New York State Transportation Fuels Infrastructure Study

Section Work Order No: 7 under Agreement 10304

Final Report
September 2012

Submitted to:

New York State Energy Research & Development Authority (NYSERDA)
17 Columbia Circle
Albany, New York 12203

Submitted by:
ICF International
9300 Lee Highway
Fairfax
Virginia 22031
&
Poten & Partners, Inc.
805 Third Avenue,
New York, New York
10022

ICF Contact
Zeta Rosenberg
703-934-3949

Warranties and Representations.

Notice

Abstract

This report examines the infrastructure and market trends that affect the supply and distribution of transportation fuels into, and within, the State of New York as well as trends affecting fuel specifications and overall demand. The primary fuels include gasoline, diesel, and emerging alternative fuels such as ethanol, compressed natural gas, and biodiesel. The report discusses current and future estimated demand for transportation fuels in the State. Additionally, the report discusses key aspects of the supply chain, ranging from international and domestic refineries, pipelines, blending, storage terminals maritime transport, and rail, to retail operations and distribution.

Keywords

New York State Transportation Fuels, Alternative Transportation Fuels, Fuels Infrastructure.

Table of Contents

List of Exhibits

List of Tables

List of Acronyms and Definitions

$/gallon	Dollars per gallon
AEO	The U.S. Energy Information Administration's (EIA) *Annual Energy Outlook*, which details the EIA's expectations for the U.S. energy sector. The current AEO, released in April 2012, includes projections through 2035.
AFV	Alternative-Fuel Vehicle
ARRA	American Recovery and Reinvestment Act
ASTM	American Society of Testing and Materials
ATBs	Articulated Tug Barges
B2, B5, B20	Biodiesel 2%, Biodiesel 5%, Biodiesel 20% Diesel composed of a certain proportion of biomass (e.g., vegetable oil or animal fat) and the remaining proportion petroleum diesel. B2 indicates biodiesel proportions of 2 percent biodiesel and 98 percent petroleum diesel, while B5 has 5 percent biodiesel, and B20 has 20 percent biodiesel, and the remainder petroleum diesel.
B/d	Barrels per Day
bbl	Barrel
BOE	Barrels of Oil Equivalent
Bioheat	The utilization of ASTM certified biodiesel within No. 2, 4, and 6 heating oils.
Blendstocks	Motor gasoline blending components that are to be blended with oxygenates to produce finished gasoline. This can also refer to foreign gasoline that does not meet U.S. specifications and must be blended or re-refined to be sold in the United States.
Btu	British Thermal Units. Unit of measure for energy content of fuels (rather than volume content measures, such as barrel or gallon).
CAFE	Corporate Average Fuel Economy
CBOB	Conventional Blendstock for Oxygenate Blending
CNG	Compressed Natural Gas
CPG	Cents per Gallon
DEC	New York State Department of Environmental Conservation

Demurrage	The cost of delaying a ship. Busy channels, occupied berths, commercial considerations, lack of shore tankage, pumping limitations, and a host of other eventualities related to how or where a charterer uses a vessel can prevent it from loading or unloading promptly. When they do, the ship's owner charges for a waiting time.
DFO	Distillate Fuel Oil, or No. 2 Fuel
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
E10, E15, E85	Ethanol 10%, Ethanol 15%, Ethanol 85% Gasoline composed of a certain proportion of fuel ethanol. E10 indicates an ethanol content of 10 percent and gasoline content of 90 percent. E15 has an ethanol content of 15 percent, while E85 indicates an ethanol content of 85 percent, and the remainder gasoline.
ECA	Emission Control Area
EERE	Office of Energy Efficiency and Renewable Energy, an office of the U.S. Department of Energy
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EPA	U.S. Environmental Protection Agency
EU	European Union
EVSE	Electric Vehicle Supply Equipment, to include conductors, such as ungrounded, grounded, and equipment grounding conductors, electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets or apparatuses installed specifically for the purpose of delivering energy from the premises wiring to the electric vehicle.
FAF	Freight Analysis Framework
FFV	Flexible-Fuel Vehicle (also called Flex-Fuel Vehicles)
FHWA	Federal Highway Administration, part of the U.S. Department of Transportation
MMBtu	Million Btus
MMg/y	Million Gallons per Year
IEA	International Energy Agency

LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
Mbbl	Thousand Barrels
MMbbl	Million Barrels
Mb/d	Thousand Barrels per Day
MMb/d	Million Barrels per Day
MMg/y	Million Gallons per Year
mpg	Miles per Gallon
MT	Metric Tons
NAICS	North American Industry Classification System. NAICS codes are the standard used by federal statistical agencies for classifying business establishments' data for the purpose of gathering, analyzing, and publishing U.S. economic trends.
NGV	Natural Gas Vehicle
NHTSA	National Highway Traffic Safety Administration, part of the U.S. Department of Transportation
NYH	New York Harbor, which represents a conglomeration of water-access distribution terminals primarily in northern New Jersey, pipeline distribution hubs in northern New Jersey, and local terminals in New York City and Long Island.
NYMEX	New York Mercantile Exchange
NYS	New York State
NYSERDA	New York State Energy Research and Development Authority
OPEC	Organization of Petroleum Exporting Countries
PADD	Petroleum Administration for Defense (PAD) Districts. The U.S. was divided into five PADDs during World War II to organize fuel allocation throughout the country, though these regional allocations are used today for data collection purposes only. PADD I (East Coast): New England, Middle Atlantic (including New York State), and Lower Atlantic; PADD II: Midwest; PADD III: Gulf Coast; PADD IV: Rocky Mountain; and PADD V: West Coast, Alaska, and Hawaii.
PDVSA	Petróleos de Venezuela SA, the Venezuelan state oil company
PPM	Parts per Million

PSIA Pounds per Square Inch Absolute

QBtu Quadrillion British Thermal Units

QUADS Quadrillion

RIN Renewable Identification Number. This is the basic currency for the Renewable Fuels Standard program for credits, trading, and use by obligated parties (e.g., petroleum refineries, petroleum bulk stations and terminals, petroleum merchant wholesales) and renewable fuel exporters to demonstrate compliance, as well as track the volumes of renewable fuels. A RIN is a 38-character numeric code that is generated by the producer or importer of renewable fuel representing gallons of renewable fuel produced/imported and assigned to batches of renewable fuel that are transferred (change of ownership) to others. RINs are valid for the calendar-generated year, or the following year, depending on the time RIN is obtained.

RBOB Reformulated Blendstock for Oxygenate Blending

RFS Renewable Fuels Standard.
RFS1: Renewable Fuel Standard under EPAct 2005 – The Energy Policy Act of 2005 (EPAct 2005) established the Renewable Fuel Standard, which required obligated parties to blend conventional fuels with a pre-determined minimum volume of renewable fuels.
RFS2: Renewable Fuel Standard as amended by the Energy Independence and Security Act (EISA) amended RFS1 in December 2007. The revised standard created by this amendment is commonly referred to as RFS2. RFS2 increased the RFS1 volume requirements for renewable fuels to be blended with conventional fuels. RFS2 also created four categories of fuel (cellulosic biofuels, biomass-based diesel, advanced biofuels, and renewable fuels) and requires specific volumes for each category each year through 2022.

RVP Reid Vapor Pressure (RVP). An indirect measure of the rate at which petroleum liquids evaporate. It is the absolute vapor pressure of a crude oil, or of single or mixed liquid petroleum products, as measured by the Reid Method (ASTM Method D 323).

ULSD Ultra-Low Sulfur Diesel

USD U.S. Dollar

USDA U.S. Department of Agriculture

USGC U.S. Gulf Coast

VMT Vehicle Miles Travelled

Conversion Factors

Volume

1 bbl = 42 gallons

1 Mbbl = 1,000 barrels

1 MMbbl = 1,000,000 barrels

Energy Content per Barrel

Oil = 5.80 MMBtu/bbl

Residual Fuel Oil = 6.29 MMBtu/bbl

Diesel = 5.83 MMBtu/bbl

Average Jet Fuel = 5.51 MMBtu/bbl

Motor Gasoline (E10) = 5.05 MMBtu/bbl

E85 = 3.96 MMBtu/bbl

LPG = 3.84 MMBtu/bbl

Energy Content per Barrel of Oil Equivalent (BOE) for Various Fuels

1 MMBOE = 1 million barrels of crude oil equivalent

Oil = 5.80 MMBtu/bbl = 1 BOE

LPG = 3.836 MMBtu/5.80 MMBtu = 0.66 BOE

E85 = 3.956 MMBtu/5.80 MMBtu = 0.68 BOE

Motor Gasoline (E10) = 5.05 MMBtu/5.80 MMBtu = 0.87 BOE

Average Jet Fuel = 5.51 MMBtu/5.80 MMBtu = 0.95 BOE

Diesel = 5.83 MMBtu/5.80 MMBtu = 1.00 BOE

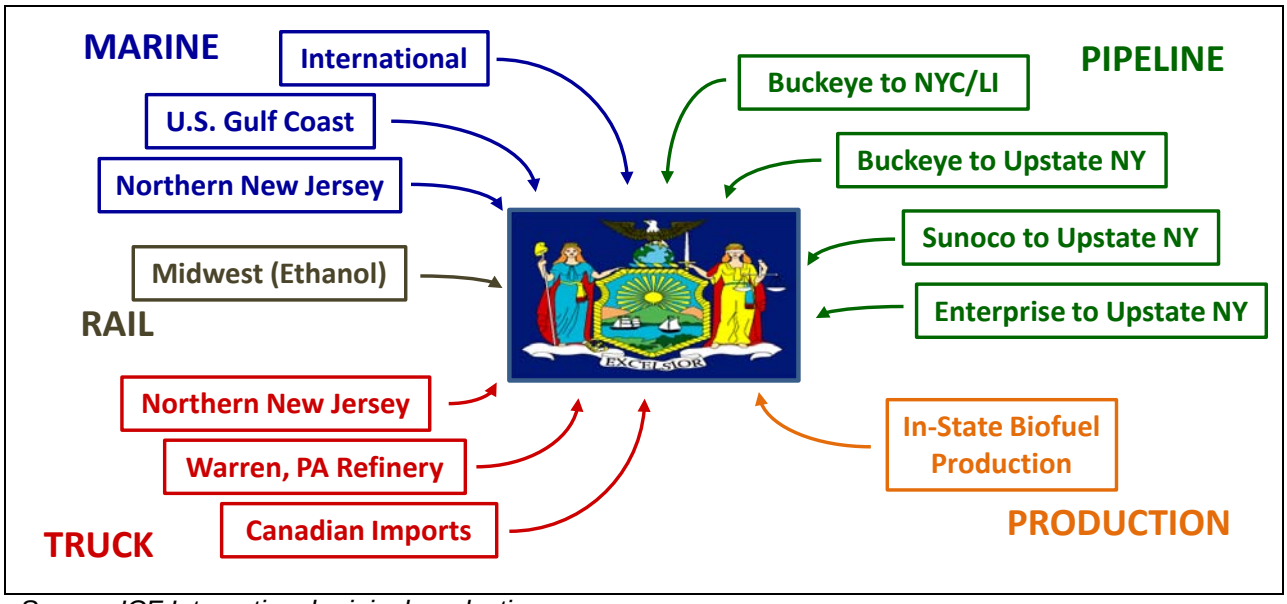
Residual Fuel Oil 6.29 MMBtu/5.80 MMBtu = 1.08 BOE

Executive Summary

NYSERDA currently is in the process of developing an Energy Assurance Plan under funding from the U.S. Department of Energy (DOE) through the American Recovery and Reinvestment Act (ARRA)[1] Energy Assurance grants system. ARRA moneys are funding this study of critical infrastructure, which will be released to the public and will appear as an appendix to the larger NYS Energy Assurance Plan.

New York State (NYS) has little in the way of production of transportation fuels. It has no petroleum refineries and only a few renewable fuels plants. Consequently the State is largely dependent on imports, whether domestic or foreign as shown in the Exhibit ES-1 schematic. Exhibit ES-1 also shows the predominant transportation mode by which the fuels are brought into NYS.

Exhibit ES-1: Schematic of NYS Supply of Transportation Fuels



Source: ICF International original production.

NYS, specifically New York Harbor (NYH) is the largest petroleum product hub on the East Coast and one of the largest in the country. NYH is also the redistribution point for foreign and domestic petroleum products for a good part of the Northeast. Storage and distribution infrastructure, both capacity and availability, is thus critically important for both the State and the larger Northeast region.

This study presents a snapshot of the transportation fuel market in NYS during the 2010-2012 time period. Trends and changes occurring in the energy markets are also identified and estimates are presented of changes in demand for transportation fuels in the near term. From these data, conclusions are drawn about critical changes that will affect the demand for and supply of transportation fuels in NYS in the future. This Executive Summary contains only a brief

[1] American Recovery and Reinvestment Act. Public Law 111–5. February 17, 2009. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ5/pdf/PLAW-111publ5.pdf

summary of the substance of the Report; instead choosing to focus on the critical changes that will be of interest to NYSERDA and stakeholders in NYS. All of the details underpinning the conclusions can be found in the first three chapters of the Report.

Section I discusses a number of aspects of the supply and demand for fuels in NYS. For demand, the report estimates both current and future demand expectations. Demand drivers are identified and the impact on future demand is assessed. The Section then discusses the various transportation fuels supply sources for NYS; ongoing and announced changes in those supply sources; and likely new sources in the future. These potential changes are examined for their impact on supply. Supply of both petroleum fuels and biofuels are examined. Changes in specifications of other petroleum products, such as marine bunkers and heating oil, are examined as they affect the supply of transportation fuels. There is also a detailed discussion of the price structure for the main transportation fuels.

Section II examines the physical infrastructure for transportation fuels within NYS and in northern New Jersey. All fuels and all transportation modes are examined. The section also assesses the impact on the existing infrastructure of market and regulatory changes and summarizes known expansions and/or contractions in the infrastructure assets base. There is a brief discussion of supply constraints with some examples of events that have impacted NYS either by causing shortages or by increasing prices.

Section III depicts the distribution of transportation fuels within the State and discusses the retail sector for transportation fuels. A final section identifies future trends that may present challenges to retail market.

Overall the study indicates that despite having minimal transportation fuel production in-state, New York is well positioned with infrastructure assets (pipelines, marine equipment, rail access, etc.) to sustain supply to consumers for the foreseeable future. While threats exist of possible additional refinery closures on the East Coast, investments by pipelines and others are enhancing the region's ability to receive more domestic and imported supply. These changes, coupled with an outlook for lower demands from continued vehicle efficiency and consumer conservation should enable New York's economy to have adequate transportation fuel to grow.

Critical Trends in the Demand for and Supply of Transportation Fuels in NYS – Section I

Section I examines the current and future supply and demand outlook for transportation fuel in New York State (NYS).

Demand Outlooks

The U.S. Energy Information Administration's *2012 Annual Energy Outlook* (AEO) assumes motor gasoline consumption will decline 1.1 percent annually between 2010 and 2035 in the Mid-Atlantic region (which includes NYS).[2] The AEO further assumes that significant volumes of E85 will be consumed only after 2032. Annual growth of E85 from 2010 to 2035 is 20.1 percent but starts from a miniscule base. NYS gasoline consumption patterns are not expected to

[2] U.S. Energy Information Administration (EIA). *Annual Energy Outlook 2012*, Middle Atlantic Energy Consumption by Sector and Source. EIA, June 25, 2012: Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm

deviate significantly from the declining Middle Atlantic trend. However, unlike gasoline, diesel is expected to grow by an annual rate of 2.1 percent during this period. New car sales are also expected to grow strongly during this period. Of the new car sales alternative light-duty vehicles (vehicles that range from Flexible-Fuel Vehicles (FFVs) to the various forms of hybrids to fuel cell driven vehicles) will grow at an annual rate of 3.8 percent.

The combination of increasing vehicle fuel economy, declining gasoline consumption, little expectation that E85 fuel consumption will rise markedly, and the uncertainty surrounding E15 sales (discussed in the report) indicate that gasoline and ethanol shipments to NYS are unlikely to rise to any large degree.

NYS has a robust infrastructure, with access to marine imports, pipeline networks to major markets, rail capacity for ethanol imports from the Midwest, access to truck movements from New Jersey and Pennsylvania, and ample storage capacity in key areas. Given the demand outlook, concerns over the need for infrastructure expansions within the State may be unfounded. The AEO is forecasting a reduction in gasoline demand in the Middle Atlantic region of 140,000 barrels/day between 2010 and 2020 (about 14%), declining from nearly 990,000 barrels per day in 2010 to fewer than 850,000 barrels per day in 2020. The forecasted loss in gasoline demand over the period is roughly the equivalent gasoline production of a refinery with 300,000 barrels/day capacity (as the gasoline yield from crude production is roughly 45%-50%).

The 2012 AEO includes the implemented Corporate Average Fleet Efficiency (CAFE) standards raising the average fleet miles per gallon (mpg) to 35 mpg, but does not include the CAFE standards for heavy-duty vehicle and the second light-duty vehicle - both of which will have considerable impact on consumption of both gasoline and diesel. These efficiencies in fleets will further lower demands for gasoline over time and could likely lower the growth in diesel for transportation, further implying the existing infrastructure may be adequate.

Supply Outlooks

NYS is well positioned to receive petroleum products from a number of sources and through a number of delivery modes. NYH's role as a hub in the Northeast petroleum and ethanol supply chains provides significant flexibility to cover supply disruptions. The flexibility stems from a petroleum product supply that comes from 1) regional refineries; 2) the U.S. Gulf Coast via the Colonial Pipeline; and 3) domestic and foreign marine imports. In addition, the region has "reserves" of petroleum supply due to a substantial network of distribution terminals, primarily in northern New Jersey, that act as an overall distribution hub for the entire Northeastern U.S.

Most of the petroleum pipeline flows from the U.S. Gulf Coast and the Philadelphia/Delaware refineries move into the northern New Jersey major distribution hubs. From there, product moves into pipeline hubs of which the central point is the Buckeye Linden hub. The Buckeye system moves large volumes of gasoline, distillates, and jet fuel on the Buckeye East lines into Long Island, feeding airports and destination terminals supplying New York City and Long Island. Buckeye also supplies volumes to its west lines that ship product to Pennsylvania and upstate New York.

This basic pattern is unlikely to change, although further regional refinery closures could raise concerns about the timeliness of replenishment in the event of disruptions. There are several structural changes in the U.S. crude oil supply as well as regulatory issues on the supply side that also could impact the supply pattern. The regulatory issues include Tier 3 fuel

specifications, federal renewable fuel standards, changes in home heating oil specifications and the impact on the transportation distillate market, and reductions in marine bunker fuel sulfur specifications.

Crude Oil Structural Supply Changes

High growth from domestic shale rock formations in the Mid-Continent (e.g. the Bakken region in North Dakota and others) as well as growing Canadian supply, combined with a lack of "takeaway" capacity from the region, have led to heavy price discounts for light, sweet crude required by many East Coast refiners. Railcars moving crude to other markets to displace higher priced crude, including the East Coast, are providing some benefit to refiners. Many East Coast refiners (Phillips 66, PBF and the former Phillips 66 Trainer and Sunoco Philadelphia refineries) are investing in rail access for Bakken-type crude oil.

Rail may or may not be a long term option for these refineries, as the level of discount on the Mid-Continent crudes may be lowered as pipelines come online to move these crudes more economically to the Gulf Coast. However, the estimated volume of light crude growth may sustain discounts for some time and create some other options to move discounted supply. This may include options such as 1) developing a crude pipeline to East Coast markets (possibly using underutilized gas pipelines converted to oil); 2) expanding refining in the Mid-Continent and moving product into the East Coast via new pipelines or 3) moving surplus light crude from the Gulf Coast to the Northeast on Jones Act vessels

All three options are complex and require large capital expenditures and development of partnerships to gain required traction. Approval of major pipelines similar to Colonial and conversion of natural gas lines involve state and/or FERC approvals, local issues, and right of way clearance. In addition, refineries are multi-billion dollar investments that require a variety of governmental approvals, and mandate a favorable outlook for the industry as the pay-back periods for these facilities extend out many years. Regardless of the decisions made to utilize these resources, the idea of leveraging the U.S. and Canadian crude supply into delivering reliable and cheaper product to the East Coast market has considerable energy security attractions, including diversifying supply away from the hurricane-exposed Gulf Coast.

Tier 3 Specifications

The U.S. Environmental Protection Agency's (EPA) proposed rule, Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicles Emission and Fuel Standards, (Tier 3) was designed to address the impact of vehicle use on air quality and human health. The proposed rule will establish new standards for vehicles and reduces the amount of sulfur and Reid vapor pressure (RVP) of gasoline.[3] The proposed sulfur specification will lower sulfur limits to 20 ppm on an individual batch basis and 10 ppm on a corporate average basis. In addition, the proposed rule will lower the nationwide (excluding California) summer gasoline RVP limit to 7 pounds per

[3] Reid Vapor Pressure (RVP) - An indirect measure of the rate at which petroleum liquids evaporate, RVP is the absolute vapor pressure of a crude oil, or of single or mixed liquid petroleum products, as measured by the Reid Method (ASTM Method D 323).

square inch absolute (psia).[4] These rule changes may require refining investment and will lower the gasoline yield from refineries, and may therefore impact refinery profitability.

What this means to NYS is a continued economic threat to the local refineries supplying the Northeast, as their base competitive position is poorer than Gulf Coast or Midwest refineries. Tier-3 specifications, if implemented, could threaten the competitive position and financial performance of the East Coast refineries.

Renewable Fuel Standard 2 (RFS2) Requirements

In an effort to encourage domestic renewable fuel production, the U.S. Congress enacted legislation mandating that the petroleum fuels industry blend their products with renewable fuels in a program commonly known as the Renewable Fuel Standard (RFS2).[5] The RFS2 requires the petroleum industry to integrate progressively larger quantities of renewable fuels each year. Ethanol usage in NYS has increased since 2007 to comply with the RFS2 requirements, such that virtually all gasoline blended in NYS has 10 percent ethanol.

One of the greatest anticipated challenges in meeting future RFS2 volume requirements is the projected flat or declining demand for motor fuels. New fuel economy standards and the potential for flat or declining use of gasoline, make the RFS2 requirement of 24 billion gallons of renewable fuel by 2017 and 36 billion gallons by 2022 challenging to blend without significant growth in E85 or E15 consumption. Additionally, as consumers drive more fuel-efficient vehicles, shrinking gasoline demand can accelerate the current E10 "blend wall" challenges as discussed in Section 2.

Moreover, large-scale disruptions in the industry can also pose sudden threats to the viability of the mandate in any given year. Any relaxation of the RFS to mitigate ethanol supply problems will require additional gasoline supply to offset the loss of ethanol in the supply chain. Since ethanol's energy content is only 70 percent of gasoline, a loss of all ethanol supply in the U.S. gasoline pool (10 percent) would require an additional 7 percent of gasoline supply and an increase in gasoline component octane levels to offset the ethanol loss.

Implementation of the RFS2 requirements related to cellulosic and advanced biofuels is lagging and may not occur within the stipulated time frame. It is unclear what the revised cellulosic biofuel requirements will be for 2013 and beyond, but given the uncertainty of commercial-scale deployment, it is likely the requirements will continue to be amended by EPA for at least the next several years. As this is a federal program obligated parties in NYS will continue to implement it following whatever changes are made at the federal level and the RFS is likely not to be a significant supply issue for some time.

Changes in Home Heating and its Impact on Transportation Distillate Market

NYS converted home heating oil sulfur levels to ULSD quality in 2012; the balance of the Northeast and possibly Middle Atlantic may follow in 1-3 years. The refiners have limited

[4] Tamm, David C.; Kevin P. Milburn; and Richard X. Thomas. "Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline." American Petroleum Institute (API), July 2011: Washington, D.C. Available at: http://www.api.org/Newsroom/upload/110715_LowerSulfur_LowerRVP_Final.pdf

[5] The "2" designates the second version of the program that was passed in 2007 under the Energy Independence and Security Act (EISA).

capacity to produce additional ULSD and if the Sunoco Philadelphia refinery was closed, local supply would be adversely affected. PBF Energy recently cancelled plans to invest $1 billion to produce ULSD at Delaware City, but may have some capability to make ULSD from alternatively processing some Bakken and other light domestic crude. While Colonial has expanded ULSD shipment capacity, and surplus ULSD exists for export on the Gulf Coast, it is possible there could be supply issues over the next few years as other states convert heating oil to ULSD and there are winter weather demand peaks. Reliance on domestic Jones Act vessels during emergencies is not assured due to availability concerns.

Reductions in Marine Bunker Fuel Sulfur Specifications

Changes in bunker fuel sulfur levels in the United States and Canada in coastal regions begin in 2012 with reductions to 1% sulfur levels, and then are lowered to 0.1% sulfur in 2015. The change in 2012 should be manageable given that the Sunoco Philadelphia refinery will continue to operate and the Trainer refinery plans to resume production. However, in 2015 it will be necessary to replace the residual fuel oil with marine diesel fuel. This will increase demand for diesel fuel in the region (although the sulfur level will be higher than that for transportation diesel fuel).

Critical Trends in the Infrastructure for Transportation Fuels in NYS – Section II

The infrastructure for transportation fuels supplying NYS includes the following major components:

- Pipeline network delivering products into the region from Gulf Coast and Philadelphia area refiners
- Marine assets moving product from distribution hubs in the NY Harbor (NYH) area to delivery terminals, primarily in NYH and up the Hudson River
- Local refiners (Phillips 66 and Hess in North Jersey) and others around Philadelphia
- Major distribution hubs along the Arthur Kill, Kill van Kull and other locations in NYH which receive imported and domestic supply and re-route via marine equipment or pipelines to NYS and NJ
- Storage terminals in NYS that receive pipeline and waterborne supply of gasoline, diesel, etc. from domestic and foreign sources for delivery to customers
- Ethanol and biodiesel plants in NYS, as well as major storage locations for ethanol receipts by unit train from the Midwest and, if economic, waterborne imports
- Rail infrastructure, primarily on CSX, CP and Norfolk Southern lines for delivery of ethanol from the Midwest or propane and other products as economics dictate

The Report details specific volumes and capacities of these various components in significant detail. The primary issues that have been affecting this infrastructure in recent years include the following:

- Mid-Atlantic refiners have become more and more uncompetitive and less profitable than refiners in other regions of the U.S. High reliance on imported light, sweet crude oil means high feedstock costs, and with less conversion capacity to premium products

(clean products as opposed to residual fuel), the regional refiners have experienced closures. While five refineries have closed or announced sales in the past several years, two have been rescued by firms hoping to turn the refinery performance around with new initiatives on yields and by squeezing new mid-continent, discounted crudes into the refineries.

- Midstream companies like Kinder Morgan, Buckeye Partners, Sunoco Logistics, and Colonial are expanding pipeline capacity, flexibility, and storage in response to refinery closures and other changing supply patterns.
- Regulatory issues such as the ULSD/heating oil changes as well as gasoline sulfur (Tier 3), RFS2 and marine bunker fuel specifications will spur continued changes over the next few years.

Details on the specific infrastructure areas are detailed in tables and text in Section II. The key issue is that the NYS infrastructure itself is heavily dependent upon key assets primarily in northern New Jersey surrounding NYH for supply of product and storage reserves. The New Jersey terminals supply the local area as well as NYS. This region serves as a redistribution hub for products from the U.S. Gulf Coast moving via Colonial pipeline, products from the Philadelphia refineries, products from the New Jersey refineries, marine receipts from overseas and from other domestic sources, and rail receipts of ethanol from the Midwest to supply markets throughout NYS. From this hub, products are redistributed to NYS via the Buckeye pipeline system and by marine transport. The importance of the Buckeye system, and in particular the Buckeye Linden hub, to NYS supply cannot be overstated.

Refinery Closures and Changes

ICF does not anticipate that refinery closures will occur en masse, and the staged closure process, as has occurred in 2011 and 2012, will likely result in increases and decreases in refining margins as NYH product markets react to announcements, shutdowns and ownership changes. This rising and falling of markets will keep some refineries operational and cause others to find buyers, and the ultimate shutdown of East Coast refineries may take many years to occur.

Certainly this has been seen in 2012 as partnerships have been formed that have resurrected the former Phillips 66 Trainer refinery and that will sustain the operation of the Sunoco Philadelphia refinery. If Sunoco operates and Trainer restarts (and Sunoco Marcus Hook remains closed), it is likely supply in the region will not materially change. Since the Trainer and Marcus Hook refineries closed in the fall of 2011, total regional crude processing has not declined significantly, with Sunoco Philadelphia increasing crude runs and the two PBF refineries also increasing crude runs to offset the closures. Loss of the two refineries (Trainer and Marcus Hook) has reduced local supply and flexibility of the system to respond in the event of an outage on Colonial or local refinery outage. However, the sustained operation of Philadelphia, restart of Trainer and commitment of new owners to operate near capacity with improved economics may mean very little supply loss from prior operation in the Northeast.

It will be important to monitor the performance of these refineries. Those under new ownership will be dependent upon enhancements in product yields, cost management and crude sourcing to achieve improvements advertised to investors. The existing refineries must make improvements advertised as well as increasing domestic sweet crude runs; completing upgrades in a timely manner; and, improving reliability.

ICF concludes that NYS has a strong and flexible infrastructure that can meet the needs of the State. There are some unknowns that may impact the State along the way, specifically the position of the refineries, but currently the supply infrastructure and storage capacity appears more than adequate.

NYS Transportation Infrastructure Capabilities – Section III

Section III further builds on the first two sections, and includes an assessment of the retail business in NYS, including price structures from crude to retail, rack business, market share and the issues impacting the retail supply chain. In addition, the trends in marine infrastructure are presented and discussion of alternative fuels (ethanol and biodiesel) and their transportation issues are presented.

Retail Findings

Major retailers in NYS (based on branded outlets) are Sunoco, Mobil (ExxonMobil), Citgo and Gulf, all with over 10% of the retail outlets (Sunoco is the highest at 17.5%). Data from OPIS indicates that retail prices in 2011 for premium gasoline tend to average $0.23-0.24/gallon over regular grade, with mid-grade prices averaging about $0.11-0.15/gallon above regular.

Service station margins based on OPIS prices were aggregated by region. Gross margins (which are measured as retail price for gasoline less taxes and less the cost paid by the dealer to the supplier) ranged from $0.13 to $0.32/gallon in 2011 in various markets in NYS. Retail margins were generally much higher in the New York City metropolitan area ($0.24 to $0.32/gallon) and lower in upstate markets ($0.13-$0.20/gallon). Service stations located in the NYC metro area will have higher costs than stations located in upstate markets and likely require a higher street price to maintain a net profit. These costs would include rent, maintenance, labor and property taxes among others.

Most stations have additional revenue streams from convenience stores and service bays, however, even that revenue in large measure is dictated by the vehicle traffic and gallons sold. The average service station in NYS sells about 1,170,000 gallons of gasoline annually, resulting in gross margins as low as $150,000 in Syracuse to $370,000 in New York City. This gross margin by itself is not significant given the costs that must be paid by the dealer (including labor).

New Jersey and Connecticut locations were examined in the NYC metro area and have similar margins to NYC metro stations. New Jersey has significantly lower retail prices due to state and local taxes that are roughly $0.30/gallon lower than New York and Connecticut.

The service station business does not appear very profitable, and there are some emerging costs that could threaten the dealer's gross margin, or which could require the dealer to increase gross margin (and thereby prices to consumers). These are discussed in more detail in the report, but include:

- Credit card fees are 2-3% of gross sales price; for every dollar increase in gasoline price, credit card companies take $0.02-0.03/gallon more in fees. As global gasoline prices rise, this fee structure creates a windfall for the credit card companies at the expense of the dealer and consumers.
- New CAFE standards requiring new vehicles to improve efficiency are lowering gasoline consumption. Clearly this is in the national interest, however, as these vehicles enter the

market, coupled with more consumer awareness of gasoline's cost, gasoline demands will decline. This will tend to lower service station volumes and will likely require marginal stations to close over time.

Marine Transportation

In 2010, just over 300 million barrels (MMbbl) of petroleum products were loaded onto marine equipment in New York and New Jersey. The sources of petroleum came from a combination of the production of refineries in New Jersey and Pennsylvania, pipeline transfers predominantly from the Gulf Coast and imports of petroleum stocks. Foreign sources supplied 207 MMbbl into NYH during 2010, according to EIA. Included in these imports were 129 MMbbl of gasoline, gasoline blendstocks and diesel. The balance is residual fuel oil and unfinished refined products.

The focal point of the marine loadings and offloadings is, as noted in other sections, the northern New Jersey and Staten Island distribution hubs along the Arthur Kill and Kill van Kull. Efficient and ratable (smooth) movements into and from these hubs is critical to consumer supply as well as pipeline movements.

Biofuels Transportation and Pricing

Section II describes the biofuel infrastructure in terms of production facilities and the rail infrastructure in New York to position biofuel products at major distribution hubs. For ethanol these include large terminals in Albany and along the Arthur Kill. The movement of ethanol from the hubs to local terminals for blending with reformulated blendstock for oxygenate blending (RBOB)[6] or conventional blendstock for oxygenate blending (CBOB)[7] is primarily managed by truck movements. These truck movements are an added cost of the ethanol supply chain, and can range from just a couple of cents per gallon for "local" terminals near the hubs to as much as $0.15-20/gallon depending on distance traveled.

In addition, price comparisons of E10 and the limited E85 sales in NYS indicate that E85 had a lower retail price than E10 gasoline. However, after adjusting for E85's lower mileage per gallon (due to the lower energy content of ethanol), E85 was in fact more expensive for consumers on a per energy unit basis. This may vary from year to year, but it is one obstacle that needs to be overcome to substantially increase E85 market growth.

Other factors besides price that will impact development of E85 or the use of E15 is the lack of Flexible-Fuel Vehicles (FFVs) in the market and the service station modifications needed to supply E85 (which will likely be borne by the dealer, and in addition to cost there are also equipment availability shortages discussed in Section III). For E15, there are also concerns that use of the fuel will void engine manufacturer's warranties, so suppliers are not rushing to market E15 in lieu of E10 at this time.

Limited data is available on the total biodiesel volumes moving in and out of NYS. While biodiesel comprises a small share of NYS fuel consumption, improving the transparency of

[6] Motor gasoline blending components intended for blending with oxygenates to produce finished reformulated gasoline.

[7] Motor gasoline blending components intended for blending with oxygenates to produce finished conventional motor gasoline.

biodiesel movements in and throughout the State will be vital to assessing potential supply shortage issues associated with compliance with additional renewables mandates. Given the large proportion of biodiesel volumes that are truck-transported, a primary source for biodiesel volumes may be trucking companies and organizations.

Effect of Ethanol Disruptions

Disruptions in the ethanol supply chain can have a serious impact on gasoline supply and could lead to the inability to load gasoline of suitable quality for delivery to service stations. The two key blendstocks produced by refiners to meet finished E10 gasoline quality (RBOB and CBOB) both have lower octane levels (83-84 octane) than finished motor gasoline (87+ octane). When ethanol, which has a much higher octane level than finished motor gasoline, is blended with RBOB or CBOB it produces 87+ octane finished motor gasoline. Therefore, shortages of ethanol at terminals can create shortages of gasoline immediately.

Consequently, an ethanol outage would lead to the need to source ethanol from more distant locations (or locate an ethanol source to truck into the terminal). To date there do not appear to have been any gasoline supply disruptions due to ethanol supply shortages, however, potential exists for this to occur due to the current drought situation in the Midwest and the temporary closure/idling of several ethanol plants due to poor economics associated with high corn prices.

In addition, NYS is highly dependent on rail, and specifically one rail company for its ethanol supply. CSX, one of the largest Class I rail lines delivering ethanol to the U.S. Northeast, delivers roughly 70 million barrels of ethanol annually, 60 percent of which (over 40 million barrels) is transported by rail to the Northeast. Events such as a rail strike or damage to its rail infrastructure could leave NYS in a vulnerable position.

Summation

This Report stresses that the transportation fuels market is in flux and is potentially undergoing major shifts both in the type of fuels consumed, in the volumes of fuels supplied, and in the modes of transport utilized to supply these fuels. To some extent the pace of the changes will be dictated by macroeconomics and by the global market that sets the overall prices for petroleum. The major energy projections, at least in the period they cover, all agree on a decline in gasoline consumption, an increase in diesel consumption (although none of them have yet factored in the use of natural gas) and a steady increase in the efficiency of vehicles. Again, they all agree that these will be the main drivers in the transportation fuel markets and that while the use of biofuels will grow their impact will be relatively minor.

The infrastructure for transportation fuels in New York is robust, and should serve the State and consumers well as the transportation fuel markets transition. There are areas of high dependency on several assets which are critical to sustained supply, and some risks if additional refinery closures occur. However, the market participants are continuing to invest in additional supply alternatives that will benefit them and New York.

General Overview of Infrastructure and Market Trends

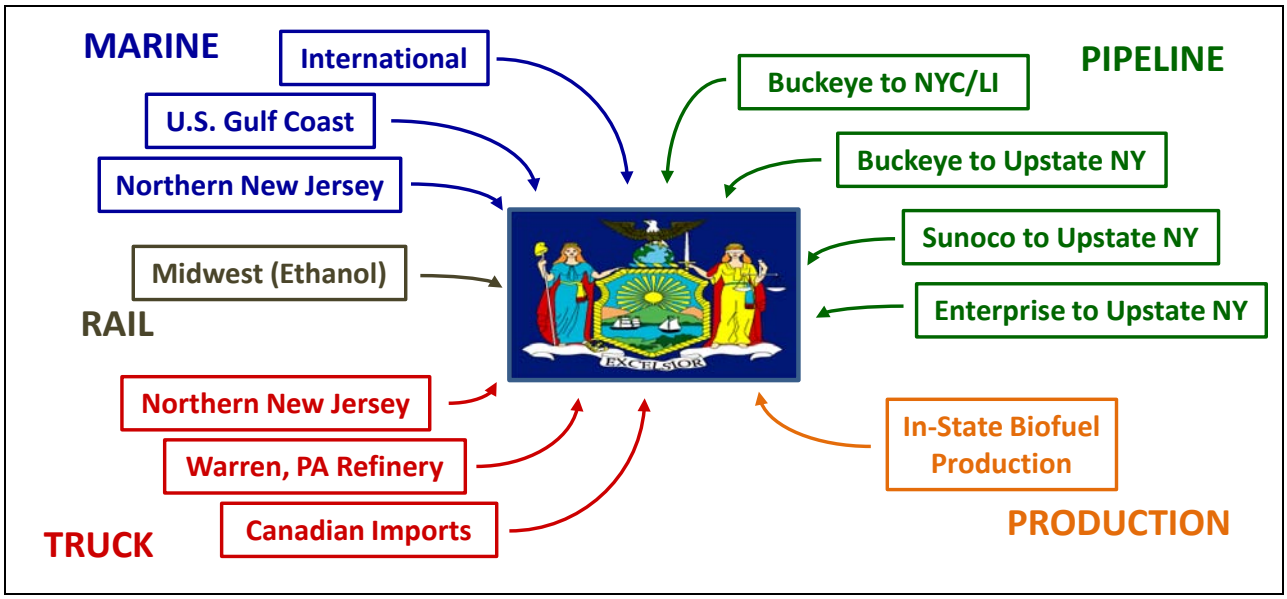
New York State (NYS), specifically New York Harbor (NYH), is the largest petroleum product hub on the East Coast and one of the largest in the country. Exhibit 1 shows the NYH geographic area.

Exhibit 1: Map of NYH Area

Source: ICF International original production using Graphic Information Systems (GIS) ESRI ArcGIS Mapping Software.

NYS itself has no petroleum refineries and little in the way of petroleum or renewable fuels plants. Consequently the State is largely dependent on imports, whether domestic or foreign as shown in the Exhibit 2 schematic, a large portion of which arrive in NYH. NYH is also the redistribution point for foreign and domestic petroleum products for much of the Northeast. Storage and distribution infrastructure, both capacity and availability, is thus critically important for both the State and the larger Northeast region.

