethanol production is so close to the market. Most fuel ethanol in the Mid-West is not used in either reformulated or winter-oxygenated gasoline. Total sales of “gasohol” in PADD 2 (in 2001) were nearly 8 times combined sales volumes of oxygenated and reformulated gasoline in the region.

By 1999, MTBE production at nearly 220 MB/D was more than double the production rate for fuel ethanol while MTBE imports had risen to 75 MB/D. Since 1999, MTBE production has been in decline, with a particularly noticeable drop this year. Ethanol production on the other hand has been moving up sharply, with production in 2003 running at nearly double the 1999 level and slightly above production of MTBE. Imports of MTBE have recently turned down as well. The change in fortune for MTBE has two main causes, one economic, the other, and more

⁴ From the MTBE (Methyl Tertiary Butyl Ether) Briefing Paper, prepared by the California Environmental Protection Agency released April 24, 1997 and updated September 3, 1998. The report can be accessed at: <http://www.arb.ca.gov/fuels/gasoline/oxy/mtbebp.pdf>.

important, environmental. The negative economic influence comes from the price of natural gas, the building block for methanol, and a source of butanes, the MTBE feedstock from merchant facilities. Between 1995 and 1999, annual average Henry Hub natural gas prices ranged from \$1.72 and \$2.77/MMBtu. From 2000 through 2003, the range has been much higher, from \$3.36 to \$5.49, with the highest average price occurring last year.

The chart on the right shows monthly average prices since the beginning of 2000 for MTBE and Ethanol at the Gulf Coast. Ethanol prices are after allowing for the effective current Federal tax incentive.⁵ For nearly all the months shown, ethanol prices were significantly below prices for MTBE. There have been a few months in which ethanol prices were somewhat higher than MTBE, notably in late 2001 when MTBE prices were falling sharply (aided by a



sharp, but temporary, decline in gas prices) and in the last two months of last year. In December, ethanol reached about \$1.20/gallon, about 25 cents above the price for MTBE and about 50 cents above its price in December 2002. Higher prices for ethanol came on the eve of MTBE bans taking effect in California, New York and Connecticut beginning with the New Year.

Environmental Concerns Regarding MTBE

The state bans on MTBE and proposals for a Federal ban reflect environmental concerns which in one form or another have been prominent since the beginnings of the oxygenate programs.

Shortly after the winter oxygenate program began, a number of health complaints (including nausea, headaches and coughing) were received from individuals in areas where MTBE was being used, notably Fairbanks and Anchorage Alaska, Missoula Montana, and New Jersey.⁶ The

⁵ As noted in the chart, the current reduction in the Federal gasoline tax for gasoline blended with 10% ethanol (by volume) is 5.2 cents/gallon. In 1993, roughly proportionate tax reductions were extended to blends with 7.7%-10% and 5.7%-7.7% ethanol. The 7.7%-10% blend meets the minimum oxygenate requirement for winter oxygenated gasoline while the 5.7%-7.7% blend meets the Federal minimum oxygenate requirement for reformulated gasoline.

⁶ The discussion of early health complaints from MTBE is taken from Assessment of Potential Health Risks of Gasoline Oxygenated with Methyl Tertiary Butyl Ether (MTBE), EPA Office of Research and Development, November 1993 and Proceedings of the Conference on MTBE and Other Oxygenates: A Research Update, published by the EPA National Center for Environmental Assessment Research, August 1995.

Center for Disease Control issued a report to Alaska in early 1993, which included a preliminary finding of a correlation between the complaints and the winter oxygenate program. The governor of Alaska suspended the program. The program was resumed with ethanol rather than MTBE as the oxygenate. Missoula Montana also switched to ethanol.

Subsequent studies done in response to the complaints concluded, “There is unlikely to be a substantial risk of acute health symptoms among healthy members of the public receiving “typical” exposures under temperate conditions,” although leaving open the possibility of problems under extremely cold conditions such as in Alaska.⁷ Other studies found no differences between reported symptoms in northern New Jersey, where MTBE was used, and southern New Jersey where it was not. MTBE is on the EPA’s list of 188 Toxic, or Hazardous, Air Pollutants. The EPA has established a inhalation Reference Concentration (RfC) for MTBE at 3 mg/ cubic meter (or 0.83 ppm), that is to say, the daily inhalation exposure of the human population, including sensitive subgroups, “that is likely to be without an appreciable risk of deleterious effects during a lifetime.”⁸ There are no systematic national data on MTBE concentrations but the limited data that do exist show levels well below the RFC.

