REMOVING MTBE FROM GASOLINE: IMPLICATIONS FOR THE NORTHEAST GASOLINE SUPPLY

Volume I

Report of the Northeast MTBE Roundtable

Prepared by the CONEG Policy Research Center, Inc.

April 2004

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Table of Contents

VOLUME I: ROUNDTABLE REPORT

VOLUME II: COMPANION REPORT

PREFACE

In 2003, the CONEG Policy Research Center, Inc. (Center) undertook a regional initiative to help Northeast state officials better understand how the region's gasoline supply and distribution system would be affected by three pending changes – the New York and Connecticut state bans on methyl tertiary butyl ether (MTBE) in gasoline; mitigation actions underway in the industry and states to respond to the state bans; and federal energy legislation making its way through the U.S. Congress.

As part of its MTBE initiative, the Center:

- commissioned a White Paper, "MTBE Bans, RFG Oxygen Requirements, and Renewable Fuel Standards and Their Potential Impact on the Supply and Distribution of Transportation Fuels in CONEG States," prepared by Downstream Alternatives Inc. (see Volume II).

- reviewed existing reports and discussed with state and industry officials the key issues that the region's gasoline supply system is likely to confront during any transition from an MTBE-based reformulated gasoline to a fuel containing ethanol.

- organized and facilitated a June 2003 Roundtable discussion to:
  - gain public and private sector reaction to the information contained in the White Paper;
  - gain insights from representatives of the petroleum supply and distribution industry about the likely consequences of MTBE bans in both New York and Connecticut – and the entire Northeast;
  - learn about the activities underway in the ethanol supply and distribution system to support changes in the Northeast gasoline markets; and
  - exchange information and ideas about key issues and mitigation measures to minimize disruptions to the region's gasoline supply/distribution system as a result of the MTBE bans.

  Participants in the Roundtable included officials from Northeast state energy offices and the Northeast regional air directors association; representatives of the gasoline and ethanol industry, as well as fuel transportation/distribution companies (e.g., railroads, barge operators, pipeline operators); and federal energy officials. Participants found the White Paper information and the Roundtable discussions to be timely and helpful. The Roundtable helped clarify industry questions about state actions to set *de minimus* levels of MTBE in the gasoline supply in New York and Connecticut, and underscored the importance of having this information widely circulated in the industry.

- conducted follow-up interviews in Fall 2003 with a cross-section of Roundtable industry participants to identify progress or any continuing problems as the gasoline and ethanol industry prepared to comply with the New York and Connecticut deadlines.

This report, prepared by the Center, summarizes the key findings that emerged from this series of discussions with industry experts who are actively involved in responding to the ongoing regulatory changes that are shaping the nation's – and the Northeast's – gasoline markets. It updates the Roundtable discussion and key findings to reflect developments since June 2003 to implement the MTBE bans. This report is an informational document to help state officials in better understanding the potential consequences of these regulatory changes for the Northeast's current gasoline supply and distribution system and the actions taken by states and industry to prepare for this transition. Much has already been written on the various environmental issues associated with ethanol, MTBE and the pros/cons of a state or national ban on MTBE. This document does not attempt to replicate those debates. A broader policy debate is underway in the Northeast on how best to balance environmental and energy goals in the individual states and the region. This report provides information on one important part of that policy discussion – the potential impacts of MTBE bans and ethanol use on the region's energy supply system.

ACKNOWLEDGMENTS

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THE NORTHEAST MTBE ROUNDTABLE
June 2003

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EXECUTIVE SUMMARY

On January 1, 2004, the formula of gasoline distributed and sold in New York and Connecticut changed as a result of legislation in those two states that bans methyl tertiary butyl ether (MTBE), a primary gasoline oxygenate and octane additive. As a result of the bans, ethanol replaces MTBE as the additive in reformulated gasoline (RFG) in New York and Connecticut. Since ethanol must be blended with the reformulated blendstock gasoline at the distribution terminal and not at the refinery, the ban on MTBE and the subsequent use of ethanol may result in a significant change in the gasoline supply patterns of the Northeast, especially the network serving New York and Connecticut.

The CONEG Policy Research Center, Inc. undertook an examination of what actions the affected industry expected to take to phase out MTBE in the New York and Connecticut gasoline supply; what challenges they expected to face; and what these changes might mean for the reliability of the gasoline supply to New York and Connecticut – and the entire Northeast market.

Key Findings

Changes in the New York and Connecticut Supply and Distribution System

1. To meet the January 2004 ban on MTBE and minimize potential disruptions in the gasoline supply, several events had to occur:

    - Refiners had to make minor adjustments to their RFG production to serve the New York and Connecticut markets for winter RFG.

    - Pipelines serving or located in New York changed either the products handled or existing distribution patterns to ensure that MTBE gasoline is not shipped into the state.

    - Distribution terminals in New York and Connecticut had to be retrofitted to accommodate ethanol delivery, storage and blending prior to the January 1, 2004 deadline. Any terminal that did not make the shift cannot supply gasoline to service stations in the two states.

    - Adequate stocks of both ethanol and the reformulated blendstock used for ethanol blending had to be in place at the terminals as of January 1, 2004.

    - Gasoline dealers in New York and Connecticut had to have arrangements in place to obtain compliant gasoline from ethanol blending terminals to avoid a last minute scramble for supplies. Dealers in these two states who have relied upon terminals in New Jersey or Massachusetts for supply must now obtain supply from terminals in New York and Connecticut.

2. The petroleum and ethanol industries assured state officials that their industries would be ready to provide the required products by January 1, 2004, and they were ready. East Coast refiners who are dominant in the New York and Connecticut markets produced the blendstock for ethanol blending. Retrofitting of terminals was underway in Fall 2003, and pipeline companies were implementing new specifications for products shipped. Major petroleum companies were working with their affiliates. The ethanol industry indicated that production was adequate to serve the California, New York and Connecticut markets; suppliers were positioning ethanol stocks; and rail and barge companies were addressing shipment issues. All these actions occurred in a timely manner.

3. To serve the summer RFG markets in New York and Connecticut, refiners had to make more substantive alterations to their RFG production, or supplement supplies to these markets.