Exhibit 2: Schematic of NYS Supply of Transportation Fuels



Source: ICF International original production.

In 2004-2005 the NYS Energy Research and Development Authority (NYSERDA) funded an extensive study of the infrastructure for home heating oil and No. 2 distillate fuel oil.[8] Currently, NYSERDA is funding the matching study presented here, which looks at the infrastructure for transportation fuels, both petroleum-based and alternatives.

NYSERDA currently is in the process of developing an Energy Assurance Plan under funding from the DOE through the American Recovery and Reinvestment Act (ARRA)[9] Energy Assurance grants system. ARRA moneys are funding this study of critical infrastructure, which will be released to the public and will appear as an appendix to the larger NYS Energy Assurance Plan.

Study Area Definitions

Definitions for this report pertain to the types of transportation fuels used in NYS and the accompanying infrastructure; the geographic spread of the infrastructure and the geographic sources of the supply; and the likely trends and changes over the next few years. Thus, the report presents a current snapshot of the supply of and infrastructure for transportation fuels and then overlays it with estimates of likely changes. Table 1 lays out some of these definitions.

[8] Home heating oil is a type of No. 2 distillate fuel oil that is used to heat homes, primarily in the Northeast. Other common forms of No. 2 distillate fuel oil include diesel fuels used in on-road and off-road vehicles.

[9] American Recovery and Reinvestment Act. Public Law 111–5. February 17, 2009. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ5/pdf/PLAW-111publ5.pdf

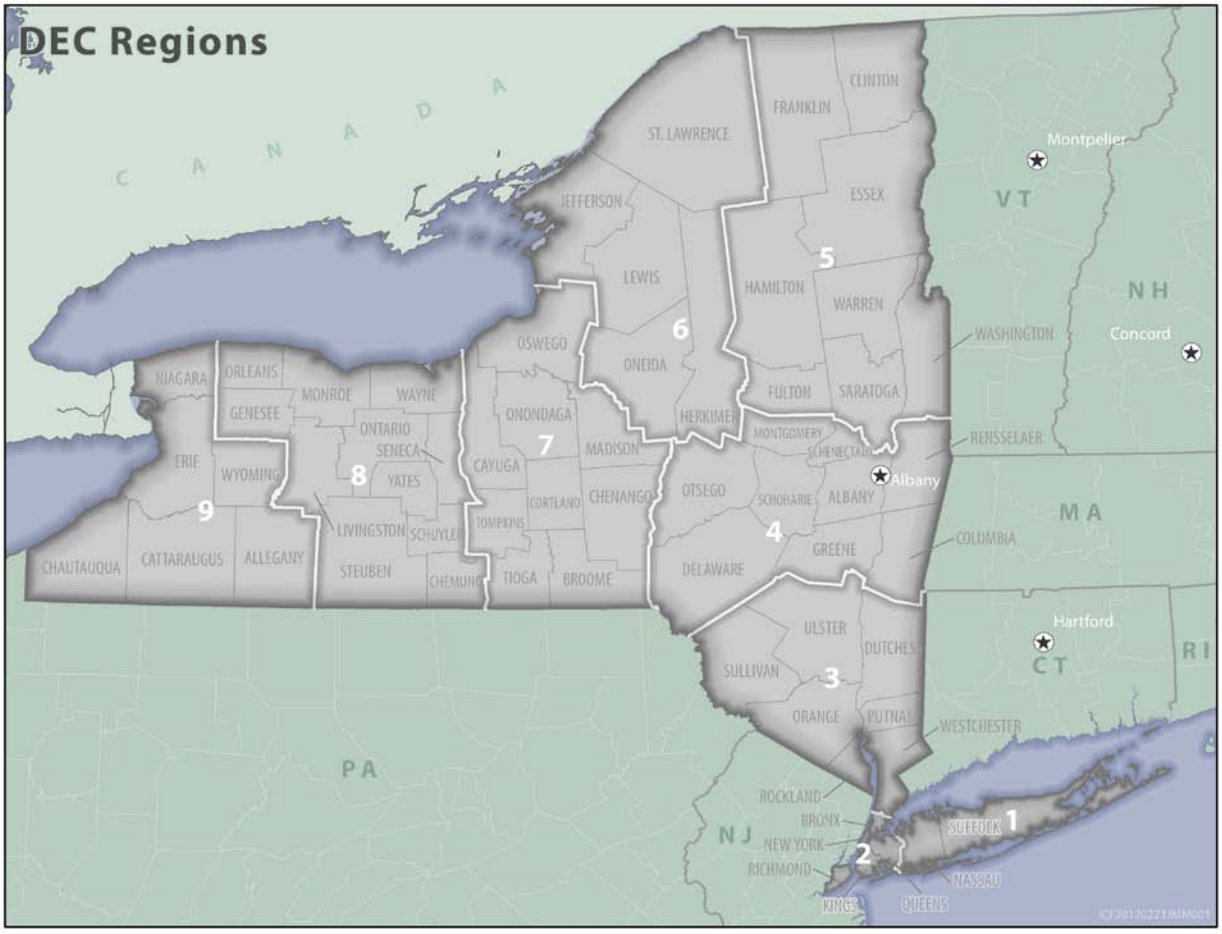
Table 1: Relevant Definitions for the Study

Geographic Region	New York State by NYS DEC Regions[10] Perth Amboy and northern New Jersey
Supply Sources	U.S. Gulf Coast Midwest New Jersey Philadelphia-area and Warren, PA refineries Canada Global market
Transportation Fuels	Gasoline (Reformulated and Conventional) E15 Diesel (ULSD) E85 Biodiesel Propane (LPG) Natural Gas (CNG/LNG) Electricity

Exhibit 3 shows the NYS Department of Environmental Conservation (DEC) regions and the counties within each region, while Exhibit 4 shows the distribution infrastructure of transportation fuels within the State and neighboring Mid-Atlantic states.

[10] DEC Region 1: Nassau and Suffolk counties; DEC Region 2: Brooklyn, Bronx, Manhattan, Queens, and Staten Island; DEC Region 3: Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, and Westchester counties; DEC Region 4: Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady, and Schoharie counties; DEC Region 5: Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren, and Washington counties; DEC Region 6: Herkimer, Jefferson, Lewis, Oneida, and St. Lawrence counties; DEC Region 7: Broome, Cayuga, Chenango, Cortland, Madison, Onondaga, Oswego, Tioga, and Tompkins counties; DEC Region 8: Chemung, Genesee, Livingston, Monroe, Ontario, Orleans, Schuyler, Seneca, Steuben, Wayne, and Yates counties; and DEC Region 9: Allegany, Chautauqua, Cattaraugus, Erie, Magara, and Wyoming counties.

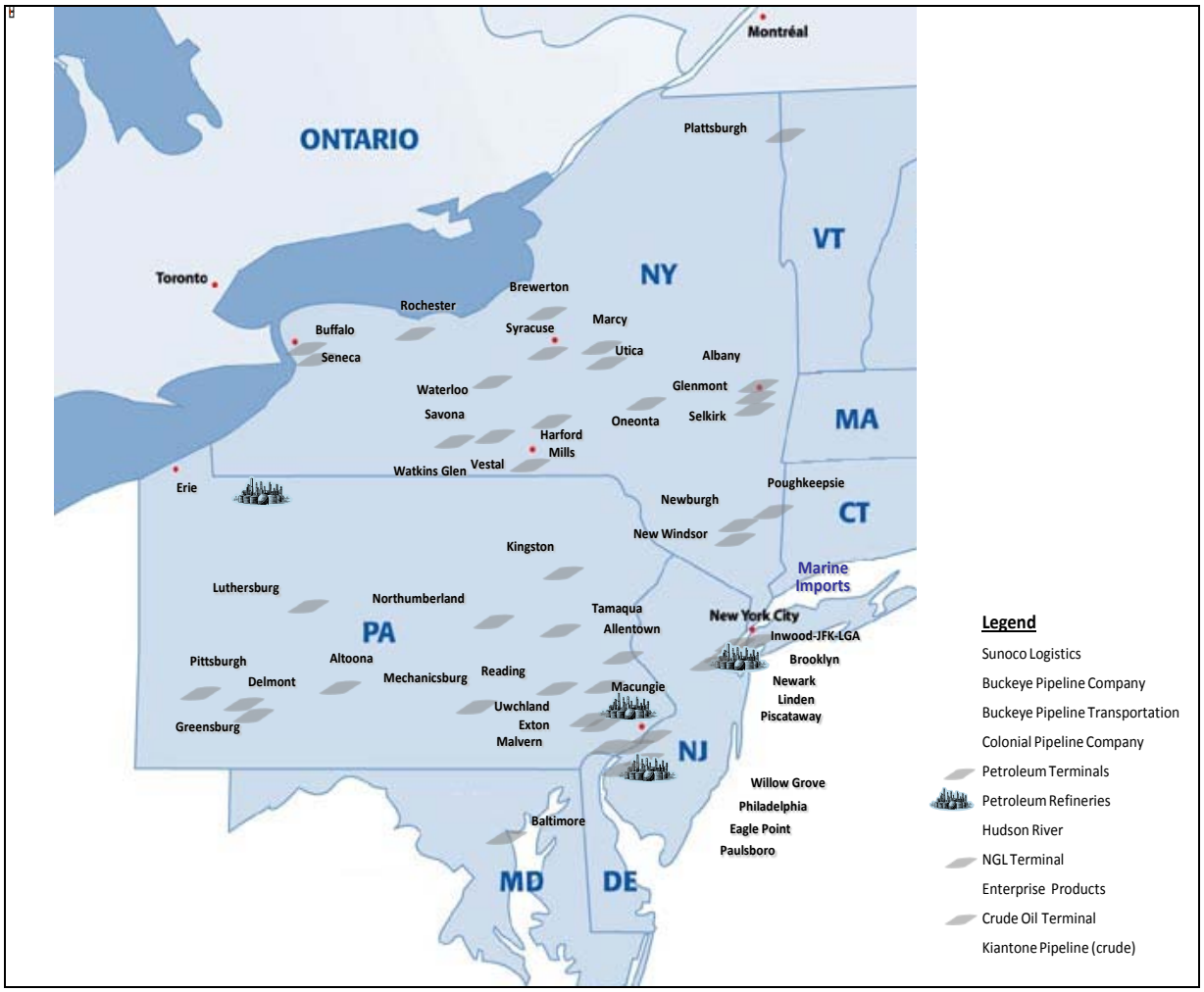
Exhibit 3: NYS DEC Regions and Counties



Source: Graphic Information Systems (GIS) ESRI ArcGIS Mapping Software.

New York State Department of Environmental Conservation. "Regions." New York State Department of Environmental Conservation, accessed August 2012. Available at: http://www.dec.ny.gov/about/50230.html

Exhibit 4: Distribution of Transportation Fuels within NYS



Source: ICF International original production.

Note: This map was put together using information from:

Petroleum Terminal Encyclopedia. OPIS/Stalsby. 2012 Edition. Valid through September 2012.

2011 SEC Company 10-K Filings.

Company websites and presentations.

The Current Fuels Market and Emerging Trends

The global fuels market, of which the United States is a part, is in a period of flux and transition. Demand has been substantially affected by the world-wide financial crisis and recession, but even apart from this, emerging trends were having a slow but dramatic impact on the market.

Over the last two decades specifications for transportation fuels have undergone substantial modification in the United States and many other countries. Gasoline is increasingly blended with oxygenates to reduce emissions and promote renewable fuels, largely corn-based ethanol in the U.S. Diesel is beginning to be blended with biodiesel and renewable diesel. In addition, both fuels have seen substantial reductions in their sulfur content.

In the U.S. Tier-2 gasoline has been adopted and the EPA has recently announced that it will be beginning work on Tier-3 gasoline that will further reduce toxic emissions and the sulfur content of gasoline from 30 parts per million (ppm) to 10 ppm. Assuming the implementation of Tier-3 follows the pattern of earlier changes, it will likely take a number of years to implement and thus may require additional storage, depending on supply sources as the nation slowly transitions to the new gasoline. All on-road diesel was converted to ultra-low-sulfur diesel (ULSD), with a sulfur content of 15 ppm or less, by 2010, and by 2014, all off-road, locomotive, and marine diesel will have also been converted to ULSD.[11]

In an effort to encourage domestic renewable fuel production, the U.S. Congress enacted legislation mandating the petroleum fuels industry blend their products with renewable fuels in a program commonly known as the Renewable Fuels Standard (RFS2). The RFS2 requires the petroleum industry to integrate progressively larger quantities of renewable fuels each year until it reaches 36 billion gallons nationally by 2022. These targets are divided into four categories, including cellulosic biofuel, biomass-based diesel, advanced biofuel, and renewable fuel. Each has its own minimum lifecycle greenhouse gas reduction thresholds. The RFS2 has had a profound impact on the renewable fuels industry, although the policy has proven to be unpopular among certain obligated parties due in part to the inaccessibility of certain fuels, recent fraud among renewable fuel producers, and the price of the fuels. Due to current Congressional review, there is a great deal of uncertainty about the future of the RFS2 and its potential impact in NYS.

Although the focus of this report is on transportation fuels, changes in specifications for other petroleum products will impact the diesel transportation market. Home heating oil was reduced to ULSD standards in NYS by July 1, 2012. In 2011 and 2012, the establishment of the North American Emission Control Area (ECA) required the substantial reduction in sulfur content of all vessels plying U.S. and Canadian territorial waters. While neither action is the focus of this study, both must be examined to assess the impact these changes will have on ULSD availability and costs to the transportation sections.

In conjunction with changes in petroleum transportation fuels specifications, changes are also occurring in the automobile industry. For the first time in several decades, substantial changes are being made in the Corporate Average Fuel Economy (CAFE). Beginning with model year 2011, the CAFE for light-duty trucks and cars was raised to 35 miles per gallon (mpg). This is expected to be achieved by 2020 and thereafter will remain flat. In July 2011, automobile manufacturers agreed to further raise the CAFE to reach 54.5 mpg by model year 2025. The latter standards were finalized in the late summer of 2012. These changes may substantially reduce the rate of growth in demand for gasoline. Currently the U.S. is moving towards the first CAFE for heavy-duty vehicles. An Environmental Impact Statement (EIS) was published by EPA, but there is considerable public discussion over it as the EIS did not address the penetration of natural gas into the heavy-duty vehicle market.

Nevertheless, the impact of increased automobile efficiency is complex in the U.S.. Historically, increases in the CAFE, while altering demand for gasoline, have resulted in increased vehicle miles travelled (VMT). Since gasoline prices, including taxes, are relatively low in the U.S., when

[11] Clean Diesel Fuel Alliance. “Locomotive, marine and non-road diesel fuel standards begin at later dates (except in California).” Clean Diesel Fuel Alliance: Washington, D.C. Available at: http://www.clean-diesel.org/nonroad.html

the CAFE increases, the unit cost of driving declines. The impact of this will be discussed further along in the report.

NYS receives the majority of its transportation fuels from outside the State, either from other domestic regions or from the global market. The Northeast/Mid-Atlantic is part and parcel of the larger Atlantic Basin market and the global market. Changes in these larger markets can have substantial impacts on the eastern seaboard states. Of particular impact are the changing fortunes of the Atlantic Basin refineries both in the U.S. and in Europe.

The closure of refineries in the Philadelphia region and in Europe could potentially threaten the security of supply in NYS as alternative sources of supply are likely to be much farther away and thus will be subject to a greater risk of upset.[12] Projections for the growth of transportation fuels in the larger market are remarkably consistent. Gasoline demand is projected to remain nearly the same, but diesel demand is projected to grow rapidly. In the world outside North America the transportation fuel of choice, encouraged by the tax structure in many countries, is diesel. The combination of growing demand for diesel and the further reduction in sulfur content likely will place constraints on availability and upward pressure on prices. Sections I and II in the report will examine these trends.

Confidential and/or Proprietary Data

This report is a public document. The data used in the report are largely drawn from public sources and are all clearly documented. However, some of the data are drawn from sources that are confidential or proprietary. In using that data we have followed the rules of the U.S. Census Bureau by aggregating the data so that individual companies cannot be identified. Even for the aggregated data to be shown there must be an adequate number of data points.

Data Sources and Integrity

This report was developed using public information from a variety of sources cited throughout the document. Sources include federal government agencies, such as the EIA, the U.S. Department of Agriculture (USDA), the Federal Highway Administration (FHWA), and others, as well as various associations and websites of companies involved in the supply, distribution, and consumption of transportation fuels. In a number of cases, the data gathered by these processes provided apparently good information; in others, similar data (volumes, shipments, etc.) from different sources provided conflicting information. Throughout the report, ICF's assumptions in developing tables, graphs, and conclusions are referenced and, where needed, rationale for using one data source versus another is identified. Though the integrity of the volume data in the report for some sources is questionable, it represents the best current information that ICF was able to identify using public data.

Structure of the Report

Section I discusses the transportation fuels supply sources for NYS, changes in those supply sources, and new sources likely to emerge in the future. Estimates of current and future demand in the State are analyzed, and demand drivers are identified. These potential changes

[12] As of this report, Sunoco Philadelphia and Phillips 66 Trainer (purchased by Delta Air Lines) are planning to continue operations.

are examined for their impact on supply. Changes in specifications of other petroleum products are examined in as much as they affect the supply of transportation fuels.

Section II examines the physical infrastructure for transportation fuels within NYS and in northern New Jersey. All transportation modes are examined. The section also assesses the impact on the existing infrastructure of market and regulatory changes and summarizes known expansions and/or contractions in the infrastructure assets base.

Section III depicts the distribution of transportation fuels within the State and discusses the retail sector for transportation fuels.

The **Conclusion** draws together the different strands from the three previous sections and identifies possible bottlenecks or problems the State may face. Future trends that will likely affect this market are also emphasized and brought to the attention of NYSERDA.

A **Bibliography** and **Data Sources** section and **Appendices** are also included. In addition to the maps of the petroleum and biofuels infrastructure of the State included in the report, the following maps are also included in an accompanying CD:

- Petroleum bulk Infrastructure: NYS DEC Regions 1-9
- Petroleum Bulk Infrastructure: NYS DEC Region 1
- Petroleum Bulk Infrastructure: NYS DEC Region 2
- Petroleum Bulk Infrastructure: NYS DEC Region 3
- Petroleum Bulk Infrastructure: NYS DEC Region 4
- Petroleum Bulk Infrastructure: NYS DEC Region 5
- Petroleum Bulk Infrastructure: NYS DEC Region 6
- Petroleum Bulk Infrastructure: NYS DEC Region 7
- Petroleum Bulk Infrastructure: NYS DEC Region 8
- Petroleum Bulk Infrastructure: NYS DEC Region 9
- Petroleum Bulk Infrastructure: NYS DEC Region 2 - Bronx County
- Petroleum Bulk Infrastructure: NYS DEC Region 2 - Kings County
- Petroleum Bulk Infrastructure: NYS DEC Region 2 - Queens County
- Petroleum Bulk Infrastructure: NYS DEC Region 2 - Richmond County
- Biofuels Infrastructure: NYS DEC Regions 1-9
- Alterative Fueling Stations: NYS DEC Regions 1-9

Section I: NYS Transportation Fuels Supply Characteristics

Overview

Section I surveys estimated demand for transportation fuels in NYS currently and within the short-term future. Transportation fuels demand data for the past decade (where available) are shown and both trends and anomalous events are identified. Monthly data are shown for the years 2010 and 2011, providing a snapshot. Using the recently published *Annual Energy Outlook 2012* (AEO) estimates for the future growth and the rate of growth for transportation fuels are discussed.[13]

This section focuses on the sources of supply for various transportation fuels, conventional and otherwise. The petroleum section examines the supply chain nationally and within the Northeast and Mid-Atlantic regions and includes a discussion of potential closure of several East Coast refineries, as well as the impact this will have on NYS, and future sources for fuels. The section also discusses the position of NYS within the larger Atlantic Basin and global markets, the changes taking place in these markets, and impact of these changes on NYS. There is a brief discussion of the potential threats to these sources of supply. The physical petroleum supply chain discussion is followed by a detailed discussion of market prices, leading to a discussion of how the market affects supply. The biofuels supply section follows a similar pattern, but includes a discussion of the general lack of data transparency.

[13] EIA. *Annual Energy Outlook 2012*. June 25, 2012. Available at http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf

Demand for Transportation Fuels in NYS

Demand for Petroleum Fuels in 2010 and 2011

Demand for transportation fuels in the U.S. has been severely affected by the financial crisis and the climbing price of both gasoline and diesel, driven by rising crude oil prices in the global marketplace. These factors will continue to affect demand in the near term. On a longer timeframe, the implemented changes in the CAFE levels and the future changes already settled on will also reduce the rate of increase in demand for on-road fuels. In addition, the surge in the domestic production of natural gas will have a growing impact on the transportation market in the future, particularly for the heavy-duty vehicles portion, which has established CNG/LNG technology.

Table I-1 displays a 12-year history of transportation fuel demand (gasoline, ethanol, and diesel) in NYS. The data show a very different pattern between gasoline and diesel. Gasoline consumption, which is largely for private vehicles, starts falling in 2008, at the onset of the financial crisis. By 2011, consumption had improved but was only slightly higher than that seen in 2000.

Table I-1: Demand for Transportation Fuels in NYS (Mb/d)

Year	Mb/d			
	Finished Gasoline	Gasoline	Ethanol*	Diesel
2000	351.4	350.4	1.0	48.0
2001	369.8	369.5	0.3	47.9
2002	388.6	388.3	0.3	46.0
2003	391.4	389.9	1.5	47.8
2004	367.0	347.8	19.2	46.7
2005	371.8	365.5	6.4	47.9
2006	375.5	358.9	16.6	57.1
2007	370.5	349.6	20.9	55.6
2008	357.5	330.3	27.2	57.0
2009	355.9	323.0	32.9	59.1
2010	356.9	323.9	33.0	65.4
2011	357.6	324.5	33.1	71.0

Sources: EIA. Prime Supplier Sales Volume. Available at: http://www.eia.gov/dnav/pet/pet_cons_prim_dcu_SNY_a.htm. Retrieved: June 11, 2012.

EIA. State Energy Data System. Available at: http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_NYa.html&mstate=New York State. Retrieved: June 11, 2012.

Note: Diesel consumption was collected for low sulfur diesel (2000-2006) and ultra-low sulfur diesel (2007-2011). Finished gasoline is the sum of the gasoline and ethanol columns. Totals may not sum due to independent rounding.

** Ethanol consumption for 2011 was estimated based on historical consumption of gasoline and ethanol.*

Gasoline use fell by 4 percent in NYS between 2007 and 2008 and fell further in 2009 before very slowly increasing in 2010 and 2011. Data for 2011 show gasoline demand to be lower than

in 2001: a reflection of the slow recovery from the financial crisis. In addition, the regulatory changes in 2011 raising the CAFE to 35 mpg are slowly having an effect.

Data on diesel show a very different pattern. Despite the financial crisis, diesel consumption continues to increase over the period. Diesel demand in the U.S. is largely a reflection of commerce and the use of public service vehicles, such as garbage trucks.

Table I-2 shows the aggregate monthly consumption of all gasoline types (regular plus oxygenated), for diesel, and for alternative fuels for 2010 and 2011 in NYS. EIA annual data for 2010 in Table I-1 shows NYS consumption of on-road diesel as 71 Mb/d, which would indicate alternative fuels consumption of approximately 19 Mb/d. Both the EIA data and the FHWA data are drawn from tax receipts data. The lowest point of the recession in NYS was 2009, so demand is only beginning to increase in the two years shown. The monthly data for 2010 shown in Table I-2 show some seasonal adjustments, with gasoline consumption being slightly higher in the summer and the fall. In 2011, in contrast, there is little seasonal adjustment..

Table I-2: Monthly Motor Fuel Consumption in NYS for 2010-2011 (b/d)

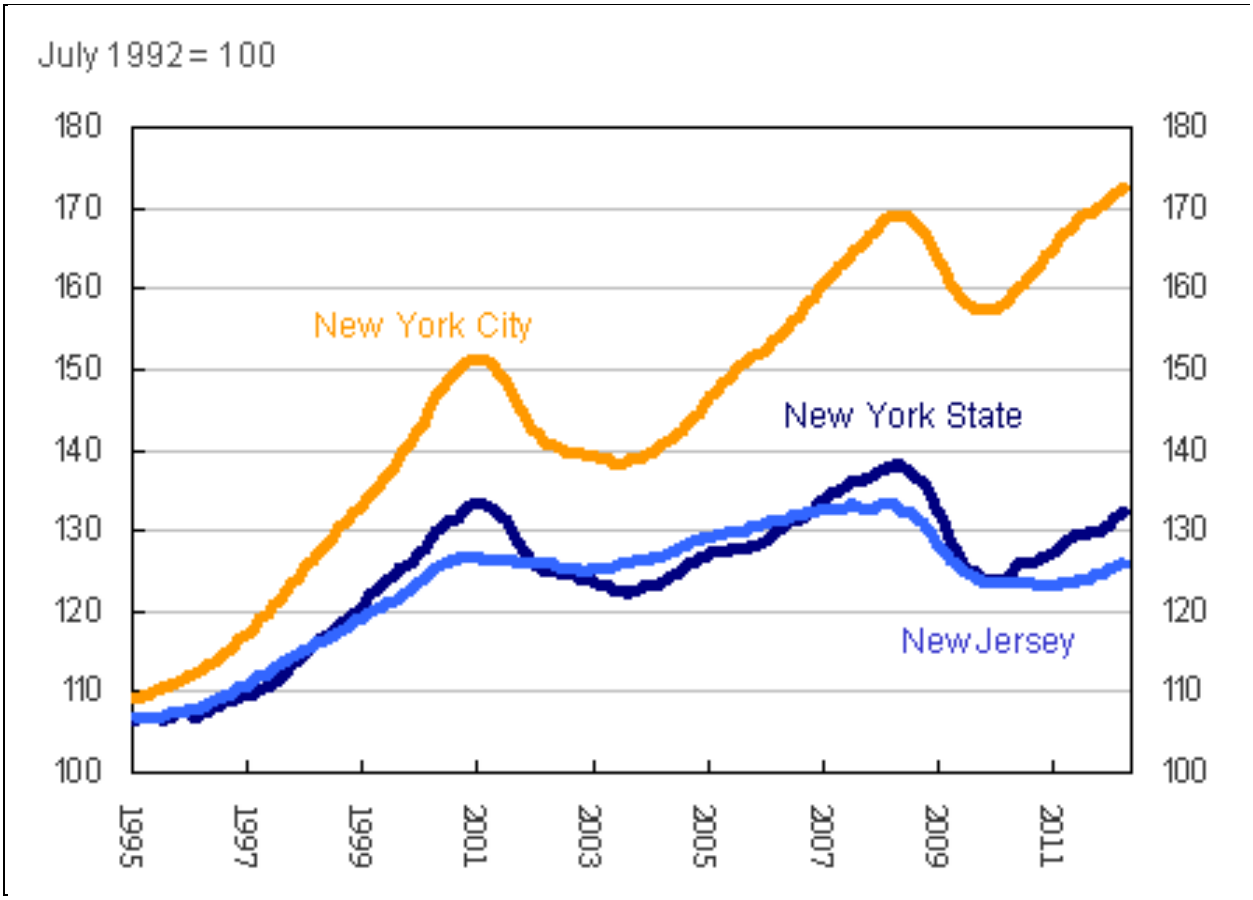
Month	Gasoline/Gasohol (b/d)		Highway Diesel + Alternative Fuels (b/d)	
	2010	2011	2010	2011
January	368,578	354,547	69,659	79,622
February	363,303	391,679	80,282	75,270
March	332,242	332,863	109,859	118,384
April	349,038	296,626	73,324	68,742
May	385,955	396,747	74,201	74,212
June	380,404	367,966	124,444	120,700
July	415,323	367,769	77,694	70,660
August	391,505	375,449	71,693	82,284
September	381,910	375,656	113,888	108,064
October	408,527	353,391	73,472	73,079
November	376,335	373,954	70,865	75,751
December	370,758	360,377	124,194	123,076
Average	*377,158*	*361,018*	*88,622*	*89,222*

Source: U.S. Department of Transportation, Office of Highway Policy Information. Monthly Motor Fuels Report by States Tax Agencies.

Note: Averages may not match due to independent rounding.

NYS is slowly emerging from the recent recession (2009-2010). The graphic below from the Federal Reserve Bank of New York State (Exhibit I-1) shows slow but fairly steady economic improvement in the region this report is examining. Nevertheless, for the reasons mentioned above, and particularly the growing efficiency of motor vehicles, it is unlikely that the demand for transportation fuels, and gasoline consumption in particular, will grow as rapidly as it has in the past. This is further discussed in the section that estimates future trends.

Exhibit I-1: Economic Indicator Indices for the NYS-New Jersey Area, 1995 to Present



Source: Federal Reserve Bank of New York. "Index of Coincident Economic Indicators." Federal Reserve Bank of New York, August 2012: Albany, NY. Available at: http://www.newyorkfed.org/research/regional_economy/coincident_summary.html

Demand for Biofuels and Alternative Fuels in 2010 and 2011

Biofuels are used in NYS primarily in the form of ethanol blended into gasoline. Ethanol usage in NYS has increased since 2007 to comply with the RFS2 requirements, such that virtually all gasoline blended in NYS has 10 percent ethanol. In order to increase usage further, it will be necessary to develop additional sales of E85[14], requiring FFVs[15].

One of the significant differences between the RFS1 and the RFS2 was the creation of four categories of fuel and required volumes for each: cellulosic biofuels, biomass-based diesel, advanced biofuels, and renewable fuels. The EPA is required to finalize the volumes for each category each November to ensure compliance. Table I-3 shows the current status of ethanol production and consumption, as well as FFVs in NYS.

[14] Defined as fuel consisting of 85 percent fuel ethanol and 15 percent gasoline.

[15] Defined as an alternative fuel vehicle with an internal combustion engine that can run on multiple fuel types, such as gasoline blended with different proportions of ethanol (e.g., E10, E15, E85).

Table I-3: Status of Ethanol in NYS

Alternative Fuels	NYS	Share of U.S.	Period
Alternative-Fuel Vehicles in Use (No.)	34,389	3.7%	2010
Ethanol Plants (No.)*	2	1.0%	2012
Ethanol Plant Capacity (MMg/y)**	164	1.2%	2011
Ethanol Consumption (Mbbl)	13,709	4.5%	2010

Source: EIA. "New York Data." Accessed July 2012 at: http://www.eia.gov/state/state-energy-profiles-data.cfm?sid=NY#Environment

** Data as of February 13, 2012.*

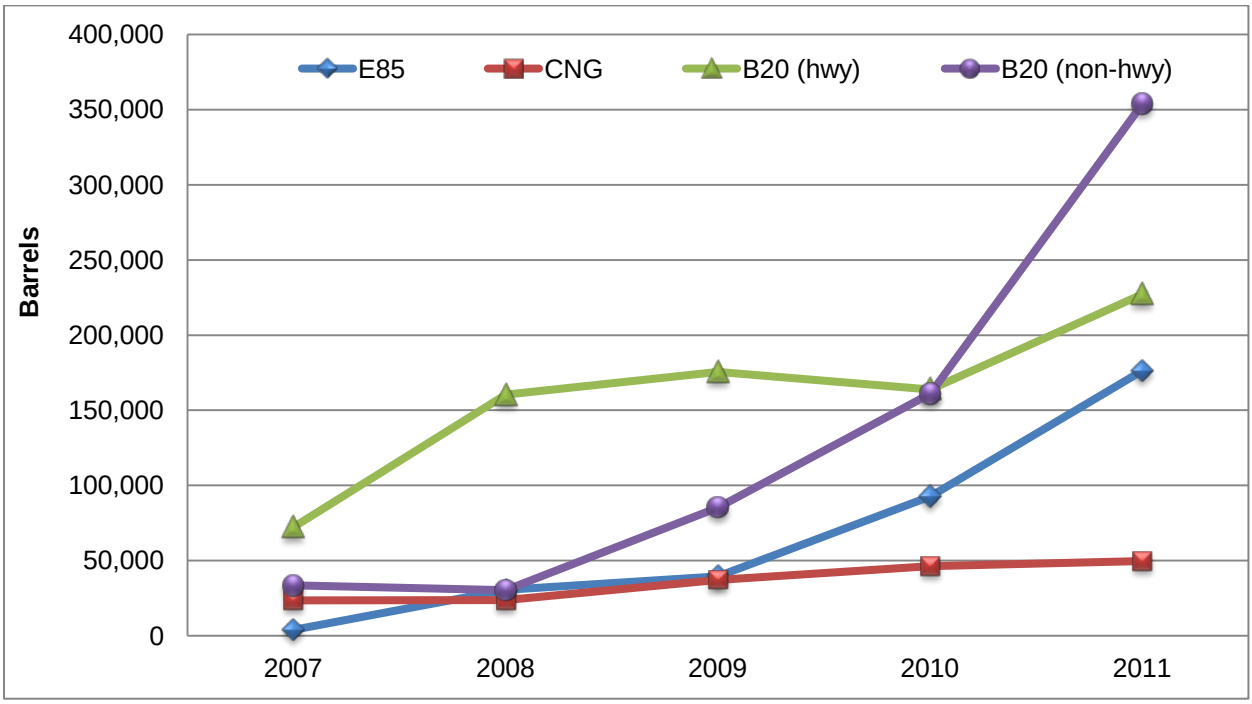
*** Data as of January 1, 2011.*

The demand for biofuels in NYS has increased considerably since 2007, however, the E85 percentage of total gasoline sales in NYS in 2011 was still very low at about 0.13 percent. Nearly all retail gasoline sales in NYS include 10 percent ethanol (E10). Consequently, increasing biofuels demand in NYS is contingent upon increasing volumes of E85 sales and biodiesel blends. Exhibit I-2 indicates that the demand for E85, B20[16] (both on- and off-road), and compressed natural gas (CNG) (which is technically an alternative fuel) have substantially grown since 2007.

In September 2006, NYS excise tax and petroleum business tax exemptions were instituted for E85, B20, CNG, and liquefied natural gas (LNG). Reporting was required as part of the exemptions, so the availability of alternative fuels data improved after December 2006. Over the 5-year period of available data, a clear upward trend in alternative fuels consumption is evident—particularly in 2011. Of greatest interest is the substantial increase in the availability and use of E85 and B20 in NYS, which grew by over 500 percent between 2007 and 2011. The volumes of E85 have substantially grown through 2011. The B20 sales are recorded from tax records. However, records for other levels of biodiesel blends are less transparent (no reporting is required for any levels other than B20). Based on B20 sales alone, B20 sales are about 1.3 percent of total distillate sales in NYS; or alternatively, about 0.26 percent of distillate sales in NYS are biodiesel. Consumption of alternative fuels is higher in the summer months than in the winter. This pattern mirrors that of gasoline.

[16] Defined as diesel containing 20 percent biodiesel and 80 percent petroleum diesel.

Exhibit I-2: NYS Alternative Fuel Consumption, 2007-2011 (Barrels)



Source: *New York State Department of Taxation and Finance. Gasoline and Petroleum Business Tax: Monthly Statistical Report. June 2012. Available at: http://www.tax.ny.gov/*

Note: *E85 is based on delivered fuel to the retail gasoline stations. B20 highway is the volume reported by taxpayers as sold for use in highway vehicles. B20 non-highway is the volume reported by taxpayers as sold for space-heating purposes.*

NYS Estimated Future Demand for All Transportation Fuels

The AEO Reference Case is generally accepted as the U.S. federal government's official view of the energy sector's future and is widely used by both public and private sector analysts. The current AEO makes projections through 2035. The AEO makes mostly national projections and includes only a few regional breakouts. It does not allocate specific numbers to NYS, but it does identify the Mid-Atlantic region. Despite the fact that there are variations among the U.S. regions, the national picture gives a robust estimation of likely changes and trends over the near and long term—changes and trends that are likely to affect NYS.

Other major annual energy forecasts that are well-regarded include the International Energy Agency's (IEA) *World Energy Outlook*[17] and the Organization of Petroleum Exporting Countries' (OPEC) *World Oil Outlook*[18]. Two other well-regarded projections are from major oil companies, ExxonMobil's *2012 The Outlook for Energy: A View to 2040*[19] and BP's *Energy Outlook 2030*.

[17] *World Energy Outlook 2011,* International Energy Agency. November 2011.

[18] *World Oil Outlook*, OPEC. 2011. Available at: http://www.opec.org/opec_web/static_files_project/media/downloads/publications/WOO_2011.pdf

[19] *2012 The Outlook for Energy: A View to 2040*, ExxonMobil. Available at: http://www.exxonmobil.com/Corporate/files/news_pub_eo.pdf

All of these projections cover roughly the same timeline and tend to be fairly high-level aggregate projections. They may disaggregate to the country level in some cases, but never below that.

Table I-4 shows the estimated demand for energy in the U.S. transportation sector through 2035, as taken from the AEO Reference Case. The projections show likely energy consumption of all fuels for the entire transportation sector. The table shows the impact of the improved efficiency in light-duty vehicles due to the increase in the CAFE to 35 mpg. The assumption is that this is achieved by 2020 and thereafter held flat. This is reflected in the table, which shows that energy consumption by light-duty vehicles falls through 2025 and then begins to climb again. Conversely, demand for diesel, as consumed by freight trucks and railways (freight), climbs steadily, reflecting the growth in commerce.

Table I-4: U.S. Transportation Sector Energy Use Projections

Transport Mode	Million Barrels of Oil Equivalent/day (MMBOE/d)					
	2010	2015	2020	2025	2030	2035
Light-duty vehicles	8.63	8.3	8.05	8.05	8.31	8.64
Commercial light trucks	0.28	0.3	0.29	0.3	0.3	0.31
Bus transportation	0.12	0.13	0.13	0.14	0.14	0.15
Freight trucks	2.32	2.65	2.68	2.72	2.74	2.81
Rail, passenger	0.02	0.02	0.03	0.03	0.03	0.03
Rail, freight	0.22	0.21	0.23	0.24	0.25	0.25
Shipping, domestic	0.1	0.11	0.11	0.11	0.11	0.12
Shipping, international	0.34	0.38	0.38	0.38	0.39	0.39
Recreational boats	0.14	0.14	0.14	0.15	0.15	0.16
Air	1.22	1.23	1.27	1.31	1.33	1.35
Military use	0.37	0.32	0.31	0.32	0.34	0.36
Lubricants	0.07	0.06	0.06	0.07	0.07	0.07
Pipeline fuel	0.31	0.32	0.32	0.32	0.32	0.32
Total	**14.17**	**14.17**	**14.01**	**14.14**	**14.48**	**14.95**

Source: *EIA. Annual Energy Outlook 2012 with Projections to 2035. June 25, 2012. Table A7. U.S. Available at http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf.*

Note: *The AEO Table A7 does not specify the energy content of each transport mode, so the data were converted from quadrillion British Thermal Units (Quads) to barrels of oil equivalent (BOE), rather than barrels.*

Table I-5: Renewable Energy Consumption in the Transportation Sector (MMbbl/d)

Transport Mode	Million Barrels/day (MMbbl/d)					
	2010	2015	2020	2025	2030	2035
Ethanol used in E85	--	2.8	22.7	56.7	133.2	226.8
Ethanol used in Gasoline Blending	311.8	343.0	360.0	382.7	382.7	379.8
Biodiesel used in Distillate Blending	5.6	33.5	42.8	44.6	46.5	48.4
Liquids from Biomass	--	6.7	24.7	74.1	175.2	294.2
Renewable Diesel and Gasoline	1.8	5.5	5.5	5.5	5.5	5.5

Source: EIA. Annual Energy Outlook 2012 with Projections to July 2035. June 25, 2012. Table A17. Available at http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf

Conversion Notes: Ethanol/bbl = 3.53 MMBtu

Biodiesel/bbl = 5.38 MMBtu

Liquids from Biomass/bbl = 4.45 MMBtu

Renewable Diesel and Gasoline/bbl = 5.44 MMBtu

shows the details of estimated renewable fuel consumption in the transportation sector. Ethanol used in gasoline blending increases over most of the period but stabilizes and flattens towards the end of the period. The most rapid growth occurs for E85, liquids from biomass, and biodiesel used in distillate blending. Nevertheless, the absolute numbers are still small, even by the end of the period.