The 1997 Urban Air Toxics Monitoring Program (UATMP) measured MTBE (for the first time) as well as other VOCs (Volatile Organic Compounds, which include substances such as benzene) and Carbonyl at 12 urban centers, one of which was Camden, New Jersey. Camden is part of the greater Philadelphia reformulated gasoline program area and the only one of the 12 areas in the UATMP using MTBE-based gasoline. In addition, there are two industrial facilities within 10 miles of the Camden monitoring station that are also sources of MTBE emissions.⁹ Camden had by far the highest reported MTBE concentrations of the 12 urban centers in the UATMP but nonetheless, they were far below the RfC level. The mean measured concentration was 1.19 ppb (arithmetic mean. The geometric mean was 0.76) or about one-tenth of 1% of the RfC for MTBE. The highest measured concentration was 4 ppb, or about 0.5% of the RfC. The RfC refers to other than carcinogenic risks. Although excessively high doses of MTBE have been shown to cause cancer in rats and mice, there are no published findings of MTBE causing cancer in humans. The rodent cancer data was not considered sufficient to support including MTBE in the latest Report on Carcinogens released by the U.S. Public Health Service.¹⁰

While inhalation concerns were prominent early in the oxygenate programs, these have been replaced in recent years by concerns about MTBE in drinking water. Indeed, these have been the

⁷ From the Summary of Risk Estimates in the Assessment cited above.

⁸ The EPA MTBE Fact Sheet from the Health Effects Notebook for Hazardous Air Pollutants at <http://www.epa.gov/ttn/atw/hlthef/methylte.html>.

⁹ 1997 Urban Air Toxics Monitoring Program (UATMP), EPA Office of Air Quality Planning and Standards, January, 1999. Available at <http://www.epa.gov/ttn/amtic/files/ambient/airtox/r99-036a.pdf>. The report notes the two facilities reported emitting about 128,000 pounds of MTBE in 1995.

¹⁰ Report on Carcinogens, Tenth Edition; U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program, December 2002. See Appendix B.

basis of proposals to ban MTBE. There have been widespread detections of MTBE in water supplies, although generally at extremely low levels. MTBE was detected in about 5% of the nation-wide ground water samples collected by the US Geological Survey's National Water-Quality Assessment Program (NAWQA) with the frequency of detections much higher in reformulated gasoline areas. A study of finished drinking water from communities in 12 states in the Northeast and Mid-Atlantic regions detected MTBE in 9% of the community water systems. Significant sources of MTBE water contamination are leaking underground (and above-ground) gasoline storage tanks and pipelines. Instances of significant surface water contamination are ascribed to recreational motorboats. The EPA has not set a health-based Maximum Contaminant Level for MTBE but has set a 20 to 40 µg/L (micro-grams/liter) threshold for "unpleasant taste and odor effects." Less than 1% of the NAWQA samples with MTBE detections exceeded the lower end of the EPA threshold. Nonetheless, there have been some instances where very high concentration levels have been reported, most notably in California.

California has a much stricter 5 µg/L taste and odor threshold than the EPA, and has as well a health-based threshold of 13 µg/L.¹¹ In March 1996, a sample from a Santa Monica water system well recorded the highest level of MTBE, 610 µg/L, ever registered from over 11,000 drinking water sources sampled since 1990. Another well within the same Santa Monica system recorded nearly 500 µg/L. Both wells were shut down and remain inactive to this day. Later that year, in June, three additional wells in the system showed high, although less extreme, levels of MTBE of which two are currently listed as inactive. On November 21st of last year, the Santa Monica City Council finalized a settlement with three oil companies, Exxon Mobil, Chevron Texaco, and Shell which calls for the companies to pay the costs of cleaning the wells, a process which could take many years and costs of constructing and operating a water treatment plant. Until local supplies are again available, the companies will continue to pay the costs of importing about 80% of the water used by Santa Monica residents. In addition, the settlement provides an additional payment to the city of \$92.5 million. In its press release the city of Santa Monica stated that it closed its wells very soon after MTBE was detected and that the city was unaware of any health problems among its residents.¹²