Potential Changes in Other Northeast States' Supply and Distribution Systems

4. The New York and Connecticut MTBE bans should not initially cause a shift in the existing supply and distribution systems in those Northeast states that have not banned MTBE in gasoline. Reformulated gasoline containing MTBE from East Coast, U.S. Gulf and foreign refineries will continue to move to terminals in these states. Barges will continue to carry cargos of RFG containing MTBE from the New Jersey terminals to New England terminals except to terminals in Connecticut. Gasoline service stations in neighboring states currently served by terminals in New York or Connecticut may continue to be supplied by these terminals, but with RFG containing ethanol. Significant shifts in the retail distribution in the border markets are unlikely unless a significant price differential develops between MTBE and ethanol blended gasolines.

5. Over time, changes made in the supply and distribution system to meet the New York and Connecticut market for MTBE-free fuel may indirectly result in some changes in the gasoline product available in other portions of the Northeast. These two states represent a significant share of the region's gasoline consumption, and have a key role in its distribution system.

6. If the energy legislation currently stalled in the U.S. Congress is eventually enacted, it will alter the entire Northeast's gasoline formula over time. Regardless of the federal legislation, the New York and Connecticut MTBE bans and the resulting changes in gasoline formula took effect on January 1, 2004.

Potential Implications for Gasoline Prices

7. The actual costs associated with the change in gasoline formula from MTBE to ethanol blending may be modest, as refiners and terminals make capital investments in conversion. They may also have fewer options to obtain blendstock. However, the actual price at the pump is likely to be affected by numerous other market-driven factors such a global crude oil prices, refinery capacity and outages, transportation distances, as well as distribution disruptions (e.g., pipeline breaks or weather affecting tankers, barges and tanker trucks).

8. The actual price impact of state MTBE bans in early 2004 was lost in the typical volatility of crude oil and gasoline prices due to global events or complications at the refinery or in the delivery logistics. The Northeast's substantial reliance upon sources outside the region for RFG blendstocks and blending components adds a complicating factor to any "hiccup" in the system. If a shortage of compliant blendstock does develop, a brief price spike (up to several weeks duration) could occur until the higher prices attract additional supplies of compliant gasoline.

9. The shift to summer RFG requires an RFG blendstock with lower Reid vapor pressure (RVP) than the winter blend. This summer blendstock is more difficult to produce. While the refiners committed to the New York and Connecticut markets will produce the blendstocks, U.S. Gulf Coast or foreign refineries that have served this market only occasionally might not produce the blendstocks needed.

What States Can Do

10. While industry and market actions are the dominant factor in a smooth transition to MTBE-free gasoline markets, states can undertake some actions to mitigate any possible supply system and related price spike problem.

    - *Guidance*: State laws and guidance that provide certainty and adequate lead time are important if industry is to plan for the transition and implement measures to adapt to the MTBE ban. Both New York and Connecticut statutes provided adequate lead time, and the states set *de minimus* levels (0.5 percent by volume) of MTBE that will be allowed in the gasoline supply. Such guidance needs to be widely circulated within the industry to avoid any confusion or uncertainty.

    - *Monitoring*: Close monitoring by the public sector – of the terminal transition, inventory levels of the blendstock and ethanol supply, and refinery actions to serve the market – to identify potential problems may help minimize supply disruptions.

    - *Outreach*: Independent dealers serving the New York and Connecticut markets need to be informed by their associations of the need to use New York and Connecticut terminals (unless non-MTBE compliant gasoline is available in other terminals). Material provided through websites is helpful to a majority of retailers not served by the major petroleum companies.

What Has Happened Since the New York and Connecticut Bans Took Effect

11. Since January 1, 2004, the supply and infrastructure challenges to implement the New York and Connecticut MTBE bans have been successfully met by the petroleum and ethanol industries to date. No price increases induced by the bans have been identified by the U.S. Energy Information Administation, New York or Connecticut as of April 2004.

12. Gasoline prices began to increase significantly in 2004 for reasons other than the MTBE bans, including higher crude oil prices and U.S. refineries projected to run at higher capacity.

Crude oil prices are expected to remain higher in response to higher world demand, low world commercial crude oil inventories, and OPEC's plan to limit the production of crude oil. Since domestic refineries are operating close to capacity, U.S. supplies and prices are vulnerable to major disruptions related to refinery production or supply distribution. Gasoline prices may be volatile if crude oil prices rise or fall, or if available refinery capacity and gasoline imports are inadequate to meet demand.

13. The remaining concern regarding the impact of the MTBE ban is whether adequate summer grade RFG blendstocks for ethanol blending will be available to meet the summer driving season in New York and Connecticut. Late April to early May is the time period when the petroleum industry typically shifts to summer grade gasoline. Supplies of summer blendstock could be tight if U.S. and foreign refineries serving the New York and Connecticut markets do not supply the necessary blendstock. A special concern is whether foreign refineries serving the Northeast markets will produce the required blendstock. If domestic and foreign refiners have correctly anticipated the demand for blendstock, a price spike related to a shortage of ethanol blendstock should not occur. Early indications are that major foreign refiners are preparing to produce the necessary summer blendstock.

14. New York, Connecticut, the U.S. Department of Energy and the U.S. Energy Information Administration continue to closely monitor the RFG blendstock supply and distribution network, as well as gasoline prices. EIA recently reported that the expected supply of summer-grade RFG blendstock for the New York and Connecticut markets is higher than it had anticipated last Fall, and therefore the likelihood of any severe shortfalls due to the initial transition is significantly reduced from its previous assessment.

15. As the New York and Connecticut bans on MTBE are implemented, legislatures in surrounding states have acted on or are considering bills to ban MTBE. Maine has enacted a bill to prohibit the sale or distribution of MTBE in gasoline. Bills to ban MTBE in gasoline are being considered by New Hampshire and Pennsylvania legislatures. Bills have also been introduced in the Rhode Island and Vermont legislatures.

INTRODUCTION: REGULATIONS AFFECTING GASOLINE ARE CHANGING

Requirements of the 1990 Clean Air Act and related mitigation strategies are the critical framework that shapes the Northeast's gasoline formula and the source of its gasoline supplies. Now, new state laws and proposed federal energy legislation will bring about further changes in how the industry produces and distributes gasoline sold in the Northeast.

On January 1, 2004, the formula of gasoline distributed and sold in New York and Connecticut changed due to state laws that ban the use of methyl tertiary butyl ether (MTBE) as a gasoline oxygenate in those two states. Current federal Clean Air Act regulations administered by the U.S. Environmental Protection Agency (EPA) require that reformulated gasoline (RFG) sold in specified non-attainment areas (including the New York City metropolitan area in New York and Connecticut) contains 2.0 percent oxygen by weight. Gasoline refiners have used MTBE to meet the oxygenate requirement. Ethanol is the only available, economic alternative to MTBE as a gasoline oxygenate additive. Since New York, like California, has not yet been successful in its efforts to receive a waiver of the RFG oxygenate requirement from EPA, gasoline in New York and Connecticut will have ethanol as an additive beginning January 1, 2004 as a result of the bans. These two states will also have significant increases in ethanol use in 2004 to meet the RFG requirements of federal clean air laws.