Table I-5: Renewable Energy Consumption in the Transportation Sector (MMbbl/d)

Transport Mode	Million Barrels/day (MMbbl/d)					
	2010	2015	2020	2025	2030	2035
Ethanol used in E85	--	2.8	22.7	56.7	133.2	226.8
Ethanol used in Gasoline Blending	311.8	343.0	360.0	382.7	382.7	379.8
Biodiesel used in Distillate Blending	5.6	33.5	42.8	44.6	46.5	48.4
Liquids from Biomass	--	6.7	24.7	74.1	175.2	294.2
Renewable Diesel and Gasoline	1.8	5.5	5.5	5.5	5.5	5.5

Source: EIA. Annual Energy Outlook 2012 with Projections to July 2035. June 25, 2012. Table A17. Available at http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf

Conversion Notes: Ethanol/bbl = 3.53 MMBtu
Biodiesel/bbl = 5.38 MMBtu
Liquids from Biomass/bbl = 4.45 MMBtu
Renewable Diesel and Gasoline/bbl = 5.44 MMBtu

The 2012 AEO Reference Case includes the CAFE increase to 35 mpg but does not include the other CAFE changes: the heavy-duty (HD) vehicle changes and the later, light-duty vehicle changes to 54.5 mpg. The interrelationship between vehicle efficiency and VMT is complicated in the U.S. due to the relatively low cost of gasoline. Increasing the CAFE results in a lower unit cost of driving, and potentially a higher VMT. Exhibit I-3 shows the historic relationship between the CAFE and VMT. The last few years show the first change. However, the change is not simple. While it is true that vehicle efficiency changes and improvements cause some impact, the changes are also being driven by the underlying financial crisis and the cost of gasoline to consumers.

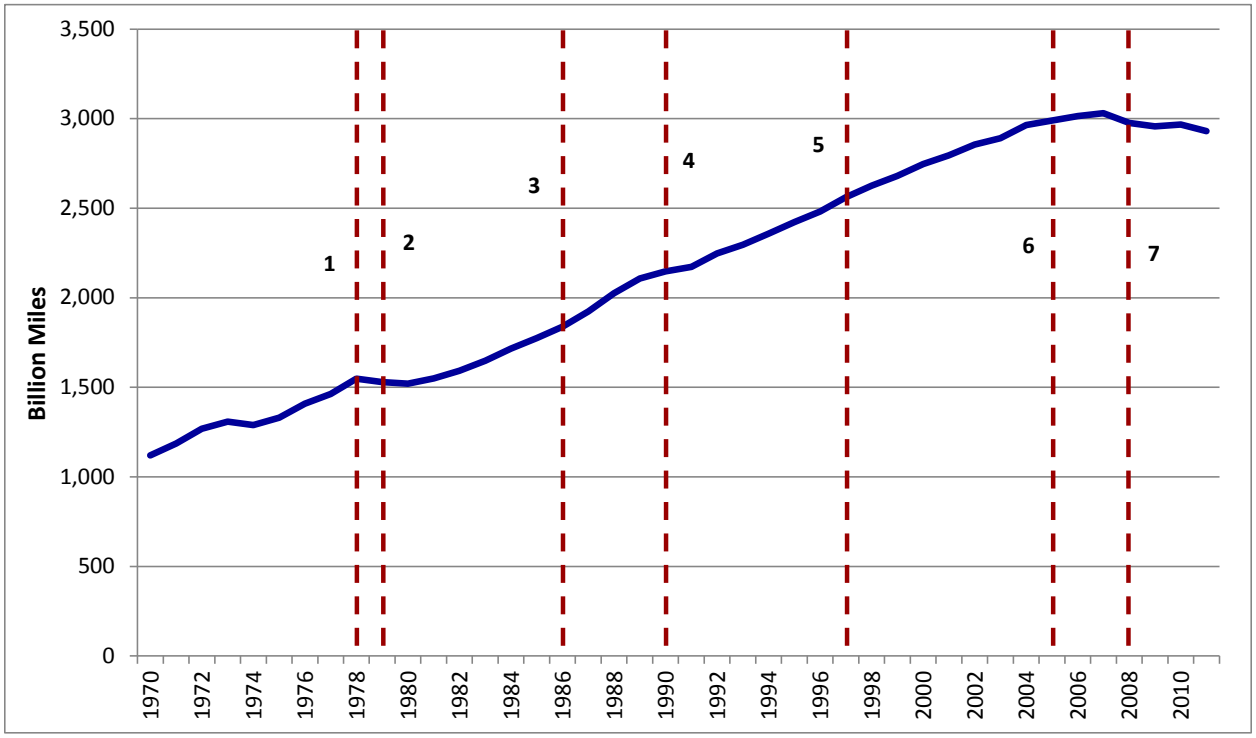
Recent Changes to CAFE

Exhibit I-3 gives a quick overview of the history of the CAFE in the U.S. and its relationship to VMT. The last 4 years have seen substantial changes in the CAFE standards, which will have a substantial impact on future demand for liquid transportation fuels. Not only have there been two changes to the CAFE for light-duty vehicles and trucks, but also for the first time there have been improvements to the standards for heavy-duty vehicles, ranging from trucks to semis.

The National Highway Traffic Safety Administration (NHTSA) published the light-duty vehicles and trucks CAFE on May 10, 2010, raising the average mpg to 35.5 for model years 2012-2016. On August 28th 2012 NHTSA published the final rule, announced on December 1, 2010, which aims to raise the average mpg for model years 2017-2025 to 54.5. An EIS related to this change incorporating public comments was published at the same time.

In conjunction with this work relating to light-duty vehicles and trucks, NHTSA published the draft EIS for heavy-duty vehicles in 2011. Analysts believe NHTSA will have to revisit this due to substantial public criticism directed at the administration's failure to address the growing role of natural gas has played in becoming a viable heavy-duty vehicle alternative fuel.

Exhibit I-3: VMT and Changes to the CAFE (Billion Miles)



Sources: U.S. Department of Transportation, Federal Highway Administration. Summary of Fuel Performance. April 28, 2011. Available at: www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/2011_Summary_Report.pdf

Center for Climate and Energy Solutions. Federal Vehicle Standards Timeline (1975-2011). Available at: http://www.c2es.org/federal/executive/vehicle-standards#timeline

U.S. Department of Transportation, Federal Highway Administration. Historical Monthly VMT Report. March 26, 2012. Available at: http://www.fhwa.dot.gov/policyinformation/travel/tvt/history/

Notes on numbered phases:

1. *1978-1985: Congress sets car standard (1978-1985)*
2. *U.S. Department of Transportation (DOT) sets truck standard to max feasible (1979-1996)*
3. *DOT decreased car standard (1986-1989)*
4. *DOT sets car standard to 27.5 mpg (1990-2010)*
5. *Congress freezes truck standards at 20.7 mpg (1997-2001)*
6. *Bush administration issues new truck targets (2005-2007)*
7. *Energy Independence and Security Act (EISA) changes CAFE to footprint standard (2008-present)*

Note: In addition to the above mentioned changes, the Obama administration issued new car and truck standards to take effect over the 2012-2016 period and proposed new car and truck standards for the 2017-2025 timeframe.

Renewable Fuels

The rest of this section offers a more detailed discussion of the likely future of renewable fuels and some of the problems facing the future implementation of the RFS2. Projections for impacts

on alternative fuel are based on changes in E15 and cellulosic ethanol from the RFS2 standards for 2013 and beyond.

As discussed above, RFS2, which was established by EISA in December 2007, is a federal policy that has significantly impacted the utilization of biofuels in the U.S. The RFS2 requires obligated parties (e.g., petroleum refineries, petroleum bulk stations and terminals, and petroleum merchant wholesalers)[20] to blend traditional fuels with a pre-determined volume of renewable fuels, increasing each year through 2022 as shown in Table I-6.

Table I-6: RFS2 Projected Volumes (Million Barrels)

Year	Million Barrels (MMbbl)			
	Cellulosic Biofuel Requirement	Biomass-Based Diesel Requirement	Total Advanced Biofuel Requirement	Total Renewable Fuel Requirement
2012	0.29	24	48	362
2013	24	31	65	394
2014	42	TBD*	89	432
2015	71	TBD*	131	488
2016	101	TBD*	173	530
2017	131	TBD*	214	571
2018	167	TBD*	262	619
2019	202	TBD*	310	667
2020	250	TBD*	357	714
2021	321	TBD*	429	786
2022	381	TBD*	500	857

Source: *EPA. EPA Finalizes Regulations for the National Renewable Fuel Standard Program for 2010 and Beyond. February 2010. p.3. Available at: http://www.epa.gov/otaq/renewablefuels/420f10007.pdf.*
2012 figure: EPA. "2012 Renewable Fuel Standards," 40 CFR Part 80. January 2012. p. 1320-1338. Available at: http://www.gpo.gov/fdsys/pkg/FR-2012-01-09/pdf/2011-33451.pdf.

Note: The total advanced biofuel requirement is the sum of cellulosic biofuels and biomass-based diesel fuel. The total renewable fuel requirement includes the advanced biofuels and all other renewable fuels. RFS2 fuel requirements for 2013 and beyond may change based on the availability of renewable fuels.

** Clean Air Action Section 211(o) specifies that the minimum volume for biomass-based diesel for years 2013 and later must be at least one billion gallons (31 million barrels), and the final rulings for volume must be available on a year-to-year basis.*

Cellulosic Biofuel

Cellulosic biofuel is defined as renewable fuel produced from cellulose, hemicellulose, or lignins including cellulosic ethanol, Fischer-Tropsch diesel using biomass, and green gasoline. The fuel must have 60 percent or less of the lifecycle GHG emissions of the gasoline or diesel fuel it displaces. The EPA is authorized to alter the cellulosic biofuels RFS2 volumetric requirements based on the projected annual production volumes and to date have amended the requirements each year since the cellulosic biofuel requirement went into effect in 2010. For example, in 2012

[20] EPA. "2012 Renewable Fuel Standards," 40 CFR Part 80. January 2012. p. 1320. Available at: http://www.gpo.gov/fdsys/pkg/FR-2012-01-09/pdf/2011-33451.pdf

the amount of required fuel was originally 250 million gallons (5.9 MMbbl) and it was reduced by EPA to 8.65 million gallons (0.21 MMbbl). Predicting the quantities of available cellulosic biofuels has proven challenging for EPA. In 2011, obligated parties were required to pay approximately $6.8 million in penalties to the U.S. Treasury for not blending the required 6.6 million gallons (0.16 MMbbl) of cellulosic ethanol, even though those volumes were not commercially available that year.[21] It is unclear what the revised cellulosic biofuel requirements will be for 2013 and beyond, but given the uncertainty of commercial-scale deployment, it is likely the requirements will continue to be amended for at least the next several years.

There are several cellulosic plants which are under construction and scheduled for startup in 2013, including the POET corn-stover plant in Emmetsburg, Iowa. The POET plant capacity is about 25 million gallons (0.6 MMbbl) per year at a cost of $250 million. In order to meet the 2022 target of 16 billion gallons per year (381 MMb/y) cellulosic ethanol, about 640 POET-sized cellulosic plants must be constructed.

Biomass-Based Diesel

Biomass-based diesel is defined as either biodiesel (mono-alkyl esters) or non-ester renewable diesel (including cellulosic diesel). The fuel must be made from an eligible renewable biomass, have 50 percent or less of the lifecycle GHG emissions of the gasoline or diesel fuel it displaces, and cannot include renewable fuel derived from co-processing biomass with a petroleum feedstock.[22] The biomass-based diesel volume requirements were defined in the statute through 2012, but required the EPA to institute yearly volume requirements from 2013 through 2022, with a floor of one billion gallons (24 MMbbl) annually. The EPA will only modify the biomass-based diesel target on an annual basis, which largely depends on industry feedback and availability of product. Last year, biodiesel manufacturers produced over one billion gallons (24 MMbbl) of biodiesel, and despite issues associated with RINS fraud and the audit requirements, industry sources expect that 2012 will meet the one billion gallon (24 MMbbl) production target in 2012, as well, indicating that in the near-term, volumes are not expected to decline.

Advanced Biofuels

Advanced biofuels are defined as a renewable fuel, other than ethanol derived from corn starch, with 50 percent or less of the lifecycle GHG emissions of the gasoline or diesel fuel it displaces. These fuels may include: ethanol derived from cellulosic feedstocks, sugars or starches other than corn starch, and waste materials; biomass-based diesels; biogas generated from organic matter from renewable biomass (including landfill gas and sewage waste treatment); and butanol or other alcohols from renewable biomass. The EPA has the authority to alter the advanced biofuel volume if changes are made to the cellulosic biofuel requirement.

[21] Matthew Wald, "A Fine for Not Using a Biofuel that Doesn't Exist," New York State Times, January 9, 2012, available online at: http://www.nytimes.com/2012/01/10/business/energy-environment/companies-face-fines-for-not-using-unavailable-biofuel.html?_r=3

[22] National Biodiesel Board, "Biodiesel and the RFS2 Summary of the Final Rule," February 2010, p. 3, available online at: http://vtbio.org/VTBIO_News_files/NBB%20Summary%20-%20Final%20RFS2%20Rule%20(2-3-10).pdf

Total Renewable Fuel Requirements

The total renewable fuel requirement includes all of the advanced biofuels plus conventional biofuels, also known as ethanol derived from corn starch. The RFS2 defines qualifying conventional biofuels as having 20 percent or less lifecycle GHG emissions of the gasoline or diesel fuel it displaces for new ethanol facilities. Lifecycle emission exceptions apply to existing corn-based ethanol facilities. The total renewable fuel requirement may be adjusted if changes are made to the advanced biofuel requirement.

One of the greatest anticipated challenges in meeting future RFS2 volume requirements is the projected flat or declining demand for motor fuels. New fuel economy standards and the potential for flat or declining gasoline use make the RFS2 requirement of 24 billion gallons (571 million barrels) of renewable fuel by 2017 challenging to blend without significant growth in E85 or E15 consumption. Additionally, as consumers drive more fuel-efficient vehicles, shrinking gasoline demand can accelerate the current E10 blend wall challenges as discussed in Section II.

The EPA's approval of E15 for use in model year 2001 or newer vehicles[23] is critical to compliance with the RFS, but some industry experts predict that even without existing legal and technical hurdles, E15 implementation may only delay the blend wall by as little as two years.[24] E15 faces a number of barriers to implementation, including: only about 62 percent of vehicles currently operating would be able to use E15[25]; some vehicle manufacturers do not provide a warranty for E15 use[26]; and only about 50 percent of retailers would currently be able to provide the fuel without additional financing challenges, as discussed in the retail section.[27] Another way to meet the RFS requirements is through the expanded use of E85 for FFVs, as discussed in the retail section.

Given industry concerns about meeting the RFS2 requirements, an outbreak of fraudulent Renewable Identification Numbers (RINs), and the issuance of fines for fuels that are not yet commercially available, obligated parties (e.g., petroleum refineries, petroleum bulk stations and terminals, petroleum merchant wholesales) have filed a lawsuit against the EPA to challenge its RFS2 mandates for cellulosic biofuels volumes and have threatened to raise consumer prices on fuels to pay for fines imposed by the EPA for RFS2 noncompliance.[28] Additionally, petroleum advocacy groups such as the American Petroleum Institute have been lobbying Congress since the statute was passed in 2007 to either reduce the volume requirements or eliminate the

[23] EPA. "E15: Misfueling Mitigation Plans." Available at: http://www.epa.gov/OMS/regs/fuels/additive/e15/e15-mmp.htm

[24] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine*. June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[25] U.S. Department of Energy, Office of Efficiency and Renewable Energy. "Statement of Dr. Henry Kelly." April 13, 2011. Available at: http://www1.eere.energy.gov/office_eere/testimony_kelly_041311.html

[26] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine*. June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[27] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine.* June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[28] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine.* June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

statute completely.[29] In 2012, the U.S. Senate established a Biofuels Investment and RFS Market Congressional Group to provide a "seed-to-wheel examination" of the RFS, with a goal of examining which provisions work and which could be improved.[30] Analysts are unsure of what recommendations will ensue and whether the RFS will remain in its current form beyond 2012.

Mid-Atlantic Projection Trends

The 2012 AEO forecasts that Mid-Atlantic consumption of liquid transportation fuels, including gasoline, E85, distillates, biodiesel, and LPG, should decrease from 576 million barrels in 2010 to less than 500 million barrels in 2035, as seen in the table below. Table I-7 shows the AEO's estimate for the consumption of liquid fuels in the Mid-Atlantic by liquid fuel.

Table I-7: Mid-Atlantic Transportation Sector Liquid Fuels Consumption Projections (MMbbl)

Liquid Fuel	Millions of Barrels (MMbbl)						Avg. Annual Growth 2010-2035 (%)
	2010	2015	2020	2025	2030	2035	
LPG	0.8	0.8	1.3	1.3	1.3	1.0	0.4
E85	-	0.3	0.3	0.5	0.5	8.1	20.1
Motor Gasoline*	368.9	341.6	314.9	298.4	290.9	280.2	-1.1
Jet Fuel	61.2	59.5	59.2	59.5	59.2	58.8	-0.2
Distillate Fuel Oil/Diesel	85.9	95.2	95.7	96.4	95.9	96.7	0.5
Residual Fuel Oil	28.3	27.5	26.9	26.2	25.8	25.3	-0.4
Other**	3.1	2.9	2.9	2.9	2.9	2.7	-0.5
Transportation Sector Liquid Fuels	**548.2**	**527.8**	**501.2**	**485.2**	**476.5**	**472.8**	**-0.6**

Source: EIA. Annual Energy Outlook 2012 with Projections to 2035. June 25, 2012. Table A11. Available at: http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf. Conversions available at: http://www.eia.gov/totalenergy/data/monthly/pdf/sec13_1.pdf

Conversion Notes: Oil/bbl = 5.80 MMBtu
LPG/bbl = 3.84 MMBtu
E85/bbl = 3.96 MMBtu
Motor Gasoline/bbl = 5.05 MMBtu*
Average Jet Fuel/bbl = 5.51 MMBtu
Diesel/bbl = 5.83 MMBtu
Residual Fuel Oil/bbl = 6.29 MMBtu
*Other**/bbl = 5.56 MMBtu*

** Includes blending alcohol*

*** Aviation gasoline and lubricants*

[29] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine.* June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[30] Jim Lane. "U.S. Senate group starts up "seed to wheel" review of U.S. Renewable Fuel Standard." May 30, 2012. Available at: http://www.biofuelsdigest.com/bdigest/2012/05/30/us-senate-group-starts-up-seed-to-wheel-review-of-us-renewable-fuel-standard/

This forecast is based on the RFS2, with some assumptions on the timing of advanced biofuel production and assumptions on fleet and consumer acceptance of advanced biofuels. The AEO clearly shows a decline in absolute demand for gasoline from 2012 to 2020 (gasoline includes ethanol blended into gasoline for E10) based on factors such as improved fleet efficiency from mandated CAFE standards and assumptions on reduced consumer demand. Since the AEO assumes that gasoline ethanol content is no greater than E10 (i.e., the AEO does not assume that suppliers, retailers, or consumers will move to E15 where allowed), lower gasoline demand should mean reduced ethanol usage.

While forecasting the change in ethanol that will be required as gasoline demand rises or falls is straightforward, a number of factors make forecasting state-level demands for E85 and biodiesel demands (or other alternative fuels) highly problematic, as detailed below.

E85/Ethanol

1. E85 sales require consumers to own FFVs. FFV sales are not mandated in NYS or nationwide, and make up just a small percentage of NYS' current vehicle fleet
2. To market E85, service stations require infrastructure investments that in many cases independent dealers cannot afford
3. Consumers (with FFVs) will recognize that E85 has only 75 percent of the energy content of E10, and therefore lower mileage by about 25 percent.[31] The difference in the pump prices of E85 and E10 will be one factor consumers will monitor to determine whether to fill their tank with one fuel versus another. (The price on the street, including any taxes or tax relief, will largely drive consumer demand.) A second factor will be the impact of lower mileage on service station visits, in that service stations will see higher volumes, as the lower energy content of E85 (relative to E10) will mean more trips to fill up.
4. The availability of ethanol will likely not be an obstacle to E85 sales. Ethanol can be produced from corn or imported. Failing to develop cellulosic ethanol at RFS2-prescribed levels will not impede increasing E85 sales. The 2012 drought in the U.S. Midwest, along with the temporary closure of a number of ethanol plants (due to poor economics attributable to high corn prices), could mean near-term gasoline supply disruptions elsewhere in the country, however.

The intent of RFS2 is to grow the use of cellulosic and other advanced biofuels, which have a lower carbon content than fossil-based fuels or corn-based ethanol. Under RFS2, corn-based ethanol must be increased to 15 billion gallons (357 MMbbl) per year by 2015, which is somewhat lower than current ethanol usage levels (recent ethanol usage has been about 12.9 billion gallons (307 MMbbl)).

Since the development of cellulosic ethanol has lagged behind expectations, the EPA has adjusted the cellulosic target each year. As long as this continues, the need to develop E85 sales volumes will also lag. Should sales of E15 overcome various obstacles (cited later in the report), ethanol supply requirements could increase as much as 50 percent.

[31] This means that for every one mile driven on E10, the same volume content of E85 equates to 0.75 miles driven on E85, given the lower energy content of ethanol (relative to gasoline).

Biodiesel

1. RFS2 provides a clear target for obligated parties (refiners and blenders) to increase biodiesel usage. Unlike cellulosic ethanol, the U.S. has the production capability to meet increasing RFS2-prescribed biodiesel requirements. Adding biodiesel to heating oil and -road diesel may not be economic for obligated parties, but they will be required to either use more biodiesel or purchase RINs, the basic currency for the RFS2 program, to meet their obligation.
2. While biodiesel's quality and British Thermal Unit (Btu) content allow it to be blended into petroleum-based diesel with minimal product quality issues, neat (100 percent) biodiesel typically has a more expensive market price than petroleum-based diesel fuels. Therefore, without a form of blending credit, suppliers of biodiesel blends (e.g., B2, B5, B20) will pay a higher cost for fuel and therefore will charge a higher rack price to cover the cost. As petroleum prices increase, the economics of biodiesel tend to improve; however, biodiesel prices can also increase due to feedstock costs. The relationship between these prices, and the value of RINs can support or impede growth in biodiesel demand.
3. The use of bioheat tax incentives, which are valid in NYS through 2017, offers consumers a tax credit of up to $0.20/gallon on purchases of B20. This incentive can help defray the possible higher cost of B20 and stimulate sales growth.
4. The NYC mandate requiring 2 percent biodiesel in heating oil (effective October 1, 2012) will likely increase biodiesel usage in NYS. While we do not have specific county demand numbers the vast population of NYC suggests a large proportion of total statewide heating oil demand regardless of temperatures.

Overall, the analysis of biodiesel markets lacks consistent information on supply, demand, blending levels, and prices. More visibility of all aspects of the supply chain will greatly assist in monitoring the trends in biodiesel demand and in accelerating resolution of obstacles to biodiesel growth. As EIA data collection, among other sources, continues to expand to include more biofuel data points, greater clarity on biofuels trends will emerge, which will enable policy-makers to more readily identify supply and demand issues.

Supply Sources into NYS: Petroleum

The location of transportation fuels infrastructure is largely dictated by two factors (among others):

- Population location and density and the attendant demand
- The sources of supply of transportation fuels and their distribution to the population hubs.

The NYS petroleum fuel market is supplied by domestic and foreign networks to meet the State's demand. Though NYS does produce small amounts of crude oil (i.e., the extraction of crude oil from underground reservoirs), NYS lacks refining capacity to process crude oil into

saleable products such as gasoline, diesel fuel, heating oil, and jet fuel.[32] This supply scenario creates a complete reliance on external sources to meet the State's liquid fuels demand.

NYS is, however, well positioned to receive petroleum products from a number of sources and through a number of delivery methods. NYH's role as a hub in the Northeast petroleum and ethanol supply chains provides significant flexibility to cover supply disruptions. NYH is broadly defined as the region depicted in Exhibit 1.

The flexibility stems from a petroleum product supply that comes from 1) regional refineries; 2) the U.S. Gulf Coast via the Colonial Pipeline; and 3) domestic and foreign marine imports. In addition, the region has "reserves" of petroleum supply due to a substantial network of distribution terminals, primarily in northern New Jersey, that act as an overall distribution hub for the entire Northeastern U.S..

Regional Supply Flows

Overall petroleum flows move into the NYH and NYS region from:

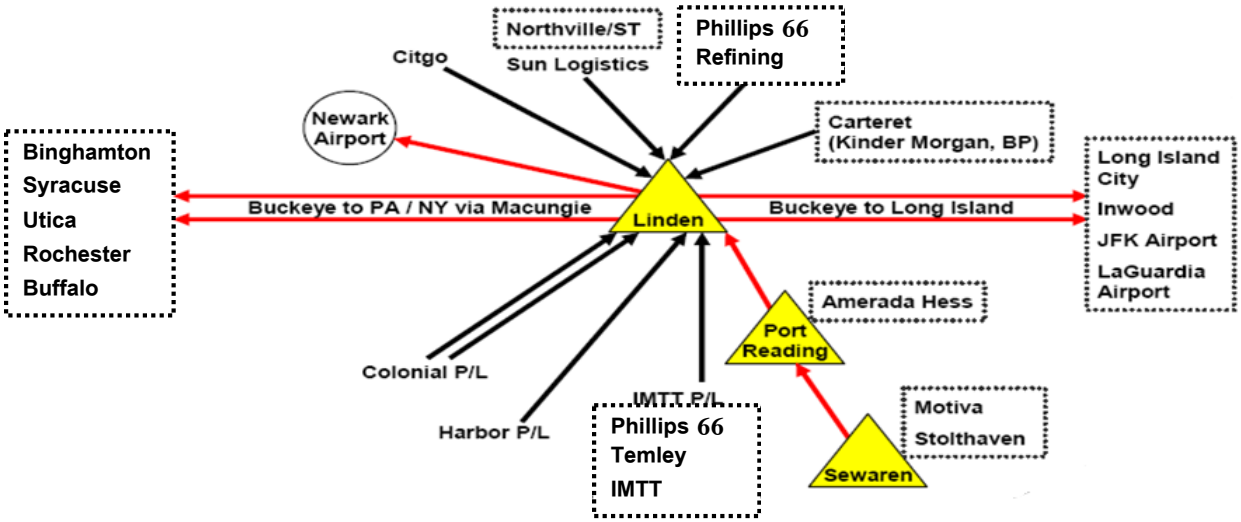
1. The Colonial pipeline, which transports product from the U.S. Gulf Coast.
2. The Buckeye pipeline, which gathers volume from the Colonial pipeline, refineries, and marine terminals and redistributes product into NYS. Buckeye supplies upstate New York through Pennsylvania, and it supplies New York City, Long Island, and JFK/LaGuardia from its pipelines stemming from their Buckeye Linden hub into Long Island.
3. Sunoco Logistics' pipelines, which carry product from Philadelphia refineries to upstate New York, Newark, and Linden.
4. Pipeline and marine movements from northern New Jersey refineries, which can feed marine terminals and hubs, as well as Buckeye's system.
5. Truck movements to western NYS from United's refinery in Warren, PA, as well as occasional Canadian product imports (United's refinery receives crude oil from Canada via the Enbridge system into West Seneca, NY, and then to United via the Kiantone pipeline).
6. Marine imports from foreign sources and from domestic markets, including Philadelphia. Crude oil into NYH (for Phillips 66's refinery) is primarily from Angola, Canada, Nigeria, and Venezuela.
7. The Enterprise Products Partners' pipeline carries propane or LPG across the southern portion of upstate New York. The product along this pipeline originates from fractionators in the upper Texas Gulf Coast.[33] This pipeline is being reversed in 2014 by Enterprise, which is planning to supply NYS from Marcellus Shale propane.

[32] About 1,000 b/d according to the EIA: EIA. "Crude Oil Production—Monthly-Thousand Barrels." Available at http://www.eia.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_m.htm

[33] Enterprise Products Partners L.P. 2011 SEC 10-K Filing. p. 31. Year ended December 31, 2011. P. 31. Available at: http://www.sec.gov/Archives/edgar/data/1061219/000106121912000006/epdform10k_123111.htm

Most of the petroleum fuels flow into northern New Jersey major distribution hubs. Products from Colonial move into a number of these hubs, including the Buckeye Linden hub and the International-Matex Tank Terminal (IMTT) in Bayonne, New Jersey. Volume from Sunoco's Harbor and East pipelines moves into the region from Philadelphia refineries. In effect, northern New Jersey is the "gathering" point for most of the volume moving into the region. These terminals are identified in Section II. There is considerable integration of these distribution terminals, and the central point is the Buckeye Linden hub. This terminal gathers volume from Colonial, Harbor, local refineries, and marine distribution terminals (including IMTT) and moves product out on the Buckeye pipeline system. The Buckeye system moves large volumes of gasoline, distillates, and jet fuel on the Buckeye East lines into Long Island, feeding airports and destination terminals supplying New York City and Long Island. Buckeye also supplies volumes to its west lines that ship product to Pennsylvania and upstate New York. Buckeye's Linden operation is depicted in Exhibit I-4 to provide some perspective on the dynamics of this market.

Exhibit I-4: Buckeye Linden Distribution Hub Supply System



Source: *Buckeye Partners, L.P. System Map. Available at: http://www.buckeye.com/Portals/0/ShipperBook/SystemMap.pdf*

Note: *Upstate NY markets were added by ICF in accordance with: Petroleum Terminal Encyclopedia. 2012 Edition. OPIS/Stalsby.*

While Buckeye provides the greatest volumes of direct supply into NYS, the Buckeye system is dependent on a host of other sources for sustained supply.

In addition to Buckeye, a significant volume of product moves into NYS markets by marine transport. Foreign imports arrive by water; however, the movement of products out from the New Jersey distribution terminals along the Arthur Kill and Kill van Kull waterways is critical to NYH regional supply and to supply terminals along the Hudson River to Albany (as well as deliveries by way of the East River to New Haven, Connecticut).

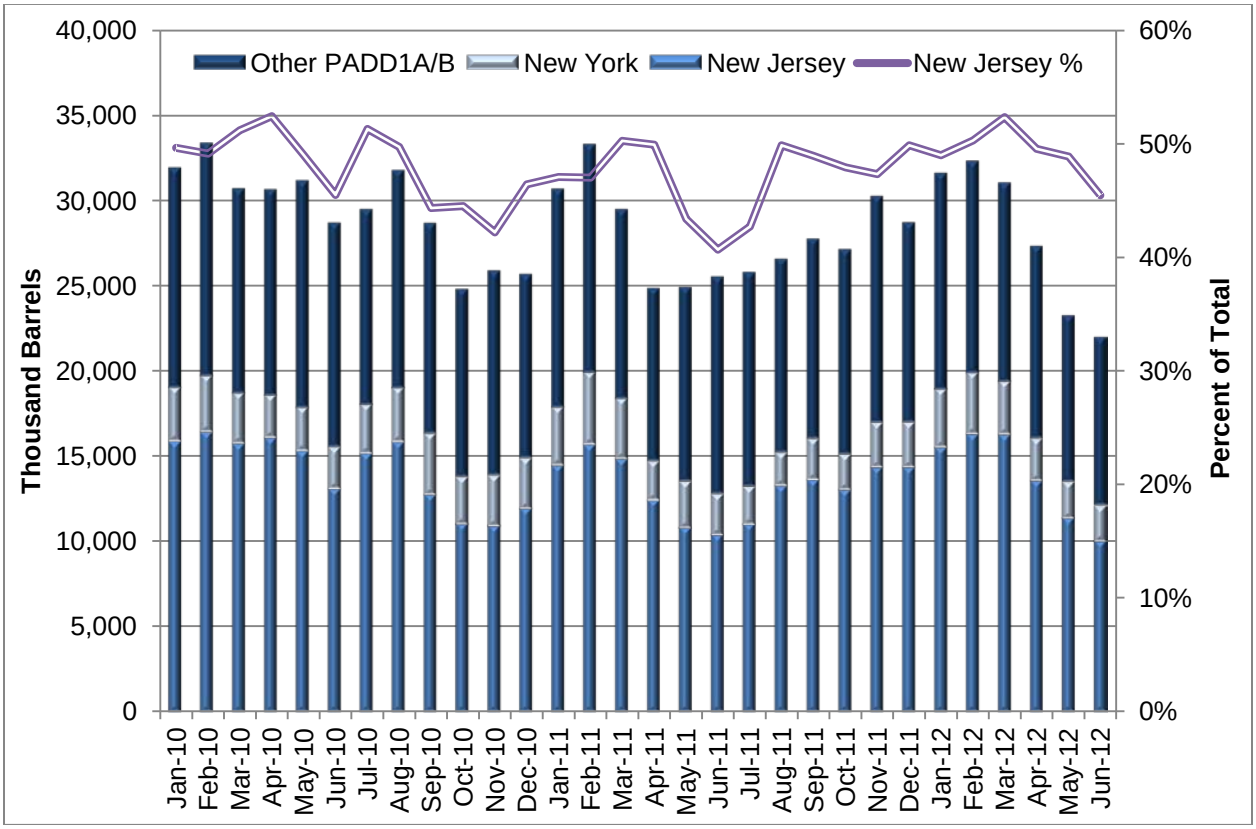
Regional Supply Storage

The supply flow into the region results in a large aggregation of product in northern New Jersey from both pipeline and marine inputs and for staging of product movements into NYS and other

states. This creates a high inventory level in the region to help cushion the impacts of temporary, short-term outages, though much of the inventory is needed to keep the required multiple grades of product moving.

Exhibit I-5 and Exhibit I-6 show the monthly inventory levels of all gasoline and distillate stocks, respectively, for Mid-Atlantic and New England States. For gasoline, New Jersey holds about 50 percent of the gasoline stocks, while New Jersey holds over 35 percent of the distillate inventory in the entire region. Nearly all this inventory is concentrated in northern New Jersey.[34] While New Jersey holds a large portion of the region's stocks, its demand for these products in the region is only about 15 percent.

Exhibit I-5: PADD 1A[35] and 1B[36] Monthly Gasoline Stocks (Mbbl)



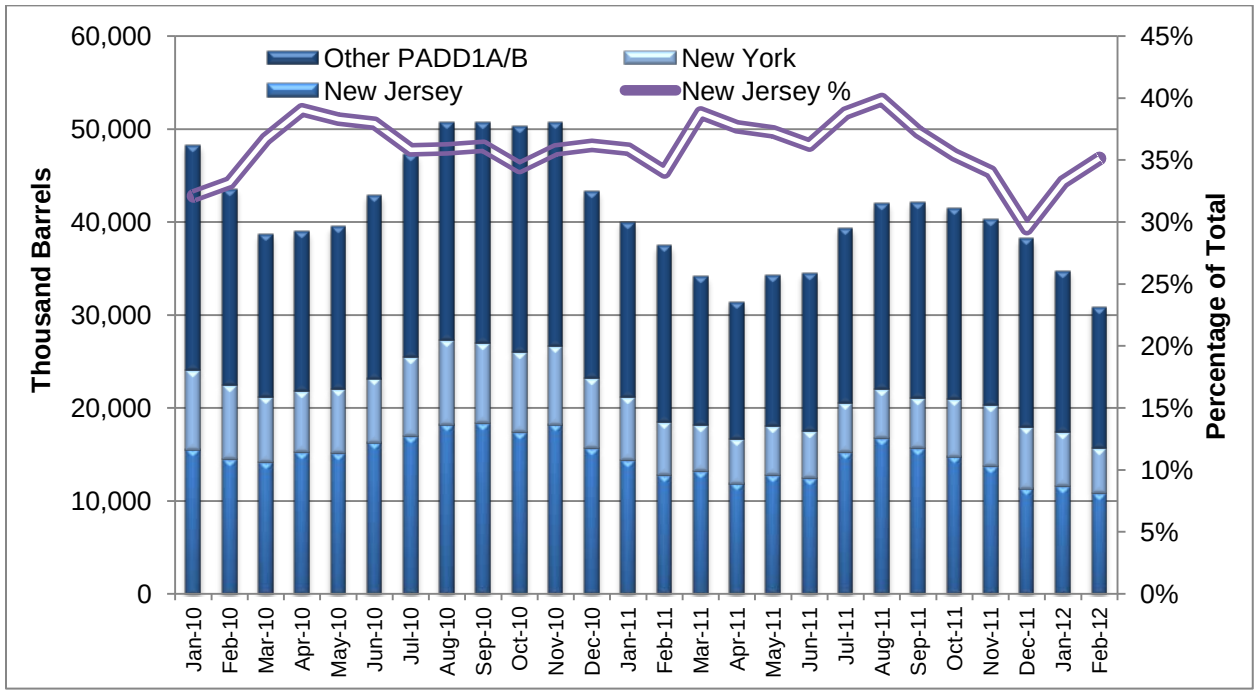
Source: EIA. Refinery, Bulk Terminal, and Natural Gas Plant Stocks by State—Distillate Fuel Oil, Annual-Thousand Barrels. Available at: http://www.eia.gov/dnav/pet/pet_stoc_st_a_EPD0_STR_mbbl_a.htm. Retrieved: September 4, 2012.

[34] U.S. Energy Information Administration (EIA). "Refinery, Bulk Terminal, and Natural Gas Plant Stocks by State—Distillate Fuel Oil, Annual-Thousand Barrels." Available at: http://www.eia.gov/dnav/pet/pet_stoc_st_a_EPD0_STR_mbbl_a.htm. Retrieved: September 4, 2012.

[35] Petroleum Administration for Defense District (PADD) 1A is classified as New England.

[36] PADD 1B is classified as the Middle Atlantic

Exhibit I-6: PADD 1A and 1B Monthly Distillate Stocks (Mbbl)



Source: U.S. Energy Information Administration. Refinery, Bulk Terminal, and Natural Gas Plant Stocks by State—Distillate Fuel Oil, Annual-Thousand Barrels. Available at: http://www.eia.gov/dnav/pet/pet_stoc_st_a_EPD0_STR_mbbl_a.htm. Retrieved: April 30, 2012.

Petroleum Imports

Foreign Imports into NYS

NYS is fully dependent on outside sources to meet the State's transportation fuel demands. Therefore, large amounts of petroleum products are shipped into the State from foreign countries via marine vessels that move product into NYH and up the Hudson River to terminals as far north as Albany. Additionally, more foreign imports are received by NYS in the western and northern portions of the State, with Canada being the sole foreign-sourced supplier to these regions.

NYH and Hudson River Imports

Foreign cargoes of petroleum products are moved into the lower and eastern portions of NYS via Long Island, NYH, and the Hudson River. Once product is imported into this area, it is either consumed locally or redirected on a variety of other supply networks to supply portions of NYS, New Jersey, Pennsylvania, and New England.

Although a large volume of petroleum products are imported into the NYS portion of NYH directly, the vast majority of these products are imported into northern New Jersey facilities, which serve as distribution points for product to move into NYS, farther into New Jersey, or west to Pennsylvania. One route for imports is to move from the marine terminals in northern New

Jersey to Buckeye's Linden, New Jersey distribution hub. From here, petroleum products can move in several directions. Outgoing lines from this distribution hub, which receives product from other sources aside from imported product, send gasoline and diesel fuel to Long Island terminals for regional supply. Jet fuel sent into this hub is rerouted east to supply the NYC regional airports, particularly JFK and LaGuardia. Lastly, movements into this hub can be shipped west to another of Buckeye's distribution centers in Macungie, Pennsylvania, which routes product north into central and western NYS, and farther west to various terminals across southern Pennsylvania.