Although rare, detections of high concentrations of MTBE continue to be reported. In 2003 (through early December) there were 40 detections at 7 California drinking water system wells of MTBE levels above the state's health threshold of 13 µg/L. One of the wells, in Monterey County, showed a level in excess of 100 µg/L and is listed as "destroyed."

It is no coincidence that California has led the way in banning MTBE. In March 1999, the Governor of California issued an executive order banning MTBE use in gasoline as of January 1,

¹¹ New Jersey has in place a much higher health-based Maximum Containment Level of 70 µg/L. In the absence of a Federal MCL, states can set their own levels. If there were a Federal threshold, states would be restricted in setting their own standard to that level or less.

¹² See the City of Santa Monica News Release, MTBE Settlement Q & A, issued November 21, 2003 and available at: http://www.santa-monica.org/cm/news/releases/archive/2003/cm20031121_qanda.htm.

2003, later delayed until January 1, 2004. New York and Connecticut implemented bans as well effective January 1, 2004. The three states account for over 40% of MTBE used in the reformulated and winter oxygenated gasoline programs.

With the Federal oxygenate requirement, especially for reformulated gasoline, still in place, and requests for waivers either denied outright (California) or not acted on, gasoline suppliers must line up substitutes, which for all practical purposes means ethanol.¹³ Indeed, even if the oxygenate requirement for reformulated gasoline were eliminated, the limited availability, costs, and environmental concerns associated with alternatives (alkylates, iso-octane, aromatics) assure a large, growing role for ethanol in any case.¹⁴

Approaches of The Energy Policy Act of 2003

Section 1506 of the pending Energy Policy Act of 2003 would eliminate the oxygenate requirement for reformulated gasoline while providing for regulatory safeguards to maintain the reduction in toxic air pollutants achieved by reformulated gasoline. Elimination of the oxygenate requirement would take effect 270 days after enactment of the legislation. The bill is less decisive, and less immediate, regarding the banning of MTBE. Section 1504 bans MTBE in motor vehicle fuel “not later than December 31, 2014” subject to certain qualifications. Subsection (c) allows a state to submit a notification to the EPA authorizing use of MTBE in fuel sold or used within the state. More important, Section 1505 calls for a review of the use of MTBE by the National Academy of Sciences. The purpose of the review is stated as follows:

The review shall examine the use of MTBE in fuel and fuel additives, significant beneficial and detrimental effects of this use on environmental quality or public health or welfare including the costs and benefits of such effects, likely effects of controls or prohibitions on MTBE regarding fuel availability and price, and other appropriate and reasonable actions that are available to protect the environment or public health or welfare from any detrimental effects of the use of MTBE in fuel or fuel additives.

¹³ In 2002, other oxygenates in use amount to less than 2% of total MTBE and fuel ethanol. The other oxygenates include: TAME, ETBE, TBA, and other aliphatic alcohols and ethers intended for motor gasoline blending.

¹⁴ In 1998 the EPA appointed, the Blue Ribbon Panel on Oxygenates in Gasoline “to investigate the air quality benefits and water quality concerns associated with oxygenates in gasoline, and to provide independent advice and recommendations on ways to maintain air quality while protecting water quality. In September, 1999, the Panel published its report, Achieving Clean Air and Clean Water in which it recommended (although not unanimously) a substantial reduction in the use of MTBE and removal of the oxygenate requirement for reformulated gasoline ---“in order to provide flexibility to blend adequate fuel supplies in a cost-effective manner while quickly reducing usage of MTBE and maintaining air quality benefits.” The Panel acknowledged that other considerations such as agricultural policy also influenced Congressional decisions regarding the oxygenate requirement and would consider other approaches to achieve its objectives if the oxygenate requirement were removed.