The gasoline formula in other non-attainment Northeast states is likely to change due to federal legislation that is still pending in the U.S. Congress (see Figure 1). The nature and timing of those changes depends upon the specific requirements in the final bill for such provisions as a national phase out of MTBE, a renewable fuel standard and any opt-out provision, and the legislation's date of enactment. While the gasoline refining industry faces an uncertain national market for RFG, gasoline industry representatives indicate that the refining industry has moved to meet the gasoline needs of the three states that recently banned MTBE – California, New York and Connecticut.

FIGURE 1: PENDING FEDERAL ENERGY LEGISLATION: KEY PROVISIONS AFFECTING RENEWABLES IN FUELS

Legislation currently before the U.S. Congress (H.R.6, S.2095) could significantly alter the nation's gasoline formula in ways that are not immediately clear. While agreement was initially reached in some provisions affecting the use of MTBE and ethanol, at the time of this publication, Congress continues to debate the bill – the contentious MTBE liability provision and the cost of the bill, in particular. At this time, the fate of any comprehensive energy legislation is very uncertain.

Congress continues to explore the potential implications of pending energy legislation. For example, current proposals for the renewable fuels section of the bill include:

- a nation-wide ban on the use of MTBE as fuel additive by December 31, 2014 except in those states that specifically authorize its use.
- a Renewable Fuels Standard (RFS) that requires five billion gallons of renewable fuel to be blended in gasoline annually by 2012. This requirement would be met primarily with ethanol, while a smaller amount could be met with biodiesel or other renewable fuels.
- a credit trading system to provide refiners with flexibility in meeting the requirements of the RFS. Under a credit trading program, less ethanol-based renewable fuel might actually be consumed in the Northeast if East Coast marketers can purchase credits from marketers in the Midwest who "over comply" with the RFS standards, rather than undertaking the more arduous task of blending the renewable fuel on the East Coast.
- the option for states to petition for a waiver from the RFS requirement if it would cause economic or environmental harm to the state. When a state "opts-out" it lowers the overall national RFS requirement.
- the elimination of the Clean Air Act's two percent oxygenate requirement for RFG within 270 days of the measure's enactment, (but upon enactment in states with waivers under Section 209(b) of the Clean Air Act), thus reducing the need nationally for an RFG oxygenate additive such as MTBE or ethanol.
- a "safe harbor" for MTBE producers, protecting them from defective product liability lawsuits. The inclusion of this controversial provision has contributed to the bill's political stalemate in Congress.

GASOLINE FORMULA – IMPACTS OF THE FEDERAL AND STATE REGULATIONS

The complex chemistry of gasoline is made even more complex as a result of changing federal and state regulatory requirements. The implications of such regulatory changes for the gasoline market is also difficult to determine, since the market's response is affected by the particular combination of federal and state requirements as well as external market forces.

MTBE is used in gasoline as an octane additive to enhance performance of premium grade gasoline, and it is used in all grades of RFG as an oxygenate to meet federal clean air emission requirements. When MTBE is removed from the RFG, the gasoline loses volume, octane quality and emissions performance – all of which must be replaced.

- If MTBE is banned and the oxygenate requirement continues, ethanol will be used by industry to provide the needed volume, octane and emissions characteristics since it is the only widely available and economic alternative to MTBE.
- Even if the oxygenate requirement is repealed, ethanol will be used to maintain octane quality.
- A federal renewable fuels standard would increase ethanol use nationally, but the actual impact depends on whether the federal oxygenate requirement is also eliminated.

Reformulated gasoline formulas also change between winter and summer seasons in response to air quality emission requirements. Since ethanol is more volatile than MTBE, gasoline containing ethanol has a higher Reid vapor pressure (RVP), the measure of the fuel's tendency to evaporate. Since fuel is more likely to evaporate during the higher temperature summer months, the summer grade RFG must be altered to accommodate the higher evaporative characteristics of the ethanol blended fuel. To reduce the evaporation of summer grade RFG, greater volumes of low vapor pressure hydrocarbons are added to the underlying blendstock, thereby reducing the RVP measure. However, this also reduces the volume of ethanol blendstock that is produced from each barrel of crude oil. In summary, the gasoline blendstock to which ethanol is added to produce compliant summer grade RFG differs from the gasoline stock that is blended with MTBE for other markets.

Federal Clean Air Act regulations require RFG in all areas that are in extreme or severe non-attainment of federal ozone standards. States, upon request to the EPA, may "opt-in" and require the use of RFG in other non-attainment areas. When electing to "opt-in," states can incorporate the environmental benefits of RFG into the State Implementation Plan (SIP) as part of demonstrating compliance with federal clean air requirements. A state that has opted into RFG may later request to EPA to "opt-out" of RFG, but it would have to revise its SIP to incorporate other actions that contribute to achieving attainment. Most of the Northeast states could choose to opt-out of the federal RFG requirement, but opt-out is not an option for the New York City consolidated metropolitan statistical area (CMSA), or the Pennsylvania - New Jersey - Maryland metropolitan statistical area.

Most of the eight CONEG states[1] currently require RFG, but some states have an option on what type of gasoline to require.

- The New York CMSA, which includes portions of New Jersey and Connecticut, is a mandatory RFG area.
- Connecticut has chosen to opt-in the rest of the state to RFG.
- New Jersey has mandatory RFG areas and a three county opt-in area.
- New Hampshire, which opted-in the area of the state that is included in the Boston CMSA, received preliminary approval from the EPA in January 2004 to opt-out of RFG.
- Massachusetts and Rhode Island have opted-in their entire states.

Since regulatory changes can result in more complicated refining and distribution systems, the petroleum industry is concerned about the continued spread of "boutique gasolines" which must be produced to meet specific state formulas. Such diverse formula requirements reduce the fungibility of the gasoline market – making it more difficult for the industry to respond to local market conditions and increasing the potential for product shortages. In an effort to lessen the complexity of the supply/distribution network and to enhance its reliability, the industry is likely to seek a "harmonization" of fuel standards as a way to reduce the number of boutique fuels that it must produce and distribute. If the federal oxygenate requirement in RFG is eliminated, more states may adopt RFG in lieu of boutique fuels, and this harmonization could ease the logistical challenges for the gasoline supply and distribution system.