In addition to loading product directly into Buckeye Linden, these northern New Jersey marine terminals have the ability to load back into smaller marine vessels (i.e., barges) that can more readily navigate inner-coastal waterways and supply other terminals in the NYH region and up the Hudson River.

The Hudson River corridor allows marine movements to travel north from the lower reaches of NYC and Long Island, up the eastern portion of NYS to destination terminals in Newburgh and Albany. Though this route exists for foreign marine movements, Albany is not a commonly accessed port for ocean-going vessels coming from abroad; rather, it is used more extensively as a receipt point for domestic marine shipments. Table I-8 identifies the quantities of gasoline (including gasoline blendstocks), distillate fuel oil, and jet fuel imported into these ports in 2011.

Table I-8: Foreign Imports into NYH and Albany in 2011 (Mb/d)

Port, State	Mb/d		
	Gasoline	Distillate Fuel Oil	Jet Fuel
Newark, NJ	139.4	6.6	2.2
Perth Amboy, NJ	125.3	6.7	1.3
New York, NY	17.3	2.6	1
Albany, NY	0.3	0.3	0.1

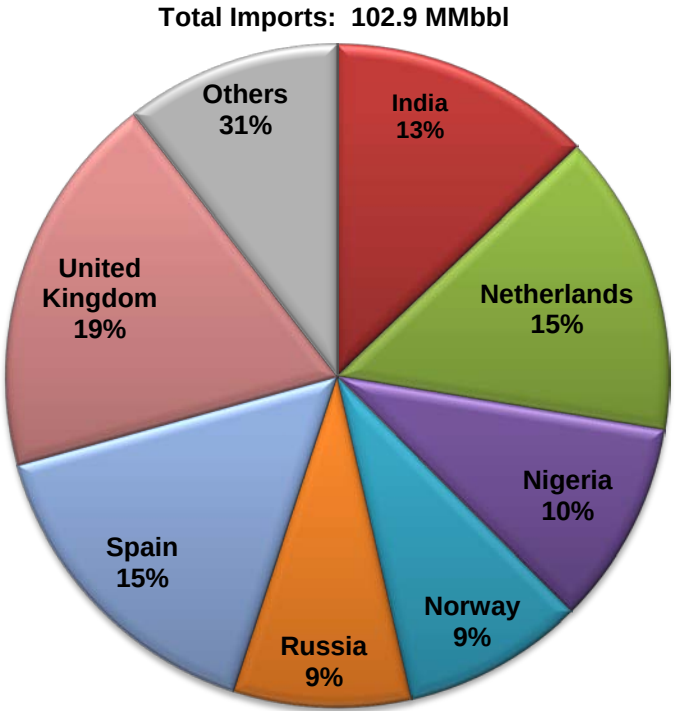
Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Note: Perth Amboy, NJ, Newark, NJ, and New York, NYS are all considered part of NYH.

Imports come from around the world to supply the integrated NYH fuels market with gasoline and distillates in order to access the high-demand markets of the northeastern United States. Gasoline imports into NYH are much more dispersed in terms of country of origin, with 36 countries spanning five continents shipping over 282,000 b/d of gasoline into the region. The vast majority of these imports are delivered into the New Jersey portion of NYH (as seen above in Table I-8). In addition to gasoline, nearly 16,000 b/d of distillate fuel oil is shipped into NYH from the Caribbean, Europe, and Canada, most of which is also delivered to New Jersey.[37] The following pie charts identify the percentage of gasoline and distillate fuel oil, respectively, imported into NYH by country of origin. Exhibit I-7 and Exhibit I-8 show gasoline and fuel oil imports by country.

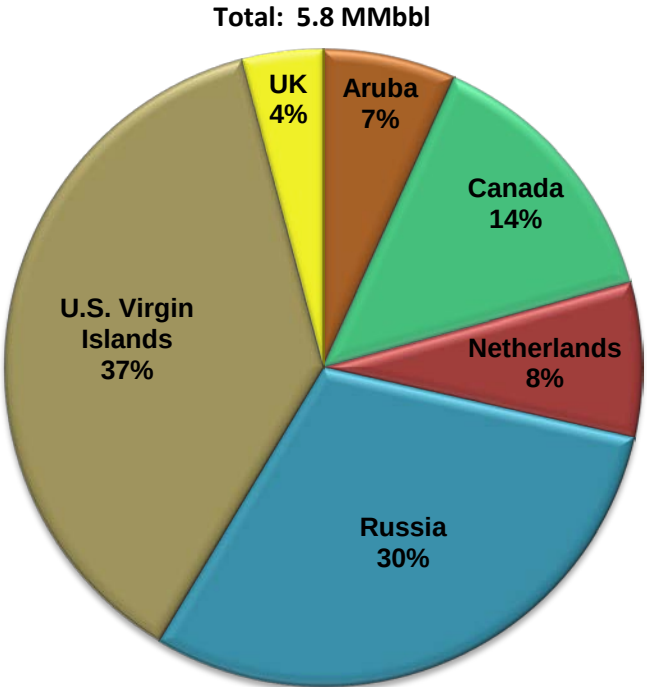
[37] EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/.

Exhibit I-7: Imports by Country of Gasoline into NYH, 2011



Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2011. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Exhibit I-8: Imports by Country of Distillate Fuel Oil into NYH, 2011



Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2011. Available at: http://www.eia.gov/petroleum/imports/companylevel/

In January 2012, Hess Oil announced the shutdown of the Hovensa refinery in St. Croix. This refinery (capacity 350,000 b/d) was a joint venture between Petróleos de Venezuela SA (PDVSA) and Hess, and provided about 160,000 b/d of imports into Florida, New England, Puerto Rico, and (to a lesser degree) the Mid-Atlantic market. Table I-9 shows imports of gasoline, distillate fuel oil, and jet fuel into the NYH and Albany ports from the U.S. Virgin Islands (Hovensa refinery) in 2011. Though the overall impact on the area is small, a large portion of imported distillates and jet fuel was sourced from this refinery in 2011. Furthermore, in addition to NYS, the other regions along the East Coast supplied by Hovensa will need to find alternative sources of product, which will put upward pressure on area product prices, including in the NYS market.

Table I-9: U.S. Virgin Islands Imports into NYH and Albany, 2011 (Mb/d)

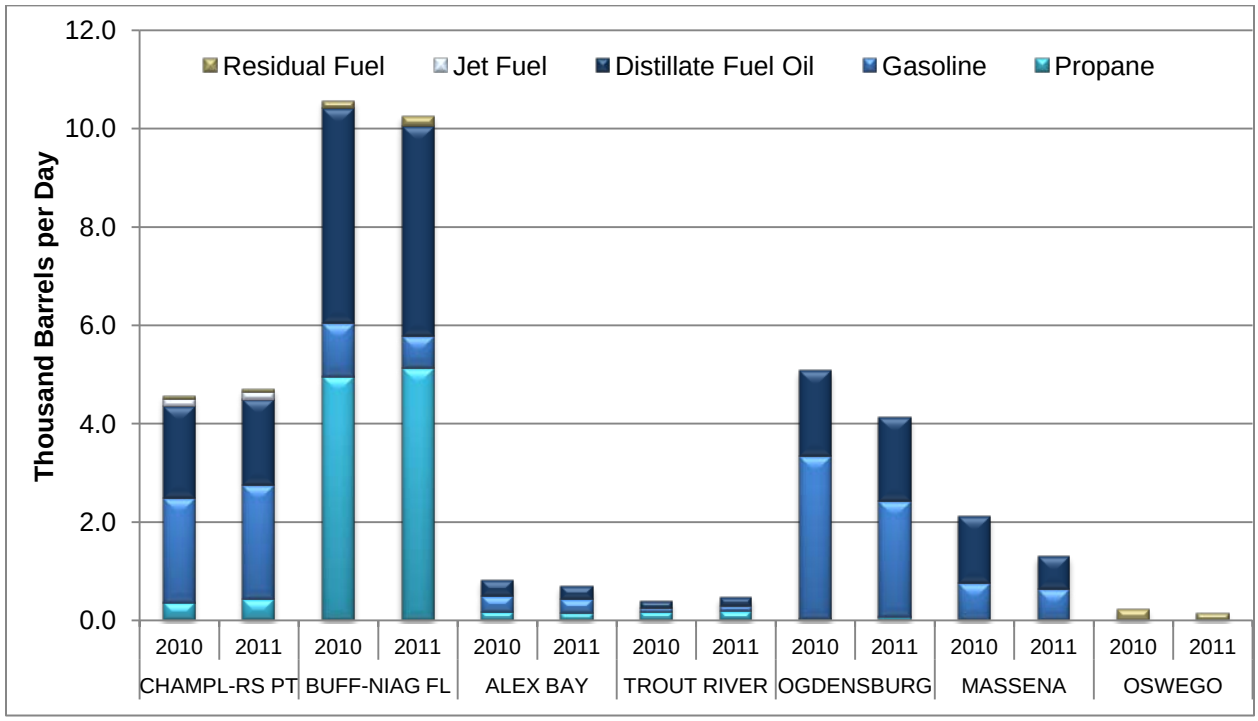
Port, State	Mb/d		
	Gasoline	Distillate Fuel Oil	Jet Fuel
Newark, NJ	0.03	1.94	0.68
Perth Amboy, NJ	1.45	2.71	0.63
New York, NY	0	1.29	0
Albany, NY	0	0.3	0.07

Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2011. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Western and Northern Imports

Virtually all the foreign imports of petroleum products into the western and northern portions of NYS originate from Canada. Compared to the import volumes moving into the downstate region, imports into the western and northern portions of the State are much smaller. Though these imports are small in comparison, their purpose is much more transparent. This region of the State does not act as a marketing and redistribution hub, so all the imports into this region are used in combination with fuels from other supply routes to meet local demands. Exhibit I-9 shows imports from Canada by port of entry and product in 2011.

Exhibit I-9: Canadian Imports to Western and Northern NYS, 2010 and 2011 (Mb/d)



Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2010-2011. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Buffalo, Champlain, and Ogdensburg receive the majority of foreign imports into this region of the State. These imports are typically consumed in the regional markets and thus are not imported for redistribution. Moreover, these volumes are used to supplement supply sources from downstate that travel north via pipelines and transport trucks.

The majority of products imported into this area are gasoline and distillates, with significant volumes of propane imports into the Buffalo region. Though gasoline is typically consumed at a higher rate than distillate fuel oil, in 2010 and 2011 more distillate fuel oil was imported into this region than gasoline. This may be caused by a number of factors. First, relatively more gasoline may be shipped from other sources so that the gross effect on the regional supply preserves this balance. Second, the agriculture industry in this portion of NYS drives the demand for diesel-driven farm equipment, including tractors and harvest equipment. Similarly, the vast majority of propane imports into this region of the State come from Canada. Propane is used as a transportation fuel, but the main driver behind its consumption in upstate New York is its use as a heating fuel and in agricultural processes, including grain drying.

Domestic Petroleum Imports into NYS

Domestic product "imported" into NYS arrives from pipelines, marine transportation, and trucks. Ethanol used for blending E10 gasoline arrives by rail, marine transportation, and truck (and is described later in this section).

The supply of petroleum fuels into NYS is effectively a two-step process. First, NYS is supplied by foreign imports, pipeline volumes from U.S. Gulf Coast refineries, Philadelphia-area refineries, and local northern New Jersey refineries. These volumes move into the Buckeye Linden hub and marine distribution hubs in NYH.

From these staging hubs, volumes are moved into NYS terminals primarily from Buckeye and Sunoco Logistics pipeline systems and marine movements from NYH distribution terminals. There are some direct foreign imports into NYS locations and also truck movements into NYS. The NYH marine hubs also supply product to Connecticut and upper New England markets.

This pattern of supply makes it very difficult to determine the specific volumes from each of the different sources into NYS (see the Data Integrity Call-Out Box at the end of this Section), in part because pipeline movements to specific destinations are generally not public information.

Pipeline Imports into NYS

The most significant supply network for petroleum products into NYS is via the inter- and intrastate pipeline systems that either directly or indirectly supply the State with transportation fuels. The pipeline networks transport product from U.S. Gulf Coast to markets in NYS, New Jersey, and Pennsylvania. These pipelines supply bulk petroleum terminals and secondary terminals (explained in greater detail in Section II of this report) for further distribution over other networks, namely transport trucks and some marine loading, and for consumption by end-users. The pipelines most relevant to the supply of petroleum products, including LPG, are introduced in the previous Supply Flows section and are presented in greater detail in Section II.

The pipelines directly supplying petroleum products into NYS are the Buckeye system (to New York City and Long Island as well as upstate New York) and the Sunoco Logistics system supplying product to upstate New York. Generally speaking, pipelines are the primary supply for DEC regions 6 through 9, while marine transport is the primary supply for DEC regions 3, 4, and 5. DEC regions 1 and 2 are supplied by both pipeline and marine transport.

Marine Movements into NYS

Domestic marine shipments of petroleum products into NYS are essentially all coming from the major terminals that receive foreign imports and domestic refinery production in the northern New Jersey region. These terminals receive primarily blendstocks, gasoline, and distillates from foreign sources as well as refinery production from local, Philadelphia-area, and U.S. Gulf Coast refineries. Parties that hold product in these terminals can use the blendstocks to produce reformulated blendstock for oxygenate blending (RBOB) or conventional blendstock for oxygenate blending (CBOB) grades for marine or pipeline shipments into NYS.[38] Domestic

[38] Gasoline blendstocks are unfinished gasoline components that require further blending with other gasoline components to meet pipeline shipment specifications as RBOB/CBOB or conventional gasoline. RBOB and CBOB are gasoline blending components produced by refineries that are later blended with other components (e.g., various additives, ethanol) to formulate gasoline that meets certain octane and performance standards for consumption in motor vehicles. For example, RBOB and CBOB are blended at the terminal with 10 percent ethanol to deliver 87 octane unleaded into the delivery truck. RBOB is consumed largely in the downstate market and CBOB is consumed in the upstate market due to gasoline regulations.

marine movements into NYS are typically loaded into terminals on Long Island and in New York City, and up the Hudson to Albany and other terminals.

On Long Island, product is delivered by marine vessel to Port Jefferson along the Long Island Sound, where product is offloaded directly into the 12-mile Northville pipeline system for delivery to two inland terminals in central Long Island. Product is also directed to southern Long Island, where several marine receiving terminals reside for redistribution. Lastly, Phillips 66's 4.7 million-barrel facility in Riverhead is supplied solely by foreign and domestic marine shipments.

Truck Movements into NYS

Domestic imports of petroleum products via truck are an important aspect of the supply chain. Trucks that load product from terminals in northern New Jersey move products into the downstate region of NYS. According to the Freight Analysis Framework (FAF), which was established by the Center for Transportation Analysis, an estimated 5,600 b/d of gasoline and over 19,000 b/d of diesel fuel are trucked into NYS from New Jersey. Similarly, trucks move about 22,000 b/d of gasoline and 9,000 b/d of diesel fuel from Pennsylvania, much of which is contributed by the United Refinery moving product into western NYS.[39]

At the same time, truck movements out of NYS are estimated from the FAF system as noted in Table I-10. These volumes nearly offset the truck movements into NYS.

Table I-10: 2010 Truck Movements from NYS (b/d)

Truck from NYS To:	Barrels per Day (b/d)	
	Gasoline	Fuel Oils
Vermont	17,400	10,200
Massachusetts	N/A	11,300
New Hampshire	4,600	100
New Jersey	4,000	2,300
Connecticut	500	2,800

Source: U.S. Department of Transportation, Federal Highway Administration. "Freight Analysis Framework Data Extraction Tool." 2011. Available at: http://faf.ornl.gov/fafweb/Extraction1.aspx

Rail Movements into NYS

The domestic movements of petroleum products via rail systems into NYS are limited. According to industry sources, about 8,000 b/d of gasoline is exiting the State via rail, while no barrels are imported. Meanwhile, distillate movements into the State according to the same source are estimated to be about 1,000 b/d with slightly less leaving the State via rail. This scenario is somewhat corroborated by FAF, though FAF reports that nearly 17,000 b/d of gasoline is leaving the State in the form of domestic rail exports. Propane is another fuel that is showing growth in railcar movements. Though the information is somewhat variable, the main point is that the rail supply into and out of the State is not critical to NYS consumers, except in

[39] U.S. Department of Transportation, Federal Highway Administration. "Freight Analysis Framework Data Extraction Tool." 2011. Available at: http://faf.ornl.gov/fafweb/Extraction1.aspx

the case of ethanol, which is transported to NYS primarily via rail from Midwestern producers, which is discussed in the biofuels section.

Trade reports have indicated that beginning in late 2011 unit train movements of Bakken crude from North Dakota were received at Global Partners' Albany terminal and transported by barge to refiners in the NYH and Philadelphia region. It is likely that these movements will continue as long as Bakken region crude oil continues to be heavily discounted. This discount allows East Coast refiners to purchase Bakken at prices well under the imported Nigerian price.[40]

Marine Product Movements

Table I-11 illustrates 2009 and 2010 domestic marine movements of petroleum products discharging in the U.S. Northeast by state. These movements include clean petroleum products (e.g., diesel, gasoline, gasoline blendstock, naphtha, jet fuel, ethanol, biodiesel) and dirty petroleum product (e.g., heavy fuel oil). Petroleum products moving to the U.S. Northeast were sourced from the U.S. Northeast, as well as from Georgia, Kentucky, Louisiana, Texas, and West Virginia.

[40] Clark, Aaron; and Bradley Olson. "Global Partners Boosts Bakken Shipments to Eastern Refiners." Bloomberg Business Week, 18 April 2012: Washington, D.C. Available at: http://www.businessweek.com/news/2012-04-18/global-partners-boosts-bakken-shipments-to-eastern-refiners

Table I-11: Domestic Marine Movements of Petroleum Products to U.S. Northeastern States (Mbbl)

Origin	Year	Destination (Mbbl)											
		Connecticut	Massachusetts	New Jersey	New York	Rhode Island	Delaware	Pennsylvania	Virginia	Maine	Maryland	New Hampshire	Total
Connecticut	2010	1,256	503	516	666	684							3,626
	2009	1,295	286	608	727								2,916
Delaware	2010			2,474	768		166	423	438				4,269
	2009		438	6,133	1,221		992	1,164					9,948
Georgia	2010												-
	2009			819									819
Kentucky	2010							322					322
	2009												-
Louisiana	2010			1,492	459			1,568					3,520
	2009			2,362	534			1,502					4,397
Maine	2010									1,186			1,186
	2009												-
Maryland	2010			2,809	907				1,220		2,384		7,320
	2009			3,979	445			611	198		1,603		6,836
Massachusetts	2010		1,346			300				142			1,788
	2009		1,015										1,015
New Jersey	2010	42,662	13,585	68,060	85,366	13,126	7,127	4,876	3,949	6,844	5,999	2,651	254,244
	2009	39,183	15,984	78,592	97,540	16,591	5,044	13,131	6,490	5,560	5,380	2,873	286,728
New York	2010	3,577	1,429	23,553	16,041	659	640		361	801	533		47,593
	2009	3,347	1,720	27,825	13,842	855	912	1,287	208	1,417			51,413
Pennsylvania	2010	733		24,079	7,446		3,820	14,897			4,046		55,021
	2009		475	29,099	6,521		2,564	14,968	1,212		2,398		57,236
Rhode Island	2010		98			241							339
	2009					291							291
Virginia	2010		1,287	2,440	1,358					10,165		5,694	
	2009	486	1,867	3,375	1,072	872	1,085			12,819		6,211	
Texas	2010			2,193					234	712		283	
	2009			3,838					649	618			

Origin (cont.)	Year	Destination (Mbbl)											
		Connecticut	Massachusetts	New Jersey	New York	Rhode Island	Delaware	Pennsylvania	Virginia	Maine	Maryland	New Hampshire	Total
West Virginia	2010								1,233				
	2009								473				
Total	**2010**	**48,228**	**18,249**	**127,616**	**113,012**	**15,009**	**11,752**	**23,554**	**16,845**	**8,972**	**18,938**	**2,651**	**404,828**
	2009	**44,311**	**21,785**	**156,630**	**121,900**	**18,968**	**10,599**	**33,786**	**21,144**	**6,977**	**15,591**	**2,873**	**454,565**
% of Total	***2010***	***12%***	***5%***	***32%***	***28%***	***4%***	***3%***	***6%***	***4%***	***2%***	***5%***	***1%***	***100%***
	2009	***10%***	***5%***	***34%***	***27%***	***4%***	***2%***	***7%***	***5%***	***2%***	***3%***	***1%***	***100%***

Source: U.S. Army Corps of Engineers

Note: U.S. Army Corps of Engineers uses short tons as commodity units. To convert to barrels from short tons, a factor of 7.36 was used.

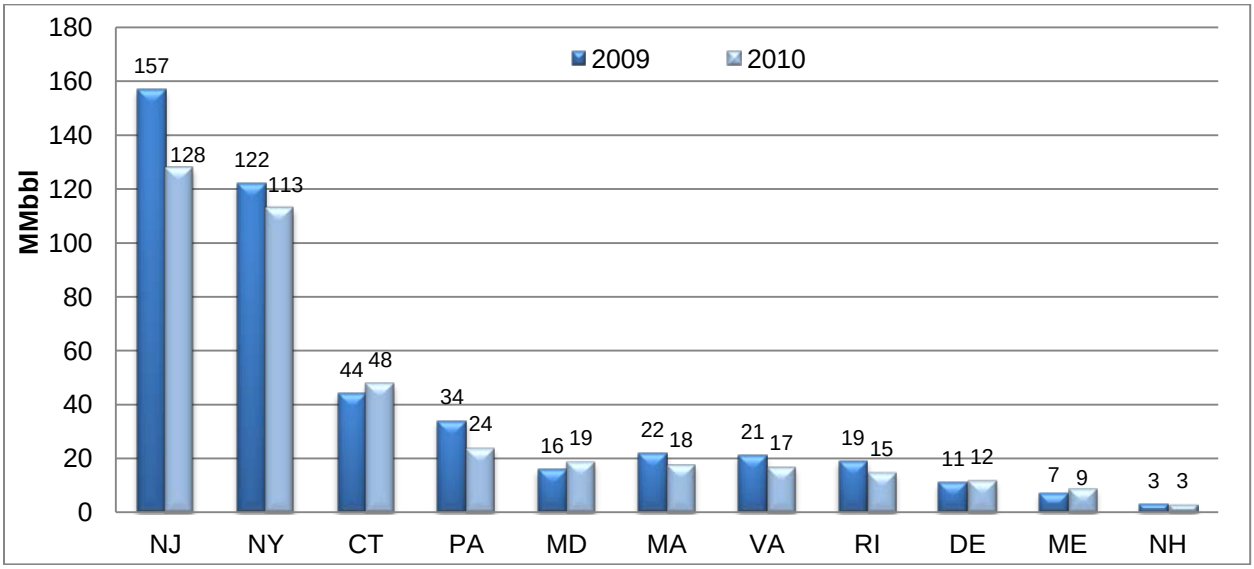
In 2010, 405 MMbbl of domestic petroleum products moved on marine routes along the U.S. Northeast. Of these movements, 63 percent (254 MMbbl) originated from New Jersey. Of these 2010 petroleum product movements, New Jersey was the most active, with 254.2 MMbbl being loaded. While 68.1 MMbbl of this volume remained within New Jersey (27%), the rest (186.1 MMbbl) traveled to other states in the Northeast. NYS was the greatest recipient of these barrels at 85.4 MMbbl (46%), while Connecticut placed second with 42.7 MMbbl (23%) received from the Garden State. While New Jersey received 127.7 MMbbl in 2010, some 68.1 MMbbl (53%) represented intrastate movements.

NYS ranked third in Northeast loadings of petroleum products (behind Pennsylvania's 55 MMbbl) with 47.6 MMbbl. Intra-NYS movements totaled 16 MMbbl (34%). Of the 31.6 MMbbl sent out of NYS in 2010, 23.6 MMbbl (75%) went to New Jersey. NYS ranked second (behind New Jersey) at 113 MMbbl of petroleum product receipts. When the 16 MMbbl of intra-NYS product movements are removed, however, the net level of inflows amounted to 97 MMbbl. New Jersey was the source of 85.4 MMbbl (88%) of NYS' net receipts, while Pennsylvania was a distant second with only 7.4 MMbbl (8%).

The active annual turnover of petroleum products transfers between New Jersey and NYS (85.4 MMbbl transferring from New Jersey to NYS, versus 23.6 MMbbl transferring from NYS to New Jersey) underscores the role of the NYH's numerous terminaling and blending assets. For comparison, East Coast imports of gasoline, kerosene, and diesel stocks during 2010 amounted to 363.5 MMbbl.

Of the 2010's 404.8 MMbbl of petroleum product movement to northeastern states, only 6.9 MMbbl (1.7%) came from Louisiana and Texas in 2010. As illustrated in Exhibit I-10**, NYS and New Jersey were the destinations of the bulk of the domestic petroleum products marine shipments discharging in the U.S. Northeast.**

Exhibit I-10: Domestic Marine Petroleum Product Movements to the U.S. Northeast (MMbbl)

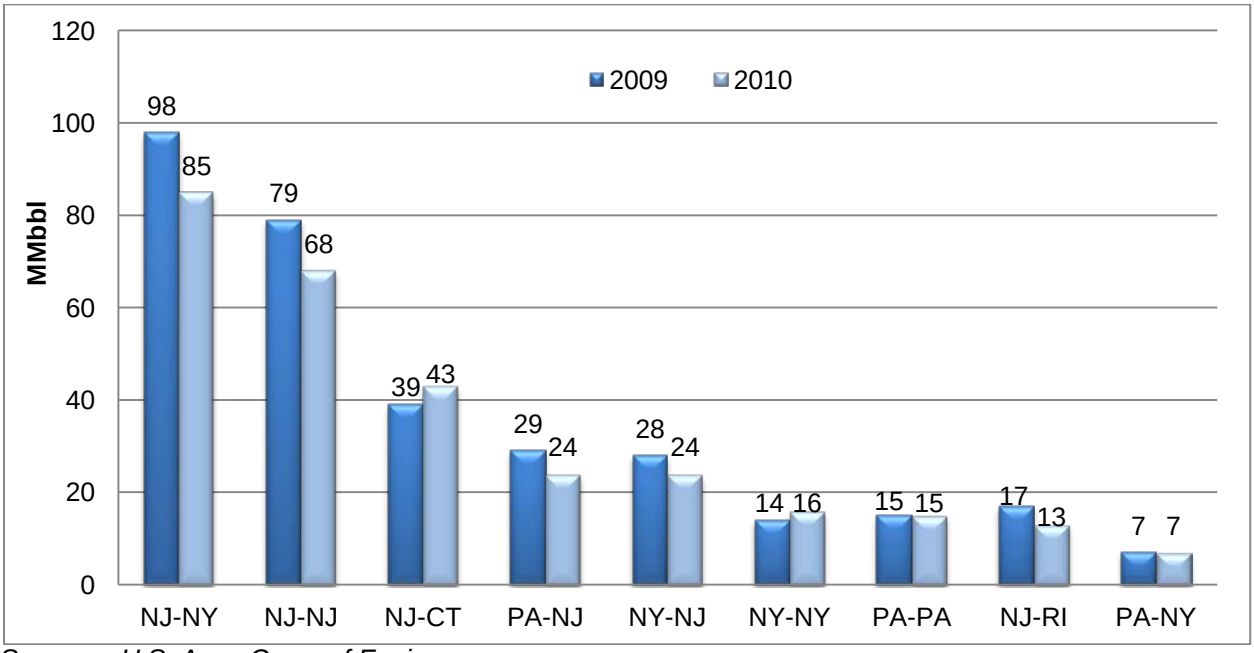


Source: *U.S. Army Corps of Engineers*

Note: *U.S. Army Corps of Engineers uses short tons as commodity units. To convert to barrels from short tons, a factor of 7.36 was used.*

Exhibit I-11 shows the top domestic marine movement routes within the U.S. Northeast.

Exhibit I-11: Top Domestic U.S. Northeast Inter-State Marine Petrol Product Movements (MMbbl)



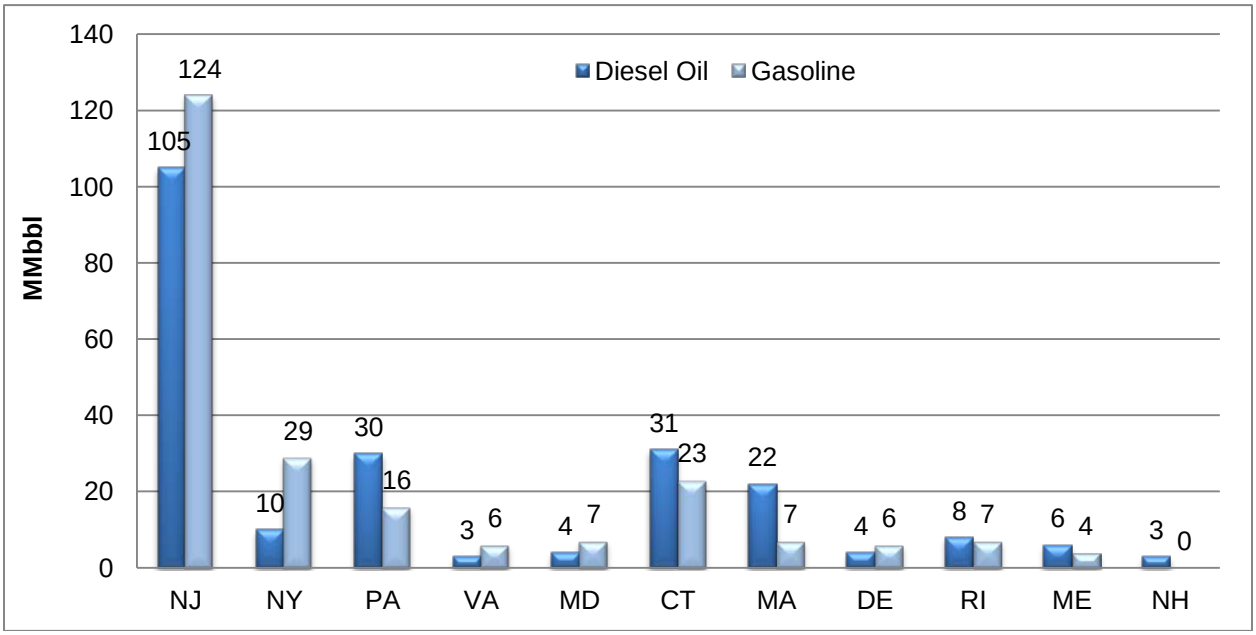
Source: *U.S. Army Corps of Engineers.*

Note: *U.S. Army Corps of Engineers uses short tons as commodity units. To convert to barrels from short tons, a factor of 7.36 was used.*

As shown in Exhibit I-12, northeastern states' domestic marine diesel and gasoline throughput (the sum of shipments in and out of a state) on 2010 was 404.8 MMbbl. New Jersey's 186.1 MMbbl of petroleum product net loadings represents 46 percent of this regional throughput, while the State's net receipts of 59.5 MMbbl represent 15 percent. For NYS, diesel and gasoline domestic marine shipments share of regional throughput was 6 percent of net loadings and 24 percent of net receipts. Diesel and gasoline domestic marine shipments share of regional throughput was 10 percent of the State's net loadings and 2 percent of its net receipts.

NYH (particularly oil storage terminals on the New Jersey side) is a major loading and discharge location for domestic marine shipments of diesel and gasoline in the U.S. Northeast. Of New Jersey's 105 MMbbl of diesel oil marine throughput, an estimated 16 MMbbl loaded in New Jersey for marine movement to another U.S. port. The reminder is discharged in New Jersey either to customers or into Buckeye pipeline for shipments to NYS or Pennsylvania. Of New Jersey's 124 MMbbl of gasoline marine throughput, an estimated 38 MMbbl loaded in New Jersey for marine movement to another U.S. port. The reminder is discharged in New Jersey (similar to diesel).

Exhibit I-12: 2010 Diesel and Gasoline Domestic Waterborne Throughput Movements by U.S. Northeastern State (MMbbl)



Source: *U.S. Army Corps of Engineers.*

Note: *U.S. Army Corps of Engineers uses short tons as commodity units. To convert diesel from short tons into barrels, a factor of 6.8 was used. To convert gasoline from short tons into barrels, a factor of 7.7 was used.*

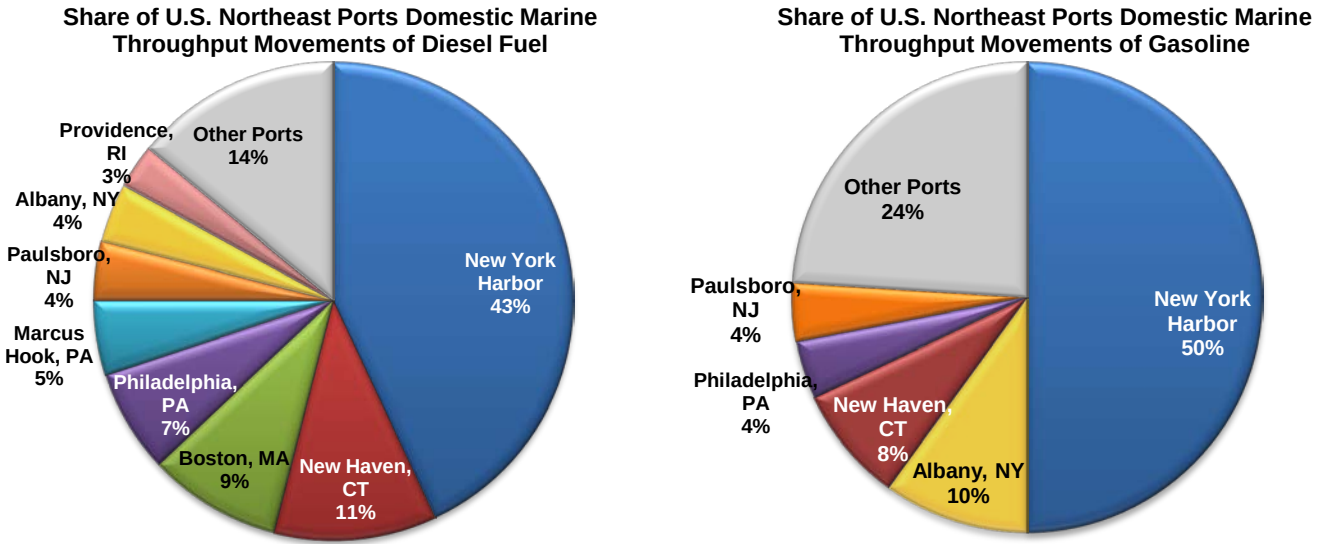
Northeast Port Throughputs

The bulk of domestic waterborne shipments of the gasoline, gasoline blendstocks and diesel originate from the refineries in Paulsboro, Philadelphia, and Linden. Domestic waterborne shipments of clean petroleum product varies year on year based on:

- Product demand in the U.S. Northeast
- Product availability from local refineries
- Trade arbitrage from foreign countries
- Barge, rail and truck shipping economics

Exhibit I-13 illustrates the share of U.S. northeastern ports by domestic diesel and gasoline shipments throughput. NYH accounts for 43 percent of domestic diesel shipments and 50 percent of domestic gasoline movements in the Northeast.

Exhibit I-13: Share of U.S. Northeastern Ports by Domestic Diesel and Gasoline Shipments Throughput



Source: U.S. Army Corps of Engineers.

Discharge Ports from NYH

Shipments of gasoline from NYH moved within the harbor, as well as to a number of ports in the U.S. Northeast. The major discharge ports include Albany, Baltimore, Boston, Bridgeport, Delaware City, New Haven, Paulsboro, Philadelphia, Portland, Providence and Wilmington.

Petroleum Market and Pricing Issues

The NYH petroleum market is the major hub for petroleum products on the entire East Coast. The petroleum supply chain involves numerous parties and financial transactions. A definition and a brief description of all the market players can be found in Appendix A. The following section discusses the various pricing issues that emerge along the supply chain.

Petroleum Market Pricing Points

The petroleum supply chain from crude oil to refinery product to terminal rack to service station to consumer involves a number of transfers from sellers to buyers. The basis for these transactions involves several pricing points that form the structure of the specific trades or purchase terms of transactions. These pricing points include:

1. **Futures market:** The New York Mercantile Exchange (NYMEX) futures market is a mechanism where buyers and sellers of crude oil, gasoline, and distillate can negotiate transactions in a transparent commodity market. The futures market is available to any credit worthy entity, including financial institutions, speculators, and others who may have nothing to do with the petroleum industry. However, the futures market reflects the collaborative view of participants on the price of crude oil and petroleum products at any

given current time as well as in the future. The NYMEX futures market reflects those views based on the location of the futures "delivery point."[41]

Similar to petroleum futures on the NYMEX, the Chicago Board of Trade (CBOT), is a futures and options exchange. Movements in the ethanol futures markets occur, as most commodity markets, from perceptions in supply and demand as well as speculation. For example, the 2012 summer drought drove up both corn and ethanol futures as the marketplace was concerned about future supply. Generally, the ethanol market price in NY is about 10 cpg higher than CBOT prices, which approximates rail costs into NY on unit trains

2. **Spot Market:** Spot market prices are wholesale prices determined based on bulk sales transactions between buyers and sellers of crude oil or petroleum products.[42] The "spot market" pricing is also used as a general benchmark for where petroleum prices are in a given market, for example: NYS, Chicago, the Gulf Coast, etc.

   Spot market prices are also used as a yardstick to measure the performance of the refining business versus the marketing business. For example, a refinery can measure its performance by estimating their profits assuming all production is sold at the spot market from the refinery "gate". Similarly, a distributor or wholesale supplier could buy product at the spot market, ship to terminals and sell product at the terminal. The terminal "rack" price (next definition) minus the spot market price and transport costs provides a measure of profitability of the wholesale supplier.

   So, what is a spot market sale? As an example, Company B may need 25 Mbbl of RBOB gasoline blendstock at a terminal in Newburgh, NY to meet planned customer demands. Company A may sell 25 Mbbl of RBOB gasoline to Company B at a terminal such as Kinder Morgan Carteret, New Jersey. Company B would then arrange barge transport to ship the newly purchased RBOB gasoline from Carteret to Newburgh where it would be offloaded into storage tanks for sales to Company B's distributors or dealer network.

   Nearly all petroleum transactions take place at some differential to NYMEX prices, regardless of location. The absolute price of the transaction is based on how the commodity's future price is trending up or down based on global market perceptions. Since oil companies do not control where the NYMEX futures prices may go, their transactions are usually hedged with futures contracts to

Spot Sales Transactions

The spot sales transaction would be agreed between the two parties based on some market "basis differential" above or below the NYMEX futures price. For transactions in NYS (the location of the RBOB NYMEX futures contract delivery point), generally the transaction would be at a premium to the NYMEX futures contract price if short-term RBOB supply was tight (hard to find); conversely, it could be at a discount if supply was plentiful.

[41] NYMEX futures delivery points are Cushing, Oklahoma for West Texas Intermediate crude oil; New York Harbor for No. 2 fuel oil and RBOB gasoline, which is blended with 10-percent ethanol in terminals for shipment to areas requiring reformulated gasoline supply, such as downstate NYS.