The review is to be completed no later than May 31, 2014.¹⁵ Not later than June 30th of the same year, the President may make a determination that restrictions on MTBE contained in Section 1504 should not take place and that legal power to ban MTBE contained in the bill should be null and void. For all practical purposes the bill does not really ban MTBE at the Federal level any time soon. But the bill allows states that have already banned MTBE or plan to do so, to go ahead while eliminating the barriers to flexibility caused by the reformulated gasoline oxygenate requirement.

These provisions are not controversial. The efforts to pass the bill broke down over Section 1502, which provided a “Safe Harbor” for producers of MTBE and renewable fuels against defective product liability as long as there was no violation of an EPA control or prohibition. The section would be effective as of September 5, 2003. The same Section makes it clear that its protection does not affect potential liabilities for environmental remediation costs, drinking water contamination, etc.

Opponents have argued that polluters should not be shielded from claims for damages caused by their products. In its news release cited earlier, the city of Santa Monica stated “---it is unconscionable that the manufacturer of a defective product, such as MTBE, would ever be exempted from liability for the harm to drinking water that their product caused.” The news release goes on to indicate that the threat of product liability recovery was an aid in achieving a settlement. But while the focus has been on MTBE, ethanol could conceivably turn out to be just as vulnerable. Although ethanol does not pose the same water contamination risks as MTBE, ingestion of even small amounts of ethanol is a known health risk for certain population groups, as the Center for Disease Control advises.

The current government advisory calls on women to drink no alcohol during pregnancy.¹⁶ It is generally acknowledged that ethanol use in reformulated gasoline will produce only low levels of exposure, but at the same time, there is also general acknowledgement that more research is needed regarding effects of prolonged, low-level exposures.

Section 1503 provides transition assistance in the form of grants to merchant producers of MTBE to encourage a shift to production of substitutes, including renewable fuels. The Section includes a series of “findings” that justify such assistance. The findings basically state that Congress was aware that substantial MTBE use would result from adoption of the oxygenate requirement, and was also aware at the time of risks of leakage from storage tanks. Moreover, Congress is

¹⁵ The National Academy of Sciences has looked at these issues before. In 1999, a study conducted by the National Research Council of the Academy concluded that neither MTBE nor ethanol additives to reformulated gasoline have much effect on reducing ozone, (with ethanol slightly less effective and having greater evaporative emissions problems). See: National Research Council, Ozone-Forming Potential of Reformulated Gasoline, National Academy Press, Washington, D.C., 2000.

¹⁶ The quote and advice cited come from the CDC Fact Sheet Alcohol Use and Pregnancy, updated in September 2002 and available at: <http://www.cdc.gov/ncbddd/factsheets/alcoholuse.pdf>

changing its mind after substantial investments have been made to supply the market, and in any case the assistance will ease any fuel supply problems. Assistance would be given only to US producers---foreign producers presumably should have taken regulatory risks into account in their investment decisions.

While in practice, the key states banning MTBE will rely primarily on ethanol as the replacement, the bill assures a growing market for ethanol by establishing mandated, growing, minimum volumes of renewable fuel to be blended into the nation's (ex Alaska and Hawaii who can opt in) motor vehicle fuel. The volumes rise from 3.1 billion gallons in 2005 to 5 billion in 2012, with the 2012 proportion to be maintained in subsequent years.¹⁷ The 2005 level is about 15% above the level of ethanol production in 2003. The bill provides for a system of tradable renewable fuel credits that would tend to minimize distortions from least-cost distribution patterns---although the MTBE bans in California, New York and Connecticut are creating in any case immediate demands for ethanol far from their Midwest production locations. The bill also shifts the costs of ethanol tax credits from the Highway Trust Fund (financed by dedicated motor fuel tax revenues) to the general revenue, thereby avoiding a perverse, growing drain of Highway Fund resources as ethanol volumes rise.