[1]For purposes of this report, the Northeast region is defined as CONEG member states: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

THE NORTHEAST'S GASOLINE SUPPLY AND DISTRIBUTION SYSTEM[2]

The Northeast region's gasoline supply and distribution system is perhaps the most complex in the nation. The eight CONEG states are served by a diverse, multi-layered network of refineries, ports, terminals, pipelines and retail distribution outlets that is both physically and economically linked. This integrated network includes East Coast, Gulf Coast and foreign refineries, pipelines, tanker ships, barges, and tanker trucks (see Figure 2 - map). This region is served by approximately 150 product terminals, of which 90 are served by pipeline, 101 have water delivery and 14 have rail access. Ethanol was already being handled by at least 11 terminals in 2002.

The source of gasoline supplies consumed in these states differs significantly by type of gasoline. East Coast refineries located in New Jersey, Delaware and Eastern Pennsylvania provide approximately 50 percent of the RFG supplies in the Northeast/Mid-Atlantic region, but only 20 percent of conventional gasoline supplies. The region obtains most of its conventional gasoline (about 70 percent) from Gulf Coast refineries, while foreign refineries provide about 20 percent of RFG and 10 percent of conventional gasoline.

The eight CONEG states consume approximately 16 billion gallons of gasoline per year (EIA, 2001 data), with RFG accounting for over 78 percent of the region's gasoline consumption. Reformulated gasoline is consumed primarily in densely populated markets along the Northeast coast.

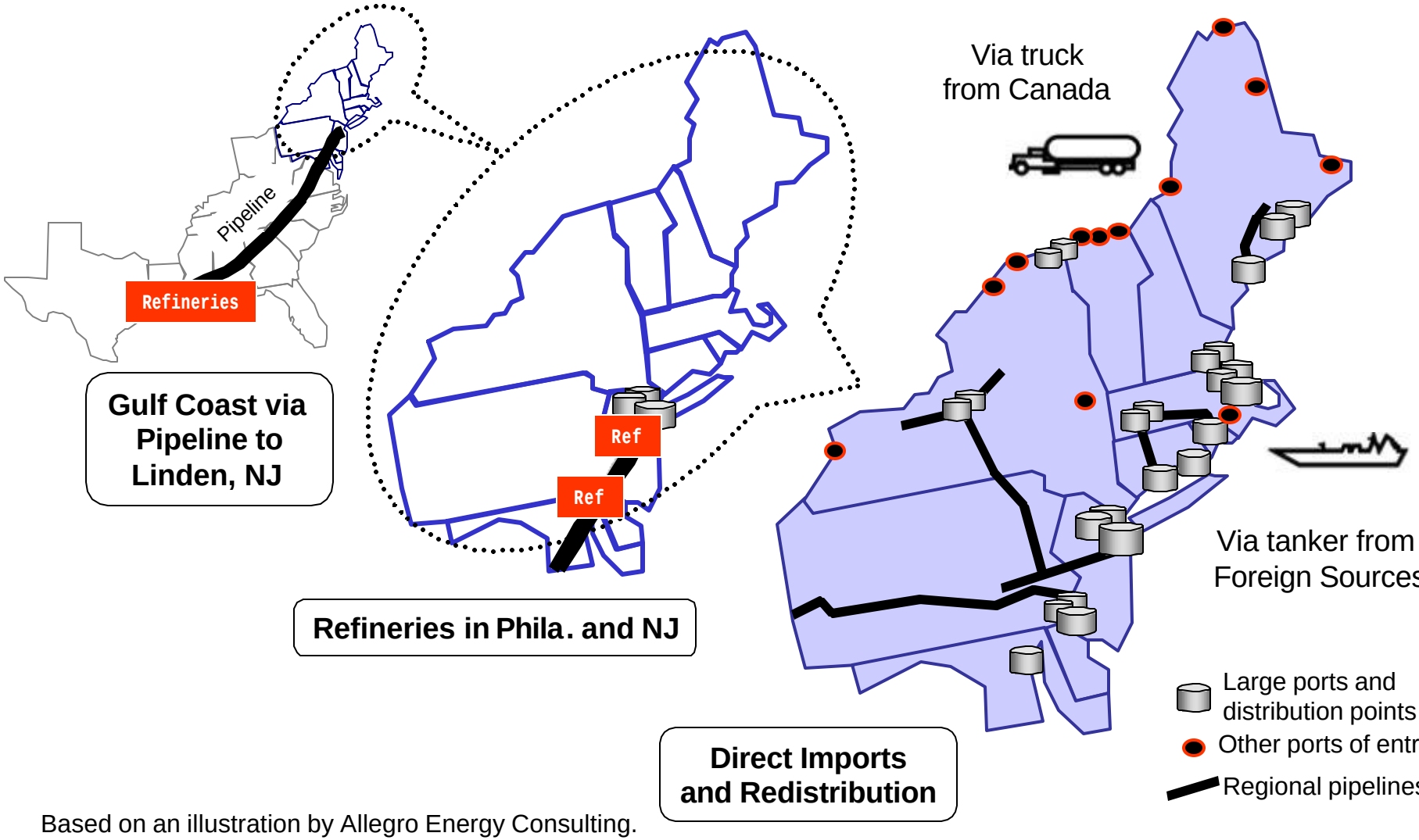
Since New York and Connecticut represent a significant share of the Northeast's gasoline consumption and have a key role in the region's gasoline distribution system, their actions to ban MTBE in gasoline could influence the Northeast's overall gasoline market. New York and Connecticut are major consumers of the region's RFG supply, accounting for about 45 percent of the region's total gasoline supply and approximately 37 percent of RFG consumption. These two states are also key parts of the Northeast's gasoline supply network, with approximately 50 percent of the region's finished product terminals located in these two states. (When New Jersey terminals are taken into consideration, the three states account for approximately 80 percent of the region's finished product terminals.)

New York Harbor – with operations on both the New York and New Jersey sides of the Harbor – is a major hub of the region's gasoline distribution system.

- Crude oil from predominately foreign sources is refined into gasoline and other petroleum products on the New Jersey side of the Harbor.

[2]For additional information on the Northeast's gasoline supply and distribution system, see Volume II of this report: Robert E. Reynolds, "MTBE Bans, RFG Oxygen Requirements, and Renewable Fuel Standards and Their Potential Impact on the Supply and Distribution of Transportation Fuels in CONEG States," Prepared for the CONEG Policy Research Center, Inc., April 2003.