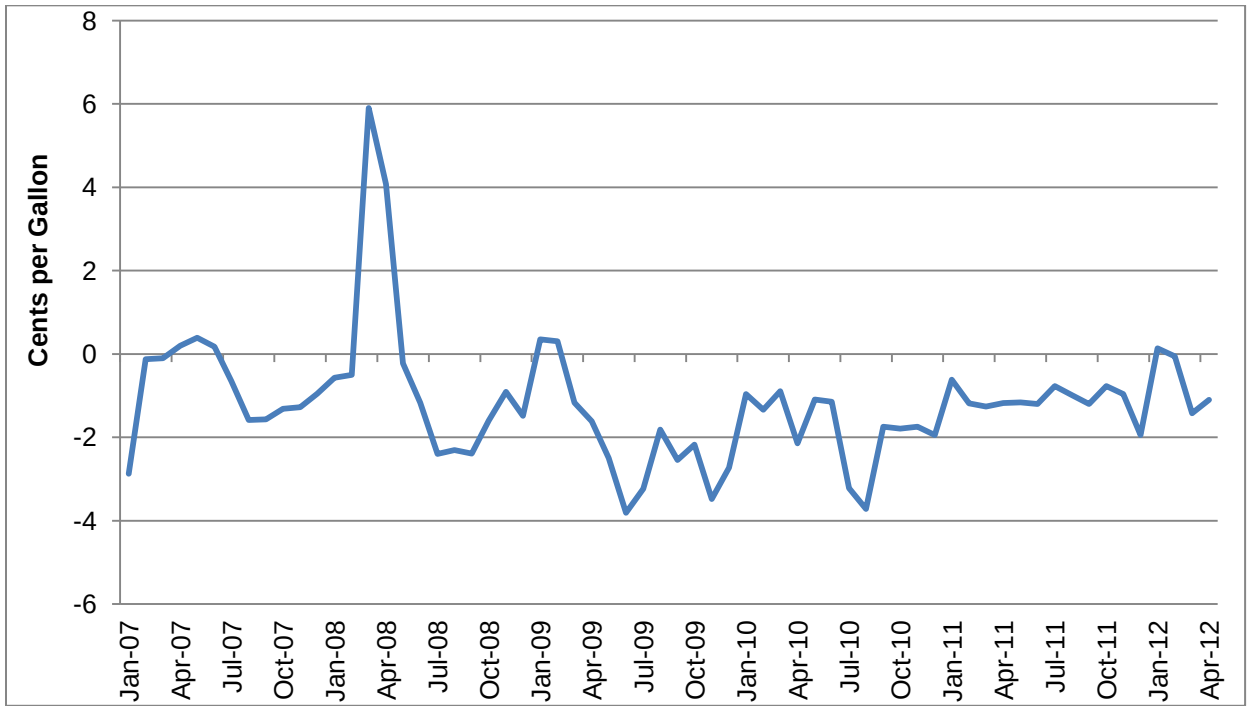
[42] Bulk sales would include sales of 10 Mbbl or more that are transacted into pipelines, barges, ships, or tanks.

protect sellers against market price increases and buyers against market price declines.

The location of the transaction is important. In NYS, where the futures delivery point for RBOB and No. 2 fuel oil is NYH, the spot price is generally close to the futures price. However, in Chicago, the spot price can vary significantly from the NYMEX futures price since local supply and demand in Chicago can be influenced by a number of factors not related to the NYS market.

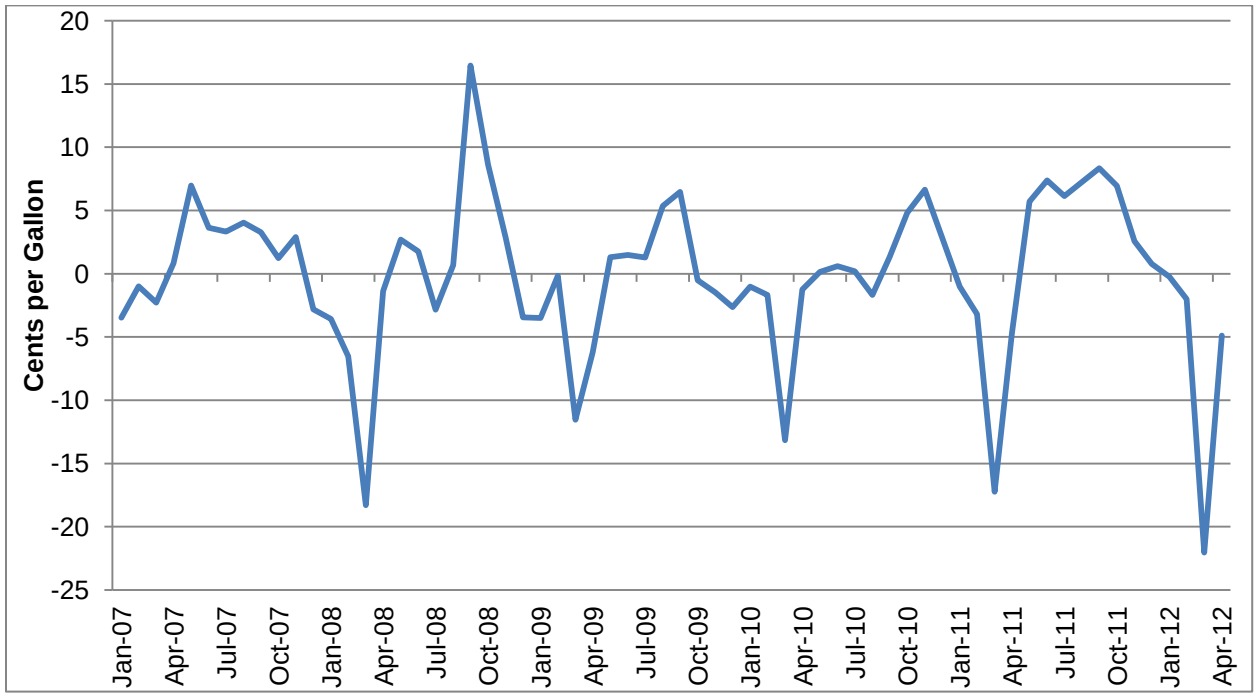
Exhibit I-14 and Exhibit I-15 show the relationship between No. 2 fuel spot price in NYH and NYMEX No. 2 futures, and RBOB spot in NYH versus NYMEX RBOB futures. Exhibit I-14 shows that in the past five years, the spot market price of No. 2 fuel has typically been $0.01-$0.02/gallon under the NYMEX futures price. This generally indicates adequate to surplus supply availability in the region. In March 2008, there was a definite spike in the spot market most likely due to a short-term supply deficiency at the end of the heating oil season. This period involved a major winter ice storm in NYS and the NYS region on March 8-9 which may have contributed to this spike.

Exhibit I-14: No. 2 Fuel Spot Price versus No. 2 NYMEX, 2009-2011 (CPG)



Source: Bloomberg No. 2 Heating Oil Spot Price (ticker symbol: NO2INYPR Index). Bloomberg Heating Oil NYMEX Price (ticker symbol: HO1 COMB Comdty).

Exhibit I-15: RBOB Spot Price versus RBOB NYMEX, 2009-2011 (CPG)



Source: Bloomberg RBOB NYH Spot Price (ticker symbol: RBOB87PM Index). Bloomberg Gasoline NYMEX Price (ticker symbol: XB1 COMB Comdty).

In Exhibit I-15, the RBOB spot versus NYMEX price chart shows that overall prices appear about equal to NYMEX, although there are specific regular declines in the spot price versus NYMEX every March. The reason for this is that March NYMEX futures represent April delivery in NYH. April gasoline sales in NYS, and the NYMEX delivery product are lower vapor pressure gasoline than in March. However, the March spot market price typically reflects RBOB gasoline delivered within one to three days of the transaction. Since many suppliers and refiners need to "liquidate" higher vapor pressure gasoline in March to meet lower EPA vapor specifications in the future month, the spot price for RBOB plunges versus NYMEX.

The RBOB spot price spikes reflect periods of short-term supply shortages. For example, the spike in 2008 followed Hurricanes Ike and Gustav, which curtailed Colonial Pipeline supply into the region due to Gulf Coast refinery problems.

3. **Rack Prices:** Rack prices are the prices charged by wholesale suppliers to distributors and other customers who purchase petroleum products by truck at terminal loading racks. Rack sales are wholesale in nature because the purchaser (in most cases) re-sells the product to service station dealers or end users (for example, commercial accounts, etc.).

   Table I-12 shows a typical listing of rack prices for 87-octane gasoline at Rochester (provided by the Oil Price Information Service or OPIS). There are a large number of suppliers who sell gasoline at the Rochester rack, although this is very typical of any terminal. The rack sellers own product in the terminal that they have either shipped to

the terminal or have rights to product due to purchases or exchange agreements with other suppliers.

Table I-12: Rochester Rack Prices for 87-Octane Gasoline

Company	Branding*	Terms	Unl	Move
Phillips 66	U	N-10	312	+4
S.R.&M.	U	1-10	312.1	+2
Global	U	1-10	315.3	+3.66
Hess	U	1-10	315.6	-3.5
Coastal	B	1-10	315.87	+0.78
Sunoco	B	1-10	316.12	+0.78
Valero	B	1-10	316.25	+0.95
XOM	B	1-10	316.8	+1.85
Citgo	B	1-10	317.1	+1
Gulf	B	1-10	317.65	+6
Valero	U	N-10	319.15	+4.3
Buckeye	U	1-10	334.8	+4

Source: Gasoline Rack Pricing. Oil Price Information Service (OPIS).

** Branded: B; Unbranded: U*

The suppliers can sell product either on a branded or unbranded basis. Distributors who purchase branded product sell the product at their own branded service stations. ("Branded" means that the gasoline loaded in the truck will have proprietary additives from the supplier. For example, service stations that fly the Shell flag, regardless of ownership, are obligated to purchase Shell branded gasoline, which means the gasoline contains Shell additives, and in turn Shell is obligated to meet all the gasoline needs of the service stations.) Suppliers can also sell on an "unbranded" basis where the distributor can re-sell the gasoline without proprietary additives to other stations (local dealers who may sell gasoline as "Quick-Mart" or other "Mom and Pop" service stations). Unbranded rack prices are typically at a slight discount to branded.

Major suppliers can sell both branded and unbranded at the same terminal. This is done to manage the supplier's overall supply. For example, branded station demands may be fairly stable, and any surplus supply that could be sold unbranded at a profit (unbranded rack minus the cost to purchase and deliver product to the terminal) enables the supplier to sell the excess inventory and earn a profit. Conversely, if supply disruptions reduce available supply, the supplier may increase pricing to unbranded customers to levels higher than branded to reduce demands and preserve inventory for branded customers, whom they typically have a long-term agreement with.

The diversity in rack prices shown in Table I-12 above reflects both the differences in "branded" (b) and "unbranded" (u) prices, and the different pricing strategies of the suppliers in the market. The unbranded suppliers with very high prices may not have available surplus product to sell and are using price to limit sales to control inventory. The "Move" column shows the change in pricing from the prior day. Generally, if NYMEX futures prices change by a penny a gallon, most rack prices will move a similar amount, although differences will occur as clearly seen in Table I-12 above.

Selling product at rack prices generates a wholesale profit. A supplier could purchase product at the Buckeye Linden hub and ship the product (in this case CBOB) on Buckeye pipeline to Rochester for sale at the Rochester terminal rack. At the market on April 27, the delivered cost of the CBOB in Rochester was $3.082/gallon, which meant that suppliers earned a profit on rack sales ranging from $0.04-$0.11/gallon, depending on each supplier's price. Many suppliers will provide discounts of several cents to branded customers based on market conditions. This complicates the wholesale profit analysis, but in general the profit levels on rack sales are relatively narrow.

4. **DTW (Dealer Tankwagon Prices):** DTW prices are the prices that suppliers and/or distributors charge service station dealers for product delivered into their service station by the suppliers' (or distributors) owned or leased trucks.

These are the primary price points that are monitored and used by the petroleum industry to assess market conditions, conduct transactions and drive business performance. There are many, many separate spot market price points based on different grades of product and different locations. The next section discusses several pricing areas key to NYS.

Market Pricing Impacting NYS

Petroleum prices impacting NYS include the primary prices that drive global petroleum market price levels, including key global crude and product prices and NYMEX prices used by a number of different parties for hedging, investing, and speculating. Exhibit I-16 shows spot market prices from 2007 through 2011 for West Texas Intermediate (WTI) crude and Brent[43] crude, and also tracks the differential between these two similar crude oils.

Crude Prices

Global crude prices are driven by a number of factors. Primary among these are the following:

- Global demand for crude oil, which has been very strong in Asia. China, India, and Middle East countries are building refineries to meet growing demand for products as well as export purposes.
- Perception of OPEC "spare capacity." With global crude demands at about 87 million barrels per day, according to the EIA, the amount of additional capacity that Saudi Arabia has is a key factor. Potential loss of supply from Iran due to international sanctions, for example, keeps upward pressure on price because it is unclear how much the Saudis could increase supply by to compensate for this supply loss. If "surplus" capacity falls below 2 percent, that is a razor thin cushion, and prices will reflect this market uncertainty.
- "Fear Factor." When global crises occur that threaten reliable supply, especially in the Middle East, parties who require crude oil for their business (refiners) will tend to buy futures to cover their financial exposure if the crisis results in a supply curtailment; speculators will buy crude futures at the same time as a financial opportunity. Both put upward pressure on price.

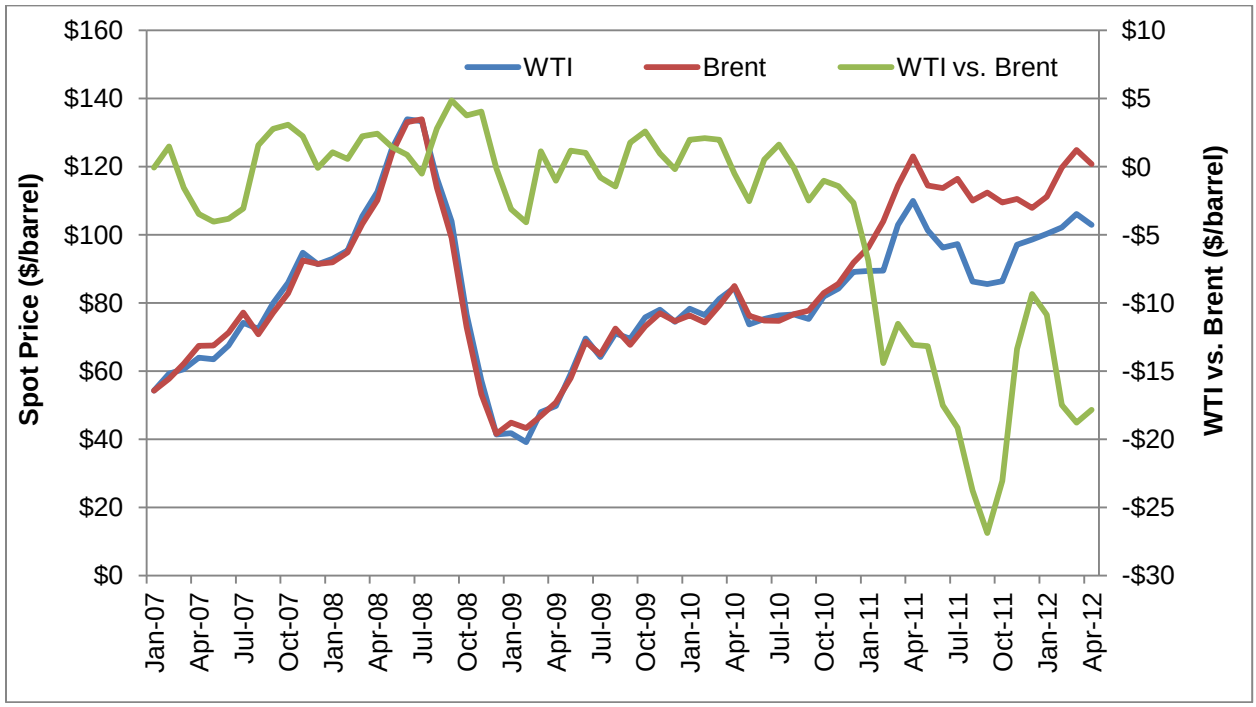
[43] WTI crude is a 40 API gravity sweet crude (under 0.5% sulfur) produced in the Texas/Oklahoma region; Brent crude is similar in quality to WTI and produced in the North Sea. Brent crude is generally viewed as the global market price for light, sweet crude oil.

- Value of the dollar. A weak U.S. dollar versus other currencies can raise the price of crude oil as crude oil transactions are denominated in U.S. dollars. The rise and fall of crude prices in 2008 followed a weakening then strengthening of the U.S. dollar versus other currencies.
- Commodity investments. Pension funds and investment firms invest in commodities like crude oil when investments in other financial assets look less promising.

Petroleum prices to NYS consumers are primarily set by the price of Brent crude. Most East Coast refiners process light sweet crude from Nigeria, Angola, and other sources based on the Brent price. Historically, Brent and WTI prices were very close, so as these global key prices rise and fall, prices to NYS consumers for products refined from crude oil (gasoline, diesel, jet fuel, etc.) follow.

Exhibit I-16 clearly shows the rise in crude oil prices prior to the fall 2008 economic crisis, when crude oil prices plunged due to lower global demands among other factors. Prices gradually rose and stabilized somewhat in mid-2009 through 2010 around $80 per barrel. In 2011, several things occurred. The events in Libya and the Arab Spring generated concerns about the possible impact on global crude supply. This fueled upward pressure on crude prices, in particular Brent. As Exhibit I-16 shows, the price of Brent crude “separated” from WTI, at times resulting in WTI prices $20-25/barrel below Brent. This unusual event was also supported by the growing supply of domestic crude oil production from North Dakota and increased Canadian imports, which were “stockpiling” at the Cushing, Oklahoma crude storage facilities. The lack of pipeline capacity to move this crude to Gulf Coast refineries (including the Keystone XL pipeline project) caused a localized surplus of crude in the Mid-Continent. These discounts (which are even greater for North Dakota crude) have triggered use of rail cars and even trucks to move crudes to refineries across the country as depressed crude prices have made this option economically viable.

Exhibit I-16: WTI and Brent Spot Price Trends ($/bbl)



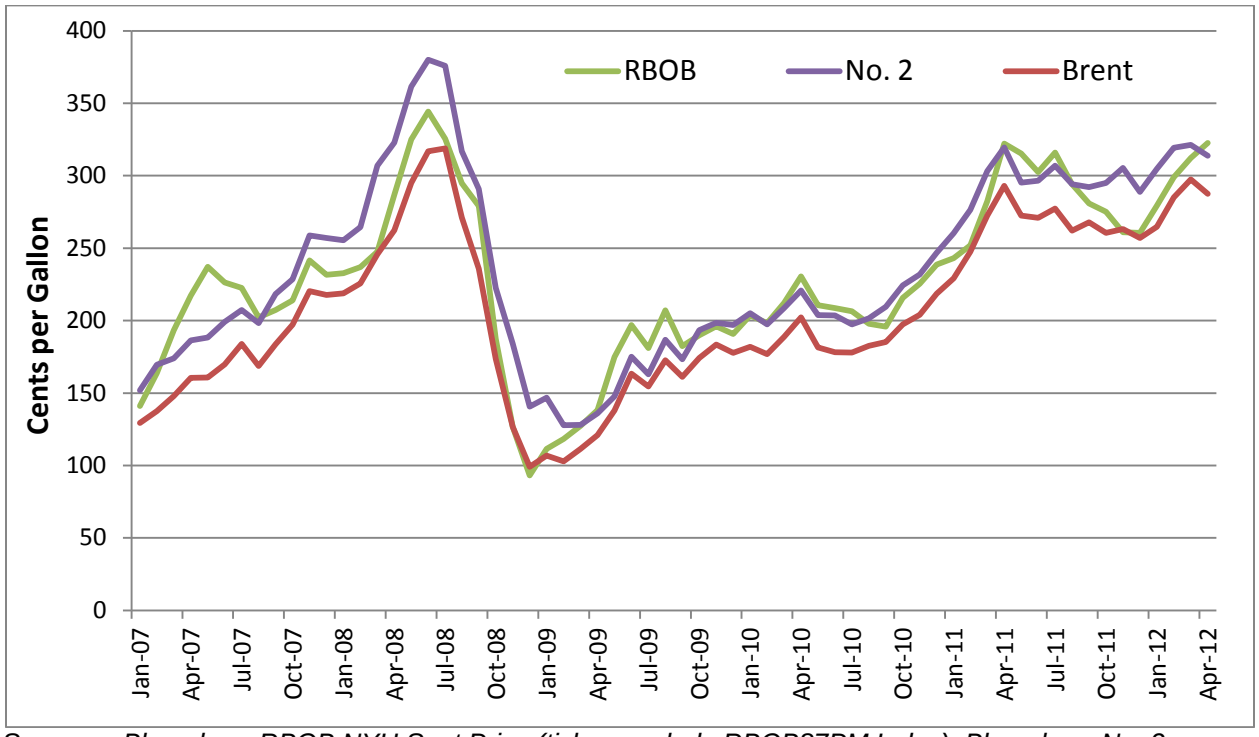
Source: Bloomberg WTI Cushing, OK Spot Price (ticker symbol: USCRWTIC Index). Bloomberg Dated Brent Spot Price (ticker symbol: EUCRBRDT Index).

This situation provides an opportunity for East Coast refiners to receive railcar shipments of North Dakota crude at delivered prices lower than the Brent-based price they are currently paying. While some refiners are exploring this, the ability to receive substantial volumes is uncertain.

Product Prices versus Crude

Product spot market prices generally follow changes in crude oil price (see Exhibit I-17).

Exhibit I-17: Spot Market Price Trends (CPG)



Source: Bloomberg RBOB NYH Spot Price (ticker symbol: RBOB87PM Index). Bloomberg No. 2 Heating Oil Spot Price (ticker symbol: NO2INYPR Index). Bloomberg Dated Brent Spot Price (ticker symbol: EUCRBRDT Index).

The relationship between petroleum spot market product prices in NYS and crude oil price can vary based on the individual supply and demand for products. So while Table I-13 shows that global crude price trends correlate directly with NYS spot market prices, disruptions in supply and demand for individual products can affect their spot market prices versus crude oil. Table I-13 shows spot market price spreads versus Brent crude in dollars per gallon.

Table I-13: Spot Market Price Spreads versus Brent Crude ($/gallon)

Year	Annual Average ($/gallon)			
	RBOB	No. 2	Brent	2-1-1 Margin*
2007	$2.09	$2.03	$1.73	$0.33
2008	$2.49	$2.86	$2.33	$0.35
2009	$1.69	$1.65	$1.48	$0.19
2010	$2.12	$2.13	$1.90	$0.23
2011	$2.84	$2.95	$2.64	$0.26

Source: Bloomberg RBOB NYH Spot Price (ticker symbol: RBOB87PM Index). Bloomberg No. 2 Heating Oil Spot Price (ticker symbol: NO2INYPR Index). Bloomberg Dated Brent Spot Price (ticker symbol: EUCRBRDT Index).

** Product margin is shown as a 2-1-1 crack spread, which is the margin generated from 2 gallons of Brent processed into 1 gallon of RBOB and 1 gallon of No. 2. Calculation: (1 gallon RBOB price + 1 gallon No. 2 price - 2 gallons Brent price) / 2.*

Table I-13 shows several key points on pricing characteristics:

1. The average spot price of RBOB and No. 2 fuel oil in NYH has been $0.20-$0.35/gallon higher than the Brent crude price over the past five years. This product margin is a relative measure of a refiner's profitability. From the table, margins in 2007 and 2008 were much higher than 2009 through 2011. This decline reflects the impact of the recession on petroleum product demands.
2. The actual refinery profits are not as high as the "product margins" may appear for several factors:
    a. Actual prices paid for crude oil will be higher by several $/bbl than the Brent spot price. African crudes processed by many East Coast refiners are priced at a $1-2 premium to the Brent price, and must be transported to the U.S. The "delivered" cost to an East Coast refiner may be $2-3/bbl higher (or, $0.05-$0.07/gallon higher). This would lower profit margins accordingly.
    b. Refineries produce about 80 percent yield of gasoline and diesel. Other products are typically much lower in value than the crude oil price (i.e., residual fuel oil, LPG, sulfur, petroleum coke). The "clean" products must have a sufficiently higher value versus crude to "cover" the losses on the "byproducts."
    c. The "product margin" must also cover all the operating costs of the refinery, including fuel use, power, chemicals, manpower, maintenance or equipment, spare parts, etc.
3. Over the past five years, No. 2 fuel oil prices have typically been higher than RBOB gasoline prices. In 2011, No. 2 prices were $0.11/gallon higher than RBOB gasoline. Prices for diesel fuel (ULSD[44]) are even higher than No. 2 fuel oil (the marginal cost of ridding the fuel of sulfur increases with each unit), as shown in
4. ULSD prices in NYH relative to those of No. 2 fuel oil are shown in Table I-14 below.

Table I-14: NYH ULSD Price versus No. 2 Fuel Oil ($/gallon)

Year	Annual Average ($/gallon)		
	ULSD	No. 2	ULSD vs. No. 2
2007	$2.15	$2.03	$0.12
2008	$2.98	$2.86	$0.12
2009	$1.70	$1.65	$0.05
2010	$2.20	$2.13	$0.07
2011	$3.02	$2.95	$0.07

Source: Bloomberg ULSD NYH Spot Price (ticker symbol: DIEINULP Index). Bloomberg No. 2 Heating Oil Spot Price (ticker symbol: NO2INYPR Index).

The higher demand levels for diesel fuel are driven by global issues. Higher demands for petroleum products in Asia and other markets are led by diesel, not gasoline. Diesel vehicles

[44] ULSD is ultra-low sulfur diesel, which has only 15 parts per million (ppm) sulfur content. No. 2 fuel oil can have up to 2000 ppm sulfur, so ULSD is a premium product. As of mid-2012, all NYS heating oil will be required to have 15 ppm maximum sulfur.

are more abundant in those markets for commercial as well as personal transportation, and diesel is used for power generation in many developing countries.

In the U.S., penetration of ethanol into the gasoline market has tended to soften the demand for fossil fuel based gasoline. This “double-edged” situation (higher diesel demand/lower gasoline demand) has changed how many U.S. refineries operate, causing them to focus more on diesel production.

The conversion to use ULSD-quality sulfur levels (15 parts per million - ppm) in NYS heating oil (July 1, 2012) and other Mid-Atlantic states over 2014-2018 period will increase demand for ULSD and lower demand for No. 2 fuel oil (2000 ppm max) and will likely widen the spread the two fuels as shown in Table I-14 above.

Rack Pricing Market Analysis

Petroleum product sales to distributors and commercial accounts are often based on terminal truck loading rack pricing, as discussed in the Pricing section. To show some typical rack pricing history, ICF analyzed rack prices at three disparate locations in NYS: Rochester, Albany, and New York City. All three locations sell ULSD, and Albany and Rochester sell E10 gasoline, which is a blend of CBOB blendstock and ethanol. In New York City, E10 is a blend of RBOB and ethanol since New York City is required by EPA to sell reformulated gasoline).

The Rochester market is supplied primarily by Buckeye Pipeline originating in Linden, New Jersey. Suppliers at the Rochester rack evaluate their wholesale economics for rack sales by comparing the cost to buy CBOB or ULSD at Linden plus the Buckeye tariff to Rochester (about $045/gallon) and compare that to their rack price at Rochester (as discussed in the “Rack Prices” section).

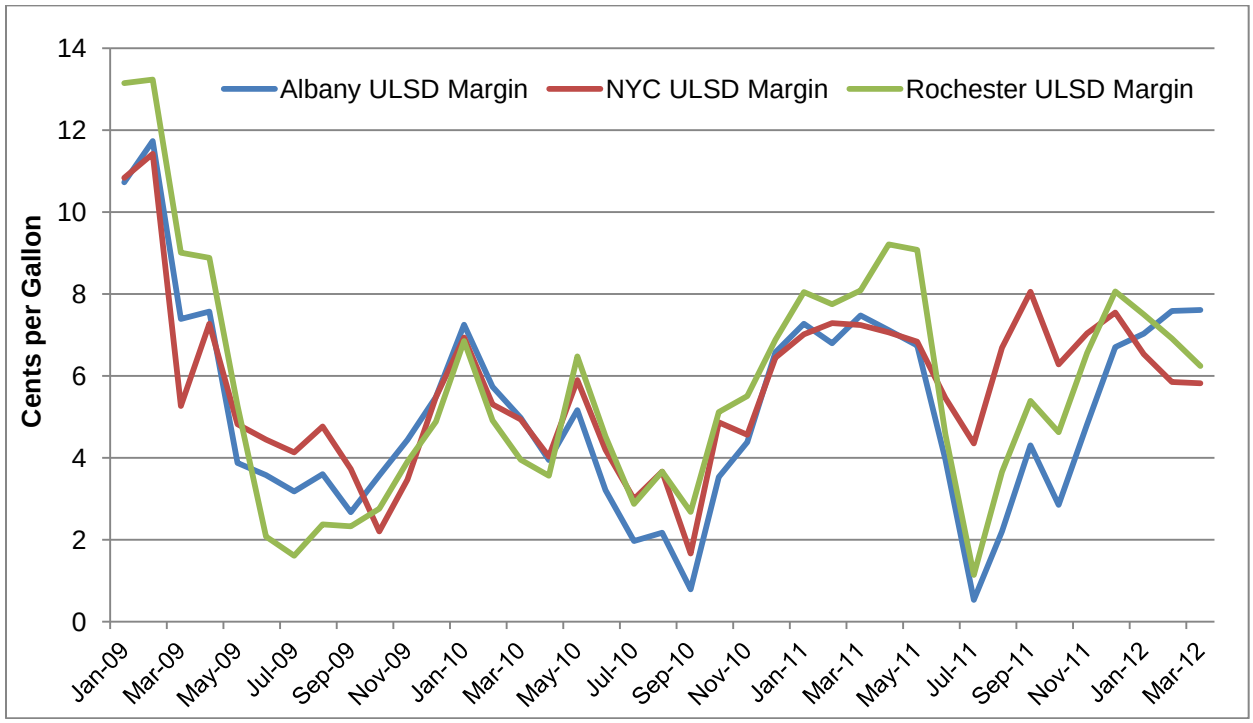
The Albany and New York City markets are supplied by marine barges from NYH. The ULSD and RBOB spot prices in NYH plus marine freight costs are compared to Albany and New York City rack prices to determine wholesale economics.

This analysis uses average rack prices in these locations (provided by OPIS), posted pipeline tariffs for Buckeye or marine charter rates provided by Poten & Partners for freight costs, and average spot market prices in NYH and Buckeye Linden as provided by OPIS to determine the historical rack margins shown below.

ULSD Margins

Exhibit I-18 shows rack margins from all three locations from 2009 through March 2012. These data show average margins for all three markets running between $0.02 and $0.08/gallon. Margins tend to be higher during winter months when overall demand for distillate products peak.

Exhibit I-18: ULSD Rack Margins 2009-2012 (CPG)



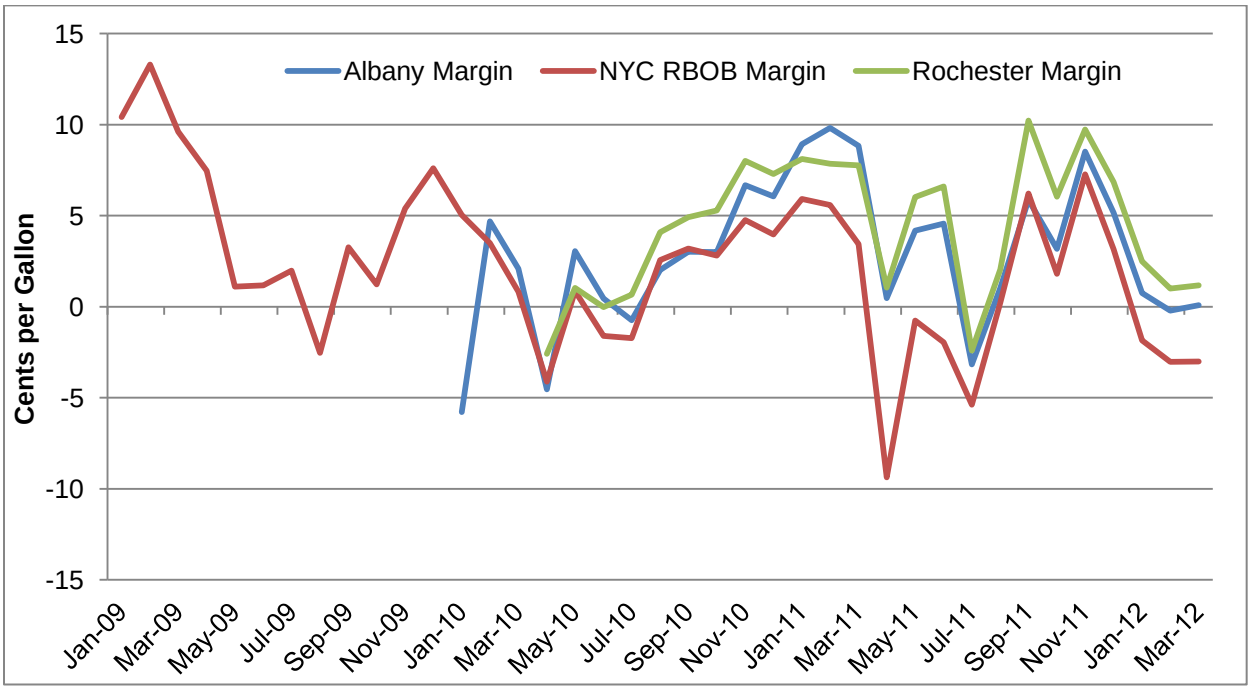
Sources: ULSD Barge NYH Spot Price. Oil Price Information Service (OPIS). ULSD Buckeye Pipeline Spot Price. Oil Price Information Service (OPIS). ULSD Rack Prices for Albany, NY, and Rochester, NY. Oil Price Information Service (OPIS). Freight Costs. Poten & Partners. Buckeye Pipe Line Company, L.P. Local Tariff for Refined Petroleum Products from points in New Jersey and Pennsylvania to point in NYS. Effective: April 1, 2012.

The rack margins are a measure of the gross profit level of wholesale suppliers. From this margin they have to deduct costs for manpower, additives, office support, and possible storage fees from terminal owners.

Gasoline Margins

For gasoline margins in these three locations, approximate rack margins are shown in Exhibit I-19. These margins reflect the CBOB or RBOB cost plus freight compared to rack prices.

Exhibit I-19: Gasoline Rack Margins, 2009-2012 (CPG)



Sources: CBOB Barge NYH Spot Price. Oil Price Information Service (OPIS). RBOB Barge NYH Spot Price. Oil Price Information Service (OPIS). CBOB Buckeye Pipeline Spot Price. Oil Price Information Service (OPIS). CBOB Rack Prices for Albany, NYS and Rochester, NY. Oil Price Information Service (OPIS). RFG New York, NYS Rack Price. Oil Price Information Service (OPIS). Freight Costs. Poten & Partners. Buckeye Pipe Line Company, L.P. Local Tariff for Refined Petroleum Products from points in New Jersey and Pennsylvania to point in NYS. Effective: April 1, 2012.

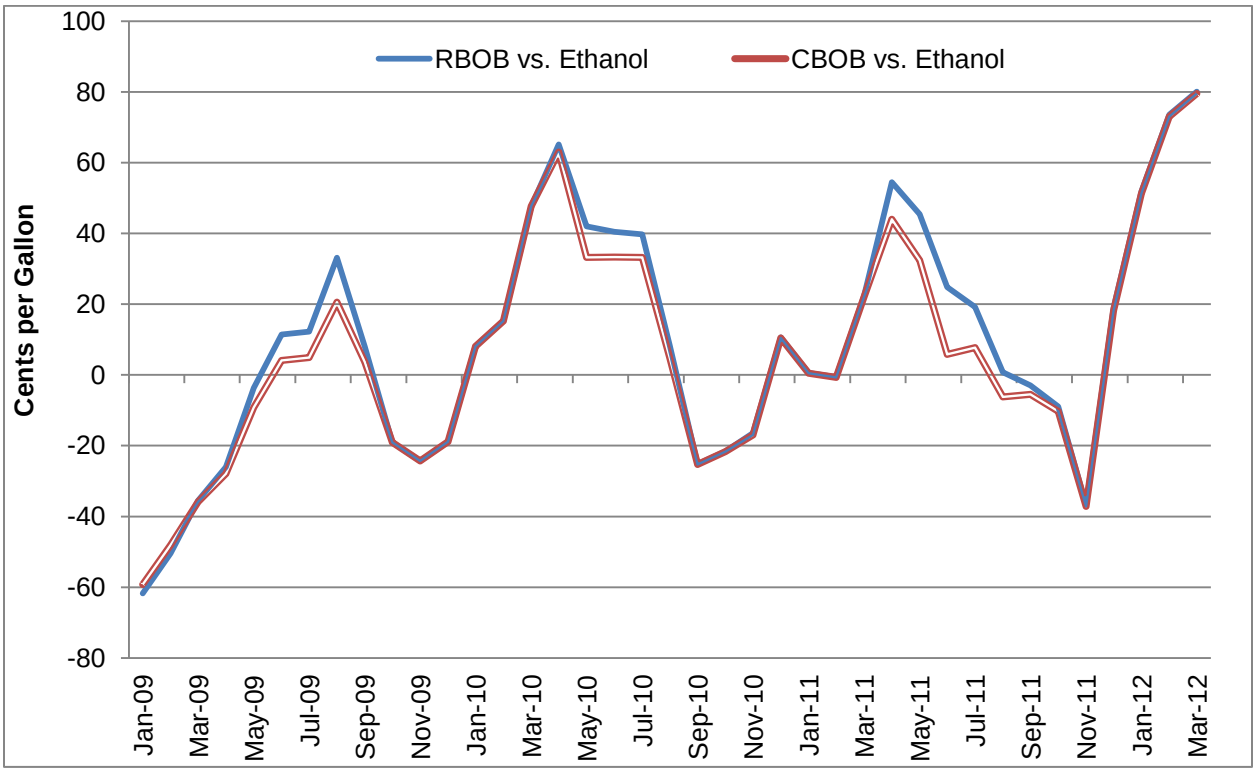
Gasoline rack margins tend to be lower than the ULSD margins over this period. In part this reflects several things:

1. Lower gasoline demands due to conservation and CAFE standards have made gasoline more competitive.
2. Increased supply of blended gasoline in the market due to ethanol growth has further increased competition (downward pressure on margins).
3. Conversely, wholesale suppliers purchase ethanol to blend with RBOB or CBOB. The ethanol market price (plus delivery to the terminal) has tended to be below the rack price of gasoline over this period. Therefore, if the ethanol price is $0.30/gallon lower than the rack price, the overall margin for the sale of E10 would be about $0.03/gallon higher than shown in the chart (as ethanol comprises about 10 percent of E10).

Exhibit I-20 presents a chart of ethanol spot market prices in NYH versus RBOB and CBOB prices in NYH. This exhibit shows that average spreads over the period vary widely. In some cases the blenders would lose money by purchasing ethanol and blending, and in others they would make considerable amounts of money by blending. The average spreads over the period were about $0.10/gallon for RBOB over ethanol and $0.06/gallon for CBOB over ethanol. An average spread difference of $0.10/gallon would mean the blender would have about a

$0.01/gallon higher margin than shown on the margin graph above (10% of the blender supply would be at a $0.10/gallon discount).

Exhibit I-20: RBOB and CBOB Spot Prices versus Ethanol, 2009-2012 (CPG)



Source: RBOB and CBOB spot prices in NYH. Oil Price Information Service (OPIS). Bloomberg ethanol spot prices in New York Harbor.

This spread does not include the $0.45/gallon ethanol blender tax credit which expired on December 31, 2011 (effectively lowering the E10 cost to blenders by $0.045/gallon). This clearly "elevates" the spread in Exhibit I-20 by $0.45/gallon through the end of 2011 (when the blender credit expired).

Regardless of the spread between RBOB or CBOB and ethanol, blenders and refiners are obligated by RFS2 requirements to blend ethanol. If the 2012 drought drives up corn and ethanol prices, blenders and refiners still have to buy ethanol (including imports) to meet RFS2 requirements. These costs also drive up E10 prices at the rack to compensate obligated parties for the ethanol premiums (barring some relaxation of the RFS2 requirements via waiver).