Preparing for the MTBE Bans

Suppliers to these markets cannot wait until the last minute to make the changeover to ethanol-based fuels. New storage and distribution arrangements must be put in place and supplies of ethanol and its distinctive RBOB lined up. In preparing for the bans, there are important market differences that impact how smooth the transition may be. The California market is served primarily by refiners within the state (plus some supplemental supplies from elsewhere in PADD 5) who thanks to geography and fuel specs have no readily available alternative outlets. The same market features also give some reassurance that costs incurred to meet changes in specifications can be recouped. Such conditions encourage orderly, timely adjustments to predictable changes, although---as is well known---the market is exceptionally vulnerable to unanticipated local supply problems. The situation is very different for New York and Connecticut. In particular, the regulatory reach of the two states is far more limited than is the case in California. Neither market is served by refineries located within the respective states. Moreover, the nearest refineries (in New Jersey, eastern Pennsylvania and Delaware) also serve large reformulated gasoline markets (including Massachusetts, Rhode Island, Southern New Hampshire, New Jersey, eastern Pennsylvania, Delaware, Washington D.C., and parts of Maryland and Virginia) that have not banned MTBE. Market incentives to outside suppliers must play a stronger role in attracting newly required supplies to the two states.

¹⁷ The actual amounts can be marginally less to the extent certain incentive provisions become operable. Ethanol from cellulose is credited at the rate of 1.5 gallons of renewable fuel for each gallon produced. If derived from waste, it counts as 2.5 gallons for each gallon produced. The bill also provides for waivers under certain conditions in whole or part of requirements to avoid significant adverse impacts on consumers

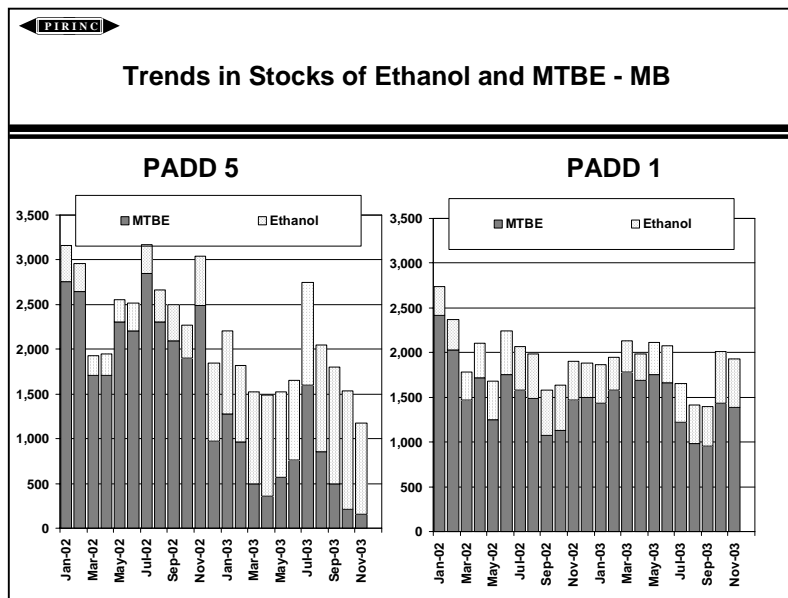
The chart below summarizes trends in MTBE and ethanol inventory levels in PADD 5 and PADD 1 since early 2002. As shown on the left, through most of 2002, stocks of MTBE in PADD 5 were far larger than ethanol stocks. Toward the end of 2002 and into 2003, ethanol stocks began to increase while MTBE stocks fell off sharply. As of end-November 2003, stocks of ethanol had reached about 1.3 million barrels, about 1 million above year-earlier levels, while stocks of MTBE were down about 90% from the year before to minimal levels.

The trends for PADD 5 suggest the changeover on the eve of the ban is nearly complete, although the low level of combined stocks relative to the year before suggests an enhanced vulnerability to any supply shortfall.

The inventory trends for PADD 1 are very different. MTBE continues to dominate and there was no buildup in ethanol stocks until very late in 2003. Ethanol stocks at end October and end November of this year were up by

73 and 115 MB respectively versus a year ago. Prior to October, ethanol stocks were below year-earlier levels. The late, and still modest buildup of ethanol stocks raises the possibility of significant “teething” problems in meeting the New York and Connecticut MTBE bans.