Northeast's Gasoline Supply: Pipeline, Mid-Atlantic Refineries, Imports



Based on an illustration by Allegro Energy Consulting.

- A large portion of gasoline for the CONEG states is received in New York Harbor by pipeline from the U.S. Gulf Coast and by tanker ships and barges from domestic and foreign sources. Gasoline from the Mid-Atlantic refineries is also shipped to New York Harbor.

- Product from New York Harbor is shipped by pipeline and barge to the New York terminals located northwest and west of the Harbor, and by barge to the New England markets.

While the New York Harbor facilities serve the larger region, the New England states are also served by other ports, terminals and pipelines that deliver fuel products throughout the region. Tanker ships and barges deliver finished product to port terminals in New Haven, CT, Providence, RI, Boston, MA, Portsmouth, NH, and Portland, ME. Pipelines from New Haven and Providence port terminals help distribute gasoline to southern New England, while a Portland to Bangor pipeline helps distribute gasoline in Maine.

Throughout the region, fleets of tanker trucks are the final leg of the distribution system, delivering finished product from terminals to the thousands of retail outlets operated as affiliates of major companies and by independent dealers.

This wide-ranging energy fuels supply and distribution network has limited tolerance for dislocations or disruptions, and such dislocations can quickly be reflected in short-term shortages or price swings. A reliance upon domestic or foreign imports of distillate products into the Northeast, combined with the industry's "just-in-time" inventory management, means that the region's distribution system – tankers, barges and tugs, terminals, distribution facilities and delivery trucks – must work flawlessly at any given time to provide a reliable supply of either gasoline or winter distillate fuels to consumers. Over time, a variety of factors have contributed to more fragile distribution logistics. Retailer and supplier consolidations continue; public and private physical infrastructure ages and declines; and regulatory differences in gasoline or distillate content require different storage and delivery facilities for different products (e.g., heating oil or diesel fuel, conventional gasoline, RFG with MTBE, or RFG with ethanol).

Both state and industry officials express concern about various market and regulatory actions that can put additional stress on the region's distribution system and affect the reliability of the region's gasoline (and distillate fuel) supply. State officials express concern about the number of petroleum industry terminals that are being idled or removed as a result of industry consolidation and asset rationalization. Industry officials are concerned about federal or state regulations that require this fragile, just-in-time distribution system to store and distribute a greater number of gasoline (and distillate) products.

CHANGES TO THE GASOLINE SUPPLY AND DISTRIBUTION SYSTEM

Under current law, the New York and Connecticut MTBE bans:

- change the formula and, as a result, some sources of supply for gasoline consumed in these two states;
- require a significant increase in the use of ethanol as an oxygenate and octane booster for gasoline sold in the two states;
- require a significant expansion of the ethanol transportation system in the Northeast; and
- require ethanol storage and blending modifications to terminals located in these states or serving these states.

MTBE may remain the primary oxygenate and octane booster in the rest of the region unless federal legislation to phase out MTBE nationally is enacted. However, since the Northeast's gasoline distribution system is regionally integrated, changes made in the supply and distribution system to meet the New York and Connecticut markets may indirectly result in some changes in the gasoline product available in other portions of region.

What Changes Are Expected in the New York and Connecticut Supply and Distribution System?

The gasoline supply pattern for New York and Connecticut will change to some degree as a consequence of the bans. These changes will occur even though Congress has not yet modified national MTBE requirements or current federal oxygenate requirements. The industry must meet the January 2004 state bans of MTBE and it must begin to produce summer grade gasoline blendstocks for the New York and Connecticut markets by Spring 2004.

Refiners: To serve the New York and Connecticut markets in 2004, refiners must alter their RFG production or supplement supplies to provide the MTBE-free product. Refiners that do not make such adjustments or supplement supply will not be able to serve these states.

- The East Coast refiners, who are dominant in the New York and Connecticut RFG markets, will produce the gasoline stock for ethanol blending.

- Other refiners overseas or in the U.S. Gulf Coast may be slow to adapt their refinery operations for the New York and Connecticut markets. If they are, this could result in a shift in existing gasoline supply sources that serve this market, and create the potential for the New York and Connecticut RFG markets to be more vulnerable to disruptions or shortages of blendstock.

The experience of California refineries provides some insight into the costs associated with converting facilities from MTBE to ethanol. According to industry sources, the investment in

southern California refineries to accommodate the California MTBE ban and ethanol replacement have been relatively modest. The refinery conversion should be less complicated in the Northeast than in California for several reasons. New York and Connecticut's emissions requirements affecting the production of the gasoline blendstock are less restrictive than the California requirements, and the Northeast also has a shorter period during which the industry must provide summer grade RFG.

Terminals: New York and Connecticut terminals must be modified to accommodate ethanol use. Since ethanol has an affinity for water and therefore cannot readily be transported in pipelines, it must be blended at these terminals with the gasoline blendstock to produce finished gasoline for distribution to service stations. New tanks or modified tanks for ethanol storage, ethanol blending equipment, and piping changes to allow ethanol delivery will be required. Rail spurs to allow rail delivery of ethanol may be desired in some cases.

Industry officials indicate that an existing tank can be made suitable for ethanol use within 60 to 90 days with all the required permits in place. The cost to modify existing tanks ranges from modest to $50,000 plus per typical tank. New tanks require 14 to 24 months to build and cost $10 to $15 per barrel (bbl) of storage capacity (i.e., $250,000 to $375,000 for a typical 25,000 bbl tank). Blending systems for the typical terminal cost about $300,000.

Conversion of New York and Connecticut gasoline terminals to be capable of handling ethanol has been the most critical step in preparing for the January 1, 2004 gasoline formula shift. Since any terminal that has not made the shift cannot supply gasoline to service stations in these two states, current distribution patterns may change. According to New York and Connecticut officials, petroleum industry representatives indicate that the terminals in these two states would be ready to meet the January 1, 2004 ban. In October 2003, petroleum industry representatives again reported that the needed modifications would be completed in sufficient time.

Pipelines: Pipelines serving or located in New York will experience some change in products handled or in distribution patterns. Pipelines delivering gasoline stocks to New York from New Jersey will not ship MTBE gasoline. For example:

- The Colonial Pipeline, which transports gasoline to the New York Harbor gasoline terminals from the U.S. Gulf Coast, established a fungible grade category for reformulated blendstock for oxygenate blending shipments and was receiving nominations to ship product by late 2003.

- The Buckeye Pipeline serving terminals in Brooklyn and Long Island banned MTBE gasoline from pipelines serving New York, effective November 9, and established a fungible grade category for blendstock.