Regional Refinery Characteristics

The profitability of a refinery is largely dictated by the cost of feedstock (price of crude oil) and the respective prices and volumes of product produced by the facility. The regional refineries supplying the NYS market include refiners in northern New Jersey, the Philadelphia region, and the United Refinery in northwestern Pennsylvania. The refineries in the region are, in general, older refineries that process all imported crude oil. Compared to complex refineries on the U.S.

Gulf Coast, the regional refineries supplying NYS are less complex with much lower capability to be profitable since they tend to process more expensive lighter, sweeter crude oil.[45]

Complex refineries are equipped with additional processing units that allow the refineries to produce a higher percentage of more valuable petroleum products (gasoline, jet and diesel) from poorer quality and cheaper crude oils. Conversely, the less-complex refineries lack some of this upgrading capacity, which results in higher production volumes of less valuable products (e.g., asphalt, heavy residual oils).

Table I-15 shows the regional refiners and their primary characteristics:

Table I-15: NYS Regional Refiner Characteristics, 2011

Company	Refinery	State	Crude Characteristics		Crude Capacity (b/d)	Throughput (b/d)	Unit Capacities (b/d)	
			Sulfur (%)	API			Coker	FCC
Phillips 66	Bayway	NJ	0.3	35.1	238,000	225,219	--	130,000
Delta Air Lines	Trainer	PA	0.18	38	185,000	119,178	--	51,500
PBF Energy	Paulsboro	NJ	1.83	32.1	160,000	108,696	26,500	54,000
PBF Energy	Delaware City	DE	1.55	27.5	182,200	109,598	48,400	81,300
Hess	Port Reading	NJ	--	--	--	63,000	--	65,000
Sunoco	Marcus Hook	PA	0.15	36.7	178,000	143,332	--	98,000
Philadelphia Energy Solutions	Philadelphia	PA	0.16	34.2	335,000	257,792	--	135,000
United Refining	Warren	PA	2.33	28	65,000	58,192	--	24,000
Total					**1,343,200**	**1,085,006**	**74,900**	**638,800**
Total Operating May 2012					**980,200**	**759,496**	**74,900**	**424,300**

Sources: EIA. "Petroleum & Other Liquids—Refinery Capacity Report." 2011. Available at: http://www.eia.gov/petroleum/refinerycapacity/

EIA. "Petroleum & Other Liquids—Refinery Capacity Report." 2012. Available at: http://www.eia.gov/petroleum/refinerycapacity/

EIA. "Petroleum & Other Liquids—Company Level Imports Archive, 2011 Imports by Month." Available at: http://www.eia.gov/petroleum/imports/companylevel/archive/.

2011 SEC Company 10-K Filings.

Characteristics

As shown in Table I-15, Sunoco Marcus Hook will be closed if a buyer is not found. Monroe Energy LLC, a subsidiary of Delta Air Lines Inc., purchased Phillips 66's shuttered Trainer, PA refinery. Furthermore, Sunoco Philadelphia is planning to operate as a joint venture between the Carlyle Group and Sunoco.[46] These three refineries share one major characteristic: they process low sulfur (sweet) crude oil which has a higher API gravity. These crude oils are primarily from Nigeria, Angola, North Sea, and are more expensive compared to heavier and

[45] Lighter crude oil has a higher specific gravity (i.e., it's less dense); sweeter crude oil has a lower sulfur content. Both of these characteristics make the crude oil easier to refine and also increase its demand in countries that do not have complex refineries. The lighter, sweeter crude is also more expensive for these reasons.

[46] "Sunoco, Carlyle in last-chance refinery deal," *Platts Oilgram Price Report*. July 3, 2012.

higher sulfur crude oils. The Phillips 66 refinery in Bayway (Linden) continues to operate but still has to process the same expensive crude oil as the refineries that have closed or are at risk of closing.

In April 2012, Monroe Energy LLC, a subsidiary of Delta Air Lines Inc., agreed to purchase the Phillips 66 refinery in Trainer, PA for $150 million. The acquisition of the refinery is meant to help the airline giant mitigate the cost of rising fuel prices. Delta plans to spend another $100 million to convert the refinery to maximize jet fuel production.[47]

The Sunoco Philadelphia refinery, now a joint venture of Sunoco and the Carlyle Group, is a key supply source in the region due to its size and its ability to produce ULSD as well as other products. However, Sunoco's decision to exit the refining business indicates that the refinery has struggled to be profitable and the joint venture (Philadelphia Energy Solutions) will need to find other means to support margins. The JV is already planning to make modifications to improve yields and process substantial quantities of domestic sweet crude which has a significant discount to foreign sweet crudes.

The Hess refinery in Perth Amboy purchases gas oil (an intermediate cut from crude oil processed by other refiners) and other blendstocks to produce products directly into the NYS market. Its profitability is more difficult to measure than the other refiners; however, the impact of shutdowns of other refineries may limit Hess's access to gas oil and make feedstock costs more expensive.

The two PBF refineries both process a higher sulfur and heavier crude slate than the other refiners on the East Coast. Both of these refineries also have advantages in complexity with coking[48] units, and the Paulsboro facility produces high value lube oil. The Delaware City refinery was closed in 2009 by its former owner (Valero) when the global decline in demand caused crude prices for sweet crude to collapse to near heavy sour crude prices, and refinery margins declined such that the more complex refineries became unprofitable.

PBF purchased Delaware City in 2010 and gradually restarted the refinery beginning in mid-2011. Throughputs for both PBF refineries in 2011 were low (Delaware City throughput in Table I-15 above is based on fourth quarter 2011 imports) compared to capacity. Despite the advantages in complexity and crude cost, both PBF refineries must operate reliably and at higher throughput levels to manage the higher fixed costs that more complex refineries have. In addition, neither PBF refinery can produce ULSD, which is the diesel consumed by on-road vehicles, making it a highly valued distillate product. The higher sulfur No. 2 fuel oil produced by these refineries is in declining demand and with No. 2 fuel oil sulfur level regulations changing in NYS to ULSD standards effective in July 2012 (and elsewhere in the region in 2014-18), the PBF refineries may become less profitable.

[47] Couret, Jacques. "Delta buys Trainer oil refinery in Pennsylvania," *Atlanta Business Chronicle.* April 30, 2012. Available at: http://www.bizjournals.com/atlanta/news/2012/04/30/delta-buys-trainer-oil-refinery-in.html?page=all

[48] A coking unit upgrades the very heavy residuum (bottoms) of the crude oil barrel into gasoline and diesel unfinished oils, which are further refined to sell as gasoline and diesel. The coking unit allows these refineries to process heavy crude oils without manufacturing residual fuel oil, which is a less-valued product.

The United Refinery in Warren, PA processes Canadian crude oil. Crude oil is shipped along the Enbridge Pipeline system in Canada into West Seneca, NY where the crude oil is rerouted onto United's proprietary pipeline (Kiantone Pipeline) to the Warren refinery. United is a smaller refinery (65,000 b/d) but has good complexity and produces asphalt rather than residual fuel oil. The current depressed prices for Canadian crude are very favorable to United and it is a key supply source into western NYS.

The overall crude capacity of all the refineries in the region is 1.343 MMb/d, and about 1.08 MMb/d were processed in 2011.[49]

Refinery Integration with NYS Supply

The petroleum fuels output from this network of refineries is integrated into the NYS supply chain through several logistics pathways:

- The Phillips 66 and Hess refineries in northern New Jersey provide product into the region via marine shipments from the refinery loading docks, and via movements from the refinery into the Buckeye Linden hub, where product can move into NYS/Long Island terminals via Buckeye's East lines, or to upstate New York via the Buckeye West lines to Macungie, PA and then north. Both refineries also provide supply to northern New Jersey via truck racks and can move product by marine movements to other states.
- The PBF and Sunoco refineries in the Philadelphia region supply the Pennsylvania, Southern New Jersey, and local Delaware and Maryland markets, but also tie into the NYS supply system. These refineries access the Sunoco Logistics (SXL) pipeline system. The SXL system has several lines. One line supplies demands in northeast Pennsylvania and upstate New York; a second supplies Newark markets, and a third (the "Harbor" line), moves products to Buckeye's Buckeye Linden hub (where product can move into NYS/Long Island terminals via Buckeye's East lines, or to upstate New York via the Buckeye West lines to Macungie, PA and then north) and other distribution hubs in northern New Jersey. The PBF refinery in Paulsboro can also access the Buckeye system through a Buckeye line from Paulsboro to Macungie.
- The Trainer refinery, now owned by Delta Air Lines, will supply jet fuel to Philadelphia International Airport, and LaGuardia and JFK International airports. Delta signed a three-year agreement with BP to supply crude oil to the refinery, and an exchange agreement in which Delta will receive jet fuel in other parts of the country in exchange for supplying BP with gasoline, diesel, and other products from the Trainer refinery. A similar exchange agreement was established with Phillips 66 as well. This refinery can feed into the SXL system. Sunoco's Marcus Hook refinery that was closed in 2011 also fed product into the SXL system. The United Refinery in western Pennsylvania supplies western NYS, Pennsylvania, and Ohio markets through truck deliveries.

Impact of Refinery Changes

The transitions impacting the supply from refineries in the region are heavily dependent on decisions pending on sale, crude source options, or operation of the refineries. The capital programs for the refineries are limited. PBF's project to expand rail receipt capability of Western

[49] The throughput includes 63,000 b/d of gas oil processed by the Hess Perth Amboy refinery, which does not process full crude oil.

Canadian Heavy and Bakken crude oils from 20,000 b/d to over 40,000 b/d this month to over 110,000 b/d by January 2013 shows the evolving economics of cheap, Mid-Continent crudes.[50] United Refining is undergoing a $4 million project to enable increased production of ULSD fuel versus No. 2 fuel oil.

Currently, East Coast sweet crude refineries (Sunoco Philadelphia and Phillips 66 Bayway) are beginning to process sweet crude oil from the rapidly growing Bakken region of North Dakota. This crude is "trapped" because of limited pipeline access to "takeaway" the crude. Because the crude is "trapped", it is heavily discounted, enabling railcar shipments of the crude to be economically shipped to refineries as far away as the East and West Coasts (spurring the PBF Delaware City investments noted above). If railcar movements of crude into Philadelphia or Linden can be arranged, the economic advantage to these refineries versus buying Nigerian crude oil will be significant.

On July 2, 2012 Sunoco and their joint venture partner (The Carlyle Group) announced they will continue operations at the Philadelphia refinery. They also announced among other plans, the construction of a "high speed" train unloading facility to bring in crude from the Bakken Shale. The railcar offloading facility is scheduled to be able to handle 140,000 b/d of crude oil. The refinery plans to substitute a portion of its current slate of crude from the North Sea and Africa to crude oils from the Eagle Ford formation in Texas, the Niobrara formation in Kansas and Nebraska, and the Bakken formation in North Dakota. The refinery also plans to benefit from relatively low natural gas prices by operating a natural gas-fired cogeneration plant at the refinery.[51]

As of this publication, it appears that both the Sunoco Philadelphia refinery as well as the former Phillips 66 Trainer refinery (now owned by Delta Air Lines) will both continue operations (although the Delta refinery may remain shuttered until the fall of 2012).

Longer Term Considerations

East Coast refineries are likely to be under sustained pressure to generate favorable margins. The transition to lower demands for gasoline reduces demand for the primary product from these refineries, and this will impact wholesale spot market prices for gasoline blendstocks. With the Sunoco Philadelphia and Phillips 66 Trainer refineries now planned to continue or revive operation under new ownership, production from these refineries may keep overall refinery margins weak in PADD 1.

Continued growth in demand for light sweet crude in East Asia will continue to increase the cost of sweet crude supply to the U.S. market.

Table I-16 shows that the price premium for Bonny Light, a key Nigerian crude, increased significantly in 2004 and 2005 as China and India's demand for light sweet crude increased

[50] "PBF Energy: Advantaged Crudes a 'Game Changer'." PBF Energy. August 24, 2012. http://www.pbfenergy.com/sites/default/files/PBF%20Announces%20Crude-by-Rail%20Plan%20at%20Del%20City.pdf

[51] "Sunoco, Carlyle in last-chance refinery deal," *Platts Oilgram Price Report*. July 3, 2012.

significantly.[52] This higher premium to the global dated Brent benchmark directly impacted all refiners purchasing West African crude oil, including virtually all East Coast refiners. As is seen in the exhibit, the prices escalated through 2008 at which time the global recession drove down demands for all crude oil and compressed margins. These spreads have fallen recently in 2012 in part because demands in Asia are reported to be lower.

Table I-16: Bonny Light versus Dated Brent ($/bbl)

Year	$/bbl		
	Bonny Light	Dated Brent	Bonny-Brent Spread
2000	28.37	28.34	0.04
2001	24.49	24.42	0.07
2002	25.12	24.98	0.14
2003	28.96	28.85	0.11
2004	38.33	38.30	0.04
2005	55.67	54.43	1.23
2006	66.98	65.39	1.59
2007	74.97	72.69	2.28
2008	101.15	97.64	3.51
2009	63.67	61.86	1.81
2010	81.20	79.64	1.57
2011	113.40	111.07	2.33
2012*	112.53	111.41	1.12

Source: Bloomberg

** Through August 1, 2012*

In addition, the development of new U.S. Gulf Coast capacity in 2012 as well as major overseas projects in the Middle East and India will put online more efficient capacity capable of producing product at costs well under the East Coast refiners (even with shipment from halfway around the world).

The East Coast refiners may be able to take advantage of the discounted domestic sweet crude for a number of years until new pipelines are completed to the Gulf Coast, or it could be sustained longer if domestic production continues to grow as rapidly as it has. However, over time the discount is likely to shrink as markets equilibrate.

The ultimate resolution of the PADD 2 crude oil situation may have a significant impact on the East Coast refineries long-term viability. As noted earlier, Mid-Continent and Canadian crudes are being discounted heavily due to lack of “takeaway” capacity from the region. Railcars to the East Coast are providing some benefit to East Coast refiners, but sustained high volume rail supply may be difficult. There are (at least) three possible infrastructure options:

[52] All crude oils have different properties. Both Dated Brent and Bonny Light are light, sweet (low sulfur) crude oils. The variation in the premiums reflects the relative demand for each crude on the global crude buyers’ market. As China and India purchased increasing quantities of these crudes in 2004 and 2005 and U.S. demand continued, the competition for the Nigerian crudes drove up the price spread to Dated Brent.

1. The construction of a major crude oil pipeline into the Philadelphia market from PADD 2. This may allow the light sweet crude to get to the East Coast efficiently and at a discount. Delivered cost would be lower than the railcar cost. This option could extend the "life" of the sweet crude processing refiners. The conversion of existing product or natural gas pipelines is one option for shipping crude oil from the Mid-Continent to the East Coast. One benefit of this option is that these pipelines are already in place so the right-of-ways they reside along are already established, which is a major hurdle in pipeline construction.
2. The construction or expansion of refinery capacity in the Midwest with development of a "product" pipeline to the East Coast (similar to Colonial from the Gulf Coast). This option would threaten the East Coast refiners significantly, as the new Midwest capacity would be very efficient and have lower costs of operation than the older East Coast refiners.
3. Perhaps most likely, the expansion of pipeline capacity to the Gulf Coast and massive growth expected in light sweet domestic crude oil from the Bakken, Niobara, and Eagle Ford regions may be well in surplus of domestic sweet crudes processed in the Gulf Coast. This may enable the use of Jones Act vessels to haul light sweet crude to East Coast refineries (displacing or augmenting rail movements).

All three options are complex and require large capital expenditures and development of partnerships. Approval of major pipelines similar to Colonial or Keystone involves state approvals, resolving local issues, and right of way clearance. Converting other pipelines may be economically more attractive because the right-of-ways have been established, and the materials have been purchased and laid. Yet, this option carries costs particularly in the conversion of natural gas pipelines. In addition, refineries are multi-billion dollar investments that require a variety of governmental approvals, and mandate a favorable outlook for the industry as the pay-back periods for these facilities extend out many years. Regardless of the decisions made to utilize these resources, the idea of leveraging the U.S. and Canadian crude supply into delivering reliable and cheaper product to the East Coast market has considerable energy security attractions, including diversification of supply away from the hurricane-exposed Gulf Coast.

Global Impacts on the Regional Market

The U.S. is an integral part of the global petroleum market and no region more so than the East Coast. The country is dependent on imports of crude oil, although with the advent of shale oil and oil from the deep offshore Gulf that dependence is declining. The U.S. also imports two MMb/d of products in addition to its crude oil imports. There have always been product exports although traditionally they have not amounted to much and have reflected logistical problems and balancing of local markets. Exports have changed in the last year and the country has moved to a net exporter of products rather than a net importer. This is in part a reflection of the recession and the decline in overall consumption.

The refining industry landscape has changed considerably particularly on the East coast. With the closures, the East Coast will be more dependent on imports from further away than the Pennsylvania/Delaware refineries, whether the source is the U.S. Gulf or foreign sources.

Just as the refining industry in the U.S. is changing so too is the industry elsewhere. Refining has always been a low margin industry (with some short lived exceptions) and goes through

various periods of rationalization. Currently, refineries are also closing in the European Union (EU) and elsewhere, driven by poor economics.

The trend towards cleaner, less-toxic, and less-polluting petroleum products, especially transportation fuels is seen everywhere in the world. No continent is untouched by this trend although some are more advanced than others. However, as the requirements, particularly for lower sulfur in transportation fuels become more stringent the technology to extract the last molecule of sulfur becomes more cutting edge, more complex, and more expensive.

Refineries are very capital intensive and, like other plants that are technology dependent, have large economies of scale. They have to be above a certain size and they have to have an adequately sized market. There are profitable smaller refineries but generally they have to produce highly value added products and/or have a captive market. So the global trend is for bigger and more complex refineries.

The emergence of large, capital intensive refineries can be seen globally, including in the U.S. Gulf Coast. In a number of countries, particularly Saudi Arabia and India, government policy has encouraged the building of large, complex export refineries that are more than competitive with any domestic refineries. It appears that these are unlikely to be competitive due to their distance from NYS. However, the Reliance and Essar refineries on the northwest coast of India receive substantial tax benefits from both the State and federal Indian governments, and both are located in a special export zone so that they are exempt from many of the normal taxes. Reliance in particular plays an increasing role in the U.S. and has also acquired substantial product storage in the Caribbean. Saudi Arabia has also embarked on a number of joint venture projects with various major oil companies to build large refinery/petrochemical complexes aimed at the export market. The target market is in many cases Asia, and especially China. However, the Red Sea Refinery complex that is being built in Yanbu has been specifically designed to produce EU diesel and U.S. RBOB and CBOB gasoline. In addition these refineries receive their local Saudi crude oil at a severely discounted rate, making them competitive everywhere.

There are a number of global trends tied into this that impact the East Coast, the region in the U.S. that is most dependent on imported products. They are as follows:

- The trade-off between gasoline and diesel as the main transportation fuel
- The differences and, sometimes, the incompatibility of major fuel specifications.

The global trend for a number of years has been to encourage the use of diesel as the main transportation fuel, not just for commerce but for personal driving. This is to take advantage of the greater efficiency of the diesel engine. There are a number of exceptions to this trend, notably the U.S., China, and South Africa. This to some extent explains the premium prices for some of the sweet crude oils like Nigerian Bonny Light, which is one of the more expensive crude oils as it has one of the largest distillate cuts of any crude oil.

The organizations that publish the major global energy projections agree on one point: gasoline demand will continue to grow but at a substantially lower rate, but diesel demand will grow steadily.[53] The decline of the rate of increase in gasoline demand in the main markets such as

[53] Organization of the Petroleum Exporting Countries. *World Oil Outlook 2011*. 2011. Available at: http://www.opec.org/opec_web/static_files_project/media/downloads/publications/WOO_2011.pdf. By

the U.S. is expected to be driven by substantially improved vehicle efficiencies. Both OPEC and the IEA envision that the decline in the demand for gasoline will be driven by increased efficiency and that alternative fuels will only play a small role.[54] The recently announced increase in the CAFE for light vehicles has not been factored into any of the projections and should have a further impact.

Diesel is used in many countries for personal transportation (the EU sells many more diesel powered cars than gasoline ones) but it is used everywhere for commerce. The U.S. move to increase the efficiency of heavy-duty commercial vehicles by 10 to 18 percent[55] will have a profound effect if successful and if it is adopted elsewhere. However, diesel demand will also be affected by the moves to reduce sulfur in heating oil and marine bunkers, as discussed previously.

The growing global demand for diesel, particularly clean diesel will ultimately impact the East Coast. U.S. refiners in the Gulf Coast will likely be able to meet most of any demand in the East Coast but the increasing pressure to reduce sulfur will raise the cost of the available diesel.

The other potential problem facing the East Coast is the availability of transportation fuels that meet U.S. specifications. While tighter specifications are spreading throughout the world the majority of countries are adopting EU specifications or some variation thereof. As mentioned above, one of the new Saudi refineries is specifically making RBOB and CBOB for U.S. gasoline blending, but the diesel being made is to EU specifications. It may well be that as the world moves to cleaner fuels and the remaining refineries are typically the large-scale, complex facilities, there too must be more coordination among countries over fuel specifications. One primary concern from this possible market transition is that the supply chain would become longer because of multiple regulation and thus more subject to unexpected disruptions.

Supply Constraints

NYS is entirely dependent on imported transportation fuels, some from other domestic regions and some from the global market. A very high percentage of these imports come by marine transportation: others by rail or by pipeline.

Supply constraints, or disruptions, fall into several categories. The first is when the type of disruption is with the feedstock or production process, such as a disruption in the supply of crude oil to the refineries that supply NYS. The cause can be manmade (i.e. geopolitical) or it can be due to natural causes (i.e. an earthquake or a flood disrupts a refinery or plant). The two most obvious examples are the Arab oil embargo of 1973 and the disruption in the Gulf Coast energy facilities brought by hurricanes Katrina and Rita in 2005, and Ike and Gustav in 2008.

2035, in the global road transportation sector, 57 percent of demand will be for middle distillates, as compared to 40 percent for naphtha and gasoline.

[54] Organization of the Petroleum Exporting Countries. *World Oil Outlook 2011*. 2011. Available at: http://www.opec.org/opec_web/static_files_project/media/downloads/publications/WOO_2011.pdf

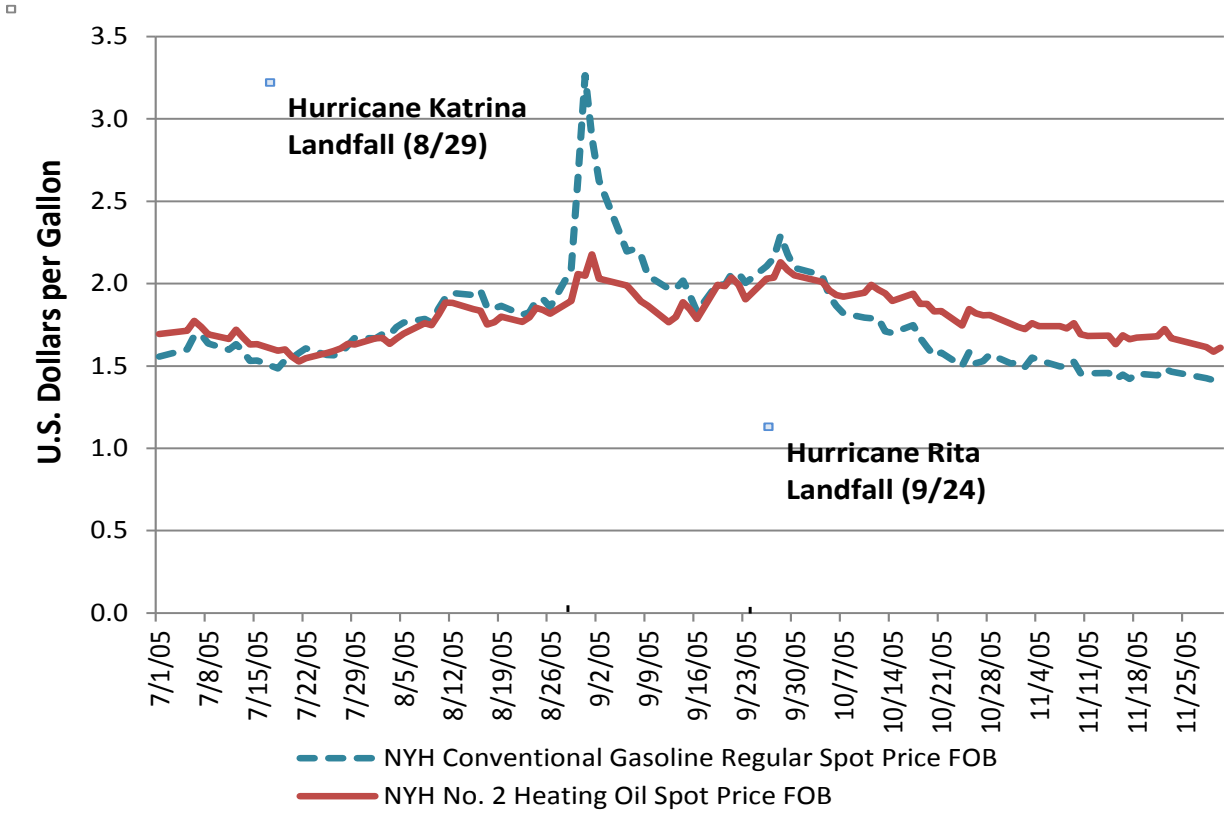
International Energy Agency. *World Energy Outlook 2011.* November 9, 2011. Available at: http://www.worldenergyoutlook.org/publications/weo-2011/

[55] *World Energy Outlook 2011.* International Energy Agency. November 9, 2011. Available at http://www.worldenergyoutlook.org/publications/weo-2011/

In the U.S., Hurricanes Katrina and Rita in 2005 and Gustav and Ike in 2008 caused substantial damage to the infrastructure in the U.S. Gulf Coast. Apart from the damage to the production platforms in the Gulf the hurricanes, and particularly the storm surges, severely damaged a large number of refineries and disabled many pump stations for both the Plantation and Colonial pipelines, the main East Coast product line that terminates in Linden, New Jersey. Effects from the Plantation and the Colonial outage were felt along the East Coast but particularly in the inland South East that has few other ways of accessing petroleum products and in many cases ran out of products.

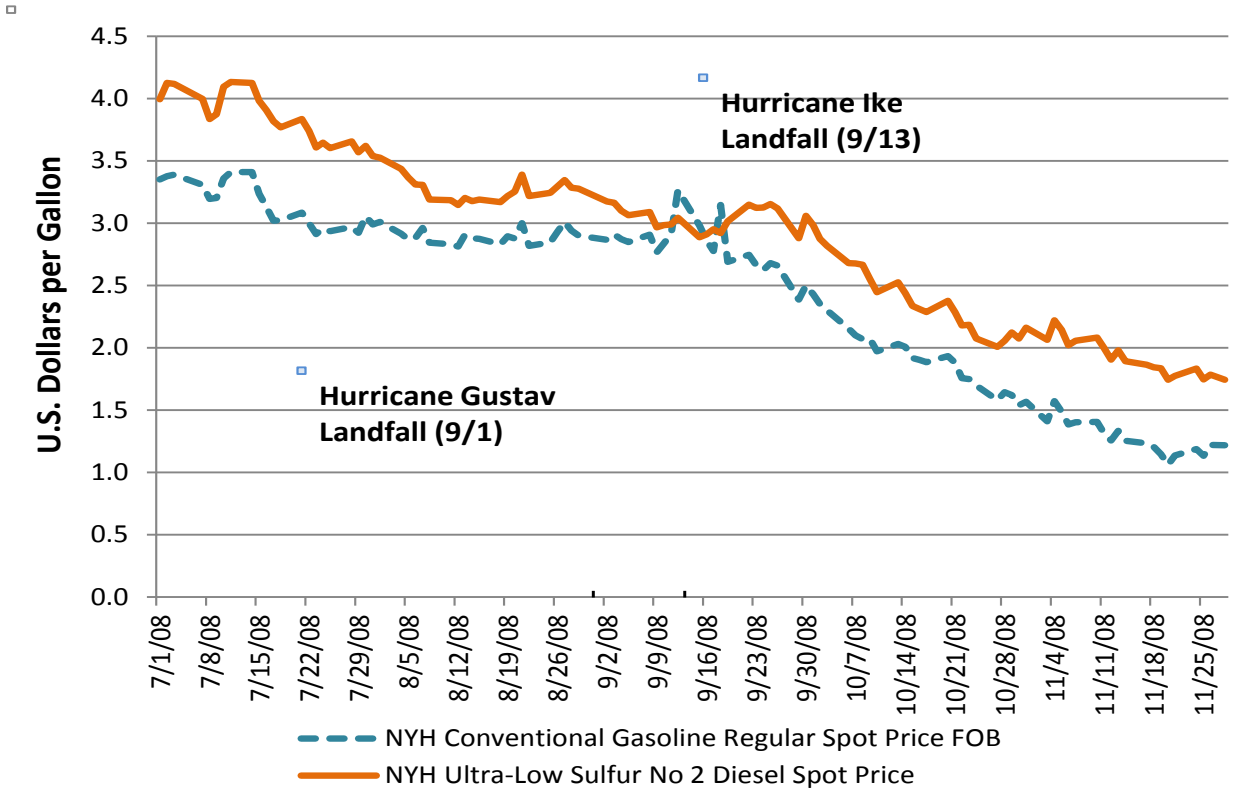
Supplies from Colonial to northern New Jersey were eventually cut off. However, NYS has the advantage over the inland Southeast in that most of the State is accessible by marine transport combined with NYH's ability to absorb more volumes of petroleum products than are received under normal conditions. The impact on the State in such situations is economic and not physical. Prices rise and product is drawn in from alternative sources. Exhibit I-21 and Exhibit I-22 show the impact in NYS on the prices of the main transportation fuels, gasoline and diesel. Given that NYS is a considerable distance from the U.S. Gulf and that even if Colonial is disrupted the price impact is not immediate. Nevertheless, both exhibits show the spike in prices that occurred when the effects of the hurricanes reached NYS.

Exhibit I-21: Price Impact of Hurricanes Katrina and Rita in 2005 ($/gallon)



Source: "Spot Prices," EIA. Available at: http://www.eia.gov/dnav/pet_pri_spt_s1_d.htm

Exhibit I-22: Price Impact of Hurricanes Gustav and Ike in 2008 ($/gallon)



Source: "Spot Prices," EIA. Available at: http://www.eia.gov/dnav/pet_pri_spt_s1_d.htm

A second, more typical example of supply disruption occurs in the distribution mode of the product. Product comes into NYS by marine transport, rail, and pipeline. Accidents can occur in all three modes; inclement weather can affect all three, although marine and rail may be more vulnerable to weather: seismic activity can affect all three; and blockages of ports and waterways can interrupt marine transport.

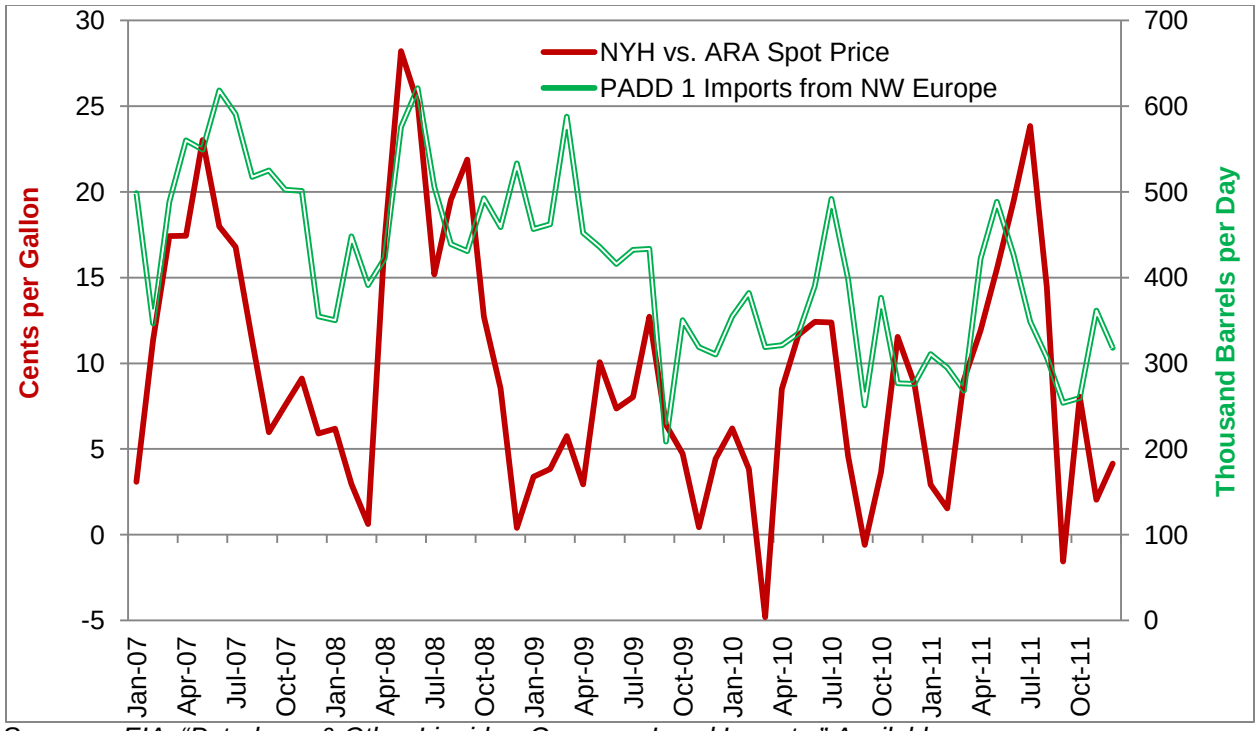
Weather delays could be attributed to ice on river waterways. The Hudson River all the way into the New York area could develop ice during the winter months. If the ice is of sufficient thickness the U.S. Coast Guard may place restrictions on barges, limiting movement to only during the day time. If ice-related delays occur, the charterer of the vessel is typically charged 150 percent of the demurrage rate.

Strong wind and thick fog can also play a role in weather delays. For barges fixed on a spot basis, weather delay costs are split 50 percent by the owner of the barge and 50 percent by the charterer of the barge. For barges fixed on a time-charter basis, the charterer covers 100 percent of the weather delay costs.

Typically the decision to move in bad weather is made by the master of the tug. Articulated tug barges (ATBs) can handle rough weather better compared to regular barges with conventional toll lines.

Finally supply constraints can also be driven by economic factors and physical shortages of available goods. A good example of this is the arbitrage between the East Coast and NW Europe in gasoline and diesel. Previously, the EU encouraged the use of more efficient diesel cars rather than gasoline powered cars through tax policy. Taxes have since been equalized in the EU but Europe still continues to buy more diesel powered cars than gasoline powered ones. Gasoline and diesel move back and forth depending on the relationship of prices on either side of the Atlantic Basin. Exhibit I-23 and Exhibit I-24 below show the net imports and the "arbitrage" price for gasoline and for ULSD. The arbitrage is much greater for gasoline than that for ULSD, along with the volumes.

Exhibit I-23: Gasoline Arbitrage, 2007-2011

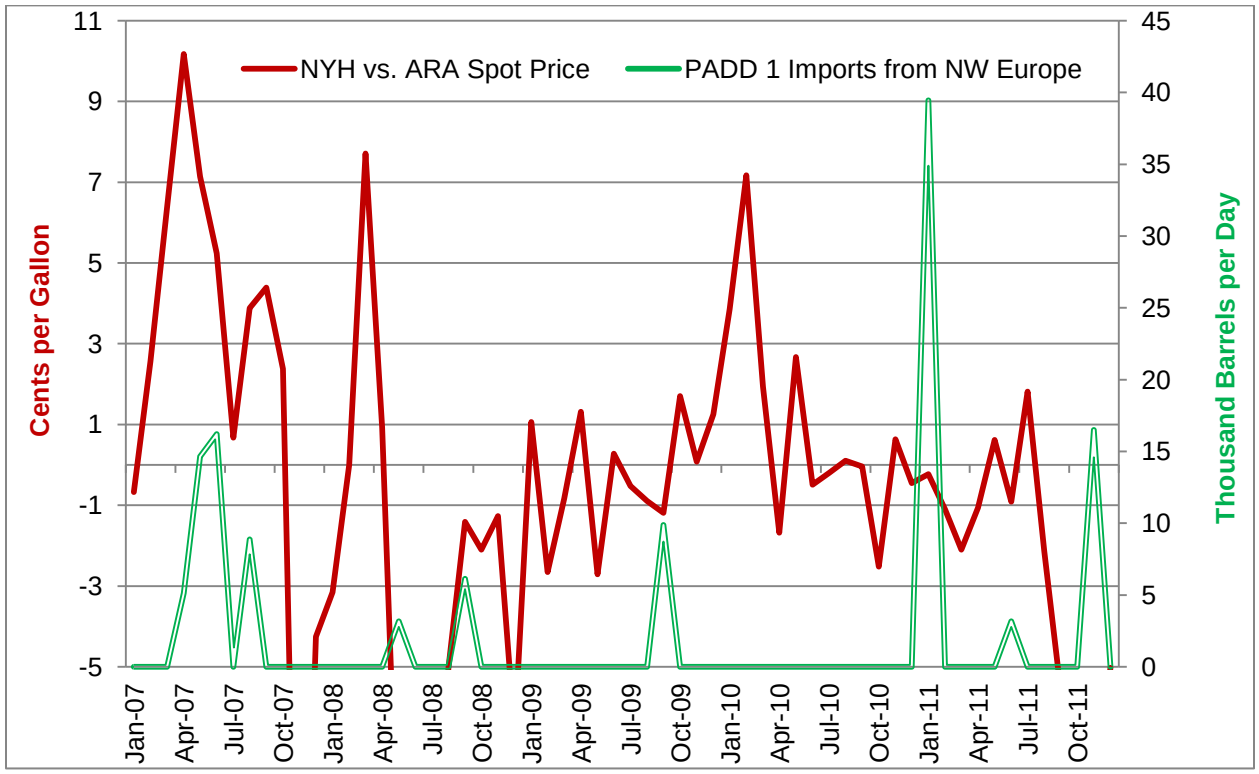


Source: EIA. "Petroleum & Other Liquids—Company Level Imports." Available at: http://www.eia.gov/petroleum/imports/companylevel/

Bloomberg RBOB NYH Spot Price (ticker symbol: RBOB87PM Index).

Bloomberg 95RON ARA Spot Price (ticker symbol: MOGE95FB Index).

Exhibit I-24: USLD Arbitrage, 2007-2011



Source: EIA. "Petroleum & Other Liquids—Company Level Imports." Available at: http://www.eia.gov/petroleum/imports/companylevel/

Bloomberg ULSD NYH Spot Price (ticker symbol: DIEINULP Index).

Bloomberg ULSD ARA Spot Price (ticker symbol: DIEN10PM Index).

Data Integrity and Issues: Petroleum Supply

A primary goal of this report is to show the sources, transportation channels, and disposition of petroleum products entering, leaving and being consumed in NYS. Assessment of this supply chain for key transportation fuels will allow the readers to understand the important sources and infrastructure necessary to sustain supply of petroleum fuels in New York State.

The supply of fuels into New York State involves all modes of transport: pipeline, marine, rail, and truck. Product also moves out of New York State by all of these methods (except pipeline) to adjacent states. There is no one database that tracks all movements of petroleum products, however, there are a number of reliable sources of information for each transport mode, as well as other sources where the data presented may or may not be comprehensive, or may cover areas broader than just New York State. The various sources used and comments on the data quality are noted below:

EIA: EIA data is generally very reliable, and is essentially complete through 2011. It was used to identify volumes of products consumed in New York State ("Prime Supplier" sales). Cross checks for gasoline and diesel fuel with NYS tax records confirm the data is sound, although jet fuel sales data appears very low, perhaps due to how jet fuel transactions occur. EIA data was also used for stocks (inventory) trends and import volumes. The import volumes are reliable but in some cases imports listed as into New York State, according to the EIA record file, were received into New Jersey terminals, so import volumes needed to be carefully reviewed to determine volumes actually delivered into NYS. Import volumes were also used to assess refinery runs by refinery on the East Coast. Export volumes are not reported on a state-level basis by EIA, only by PADD, however, there was an alternative option for exports (see below).