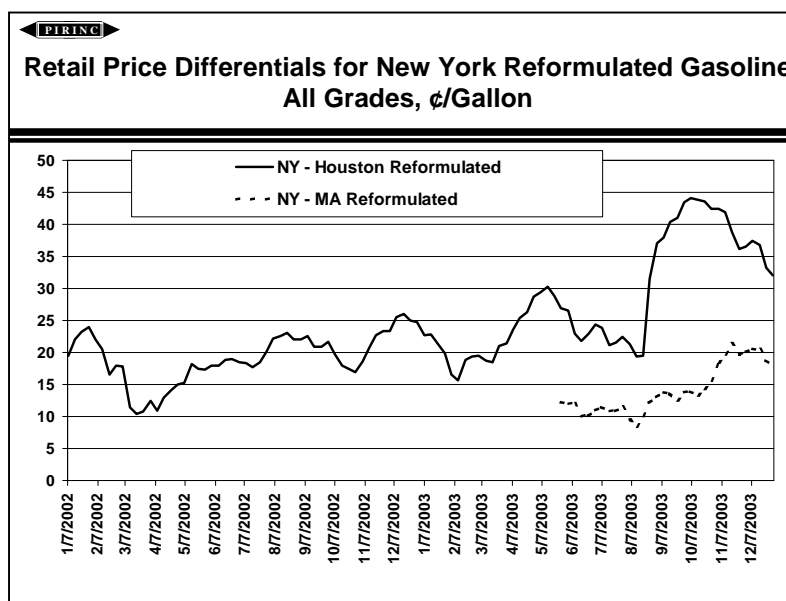
The switch from MTBE to ethanol raises further supply considerations not illustrated in the chart. By volume, less ethanol is needed than MTBE to meet the oxygenate requirement (5.8% ethanol per gallon of gasoline as opposed to 11.7% MTBE), but this would mean significantly less total volume of finished gasoline as a result of the change. One approach being taken to compensate is adding still more ethanol to the reformulated gasoline pool. Indeed, ethanol-blended reformulated in the Chicago-Milwaukee area already contains 10% ethanol, the maximum allowed under current EPA regulations. There is however a complication, namely, the impact of higher ethanol content on RVP (18 for ethanol vs. 8 for MTBE), with consequent adverse impact on overall emissions of VOCs, particularly in the summer when a Phase II reformulated gasoline RVP limit of about 7 is enforced¹⁸ Even allowing for the 0.3 RVP increase allowed by the EPA for 10% ethanol-based reformulated, a much more stringent, low



¹⁸ RVP (Reid Vapor Pressure) is a measure of vapor pressure of gasoline in pounds per square inch. It is widely used as a measure of gasoline volatility or vaporization characteristics. The lower the RVP, in general, the less evaporative emissions will occur.

RVP RBOB is required to stay within summer RVP limits. An additional consideration involves the overall loss of energy content when MTBE is replaced by ethanol. A gallon of ethanol contains 76 MBtu, less than the energy content, 94 MBtu of a gallon of MTBE (a gallon of gasoline contains about 115 Mbtu) so that replacement of MTBE by nearly an equivalent volume of ethanol reduces the energy content of a gallon of gasoline by about 1.5%. The shift thus results in a slight increase in total reformulated gasoline supply requirements.¹⁹ For New York and Connecticut, there is a further supply issue; namely, the loss of flexibility in the regional distribution system that results when product specifications in the two states become radically different from those in their neighbors. This limitation on the free flow of product means that if something goes wrong with the flow of ethanol-based gasoline supplies in the two states, they cannot look for relief from the most readily available supply sources. The result is increased risk of very volatile prices.

Certain, limited price information indicates consumers were already paying significantly higher prices as the effective date of the bans approached. The next chart looks at two sets of retail price differentials for New York reformulated gasoline (all grades). The first, beginning in January 2002, shows New York reformulated versus Houston MTBE-based reformulated gasoline and the second, beginning in May 2003, New York reformulated versus Massachusetts MTBE-based reformulated.