- Buckeye no longer ships MTBE-RFG to Pennsylvania terminals from New York Harbor. Such shipments are from the Philadelphia area via the Laurel Pipeline.

- In Connecticut, Buckeye ships different levels of gasoline stock for ethanol blending via the Jet Line System on a segregated basis.

Dealers: Representatives of major petroleum companies indicate that they have worked with affiliated dealers to prepare for the transition to the new RFG. However, independent dealers in New York and Connecticut who have depended on terminals in New Jersey and Massachusetts as the source of gasoline for delivery to New York or Connecticut service stations will have to rely upon New York or Connecticut terminals for compliant gasoline – unless New Jersey terminals decide to provide non-MTBE compliant fuel. Adjustment to this changing supply pattern may not be smooth initially as these dealers scramble for new supply arrangements. "Going over to New Jersey for a tanker truck of gasoline" may no longer be an option.

Ethanol Supplies and Distribution: According to ethanol industry officials, production of ethanol will not be an issue for the Northeast as the New York and Connecticut bans go into effect. The shift to ethanol in those two states is expected to require a maximum of about 470 million gallons per year. However, the U.S. ethanol production capacity is underutilized. With a production capacity of approximately 2.7 billion gallons per year (bgy), actual production is projected at 2.5 bgy in 2003, and over 450 million gallons per year additional production is currently under construction.[3]

- According to ethanol industry officials, some Northeast terminals currently have ethanol blending capability and others, including some in other Northeast states, are making investments in ethanol blending capability. Ethanol suppliers are positioning ethanol stocks to meet the emerging New York and Connecticut markets.

- The Northeast currently has gasoline dealers providing ethanol blend gasoline on a competitive price basis.

- Ethanol is being transported to the Northeast by a combination of barge and rail tanker car, with shipment costs and terminal facilities determining the choice of shipment mode. The lack of rail access to most New York and Connecticut terminals poses a problem for rail shipments to these terminals. A possible solution to this problem might be rail-to-barge transshipment hubs in the Northeast. Such hubs would allow large unit trains to move ethanol to the transshipment storage where it would be transferred to barges that can access the region's water-based terminals. Approximately two-thirds of the region's terminals have water access, while only a few have direct rail connections.

  CSX Transportation has made significant investments at a terminal in the Port of Albany to facilitate such rail-to-barge movements. Norfolk Southern is reportedly working on a rail program at a terminal in Newark. Major ethanol terminaling capabilities to accomplish such

[3] Renewable Fuels Association, *Building a Secure Energy Future*, February 2003

shipments have been set up in Sewaren, NJ. Some barge/marine transport companies have already been contacted about moving supply to area terminals.

In response to the New York and Connecticut MTBE bans, the ethanol industry is making investments to serve the Northeast markets, and is working with rail and water shippers to strengthen the ethanol delivery system. These activities could broaden the application of ethanol in the region, especially if federal legislation phases out MTBE and eliminates the oxygenate requirement, and ethanol is used in the region's RFG for octane performance and toxics compliance.

What Changes Might Occur in the Supply/Distribution System Serving the Other Northeast States?

States that have not banned MTBE should not experience significant changes in gasoline formula or the sources of supplies as a result of the New York and Connecticut bans. New England terminals (except those in Connecticut) could continue to receive barge shipments of MTBE gasoline from New Jersey (but not New York) terminals. Foreign or U.S. Gulf cargoes of MTBE gasoline will continue to be delivered to New Jersey terminals for delivery to states allowing MTBE.

Service stations in the border areas of Vermont, Massachusetts and Rhode Island that are currently supplied by New York or Connecticut terminals are likely to continue to be served by these terminals – but with ethanol blended gasoline. These "border" dealers must prepare their tanks and gasoline inventory for ethanol gasoline delivery. These border dealers could shift their delivery pattern to more distant terminals that continue to handle MTBE gasoline. Their decision is likely to be driven by differences in the availability, price and logistics challenges between the two types of fuels.

Significant shifts in the retail distribution in these border markets are unlikely unless a significant price differential develops between MTBE and ethanol blended gasolines. Since the retail distribution system is currently tight, it may be difficult to find the additional tanker trucks and drivers required to deliver gasoline from more distant terminals. In fact, new federal safety regulations that limit drivers' hours of service increase pressure on the distribution system and its existing supply pattern. Current uncertainty over federal energy legislation and its consequences on distribution patterns is a barrier to greater investment in tanker trucks and drivers.

Even with different state requirements governing the use of MTBE in gasoline, the Northeast's RFG markets may – over time – move away from MTBE gasoline in response to economic and distribution logistics. If ethanol remains price competitive, and the industry seeks to deliver fewer diverse gasoline products, the current investment to make the New York and Connecticut supply/terminal distribution system compatible with ethanol may contribute to greater ethanol use in the region over the longer term.

MTBE BANS: IMPLICATIONS FOR GASOLINE PRICES

Gasoline Prices

The actual costs associated with the change in the gasoline formula from MTBE to ethanol blending may be modest, but the actual price at the pump is likely to be affected by numerous other factors that are driven by market forces. The move to ethanol-blended gasoline may result in fewer options for refiners and terminals to obtain the blendstock. However, the actual price to consumers will be affected by such factors as global crude oil prices, refinery capacity or outages, transportation distances, as well as distribution disruptions (e.g., due to pipeline or weather events affecting tankers, barges and tanker trucks).

Ethanol currently sells at a significant discount to MTBE when the federal ethanol excise tax exemption is factored in.[4] However the costs of the underlying blendstock will vary between winter and summer grade RFG, since the changes needed to deal with ethanol's higher vapor pressure for summer grade RFG increases the cost of the blendstock during the summer months. The Energy Information Administration (EIA) has estimated that a combination of state MTBE bans and a continued oxygenate requirement would result in about a 1 cent/gal increase in winter grade gasoline prices and a 5 cents/gal increase for summer grade gasoline[5]. An American Petroleum Institute commissioned study estimates that the combination of the ethanol mandate, elimination of the oxygenate requirement, and the MTBE phase-out would reduce gasoline costs slightly (0.2 cents/gal).[6]

The actual impact of state MTBE bans could be lost in the typical volatility of crude oil and gasoline prices due to global events or complications at the refinery or in the delivery logistics. For example, a swing of $10 per barrel in crude oil prices ($20/bbl→$30/bbl or $30/bbl→ $20/bbl) moves retail gasoline prices by nearly 25 cents/gal. In early 2004, crude oil prices at $30/bbl are in the higher range of their traditional fluctuation; but energy analysts predict that crude oil prices will remain in the $30 plus/bbl range for the near future.