Federal Highway Administration: The FHWA has a Freight Analysis Framework tool (*Freight Analysis Framework Data Extraction Tool* (http://faf.ornl.gov/fafweb/Extraction1.aspx) which tracks shipments of commercial goods by pipeline, truck, rail, water, and "multi-modal". The FAF database is complete through 2010. There are categories for petroleum products which allow assessment of volumes moving into and out of New York State aggregated from all the states sourcing product. The "FAF" data are useful but appear to have a number of results that are inconsistent with other sources. For example, the FAF gasoline pipeline shipments from New Jersey into New York State show volumes that are 10 percent or less of known pipeline movements. Waterborne movements appear significantly higher than shipments directly into New York State, however, there could be multiple accounting for shipments into New York Harbor and then into NYS terminals. Rail movements for gasoline and distillates from FAF appear reasonably close to information provided by Rail Industry sources. Truck movements of gasoline and distillates into New York State appear to be higher than expected, but truck movements out of New York State also appear higher. For example, in 2010 the FAF system showed about 33,000 b/d gasoline exported to Vermont from New York State, about half by rail and half by truck. Vermont gasoline consumption (per EIA) was 23,000 b/d in 2010. This could mean FAF is wrong, but could also mean that some of the volume moved to Vermont was delivered into New Hampshire or Massachusetts. The FAF data also does not segregate distillate fuel oil from residual fuel oil, which can lead to uncertainty in transport modes such as waterways and truck.

Army Corps of Engineers (ACE) Waterway Data: The ACE data tracks movements of commodities of all types into and out of ports in the U.S. The ACE data are complete through 2010. ACE data are also useful but are an example of how data may cover multiple areas. The ACE data show very high movements of gasoline and distillate into "New York State", however, it appears that these data may mean "New York Harbor", not New York State. The ACE data does list foreign export volumes from New York State (which is more detail than EIA provides), however, it may be exports from "Harbor" sources, which would generally be New Jersey.

Commercial and Association Sources: Data from these sources were also used from specific company websites or SEC 10-K filings, which provide generally reliable information (although specific to individual companies). Commercial entities such as Poten and Partners (who provided Marine analysis for this report) track spot marine charter activity in the Northeast. Poten estimates that 75-80 percent of marine movements are spot charter transactions. Therefore ICF utilized Poten estimates of movements as being reliable reflections of movements from specific sources to destinations. In addition, data were gathered from rail companies and associations on movements of products (in particular ethanol, which is discussed in the biofuels section).

The available data on petroleum movements, stocks, supply, and sales provides sufficient information to identify and assess the major supply and demand factors impacting New York State. However, anomalies in some of the data sources preclude a rigorous analysis of the specific supply and demand volumes for each product by each mode of transport.

Supply Sources to NYS: Biofuels

Ethanol Supply Chain

As illustrated in Exhibit I-25, the ethanol supply chain begins with the production and transport of the feedstock. In the U.S., corn is the main feedstock, with switchgrass and other cellulose feedstocks expected to become more common in the future. The largest feedstock suppliers are located in the Midwest, which then transport feedstock to nearby production facilities. The production facilities convert the raw feedstocks into ethyl alcohol (ethanol) through fermentation of the feedstock sugars. Ethanol supplies designated for fuel use are then "denatured," in which toxic substances or bittering agents are added to prevent human consumption.

Ethanol[56] is then transported, primarily via rail car, between large supply sources and receipt points. The largest supply routes are between the Midwest, where the largest feedstock supplies and production facilities are located, and the coasts, where the largest fuel consumption occurs. CSX, one of the largest Class I rail lines delivering ethanol to the U.S. Northeast, delivers roughly 70 MMbbl of ethanol annually, 60 percent of which (over 40 MMbbl) is transported by rail to the U.S. Northeast.[57] While data by each rail company is difficult to obtain, for comparison purposes, NYS ethanol consumption for 2010 (13.7 MMbbl) comprises roughly one-third of CSX's volumes shipped to the U.S. Northeast.[58]

Ethanol is delivered to NYS primarily by unit train deliveries from the Midwest. Net rail shipments to NYS of 9.8 MMbbl equaled over 70 percent of the State's total consumption of 13.7 MMbbl in 2010.[59] Another share of NYS ethanol consumption is comprised of in-state ethanol production, with annual production of 1.2 MMbbl, a figure that has the potential to reach nearly 3.2 MMbbl with the opening of the Sunoco ethanol facility in 2010.[60] In terms of NYS' ethanol production potential, in addition to the two ethanol production plants, Mascoma has an ethanol pilot facility, which focuses on production of cellulosic (switchgrass) feedstocks, though

[56] Hereafter "ethanol" refers to denatured fuel ethanol.

[57] Phone and email correspondence with CSX representative, April 2012.

[58] EIA. "State Energy Data System—Table F4: Fuel Ethanol Consumption Estimates." 2010. Available at: http://www.eia.gov/state/seds/hf.jsp?incfile=sep_fuel/html/fuel_use_en.html

[59] Industry sources.

[60] U.S. Department of Agriculture. "USDA Biofuels Strategic Production Report." Annual ethanol truck shipments as of March 2010. June 23, 2010. Available at: http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf

EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://38.96.246.204/petroleum/imports/companylevel/archive/ [http://www.eia.gov/petroleum/imports/companylevel/ (a more general URL) or http://www.eia.gov/petroleum/imports/companylevel/archive/ (for 2011 imports by month) for this source.] Accessed January 19, 2012.

Debra J. Groom. "Ethanol plant in Volney moves closer to full production," *Syracuse Online*. January 5, 2010. Available at: http://www.syracuse.com/news/index.ssf/2010/01/ethanol_plant_in_volney_moves.html. Industry sources cite a total capacity of 85 billion gallons (2 MMbbl), rather than the 100 billion gallons (2.4 MMbbl) figure cited in the article.

no other production facilities are planned, given the expiration on domestic ethanol production subsidies.[61]

There were few foreign imports of ethanol into NYS in 2010 (160,000 barrels), which arrived from Canada via rail.[62] NYS ethanol supplies also include occasional waterborne imports (730 Mbbl in 2010), shipments transported from other states via truck or short line (rail) (1.2 net MMbbl in 2010[63]). In previous years, NYS received (marine) imports from Brazil, other parts of South America, the Caribbean, and Canada. With the expiration of both the subsidy to domestic ethanol producers and the tariff on ethanol imports earlier this year, the U.S. may see a rise in (waterborne) ethanol imports.[64] Import levels will ultimately be dictated by U.S. ethanol market prices versus prices in Brazil and freight rates.

Regarding ethanol truck imports to NYS from other states, it is possible, given the well-developed unit train delivery structure of northern New Jersey (discussed in further detail in Section II), that a share of ethanol shipments into northern New Jersey terminals are then transported to NYS for consumption. In 2009 and 2010, New Jersey saw total rail imports of 32-33 MMbbl each year, much of which is likely delivered into northern New Jersey distribution terminals.[65] The NYS/northern New Jersey areas appear to be a large hub for ethanol supplies carried from the Midwest as volumes transported into the area exceed local demand.

Unit train deliveries from the Midwest, by far the largest ethanol supply source to NYS, involve dedicated rail trains of 60-100 railcars (43-72 Mbbl[66]) that transport ethanol into major ethanol distribution hubs in Albany and northern New Jersey. From these receipt terminals, ethanol moves primarily by truck, but also by barge and local rail lines (short lines), into primary distribution terminals where ethanol is rack blended with RBOB or CBOB gasoline blendstock for delivery as E10 to service stations. In 2009, roughly 500 storage terminals nationwide maintained ethanol storage, though just 88 had rail car access, highlighting a potential need for increased rail access to terminals.[67] The NYS/northern New Jersey region, however, has excellent assets to facilitate rail access, and although (waterborne) ethanol imports have dwindled in recent years, the region is equipped to handle significant import volumes of ethanol if the market dictates. This was illustrated by the high volume of ethanol imports in 2006, which reached 7 million barrels (20 Mb/d) into the NYS and northern New Jersey region.[68]

[61] Mascoma, "Our Facilities." 2011: . Available at: http://www.mascoma.com/pages/sub_business03.php

[62] U.S. Energy Information Administration. "Petroleum & Other Liquids—Company Level Imports." 2011. Available at: http://38.96.246.204/petroleum/imports/companylevel/archive/. Accessed January 19, 2012.

[63] U.S. Department of Transportation, Federal Highway Administration. "Freight Analysis Framework Data Extraction Tool." 2012. Available at: http://faf.ornl.gov/fafweb/Extraction1.aspx

[64] Robert Pear. "After Three Decades, Tax Credit for Ethanol Expires," *New York State Times*. January 1, 2012: . Available at: http://www.nytimes.com/2012/01/02/business/energy-environment/after-three-decades-federal-tax-credit-for-ethanol-expires.html

[65] Industry sources.

[66] This assumes a rail car capacity of 30,000 gallons (714 bbl).

[67] U.S. Department of Agriculture. "Study of Rural Transportation Issues." p. 136. April 27, 2010: Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

[68] EIA. "Petroleum & Other Liquids—Company Level Imports." DATES. Available at: http://38.96.246.204/petroleum/imports/companylevel/archive/. Accessed January 19, 2012.

CSX, NYS' primary supplier of Midwestern ethanol, serves a total of 18 unit train[69] terminals in the U.S. Northeast, three of which are located in NYS and northern New Jersey: Buckeye Terminal (Albany, NY), Linden Transload Terminal (Linden, NJ), and Motiva Enterprises (Sewaren, NJ).[70] While CSX does emphasize unit train distribution when demand supports unit train quantities, the rail line also serves another six ethanol distribution terminals in NYS and northern New Jersey: IMTT (Bayonne, NJ), Kinder Morgan (Carteret, NJ), TRANSFLO (Elizabeth, NJ), Kinder Morgan (Perth Amboy, NJ), Sunoco (Tonawanda, NY), and Apex Oil (Rensselaer, NY).[71]

The Buckeye Terminal in Albany is one of CSX's largest and most efficient rail terminals, and supports much of ethanol consumption in NYS/New Jersey markets, as well as surrounding areas.[72] In addition to transporting ethanol into NYS, CSX also moves corn, used for ethanol production, into Medina, NY and Fulton, NY to support the State's two ethanol production facilities, Western NYS Energy and Sunoco, respectively[73]. Exhibit I-25 illustrates the ethanol supply chain.

[69] A unit train, or "block train" is a train in which all cars are shipped from one origin to one destination. This type of train differs from a traditional manifest rail car, which can be split up along the route or stored en route to the final destination. A unit train typically carries only one commodity is meant to simplify rail freight transport for large-volume transport of goods, such as ethanol.

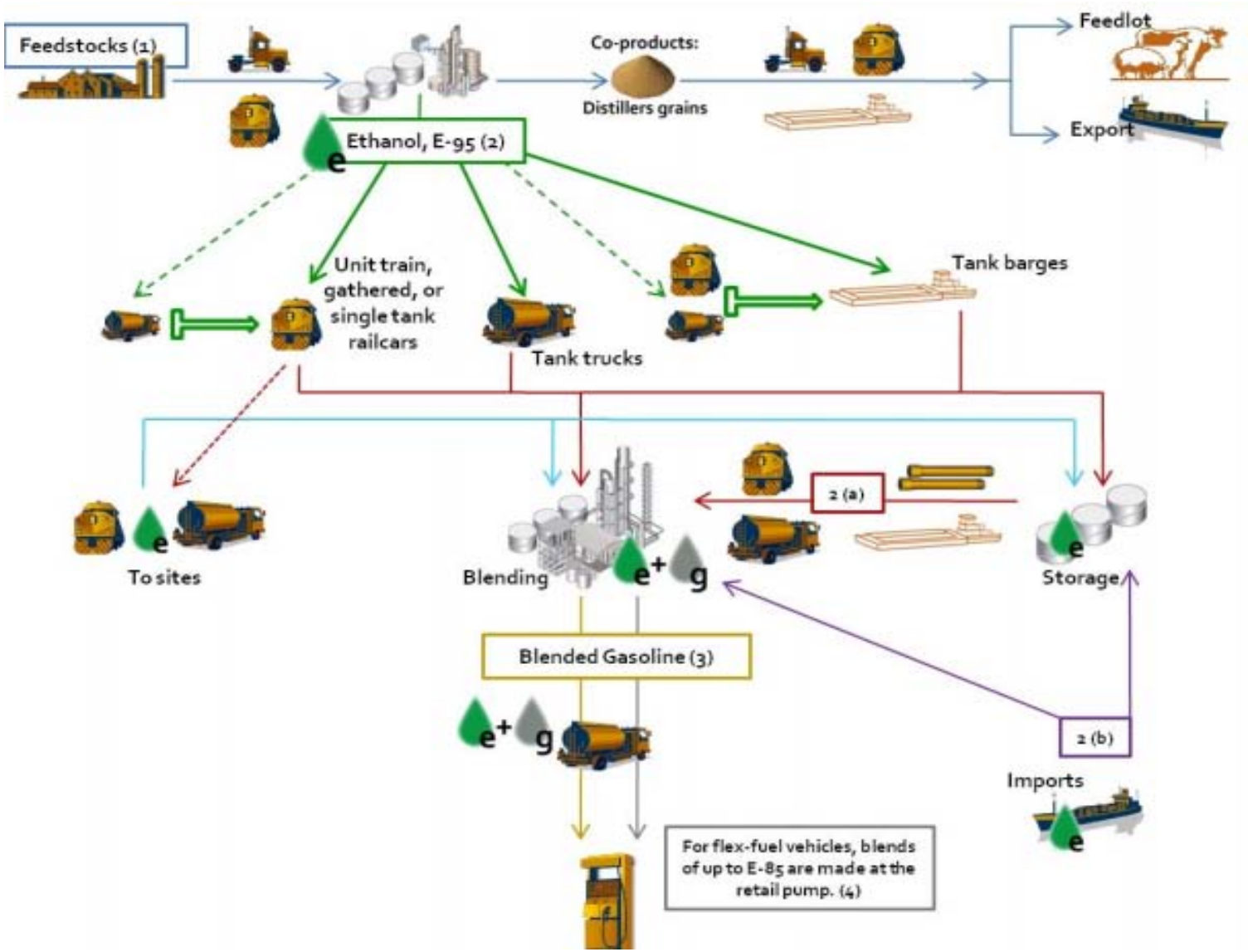
[70] CSX. "EthX—Express Ethanol Delivery: List of Ethanol Distribution Terminals." CSX, 2012: Jacksonville, FL. Available at: http://www.csx.com/index.cfm/customers/commodities/agricultural-products/services/ethx-express-ethanol-delivery/

[71] *Ibid.*

[72] *Ibid.*

[73] Note: Section II discusses NYS' specific biofuels infrastructure, including terminals, production facilities, and rail line routes in more detail.

Exhibit I-25: Ethanol Supply Chain and Transportation Patterns



Legend

(1) Feedstocks via truck or rail to the biorefinery.

(2) Ethanol, which is denatured at the biorefinery, is shipped via truck, rail, or barge to a storage hub, petroleum or blending terminal, or rail-to-truck transloading (*truck-to-rail and truck- or rail-to-barge are intermediate moves*).

- (a) Ethanol via truck, rail, barge, or pipeline from storage to blending terminal.
- (b) Ethanol imports via ocean tanker vessel to storage or blending terminals.
- (c) Ethanol via truck from rail-to-truck transloading to storage or blending.

(3) Ethanol and gasoline are blending at the meter and shipped via gasoline trucks from blending terminal to service stations.

(4) E85 blends are currently typically blended at the service stations serving E85, implying that ethanol is also delivered via truck to the service stations.

Source: U.S. Department of Agriculture. "Study of Rural Transportation Issues." April 27, 2010. Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

Ethanol Pipeline Transport Feasibility

The ethanol infrastructure is not currently compatible with the pipeline-based petroleum infrastructure. Ethanol cannot be sent via petroleum pipelines for a number of reasons. Ethanol is a hygroscopic[74] miscible[75] substance, meaning that while petroleum products do not absorb water, ethanol will take in any water molecules contained along the way in a pipeline, which can lead to corrosion of the pipeline, as ethanol (as an alcohol) and water both cause corrosion. In addition, ethanol is denser than petroleum products such as gasoline, diesel, and jet fuel, and will settle at the low points of the pipeline. Petroleum products moving through the pipeline will then pick up the settled ethanol, effectively changing the structure of that petroleum product. Ethanol also picks up any dirt in the pipeline, which introduces impurities into the ethanol itself. While ethanol supplies typically move from the Midwest to the coasts, petroleum products are sent in the opposite direction, carrying product to the middle of the country.

In terms of the likelihood for dedicated (ethanol-only) pipelines, long-distance pipelines are not economically viable due to cost and low volumes to justify the investment without governmental support. Short-distance dedicated lines, linking distribution hubs to nearby terminals, are much more likely. Kinder Morgan has a unit train that delivers ethanol from the Midwest to Tampa, FL where it is piped to Orlando, along with gasoline supplies, though the project has required significant retrofitting investment and related equipment to support ethanol.[76] Kinder Morgan also recently announced construction of a 16-inch *dedicated* ethanol pipeline linking its facilities in Linden and Carteret, New Jersey.[77]

The ethanol pipeline project complements a storage expansion project at its Carteret location, which will add more than one MMbbl of storage to its nearly eight MMbbl of storage capacity for petroleum and biofuels products. The Carteret terminal is Kinder Morgan's largest NYH terminal.[78] The Linden terminal can handle 36 Mb/d of ethanol with a total ethanol storage capacity of 550 Mbbl through Citgo Petroleum's Tremley Point terminal. The pipeline will link Kinder Morgan's unit train receiving terminal in Linden to storage tanks in Carteret, allowing more flexibility in accessing ethanol. The company anticipates that an additional 195 Mbbl of storage will support domestic demand, though the system is also designed for export.

Potential Ethanol Supply Disruption Issues

Ethanol disruptions are possible at any point along the supply chain, including Midwestern production facilities, derailments along the Midwestern corridor to the East Coast, or at distribution terminals. NYS is supplied primarily by CSX, though other rail lines such as Norfolk

[74] Hygroscopic substances easily attract and absorb water molecules.

[75] Miscible substances are those that mix at the molecular level to produce a smaller volume than that of each substance alone.

[76] Kinder Morgan Energy Partners, LP. "KMP Begins Commercial Operations of Ethanol Transportation on Central Florida Pipeline System." December 2, 2008. Available at: http://phx.corporateir.net/phoenix.zhtml?c=119776&p=irol-newsArticle&ID=1231520

[77] Thomson Reuters. "Kinder Morgan completes New Jersey ethanol pipeline." April 3, 2012. Available at: http://www.reuters.com/article/2012/04/03/kinder-morgan-ethanol-pipeline-idUSL2E8F36VZ20120403

[78] Jim Lane. "Kinder Morgan completes ethanol pipeline between New Jersey and New York State," *Biofuels Digest*. April 4, 2012. Available at: http://www.biofuelsdigest.com/bdigest/2012/04/04/kinder-morgan-completes-ethanol-pipeline-between-new-jersey-and-new-york/

Southern also supply the region. During 2011, there were few disruptions and those that did occur did not appear to affect NYS' access to supply or overall ethanol prices.

While disruptions have been minimal, it is important to note that disruptions in the ethanol supply chain can have a serious impact on gasoline supply and could lead to the inability to load gasoline of suitable quality for delivery to service stations. The two key blendstocks produced by refiners to meet finished E10 gasoline quality (RBOB and CBOB) both have lower octane levels (83-84 octane) than finished motor gasoline (87+ octane). When ethanol, which has a much higher octane level than finished motor gasoline, is blended with RBOB or CBOB it produces 87+ octane finished motor gasoline. Therefore, shortages of ethanol at terminals can create shortages of gasoline immediately.

There were minimal disruptions at biofuel refineries reported in 2011, with the most significant being a two-day outage at the Quad County Corn Processors' ethanol plant in Iowa due to a tornado.[79] In the case of large-scale supply disruptions, reductions of Midwest ethanol supply would trigger much higher ethanol prices and likely attract imports (primarily Brazil). However, prices would have to rise sufficiently high to cover freight cost and profit to make the ethanol available.

There were also four rail-related events in 2011. The most serious of these was a Norfolk Southern derailment of a train carrying 62 railcars of ethanol in Arcadia, Ohio in February.[80] The derailment involved 31 of the cars, and eight of the cars exploded. Another 131-car train, 7-9 of which held ethanol, derailed in Illinois in October 2011, which also resulted in 26 cars exploding.[81] Three of the 12 cars carrying alcohols derailed in Oregon in May and caught fire, and there were also two cars that derailed in Texas in September which involved ethanol leaks.[82] None of these derailments appeared to impact ethanol supply or pricing.

Potential ethanol supply disruptions center on the State's ability to receive rail shipments from the Midwest, though expiration of the tariff on ethanol imports may expand NYS' ethanol supply base to include a larger share of waterborne imports from the Caribbean and parts of South America (particularly Brazil).

In addition to expanding supply sources with the expiration on ethanol tariffs, the East Coast ethanol inventory has nearly doubled over the past five years, particularly at bulk terminals. In

[79] Sioux City Journal. "Arthur tornado rated an EF2; Galva twister an EF1," *Sioux City Journal*. April 10, 2011. Available at: http://siouxcityjournal.com/news/local/article_c9730e84-63a4-11e0-a34b-001cc4c002e0.html

[80] Associated Press. "Ohio Train Fire Contained After Explosion," *AOL News*. February 6, 2011. Available at: http://www.aolnews.com/2011/02/06/train-derailment-in-arcadia-ohio/

[81] USA Today. "Fiery train derailment in Illinois leads to evacuation." October 7, 2011. Available at: http://www.usatoday.com/news/nation/story/2011-10-07/us-derailment-fire-illinois/50687066/1

[82] Kimberly A.C. Wilson. "Train derailment near Scappoose: Crews keep distance from 2 alarm hazmat fire," *Oregon Live*. May 4, 2011. Available at: http://www.oregonlive.com/pacific-northwest-news/index.ssf/2011/05/hazmat_crews_firefighters_respond_to_train_derailment_near_scappoose.html

ABC 13 News. "Train derailment forces evacuations in Galveston Co." September 14, 2011. Available at: http://abclocal.go.com/ktrk/story?section=news/local&id=8353574

total, fuel ethanol stocks rose from 3.4 MMbbl in 2007 to 6.2 MMbbl in 2011, as seen in Table I-17.[83]

Table I-17: East Coast (PADD 1) Ending Stock of Fuel Ethanol by Source (MMbbl)

Year	Million Barrels (MMbbl)		
	Total Ending Stocks	Refinery Stocks	Bulk Terminal Stocks
2007	3.4	0.1	3.3
2008	4.7	0.1	4.6
2009	6	0.2	5.8
2010	5.7	0.2	5.5
2011	6.2	0.2	6

Source: EIA. "Stocks by Type: East Coast (PADD 1) Fuel Ethanol in Annual-Thousand Barrels." 2012. Available at: http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

Note: Figures converted from Annual-Thousand Barrels to Annual-Million Barrels.

Ethanol disruptions at distribution terminals would mean that RBOB and CBOB cannot be blended into finished gasoline, so the ethanol supply is critical. Disruptions at this point in the supply chain would clearly lead to inability to load gasoline of suitable quality for delivery to service stations, since RBOB and CBOB products are typically 83-84 octane without ethanol. Consequently, an ethanol outage would lead to the need to source ethanol from more distant locations (or locate an ethanol source to truck into the terminal). To date there do not appear to have been any gasoline supply disruptions due to ethanol supply shortages, however, potential exists for this to occur in 2012 due to the drought situation in the U.S. Midwest and the temporary closure/idling of several ethanol plants due to poor economics associated with high corn prices.

Any relaxation of the RFS to mitigate ethanol supply problems will require additional gasoline supply to offset the loss of ethanol in the supply chain. Since ethanol's Btu content is only 70 percent of gasoline, a loss of all ethanol supply in the U.S. gasoline pool (10 percent) would require an additional seven percent of gasoline supply and increase in gasoline component octane levels to offset the ethanol loss.

Biodiesel Supply Chain

The biodiesel supply chain is on a much smaller scale than that of ethanol, and consists largely of local facilities producing biodiesel for NYS markets, as well as some shipments from out of state. The majority of diesel fuel in this region is blended to the B5 level.[84]

In 2003, NYSERDA published a feasibility study on the potential to develop a biodiesel industry in NYS. The study initially estimated NYS could produce approximately 40 million gallons (950

[83] EIA. "Stocks by Type: East Coast (PADD 1) Fuel Ethanol in Annual-Thousand Barrels." 2012. Available at: http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

[84] Phone interview with John Vavalo, Northern Biodiesel, April 3, 2012.

Mbbl) of biodiesel using soybeans and yellow fat originated in NYS.[85] In 2012, NYS has two established biodiesel facilities: Northern Biodiesel, with an annual production capacity of over 15 million gallons (360 Mbbl) and TMT Biofuels, with production capacity of 250,000 gallons (6 Mbbl). Another biodiesel facility, Metro Biofuels, Inc., is expected to come online in fall 2012, with an annual production capacity of 110 million gallons (2.6 MMbbl). These facilities use waste vegetable oil as their primary feedstock (see Table II-19 for plant specifications).

Biodiesel supply in the Rochester and Buffalo, NY areas are primarily brought in by rail and truck. Biodiesel is transported primarily by specialized trucks, and in some cases, rail cars, which have heated coils to keep the fuel from gelling. While NYS obtains the majority of its biodiesel from in-state producers, out-of-state supplies can be in from as far away as Atlanta, GA, according to industry sources. The biodiesel balance between in- and out-of-state supplies depends largely on market conditions and the impact of government incentives to achieve state and federal renewables mandates. Actual data on biodiesel volumes produced in, imported into, and consumed in NYS remain opaque, though current annual volumes produced in-state total roughly 50-73 Mbbl, in addition to a number of small-scale facilities[86] producing for local markets.[87] Total biodiesel volumes may increase considerably with the addition of Metro Fuel Oil as a biodiesel producer. In addition to production in-state, 2010 saw 11 Mbbl of biodiesel imports from Canada into Buffalo, NY, as well as a number of imports from surrounding states.[88]

Limited data is available on the total biodiesel volumes moving in and out of NYS. While biodiesel comprises a small share of NYS fuel consumption, improving the transparency of biodiesel movements in and throughout NYS will be vital to assessing potential supply shortage issues associated with compliance with additional renewables mandates. Given the large proportion of biodiesel volumes that are truck-transported, a primary source for biodiesel volumes may be trucking companies and organizations.

[85] New York State Energy Research and Development Authority. “Statewide Feasibility Study for a Potential New York State Biodiesel Industry.” June 2003. Available at: http://www.ascensionpublishing.com/BIZ/newyorkplan.pdf

[86] Small-scale facilities are defined here as those producing less than 40,000 gallons (about 1 Mbbl) annually.

[87] Industry sources.

[88] EIA. “Petroleum & Other Liquids Company-Level Imports Archive: 2011 Imports by Month”: Available at: http://www.eia.gov/petroleum/imports/companylevel/archive/

Data Integrity and Issues: Biofuels Supply

This report attempts to characterize the supply and flow of biofuels into and out of NYS. While more information is available on ethanol movements, particularly rail movements (the primary mode of transportation for ethanol shipments into NYS), very little information is available on state-level aggregate movement and supply of biodiesel. For both ethanol and biodiesel, a variety of sources were used to assess the supply chain infrastructure. While some sources contradicted others, certain sources were favored over others and assumptions were made to rectify these contradictions wherever possible.

Although marine, rail, and truck movements are utilized in biofuels transport around NYS, the ethanol section focused mainly on rail shipments, given the large role that rail lines play in ethanol transport to NYS and availability of data. For biodiesel, publicly available data is included when available, though aggregate consumption and supply figures are not available. Thus, the biodiesel section is more qualitative and includes an extensive discussion of policy issues surrounding biodiesel demand and supply.

ICF has attempted to provide a broad overview of NYS' biofuels network, though given the public nature of this document, specific information on was often unavailable due to confidentiality or security issues.

Sources include:

- EIA for company-level imports, ethanol consumption, and ethanol stocks
- U.S. Department of Agriculture for NYS ethanol production as of March 2010
- Poten and Partners for ethanol marine movements
- U.S. Department of Transportation, Federal Highway Administration: Freight Analysis Framework Data Extraction Tool: (http://faf.ornl.gov/fafweb/Extraction1.aspx) for ethanol trucking estimates
- CSX for CSX-specific rail line information
- Various interviews with industry participants and experts
- Other publicly available data

Section II Inventory of NYS Transportation Fuels Infrastructure

Overview

This section examines the major infrastructure supporting the distribution of petroleum fuels to New York including primary terminal storage at ports, pipeline terminals, or railway terminals. Secondary terminal storage is also examined as it is critical for the distribution of the products to the end users, a point that will be discussed in Section III.

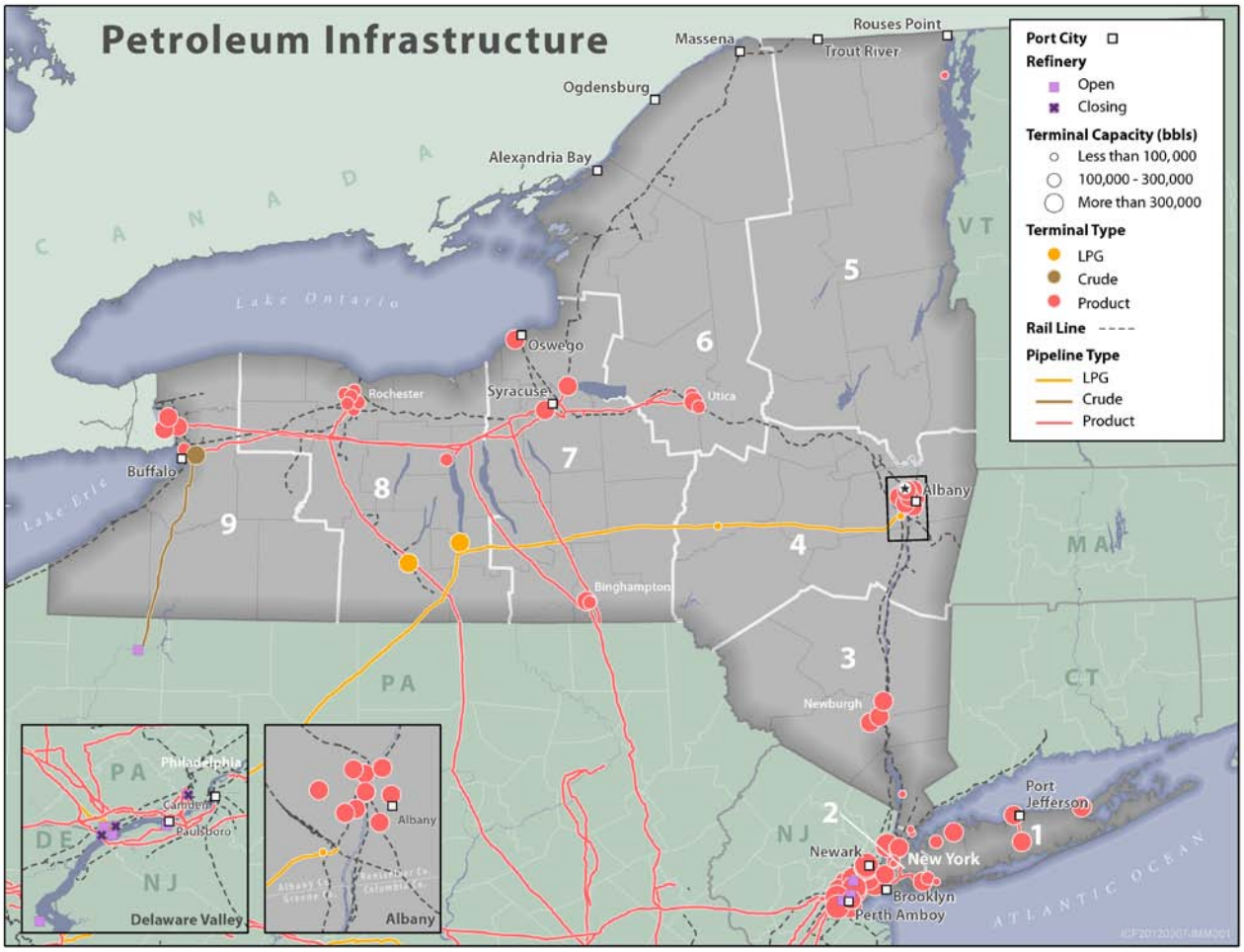
While the focus of the assessment is a current snapshot of the infrastructure, this report has also examined likely changes in the next few years, some driven by constraints in the infrastructure and some driven by state and federal regulatory changes to transportation fuels. As NYH accesses the North Atlantic Basin market, particular attention is paid to NYS marine ports and facilities, and to the likely congestion as overall global trade increases in the future.

Petroleum Pipeline and Terminal infrastructure

The U.S. is filled with an interconnected web of petroleum and petroleum product pipelines and storage terminals. This energy infrastructure works to reliably supply liquid fuels (e.g., motor gasoline, diesel fuel) by transporting them from production regions to markets across the country. The petroleum network in NYS is comprised of various pipeline and storage terminal assets as well that operate to supply the State and surrounding areas with a variety of fuels. Since NYS is not home to any petroleum refineries, the State relies entirely on the movement of petroleum products from other markets.

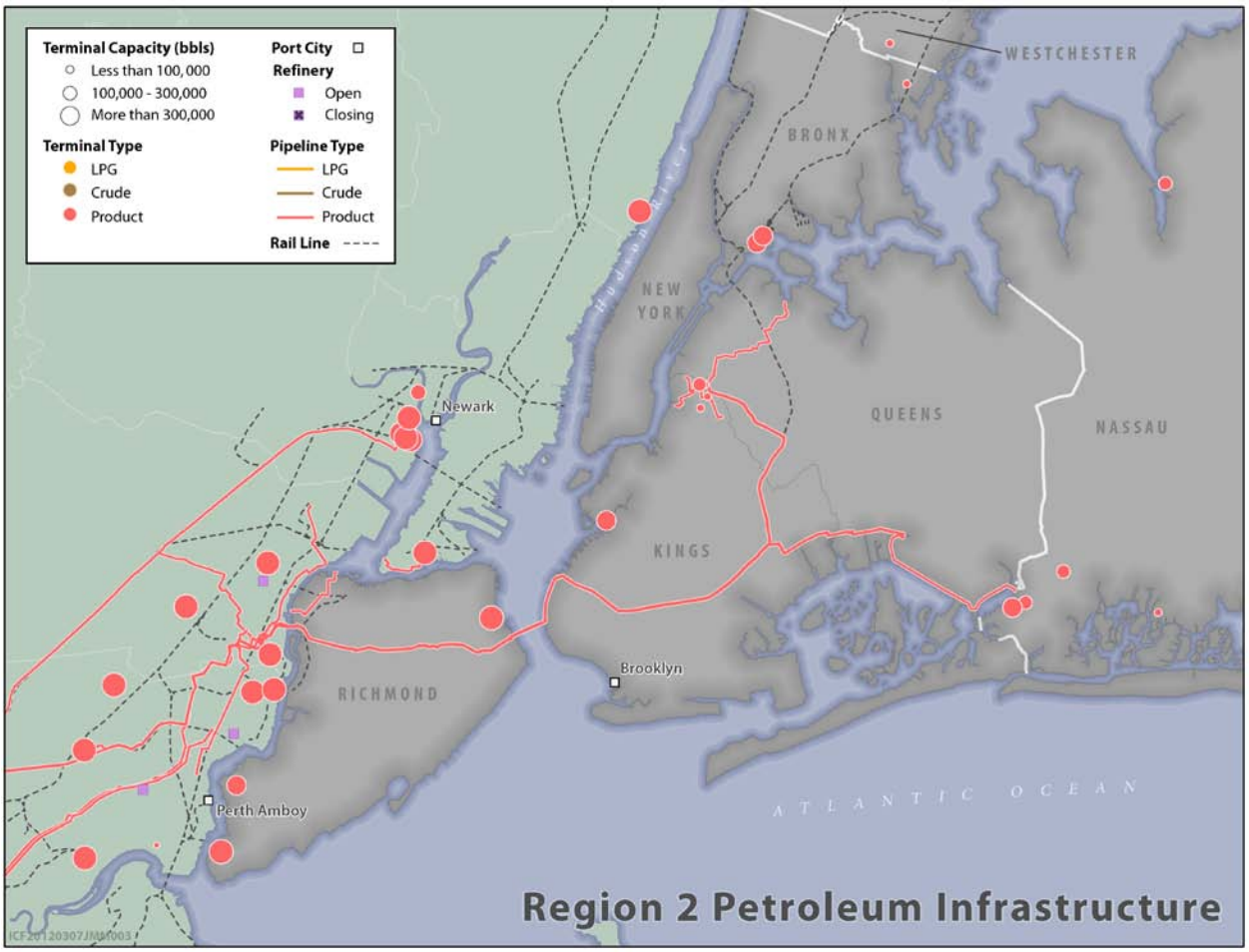
This section of the report will present the different petroleum asset types in NYS and highlight the individual assets that are of particular importance to the supply of petroleum products into and around the State. Exhibit II-1 and Exhibit II-2 below are maps of the petroleum assets in NYS and DEC Region 2, respectively.

Exhibit II-1: NYS Petroleum Infrastructure Map



Source: OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.
Graphic Information Systems (GIS) ESRI ArcGIS Mapping Software.

Exhibit II-2: Region 2 Petroleum Infrastructure Map



Source: OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.
Graphic Information Systems (GIS) ESRI ArcGIS Mapping Software.

Petroleum Pipelines Supplying NYS

The most efficient method for transporting liquids in large quantities is via pipeline. The State relies heavily on intra- and interstate pipelines for fuel supply (marine and rail are other modes of supply). There are seven main pipeline systems that operate to either directly or indirectly supply NYS with petroleum products.

Buckeye Partners, L.P. operates the most extensive petroleum product pipeline network in NYS. The system is comprised of several different pipelines that are connected to 22 terminals for a total access capacity of 4.7 MMbbl. Buckeye owns the majority of the capacity residing along its system, which includes 10 terminals with over 2.6 MMbbl of capacity.[89] The pipeline operates in two main segments. One segment moves product west from Linden junction to Macungie, PA, then north on two lines from Macungie. These lines diverge in southern NYS and continue north to the Auburn, NY area where both split east-west. From there two lines run east to Brewerton

[89] OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

and Utica, while the other two lines run west to Rochester and Buffalo. The other main segment of Buckeye's system runs from its distribution hub in Linden, NJ to terminals in the New York City/Long Island region, which includes destination terminals at LaGuardia and JFK airports.[90]

Colonial Pipeline Co. owns and operates one of the major petroleum product arteries on the East Coast. This system transports products from the refining centers in the U.S. Gulf Coast throughout the southeastern U.S., up through the Atlantic Coast where it terminates in northern New Jersey, moving product into the Buckeye Linden hub, other terminals in northern New Jersey, and Kinder Morgan's terminal on Staten Island. From this staging point, product can be redistributed along a variety of other distribution systems (including marine vessels) to destinations throughout NYS and the Northeast.