From early 2002 through the first half of 2003, the differential between New York and Houston reformulated averaged about 20 cents/gallon. Beginning at end-August of last year, there was a sharp upward movement in the differential to an October peak of nearly 45 cents. Since then the

¹⁹ In the summer, when the problem of evaporative emissions is most acute, the supply loss is increased by the need to remove other high RVP components from the reformulated gasoline pool to stay within the RVP limit when ethanol is added. To a certain extent, the loss to overall gasoline supplies is mitigated if the high RVP components can be shifted to other gasoline products subject to less stringent RVP limits. In California the supply consequences are more significant. State regulations effectively limit ethanol to about a 6% maximum by volume while the predominance of reformulated gasoline in the overall pool limits possibilities for shifting other high RVP components to other uses. For a discussion of this issue see pp. 8-9 of the report prepared by the Office of Oil and Gas of the Energy Information Administration, Preparations for Meeting New York and Connecticut MTBE Bans, October 2003, available at: http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/mtbebens/mtbebens.pdf

differential has eased somewhat with the latest week showing about a 32 cent difference. There is some indication that suppliers to the New York and Connecticut markets began the process of reducing their stocks of MTBE-based gasoline in preparation for the bans toward the end of the summer. At the beginning of August, total gasoline stocks in PADD 1 and PADD 3 were down about 3% (PADD 1Y down 5%) and 6% respectively from year-earlier levels. By the beginning of September, stocks in PADD 1 were down 10% (PADD 1Y down 28%) from year-earlier levels while stocks in PADD 3 were down by the same 6% as at the beginning of August.

When the Department of Energy's price series for Massachusetts reformulated began at the end of May 2003, the average price of New York reformulated was about 10 cents/gallon higher. In November, the differential widened to about 20 cents, although in the most recent week, it has fallen slightly to about 18 cents/gallon.

The recent significant widening of the differentials between New York reformulated and the two other gasolines correspond in time with the apparent late beginnings of major efforts to adjust to the pending MTBE bans. The widening of differentials to date are significantly greater than the Department of Energy's recently published estimates of the long-run equilibrium costs of supplying the two markets---1 cent/gallon for winter grade reformulated and 5 cents/gallon for the more stringent summer grade---suggesting some "teething problems" are indeed taking place.²⁰

Concluding Notes

Overall, it's hard to get very excited about MTBE and ethanol (as well as other) provisions of the latest energy bill. Removal of the oxygenate requirement for reformulated gasoline adds a critical element of flexibility in adjusting to current and prospective bans on MTBE. Nonetheless, large volumes of ethanol are still having to move in short order from their production sites in the MidWest to the coasts where MTBE bans have come into effect with the New Year.

If the country is to have a renewable fuels mandate, the bill provides for a rational approach, with safeguard provisions to deal with supply shortfalls. It's not clear why with a mandate in place, Congress still proposes to keep the tax credits in place. The tax credits were originally introduced to give a high cost fuel a chance to penetrate the market place. But if the mandated ethanol volumes must be taken up in any case, the tax incentive becomes redundant. The credits simply mean part of the costs of the mandate show up as an additional charge (among many others) against the general revenue as opposed to flowing through to consumers. Given the extremely high current and projected Federal budget deficits, this does not appear to be the most prudent approach.

²⁰ See the Energy Information Administration report cited earlier, Preparations for Meeting New York and Connecticut MTBE Bans, October 2003.

As for the most prominent point of debate, protection from defective product liability lawsuits, there is good reason to hesitate before granting such an exemption for any product which may turn out to be defective and potentially harmful. There are however other considerations to keep in mind when addressing MTBE or, as the bill also provides, renewable fuels. Large scale production of MTBE and lately ethanol are by and large the result of Federal regulation, both existing and prospective. MTBE in almost all cases was by far the most practical way to meet Federal oxygenate mandates. Moreover, there have been no lasting adverse health consequences demonstrated with respect to MTBE use in fuels---although there have been clear instances of damage to water supplies. The bill properly excludes any protection against liability for damage to water supplies, environmental remediation, negligence, etc. As for renewable fuels and other substitutes for MTBE, it remains to be seen what if any unanticipated environmental or other hazards emerge as a result of Federally-encouraged substantial growth in their volumes.