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[4] As part of federal transportation legislation pending before Congress, federal ethanol tax credits would replace the current reduced tax rates on alcohol blended fuels for gasoline.

[5] "Preparations for Meeting New York and Connecticut MTBE Bans," Office of Oil and Gas, Energy Information Administration, U.S. Department of Energy, October 2003.

[6] "Effects of Repealing the Federal Oxygenate Requirement in RFG Under a National MTBE Phase-Down" Math Pro, Inc., August 30, 2002.

Potential Price Spike

It is a spike in gasoline prices, not average gasoline prices, that creates considerable public interest and concern. An MTBE ban could result in a temporary gasoline supply interruption and contribute to a short-term price spikes, if the petroleum industry is not prepared for the change. The potential causes of such a spike directly related to a state ban on MTBE could include:

- a temporary shortage of current MTBE-RFG immediately prior to the effective date of a ban, as the terminals and retail dealers convert tanks and related equipment to the ethanol blendstock;
- a lack of sufficient reformulated gasoline blendstock for ethanol blending at terminals in the state;
- a lack of sufficient ethanol blending capacity at these terminals;
- a lack of sufficient ethanol stocks at these terminals; or
- a slow response by independent dealers serving the state which has banned MTBE to establish supply arrangements with terminals located in the state.

The petroleum and ethanol industries indicated these conditions were not likely to occur as the bans are implemented in New York and Connecticut, since the state laws provided adequate lead times to plan for the transition, and measures to adapt to the MTBE bans are in place or well underway. Events surrounding the January 1, 2004 deadline bore out this prediction.

However, the Northeast's substantial reliance on sources outside the immediate region for RFG blendstocks and finished product add a complicating factor to any "hiccup" in the supply system. If a price spike were to occur, its duration would likely be brief due to the price/supply market corrections inherent in the petroleum industry. A supply shortage drives up prices, which in turn attracts more supplies that eliminate the shortage. Higher prices would attract compliant gasoline blendstocks from the U.S. Gulf Coast and foreign sources. The arrival of new supplies should take no more than four to six weeks. Shipments by barge from the U.S. Gulf Coast take approximately six to eight days, while pipeline transit time is approximately 20 days. At the retail level, any adjustments in terminal to service station distribution would take less time, especially if dealers are aware of the need to make new arrangements for compliant product.

The Near-Term Outlook

In mid-October 2003, industry representatives who participated in the CONEG Roundtable identified two areas of continuing uncertainty on how the market will respond to the new New York and Connecticut gasoline requirements.

- The RFG supply sources from foreign refineries are an area of uncertainty. These refiners supply reasonably significant volumes of both RFG and blending components into New York Harbor. Due to the proprietary nature of product trading information, the question of how foreign refiners respond to the changed New York/Connecticut market requirements cannot be addressed with any certainty. Refiners with market affiliations in the New York/Connecticut area are likely to make the necessary changes to supply the blendstock for ethanol. Opportunistic suppliers are likely to continue to supply blending components since the need for such components would remain unchanged or increase after the conversion to ethanol.

- Opportunistic foreign refiners that have been providing imports of finished MTBE-based RFG may choose to direct their production to another market, at least during the initial phase of the program. Should this happen, the supply of blendstock could be tight especially in the initial transition to summer grade fuels. This in turn could lead to price volatility due to gasoline's relative inelasticity. Any unforeseen interruptions to normal supply would be especially problematic, leading to temporary, but potentially steep, price increases.

The increase in gasoline prices that began in 2004 appears to be related to factors other than MTBE bans – namely, higher crude oil prices on the global energy markets and projections that the U.S. refinery industry will be operating at close to maximum capcity, especially in the summer fuel season. The transition of the physical infrastructure to handle ethanol and reformulated blendstock was completed before January 1, 2004. The continuing question is how the market reponds to providing the necessary blendstocks on an ongoing basis. Early indications are that the major foreign refiners are preparing to produce the necessary summer blendstock.

WHAT STATES CAN DO

In June 2003, industry participants in the CONEG MTBE Roundtable identified a number of state activities that could mitigate any possible supply shortage and related price spike problem.

- Industry Roundtable participants expressed concern about the need for state guidance on *de minimus* levels of MTBE that would be allowed in the New York and Connecticut gasoline supply. Both New York and Connecticut have issued guidelines that set the *de minimus* level at 0.5 percent by volume (see Appendix). Industry representatives stressed the importance of circulating this guidance widely within the industry.

- Action by the public sector to closely monitor the progress being made by New York and Connecticut terminals to modify the facilities for ethanol access, storage and blending could help ensure that the transition to MTBE-free gasoline remains on course.

- The public sector could closely monitor the progress of New York and Connecticut terminals in building the inventory levels of reformulated blendstock and the ethanol itself. Early identification of possible inventory problems could help minimize supply disruptions.

- Independent gasoline dealers serving New York and Connecticut markets should be informed by their associations of the need to use New York and Connecticut terminals (unless non-MTBE compliant gasoline is available in other terminals).

- Websites could be useful to those in the distribution system that may not be receiving the information directly from major petroleum suppliers. Examples include websites that might have information for gasoline retailers, "Mom & Pop" type gasoline retail outlets, and automotive service technicians. In addition, a document that may provide useful guidance to state agencies is
  Fuel Ethanol: Industry Guidelines, Specifications and Procedures, a condensed technical reference for ethanol producers, blenders, and other interested parties. It is available at:
  http://www.ethanolrfa.org/pdf/RFA_Pub_960501.pdf

WHAT HAS HAPPENED SINCE THE NEW YORK AND CONNECTICUT BANS TOOK EFFECT

The supply and infrastructure challenges to implement the New York and Connecticut MTBE bans have been successfully met by the petroleum and ethanol industries to date. An adequate ethanol distribution system was developed; adequate stocks of ethanol have been in place; distribution terminals were retrofitted to accommodate ethanol delivery, storage and blending; and adequate stocks of reformulated blendstock used for ethanol blending have been produced and distributed. MTBE ban induced price increases have not been reported by EIA, New York or Connecticut who are monitoring prices. California energy officials report a similar experience in meeting their January 2004 MTBE ban.

Gasoline prices have increased significantly for other reasons, primarily the higher price of crude oil. West Texas intermediate crude oil prices have increased from below $20 per barrel in January 2002 to over $35 per barrel in April 2004. EIA experts believe crude oil prices will remain in the $30-$33 per barrel range through 2004. The higher 2004 oil prices appear to be driven by higher world demand, low world commercial crude oil stocks and OPEC's plan to freeze production at 2003 levels. The surging China and India economies, and the rebounding U.S. economy are leading the higher world demand. These economies are projected to continue with strong growth. Commercial crude oil stocks are at the minimum level of the 5-year average maximum/minimum levels as companies have drawn down stocks instead of purchasing crude oil in a rising price market. OPEC appears to be increasing its target price to above $30 per barrel through a reduction in production growth. A repeat of unrest in Nigeria or Venezuela would reduce supply and drive up prices.

The U.S refineries are being run close to the industry's maximum capacity; hence, U.S. supplies and prices are vulnerable to any major disruptions to refinery production or supply distribution. The U.S. increasingly depends on imported gasoline and blendstocks to meet total demand. Disruption in these supplies would drive up prices.

The remaining concern with MTBE ban impacts is whether adequate summer grade RFG blendstocks for ethanol blending will be available to meet the summer driving season in New York and Connecticut. Lower Reid vapor pressure blendstock is required in the summer. Supplies of such blendstocks could be tight if U.S. and foreign refineries serving the New York and Connecticut markets do not make the necessary retrofits to supply the necessary blendstocks. A special concern is whether foreign refineries will produce the required blendstocks.

Late April to May is the time period when the petroleum industry shifts to summer grade gasoline. If the supply of RFG blendstock for ethanol blending is inadequate a price spike will occur until the market responds with compliant blendstock. If refiners have anticipated the blendstock demand correctly a price spike due to a ethanol blendstock shortage will not occur. However, gasoline prices will be volatile if crude oil prices rise or fall or if available refinery capacity is inadequate to meet demand. The EIA estimates that the impact of a sustained 5 cent per gallon increase in the price of summer MTBE-free reformulated gasoline would be equal to approximately a $2 per barrel increase in crude oil prices.

As the New York and Connecticut bans on MTBE are implemented, legislatures in surrounding states are also considering bans of MTBE in gasoline. In April 2004, the Maine legislature enacted a bill (H.B.1390B, P.L. 638) that prohibits the sale or distribution of gasoline containing MTBE effective January 1, 2007. In New Hampshire, both the House and Senate are acting on a bill (S.B. 397) that prohibits the sale or delivery of gasoline with MTBE as of January 1, 2007 (or six months after federal approval of an opt-out of the federal reformulated gasoline program. Both the Maine and New Hampshire bills provide for an MTBE *de minimus* level of .05 percent by volume.

The Pennsylvania legislature is considering a bill (H.B.427) that would create an immediate ban, but the state Department of Environmental Protection has indicated that any state ban should provide for a three year lead time before a ban takes effect. Bills dealing with MTBE bans have also been introduced in legislatures in Rhode Island and Vermont.

APPENDIX - STATES GUIDANCE ON MTBE *DE MINIMUS* LEVELS

CT: Public Act No. 03-122
NY: Department of Agriculture and Markets Memorandum

Substitute Senate Bill No. 840

Public Act No. 03-122

AN ACT CONCERNING MTBE AS A GASOLINE ADDITIVE.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. Subsection (b) of section 22a-450a of the general statutes is repealed and the following is substituted in lieu thereof (*Effective from passage*):

(b) The Commissioner of Environmental Protection shall, in conjunction with the Northeast Regional Fuels Task Force, develop and implement a plan for the phase-out of the use of MTBE in a manner that will eliminate MTBE as a gasoline additive in gasoline intended for sale to ultimate consumers in this state on and after **[**October 1, 2003**]** January 1, 2004, provided the state of New York also requires the elimination of MTBE as a gasoline additive on such date. In the event that the state of New York does not require the elimination of MTBE as a gasoline additive in gasoline on and after January 1, 2004, the commissioner shall develop and implement such phase-out plan that will eliminate MTBE as a gasoline additive on and after July 1, 2004. Not later than January 1, 2001, and annually thereafter through January 1, **[**2003**]** 2004, the commissioner shall report to the joint standing committee of the General Assembly having cognizance of matters relating to the environment on how the elimination of MTBE will be achieved. Each report shall include a progress update on the status of the regional efforts to reduce MTBE levels in gasoline. Nothing in this section shall prohibit a person from selling, offering for sale, distributing or blending a motor fuel that contains not more than one-half of one per cent by volume of MTBE.

Approved June 18, 2003

State of New York
Department of Agriculture and Markets
1 Winners Circle
Albany, New York 12235

Bureau of Weights and Measures
518-457-3146
FAX: 518-457-5693

Memorandum

To: All Importers, Wholesalers, Distributors and Retailers of Gasoline
From: Ross Andersen, Director
Date: September 25, 2003
Re: Ban against gasoline containing MTBE

Effective January 1, 2004, the gasoline additive methyl tertiary butyl ether, better know as MTBE, will no longer be permitted in New York State. Agriculture and Markets Law section 192-g provides as follows:

Methyl tertiary butyl ether; prohibited.
1. For the purposes of this section, "gasoline" shall mean any fuel sold for use in motor vehicles and motor vehicle engines, and commonly or commercially known or sold as gasoline.
2. No person shall import into, or sell, dispense or offer for sale any gasoline which contains methyl tertiary butyl ether.
3. Any person who violates the provisions of this section shall be liable for a civil penalty of not less than five hundred dollars nor more than ten thousand dollars.

The Department of Agriculture and Markets oversees a sampling and testing program to verify conformance of motor fuels with this and other sections of the Agriculture and Markets Law and associated regulations. Beginning January 1, 2004 samples taken under this program will be examined to determine the presence of MTBE in gasoline.

The Department has received inquiries from regulated parties as to how a trace amount of MTBE that may be found will be treated for enforcement purposes. The Department recognizes that MTBE exists naturally in some gasoline. It may be absorbed from inadvertent co-mingling with other gasoline products or residues while in transit in tankers, barges, or in pipelines. Other states that have banned gasoline containing MTBE have set a tolerance level for that additive at one-half of one percent by volume. Such de minimus level for New York would be consistent with the regulatory approach taken by other states. Thus, in enforcing Agriculture and Markets Law section 192-g, the Department will not consider regulatory action in instances where laboratory analysis confirms the presence of MTBE at a level of 0.5% by volume, or less, in gasoline.

I hope that the above information is helpful to you in meeting the requirements of the new law.