Although the International-Matex Tank Terminals (IMTT) pipeline only spans a few miles and does not supply any storage capacity in NYS, it is a very important asset to the NYS petroleum product market due to its volume and connection points. The pipeline connects the company-owned Bayonne, NJ terminal, a massive 15.4 MMbbl storage facility, with the Buckeye Linden hub from which product can be redistributed throughout the State as mentioned before.[91] Furthermore, the pipeline can reverse direction and move product from Linden to Bayonne for outloading onto marine vessels.

Sunoco Logistics operates the second most extensive petroleum pipeline system in NYS. Two pipelines transport products from the Philadelphia region refineries, north through New Jersey to distribution centers in northern New Jersey. One is the "Harbor Line," which is a 16-inch diameter pipeline that terminates in Linden, NJ. The second line, known as the "Newark Line," runs north and west of the Harbor Line and it is a 14-inch diameter pipeline that ends in terminals in Newark, NJ. From Linden, the Harbor line volumes can access the Buckeye Linden hub to potentially re-route volume into upstate New York or other marine terminals. The other segment of the Sunoco system moves product through Pennsylvania into upstate New York and terminates in Rochester and Tonawanda (Buffalo).[92] The pipeline system is connected to 6 terminals in NYS with a combined capacity of over 2.3 MMbbl.[93]

Northville Industries Corp. operates a proprietary pipeline that spans 12 miles south from their outloading facility at Port Jefferson on Long Island to company-owned terminals in East Setauket and Holtsville. The two terminals have an aggregated capacity of 1.3 MMbbl.[94]

United Refining Co. owns the Kiantone pipeline, which transports crude oil from the company's 485 Mbbl tank farm in West Seneca, NY to its 65,000 b/d refinery in Warren, PA. The pipeline extends 78 miles and has a capacity of 70,000 b/d. United is the sole shipper along this pipeline, which essentially supplies all of the crude feedstock for the company's refinery. The

[90] Buckeye Partners, L.P. "System Map." Available at: http://www.buckeye.com/Portals/0/ShipperBook/SystemMap.pdf. Buckeye also has a line that supplies Newark airport with jet fuel.

[91] OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

[92] Sunoco Logistics. "Asset Map." Available at: http://www.sunocologistics.com/Customers/Business-Lines/Asset-Map/130/

[93] OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

[94] NIC Holding Corp. "About Northville Industries." Available at: http://www.northville.com/

vast majority of the crude oil shipped along this pipeline originates from Enbridge's pipeline in Ontario, Canada.[95]

The Enterprise Products Partners' pipeline is a liquefied petroleum gas (LPG) pipeline that transports LPG (propane) throughout upstate New York. The pipeline spans about 200 miles and directly feeds four terminals with an aggregated capacity of over 3.1 MMbbl, including large underground storage facilities in Watkins Glen and Savona, NY.[96] The pipeline has a throughput capacity of 42 Mb/d.[97] The pipeline terminates at the Selkirk, NY terminal south of Albany.

Table II-1 highlights the pipeline characteristics for the aforementioned pipelines.

Table II-1: NYS Pipeline Assets

NYS Pipeline	Pipeline Type	Company Owned in NY		Connected to Pipeline in NY		Pipeline Characteristics		
		Terminal Count	Terminal Capacity (bbl)	Terminal Count	Terminal Capacity (bbl)	Diameter in NYS (inches)	Length in NYS (miles)	Throughput Capacity (b/d)
Buckeye	Product	10	2,588,470	22	4,723,674	6 & 10-14	~550	
Colonial	Product	--	--	1	2,939,334		<1	
IMTT	Product	--	--	--	--		~2	
Sunoco	Product	4	920,300	6	2,357,363	8	~200	
Northville	Product	2	1,280,000	2	1,280,000	16-Dec	12	
Kiantone	Crude	1	485,000	1	485,000		78	70,000
Enterprise	LPG	3	1,209,228	4	3,109,228	8	~200	42,000

Sources: OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

SEC filings: Phillips 66 2011 SEC 10-K Filing. Year ended December 31, 2011. Available at: http://www.sec.gov/Archives/edgar/data/1163165/000119312512070636/d267896d10k.htm. Sunoco, Inc. 2011 SEC 10-K Filing. Year ended December 31, 2011. Available at: http://www.sec.gov/Archives/edgar/data/95304/000119312512085407/d264773d10k.htm. Hess Corporation 2011 SEC 10-K Filing. Year ended December 31, 2011. Available at: http://www.sec.gov/Archives/edgar/data/4447/000119312512081827/d270298d10k.htm. United Refining Company 2011 SEC 10-K Filing. Year ended August 31, 2011. Available at: http://www.sec.gov/Archives/edgar/data/101462/000119312511324609/d257760d10k.htm

Buckeye Partners, L.P. "System Map." Available at: http://www.buckeye.com/Portals/0/ShipperBook/SystemMap.pdf

Colonial Pipeline Company. "System Map." Available at: http://www.colpipe.com/ab_map.asp

Sunoco Logistics. "Asset Map." Available at: http://www.sunocologistics.com/Customers/Business-Lines/Asset-Map/130/

NIC Holdings Inc. "About Northville Industries." Available at: http://www.northville.com/

Vincent Di Cosimo. "Enterprise: A Market in Transition, A Presentation to the National Association of State Energy Officials." 2006. Available at: http://www.naseo.org/Events/shopp/2006/Presentations/Vincent%20Di%20Cosimo%20SHOPP%202006.pdf

[95] United Refining Company 2010 and 2011 SEC 10-K Filing. Year ended August 31, 2011. Available at: http://www.sec.gov/Archives/edgar/data/101462/000119312511324609/d257760d10k.htm

[96] OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

[97] Vincent Di Cosimo. "Enterprise: A Market in Transition, A Presentation to the National Association of State Energy Officials." 2006. Available at: http://www.naseo.org/Events/shopp/2006/Presentations/Vincent%20Di%20Cosimo%20SHOPP%202006.pdf

Regional NYS Petroleum Terminal Capacity

Petroleum products are delivered via multiple distribution systems into petroleum terminals across the State. Terminals serve a variety of functions including acting as a redistribution center to load petroleum products into other delivery networks for local marketing and distribution, or for movements onto other intra- and inter-state systems. In addition, terminals may serve as storage sites for large end-users such as airports and electric generating utilities, which need significant storage capabilities to meet episodic demand. Though terminals dedicated to end-users are not typically included with distribution terminals, they do need to be analyzed as their functions are critical and their asset capacities can be substantial. Appendix B of this report contains a complete listing of all the primary terminals in NYS and northern New Jersey as well as all the secondary terminals in NYS.

Table II-2 below shows the regional breakdown and total NYS terminal capacity of aboveground storage tanks at terminals with more than 400,000 gallons (9,524 barrels) of storage capacity.[98] Regions 1 and 2 encompass the NYC/Long Island area. The high population of this area drives demand, which in turn requires large amounts of storage capacity. Furthermore, Region 2 includes NYH, which is a staging point for imported product, from both domestic and foreign sources, to move into various systems destined for markets throughout the Northeast. The largest region in terms of storage capacity in NYS is Region 4. This region encompasses Albany and Rensselaer, which are northern termini for products shipped up the Hudson River from NYH for local consumption and redistribution inland, and is a main receipt point for ethanol rail deliveries from the Midwest.[99]

Over 32 percent of the storage capacity in NYS is for diesel and No. 2 fuel oil. These products are used for on-road diesel fuel (e.g., passenger cars, trucks, busses), off-road purposes (farm and construction equipment), and home heating fuel, which is used extensively in the Northeast.

No. 6 fuel oil tankage in the State is over 16 MMbbl, which constitutes 30 percent of the State's terminaling capacity.[100] No. 6 fuel oil is a heavy and viscous fuel that is used primarily as fuel for large ships, power generation by electric utilities, and for commercial and industrial heating purposes. Storage for No. 6 fuel oil in NYS is centered on regions 1-3, which include NYH (ship bunkering), large urban areas (power generation), large commercial buildings such as apartment complexes, and industrial centers (e.g., boilers). With trends to reduce use of No. 6 fuel and other heavy oils for commercial and residential heating, more use of less expensive natural gas for power generation, and reductions in sulfur level of bunker fuels, demand for No. 6 fuels may continue to decline.

[98] The NYS Regions are defined by the DEC at: http://www.dec.ny.gov/about/50230.html

[99] NYH storage excludes northern New Jersey storage facilities.

[100] Percentages based on DEC data for aboveground storage tanks at terminals with more than 400,000 gallons (9,500 barrels) of capacity.

Table II-2: NYS Terminal Capacities (Mbbl)

Product	NYS DEC Petroleum Storage Capacity (Mbbl)									
	Region 1	Region 2	Region 3	Region 4	Region 5	Region 6	Region 7	Region 8	Region 9	Total
Empty	48	794	21	750		43	179	51	156	**2,043**
Gasoline	1,111	1,542	529	2,327	< 1	357	747	836	635	**8,083**
Gasoline/Ethanol	142	37		1,074			90	41	42	**1,426**
Jet Fuel		887	60	73			44		101	**1,165**
Kerosene (#1 Fuel Oil)	272	371	111	401	24	107	204	233	51	**1,775**
#2 Fuel Oil	2,914	2,777	2,262	4,157	25	407	668	317	293	**13,820**
#4 Fuel Oil		68								**68**
#5 Fuel Oil									95	**95**
#6 Fuel Oil	6,332	1,279	2,320	943	47	84	4,827	48	243	**16,124**
Diesel	229	261	451	1,064	32	71	332	364	292	**3,094**
Biodiesel	100	33	8	1					1	**143**
Lube Oil	4	5	< 1	3	< 1		3	< 1	< 1	**15**
Asphalt		169		993			761	466	635	**3,024**
Crude Oil				186					489	**676**
Other*	57	6	180	41	1	162	40	23	121	**631**
Total	**11,209**	**8,230**	**5,942**	**12,013**	**129**	**1,232**	**7,894**	**2,379**	**3,155**	**52,183**

Source: DEC Regional Capacity Database.

Note: This table does not include liquefied petroleum gas (LPG) storage.

** "Other" fuels include: hydraulic oil, white/mineral spirits, motor oil, transmission fluid, waste oil/used oil, turbine oil, mineral oil, and used oil (heating).*

Primary Bulk Distribution Petroleum Terminals in NYS

Primary terminals are bulk petroleum terminals that act as distribution hubs for regional supply. These terminals typically receive product from bulk transportation networks such as tankers and other large marine vessels, pipelines, and/or railroad systems. For outloading stored product, these terminals almost always have on-site tanker truck "loading racks" where trucks fill their tanks for delivery to area service stations and other end-users. Some terminals have the capability to receive and load by marine or pipeline.

Primary terminals typically store a variety of different petroleum products in segregated storage tanks. In operating a terminal, owners must file for a variety of permits to operate and store various petroleum products, and must operate using equipment designed for these different products. Though terminals are designed to meet the specific demands of the area they supply, these terminals usually hold common products such as motor gasoline, on-road diesel (ultra-low sulfur diesel or ULSD), and heating oil. In addition, due to federal mandates and gasoline specifications, most terminals store ethanol as a blending component for motor gasoline. Ethanol and gasoline are not stored together due to the chemical properties of ethanol, so they

are typically either in-line blended or "splash" blended at the loading racks when gasoline is loaded into tanker trucks for delivery to service stations.[101]

According to analysis comparing publicly available information (e.g., OPIS, corporate websites, SEC financial filings, etc.) with the DEC database, there are 63 primary terminals in NYS with a combined capacity of over 37.6 million barrels. Included in this are a 485 Mbbl crude oil terminal in West Seneca, NY and four liquefied petroleum gas (LPG) terminals with an aggregated capacity of 3.1 MMbbl across the southern portion of upstate New York. The text box below discusses the data sources and problems with their use in more detail.

Data Sources and Issues: Petroleum

The main data sources of the petroleum terminal assets in NYS are the NYS DEC and the OPIS/Stalsby Petroleum Terminal Encyclopedia. In addition, company websites, company financial statements, NYS DEC Title V permits, and news sources were used to fill in information gaps and resolve anomalies.

The DEC information provided regional tankage data by product for terminals larger than 400,000 gallons (9,524 barrels). In addition, the DEC also outlined all the terminals (primary and secondary) residing in NYS, and identified location information and terminal function for these facilities. The OPIS directory provided information on primary terminal capacities, modes of receipt and delivery, and other features not collected by DEC.

The most significant discrepancy came in merging the two data sets to align the DEC data with the terminal capacity information provided by OPIS. For primary terminals, there was great overlap between the datasets, though OPIS listed some terminals not identified by DEC and vice versa. These discrepancies were addressed through subsequent research. OPIS does not provide information on secondary terminals, so further research was conducted to identify capacities for these terminals. In the event no capacity information was attained, ICF assumed the total capacity of aboveground storage tanks at terminals with greater than 400,000 gallons (9,500 barrels) of storage as the total amount of primary and secondary storage in the State. ICF calculated the difference in regional capacities based on this total minus the confirmed primary and secondary capacity in each region and apportioned out the difference to secondary terminals without capacity data.

The main data sources of the pipeline assets were publicly available information from OPIS, company websites, company financial statements, and news sources. There were no significant issues surrounding the pipeline information.

Primary terminals throughout the State vary in size, distribution abilities, and area supplied. A few of the larger terminals in different regions around the State are highlighted below:

Kinder Morgan's Staten Island terminal is intertwined with the northern New Jersey assets. It can store almost 3 MMbbl and receives marine and Colonial pipeline product shipments. It does not have a truck loading rack for local product delivery.

On Long Island, Phillips 66's Riverhead terminal is a 4.8 MMbbl facility that stores a variety of products, the majority of which are sourced from domestic and international marine shipments.

[101] Splash blending would involve the operator loading a certain volume of RBOB or CBOB product and then adding an estimate volume of ethanol to result in a 10% ethanol blend. It mixes by "splashing" back and forth in transit to the service station.

Buckeye's Marcy terminal is one of three in DEC Region 6, but this 560 Mbbl terminal contains the majority of the Region's storage capacity. The terminal is supplied by Buckeye Pipeline.

Though Enterprise's Watkins Glen terminal stores LPG (propane), which has only limited use as a transportation fuel, this facility has underground storage capacity of nearly 1.2 MMbbl and is very important to the NYS supply of LPG along the Enterprise Pipeline in the State.

Noco Energy Corp owns and operates a 1 MMbbl petroleum product storage facility in Tonawanda. This terminal is equipped to receive shipments of petroleum products from Sunoco and Buckeye pipelines, marine movements along the Great Lakes, and rail deliveries from CSX.[102]

Secondary End-Use Terminals in NYS

Secondary terminals are located on the site of large end-users, which are characterized by their significant fuel demands. These end-users, with significant storage capacity, can include airports, industrial facilities, and power-generating utilities. Though a few of these terminals may receive product from bulk transportation sources (marine, pipelines, and rails), they typically receive product by truck. They are usually one of many customers that the larger primary terminals supply, so it is typical for them to have less capacity than the primary terminals. Furthermore, tanks at secondary terminals are usually dedicated to only a couple (or fewer) products because they serve only one consumer. For instance, airport terminals are largely used to store jet fuel, though they may have additional tanks for ULSD to fuel airport support vehicles.

There are 131 secondary terminals in NYS, with a combined capacity of 17.6 MMbbl. These terminals include storage for airports (e.g., JFK and LaGuardia), electric power utilities, governmental institutions (e.g., West Point Military Academy), and industrial facilities (e.g., Lockheed Martin Mission Systems and Sensors).

Northern New Jersey Bulk Distribution Terminals

The NYS petroleum supply system relies heavily on the terminal infrastructure in New Jersey. In addition to a number of terminals that directly supply customers in northern New Jersey, the North Jersey region serves as a hub for the receipt and redistribution of transportation fuel supply from the following sources:

1. Colonial Pipeline
2. Sunoco's Harbor and East lines from Philadelphia refineries
3. Phillips 66 and Hess refineries in northern New Jersey
4. Marine receipts into terminals along the Arthur Kill, Kill van Kull, and in Perth Amboy
5. Rail receipts of ethanol from Unit Trains sourced in the Midwest

The products received by pipeline are generally either finished products or gasoline blendstocks (RBOB or CBOB) produced to specifications which require only additional blending with ethanol at the final terminal destination. The marine receipts could be finished products, RBOB/CBOB,

[102] "Tonawanda Intermodal Terminal." NOCO. http://www.noco.com/documents/NOCO_terminal.pdf

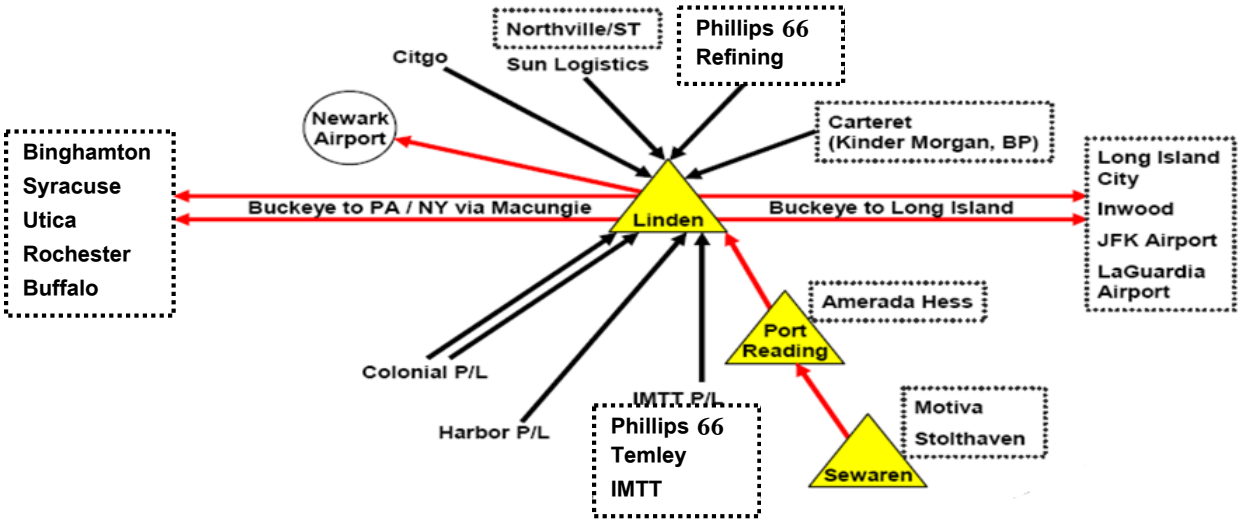
or other gasoline blendstocks which product owners (primarily blending companies, traders, etc.) import or purchase to "blend" into either finished gasoline or RBOB/CBOB in northern New Jersey terminals.

The redistribution of the product into NYS is primarily through two methods: Buckeye Pipeline and marine transportation. The importance of the Buckeye system and in particular the Buckeye Linden hub to NYS supply cannot be overstated. The Buckeye system is operated as follows.

Buckeye Hub and System

The origin point of the Buckeye Pipeline is the Buckeye Linden hub. The Buckeye Linden hub has several million barrels of working tankage which is used to both receive product from multiple sources in the NYS-New Jersey market, and to stage shipments out to terminals on the Buckeye Pipeline system.[103] Exhibit II-3 below (from Buckeye's website) shows the complexity and number of connections into and out of the Buckeye Linden hub.

Exhibit II-3: Buckeye Linden Distribution Hub Supply System



Source: *Buckeye Partners, L.P. "System Map." Available at: http://www.buckeye.com/Portals/0/ShipperBook/SystemMap.pdf.*

Note: *Upstate NY markets were added by ICF in accordance with: Petroleum Terminal Encyclopedia." 2012 Edition. OPIS/Stalsby.*

The Buckeye Linden hub is the primary pipeline supply point into NYS. As seen in the exhibit above, volume moves from the Buckeye Linden hub (the arrows indicate the direction of flow) through the Buckeye "East" lines into Long Island, supplying the jet fuel needs of JFK and LaGuardia airports, as well as several primary supply terminals for gasoline and distillates on Long Island. Buckeye, through separate "West" lines, moves products from the Buckeye Linden hub into Pennsylvania, where product is delivered into another hub at Macungie, PA (near Allentown). Product is then shipped from Macungie to 1) upstate New York and 2) central Pennsylvania.

[103] The specific volume of tankage is not public information. It is not reported in the OPIS directory because it is storage used for operational purposes and it is not "available" capacity for storage.

The Buckeye Linden hub receives product from 17 source points: two refineries, six connecting pipelines, and nine storage and terminaling facilities.[104] Primary sources include:

1. Colonial Pipeline (which transports product from the Gulf Coast)
2. IMTT terminal in Bayonne, NJ (which receives waterborne cargoes of products, in addition to Colonial volume)
3. Sunoco Logistics' Harbor Pipeline (which moves product from Philadelphia refineries to northern New Jersey)
4. North Jersey refineries (Hess in Port Reading and Phillips 66 in Linden)
5. Multiple other North Jersey and Staten Island distribution terminals (e.g. Shell Sewaren)

The Buckeye Linden operation is very complex. The pipeline must coordinate the simultaneous receipt and shipment of batches to insure that deliveries on their system at airports and truck loading terminals occur in time to meet their shippers' delivery timing and quality requirements. Delays will result in supply outages.[105]

In addition, Buckeye must ensure that tankage is available at the Buckeye Linden hub to receive product on the schedule of Colonial and Harbor pipelines, as well as the other distribution terminals and refineries. If tankage is not available, it is possible those pipelines (e.g., Colonial) may have to slow down their delivery schedules.

Northern New Jersey Distribution Terminals

The petroleum infrastructure in northern New Jersey is also heavily dependent on the integration of major distribution terminal hubs with the pipelines delivering product, marine deliveries, local refinery deliveries, and rail receipts into some of the hubs. The major infrastructure stretches from Perth Amboy up the Arthur Kill waterway into the Kill van Kull. Virtually this entire system of infrastructure is in New Jersey, except for the Kinder Morgan terminal (formerly the Port Mobil facility) located on Staten Island.

The petroleum infrastructure in this region is described below beginning with the southernmost location along the Arthur Kill and progressing north (all these locations have marine access).

- Hess's Perth Amboy terminal has 5 MMbbl of storage and can receive product from Colonial and water.[106]
- Chevron has a terminal in Perth Amboy that can hold 2.7 MMbbl of products and has marine and rail access. Chevron has sold the terminal to Buckeye, who will build a 16-inch line to the Buckeye Linden terminal. This pipeline in existing right-of-way should be available by 2013 and will allow Buckeye to directly move waterborne supply. Buckeye is planning to refurbish an additional 1.4 MMbbl of tankage at this location.
- Kinder Morgan's Perth Amboy terminal holds 3.56 MMbbl of storage and can receive from Colonial and access Buckeye. The terminal can receive rail shipments.

[104] Buckeye Partners, L.P. SEC 10-K Filing. p. 9.

[105] Shippers contract with pipeline companies to move their product for a fee (tariff). Shippers can be oil companies, traders, airlines, utilities, etc.

[106] New Jersey Title V Permit. Petroleum Terminal Encyclopedia. OPIS/Stalsby. 2012 Edition.

- Motiva (Shell) has a terminal in Sewaren with 4.65 MMbbl of storage. Motiva can receive from Colonial, access Buckeye, and is the primary destination for ethanol unit trains on the East Coast from the Midwest.
- Hess's Port Reading Refinery processes only gas oil that it either imports or purchases locally from Phillips 66. Hess is connected to the Buckeye Linden hub, Hess terminals, and waterborne liftings. Hess reports about 4.8 MMbbl of storage in Port Reading and can receive volume from Colonial and access Buckeye pipeline as well as both marine and rail transport.
- Kinder Morgan operates a 7.8 MMbbl terminal in Carteret, which can receive products from Colonial and ship into Buckeye. The terminal has 281 tanks. BP Products operates a 1.5 MMbbl terminal in Carteret that receives product from Colonial.
- In Linden, Citgo operates a 3.6 MMbbl terminal, which receives product from Colonial and can ship into Buckeye. Also in Linden, NuStar operates a 4.1 MMbbl terminal, which can receive product from Colonial.
- Phillips 66 operates a 238,000 b/d refinery in Linden, which can access Buckeye Pipeline, as well as local and marine outlets for product.
- In Bayonne, at the confluence of the Kill van Kull and NYH, is the International-Matex Tank Terminals terminal, which is the largest terminal in the United States. The terminal has over 15.4 MMbbl of storage. IMTT receives products primarily by marine transport, but also receives from Colonial pipeline. Through the IMTT pipeline product at the terminal can be sent into the Buckeye system. Almost half of the storage at IMTT is for residual oil and marine diesel.
- Hess also operates a 1.7 MMbbl terminal in Bayonne, which can receive product by marine transport.
- Newark has five terminals located along the Kill van Kull, ranging from 238 Mbbl up to 1.1 MMbbl.[107] All can receive product by water, Colonial, and/or the Sunoco Newark Pipeline.

As shown in the Buckeye Linden hub diagram (Exhibit II-3 above) earlier, there are extensive interconnections between many of the distribution hubs in northern New Jersey. Similarly, Colonial Pipeline is understood to have extensive connections to multiple terminals in the region.

Terminal Operations and Blending Issues

Product coming into the northern New Jersey terminals from pipelines (Colonial, Sunoco, IMTT) will generally be RBOB or CBOB product, as well as distillates and jet fuel for either local use or shipment through the Buckeye system to either NYS/Long Island terminals or west into Pennsylvania and upstate New York locations. Product can also move into many water access terminals for loading barges for NYH regional terminals or terminals north along the Hudson River.

Waterborne product received into the terminals along the Arthur Kill or the Kill van Kull can be a mix of primarily imported finished products (e.g., diesel fuel, residual fuel), RBOB or CBOB, as well as other gasoline blendstocks. In 2011, the bulk of imports into the region were "other"

[107] The Getty, Hess, Motiva, Sunoco, and Centerpoint terminals.

gasoline blendstocks, with over 248,000 b/d of imported gasoline blending components (not RBOB or CBOB) being discharged into these locations along the Arthur Kill and Kill van Kull. While all terminals imported some volumes of blendstocks for "re-blending" into CBOB or RBOB product, by far the largest blending terminal was the Kinder Morgan terminal in Carteret, receiving over half of all blendstock imports. The IMTT location in Bayonne is second in volume, receiving about 15 percent of all imported blendstocks used for re-blending.

The imported blendstocks could include low octane straight run naphtha, high octane alkylate and reformate, gasoline from Fluid Catalytic Crackers (FCC) and other refinery units. The commercial blender secures these products, stores them in a terminal and then blends the products in the proper ratios to produce either finished gasoline, or CBOB or RBOB product. The blender makes money by purchasing the components at discounts and selling as finished product (covering shipping costs and terminal storage fees).

Blending Process

Ethanol is transported through an independent system of rail cars, trucks, and barges until the product is added to gasoline at distribution terminals before shipping to retail service stations. Typically, ethanol is added directly to the gasoline tanker trucks in a process called "splash blending," in which the ethanol mixes with the gasoline during transport to the final end-user. There are a few other types of blending (both for ethanol-gasoline and biodiesel-diesel blendstocks), including in-tank blending, in which each product is loaded into the tank separately but often simultaneously to facilitate mixing.

In-line blending entails ethanol or biodiesel being added to the respective product stream through a pipe or hose and is then mixed in the pipe or when added at the receiving vessel. Rack blending involves adding ethanol or biodiesel to the respective product in the tanker truck directly at the rack.

Gasoline product containing ethanol must remain separate from product without ethanol during transport and distribution.

The re-blended product can be loaded into barges for delivery to the Harbor market, Albany, or New England as markets dictate. Alternatively, production of RBOB or CBOB product can be moved into the Buckeye system for deliveries into Pennsylvania or upstate New York or Long Island terminals. Blending of gasoline components appears to be concentrated in the large water access terminals, given the need for storage to isolate different components.

Imports of gasoline-type stocks into the New York/New Jersey Harbor area represents a brisk business for both oil companies and oil trading companies. Of the 105 MMbbl imported into this harbor area in 2011, less than 10 percent was designated as finished gasoline. Hydrocarbons that were intended for blending into gasoline accounted for just over 60 percent of 2011's imports. Semi-finished gasoline such as RBOB and CBOB, which is suitable for ethanol splash blending at final distribution terminals, represents the remainder of these imports. Hence, importers of the gasoline-stocks seem oriented towards acquiring various blending components (reformate, straight run gasoline, FCC gasoline, alkylate etc.) in overseas markets and then blending them in the Harbor into ethanol-ready gasoline, which is then distributed to splash blenders.

As a subset of this group, trading companies are also active gasoline blenders that use tankage assets to enable their marketing operations. Given the multitude of seasonally changing U.S. quality specifications, coordinating the finding, purchasing, shipping, importing and selling of semi-finished gasoline within the opportunity afforded by a short duration quality window can be challenging . With asset-tankage, however, a buffer or reserve of blendstocks becomes available to accommodate changes in seasonal specifications. Acquisition of tankage assets gives trading activities agility and flexibility to meet both the seasonal variations in U.S. gasoline

specifications and the opportunities presented by attractively priced blendstocks. Tankage assets enable adroit traders to accumulate blendstocks – hopefully at distressed prices – and then cold blend them into ethanol-ready gasoline. Seasonal changeovers in finished gasoline quality specifications – mainly RVP and distillation curve – are better managed through the use of tankage.

Traders: Most parties in the petroleum supply chain employ traders. The trader's role can be varied. For refiners, blenders, and suppliers, the traders who work for these companies have a role to buy or sell product on a spot market basis to optimize the cost for those parties to deliver product to terminals. For example, a refiner may be "short" product due to high demands or perhaps a period of refinery maintenance. The refinery inventory and distribution personnel ("schedulers") would identify the timing and volume of purchases needed to meet required shipments on pipelines or marine equipment. The traders would act on that information and negotiate and finalize a "trade" (purchase or sale) to meet the companies' needs.

Most gasoline and distillates that are bought and sold on the "spot market" by traders are products that meet defined specifications for quality (e.g., octane, cetane, distillation, vapor pressure). The spot market products are "commodities" and the production of gasoline from refineries must meet those commodity specifications. In almost all cases, product at one branded service station (e.g., Shell) is different from a competitor station (e.g., ExxonMobil) only by the additives that are added into the gasoline delivery truck at the loading terminal.

However, there are some companies who are structured to be primarily trading companies. These companies (Vitol, Glencore, Westport, and others) make money primarily by buying petroleum products in one location and selling in another. They focus on market pricing anomalies and volatility (spikes and dips in market prices) and arrange physical movements of product to capture these imbalances by (for example) buying product in discounted markets and selling in other markets. These companies must manage their price exposure carefully (through NYMEX hedging for example), and they provide a key role in the smooth movement of global petroleum supply. For example, a trading company may see low priced gasoline blendstocks available in Europe. They can assess the cost to purchase and ship the product to NYS, and if the NYS price is higher than the purchase cost plus freight, they will buy the European product, charter a vessel, and immediately re-sell it into the NYS market to lock in their profit.

Pipeline Companies: Pipeline companies provide a service by transporting petroleum products from "origin" points (where product is delivered to the pipeline) to destination points (terminals along the pipeline route). Pipelines neither own product nor buy or sell product. They move product along the pipeline based on shipments "nominated" by suppliers for movement from origin points to terminals. If capacity exists to meet all nominations, the pipeline coordinates with shippers to determine the optimum scheduling of deliveries for each pipeline cycle.[108] The pipeline uses sophisticated controls to manage the delivery of volume to multiple terminals along the pipeline system consistent with the delivery schedule. Pipelines collect a regulated tariff for all barrels shipped on the line (most pipelines are common carrier systems regulated by the Federal Energy Regulatory Commission (FERC)).

[108] A pipeline moves product continuously in cycles. Within one pipeline, over a 5-day "cycle," the pipeline company may move unleaded gasoline for 2 days, premium gasoline for 0.5 days, jet fuel for 0.5 days, and then diesel for the remaining 2 days. The next cycle would begin again with unleaded gasoline.

Marine Companies: Similar to pipeline companies, marine companies provide a transportation service for a fee. Marine movements can be by ship or by barge and tug combinations. Marine movements are scheduled by suppliers from terminals with water access to terminals with water access. Unlike pipeline companies, the cost of the marine movements may vary based on the prevailing market for vessels. Most marine movements of petroleum product in the NYS market are by spot charters arranged between suppliers and the marine companies. Similar to pipelines, the marine companies do not take custody of the product they are transporting.

Distributors: Distributors (or "jobbers") are near the end of the petroleum supply chain. A distributor is a party who would purchase gasoline and/or diesel fuel or heating oil from a terminal's loading rack from a petroleum supplier. The supplier would have a contract with the distributor to sell a certain volume of product monthly or annually to the distributor at a given terminal at the suppliers' posted "rack" price. The distributor will load the product into their truck and deliver the gasoline and/or diesel to their customers. A distributor may own one or many gasoline stations in a region, or may re-sell the product to an independent dealer. Distributors make money by purchasing wholesale at the rack and then re-selling wholesale to the independent service station (charging a price that covers trucking cost and provides a profit) or by delivering the rack supply directly into their own service stations and charging a "street price" to consumers that provides a profit and covers shipping and service station costs.

Service Station Dealers: Service station dealers are operators of retail gasoline stations who purchase product from either suppliers or distributors and who make money by reselling to consumers at the service station pump. Dealers who market a specific "brand" (e.g. Shell or Exxon) are required to purchase gasoline on a "branded" basis, which means they agree to only market Shell or Exxon product using their proprietary additives. The supplier can either sell to the dealer at the "rack" price (for dealers who are distributors) or on a "delivered" price (DTW or dealer tankwagon price), where the supplier or distributor/jobber delivers the product by truck to the service station, and charges a DTW price that includes a transport fee.

There are some individual service stations or companies operating service stations which will purchase "unbranded" supply from distributors. These service stations may sell product under a brand name of their choosing. The unbranded supply is made available at loading racks by suppliers typically at a discount to branded pricing to allow the supplier to "move" product in excess of their branded demand, but does not have proprietary additives in the delivered gasoline.

Changes in Terminal Operations as a Result of Ultra Low-Sulfur Home Heating Oil

This study used two approaches to understand the impact of Ultra Low-Sulfur Heating Oil (ULSH)) requirements upon terminal operations in the State. The first is a review of industry publications; the second is a collection of responses from lead operators of selected terminals in NYS.

One likely impact of the ULSHO requirement is lowered distribution costs resulting from handling of reduced number of fuels[109] at the wholesale and retail levels. Additional storage capacity at terminals is another anticipated outcome. Much of the storage capacity allocated to

[109] John Huber. "Ultra-low Sulfur Diesel Fuel/Heating Oil, A Presentation to the National Association of State Energy Officials." October 11, 2011. p. 48. Available at: http://www.naseo.org/events/winterfuels/2011/John%20Huber%20Presentation.pdf

high-sulfur distillate fuel oil would be turned over to ULSD after tank cleaning.[110] Following references presented in the literature, the study next turned to a survey conducted with lead operators of Buckeye Terminals in Albany and Oneida, NYS, along with John Maniscalco, Chief Executive Officer of the New York Oil Heating Association, Inc., a trade association representing heating oil terminals surrounding the NYH area.

These field surveys provided industry views on changes in terminal capacity and operations, if any, to comply with the ULSHO requirement by July 1, 2012 in specific regions of NYS, and should not be generalized to that of terminals in other parts of the State until further investigation. At the Buckeye Terminal in Albany, NY, there are currently no plans underway to build new tanks to accommodate anticipated increased demand of ULSD or ULSHO in the State by July 2012. In fact, there is spare tank capacity that could be re-activated at the terminal. Moreover, anticipated changes in terminal operations would be limited.[111] Other than decontamination, the equipment used for storing and then loading/unloading ULSD or low-sulfur heating oil would not be very different from that of distillate fuel oil (DFO) with a sulfur content above 15 ppm. Currently, heating oil terminals in the NYH area receive product by barge. The sulfur content of heating oil supplied to New York City is a maximum of 2,000 ppm, or 0.2 weight (wt) percent; for areas outside of New York City, the sulfur limit varies from 0.37 wt percent to 1.5 wt percent (or 3,700 and 15,000 ppm, respectively) unless granted permission otherwise.[112].

With implementation of the requirement, tanks that currently store high-sulfur heating oil will be turned over to store heating oil with sulfur content of no more than 15 ppm.[113] An example of this would be the Buckeye Terminal in Oneida County, NYS. Although there have been closures of petroleum terminals in the area and purchases of terminals by Buckeye from major oil companies, there are currently no plans to build new tank capacities to comply with the Mandate. For terminals in Oneida County that are currently still carrying high-sulfur DFO, there will be incremental construction to allocate the capacity of those tanks to store ULSD before the compliance deadline.[114]

Handling of Distillate Fuel Oil in NYS Terminals

The transition from burning higher sulfur home heating oil to ultra-low sulfur remains a short-term priority in NYS. While many homeowners have switched from fuel oil to natural gas in residential homes across the Northeast,[115] many oil heat customers still remain. According to EIA, the average annual growth rate of heating oil (No. 2 fuel) in the residential sector of the Middle Atlantic region encompassing NYS, New Jersey, and Pennsylvania, from 2009 to 2035 is

[110] John Maniscalco. Interview with CEO of New York State Oil Heating Association in "New York State, Connecticut spearheading ultra-low-sulfur heating oil laws in the U.S." Available at: http://www.worldfuels.com/wfExtract/exports/Content/a8c2093c-8356-4fab-965b-e20a52a3eb70.html

[111] Interview with John Ryan, Lead Terminal Operator. Buckeye Albany Terminal. March 1, 2012.

[112] Department of Environmental Conservation. "Subpart 225-1 Fuel Composition and Use – Sulfur Limitations." Available at: http://www.dec.ny.gov/regs/4225.html

[113] Interview with John Maniscalco, CEO of the New York State Oil Heating Association. March 6, 2012.

[114] Interview with Bill Kolwaite, Lead Terminal Operator. Buckeye Marcy Terminal. March 1, 2012.

[115] Diane Cardwell, et al. "As price of oil soars, users shiver and cross their fingers," *New York State Times*. January 21, 2012. Available at: http://www.nytimes.com/2012/01/22/business/heating-oil-costs-surge-and-many-in-northeast-cant-switch.html?pagewanted=1&tntemail0=y&_r=1&emc=tnt

expected to decline by 1.23-percent per year under the Reference Case.[116] This trend will lower heating oil consumption from 128,000 b/d in 2009 to 81,000 b/d in 2035 in the Mid-Atlantic region and in the near term will significantly increase the demand for ULSD. The sections below describe anticipated operational changes at terminals and bulk plants in NYS, identified through methodologies such as literature review and field surveys conducted with lead operators of terminals in the State.

Distribution of Products from Terminals to End Users

No. 2 fuel oil is shipped in batches, along with other petroleum products, through pipelines or marine equipment (barges, ships) to terminals, and designated for storage in atmospheric cone roof tanks, also referred to as fixed-roof tanks, that are cylindrical in shape. During this process, safety precautions and work practices are implemented to avoid spillage, intermixing of products, and tank overflow. In addition to assessing the available capacity of tanks designated for product receipt, proper alignment of valves, position of the tank inlet (i.e. open), and ensuring that drains in dyke areas surrounding the product-receipt tanks are closed to contain either an overfill or a spill are just some examples of these precautionary measures. From the tanks, products are transported to end users through either rail or truck tankers. At the loading rack, an aboveground transport system consisting of pipelines that connect product tanks to the loading rack, a variety of hoses/loading arms used to fill rail cars and tank trucks, meters that measure the flow rate – all under the monitoring of instrumentation systems – are used to transport products from the tank to the railcars or trucks. Dye is also added to ULSD designated for on-road transportation purposes to distinguish it from that used for residential heating.

Cleaning and Re-Activation of Tanks

Operationally, distribution terminals will need to lower tank inventory levels and clean the tanks to remove all higher sulfur material. This process should be managed relatively easily through procedures the industry learned in 2006 and 2007 when ULSD was initially required for on-road usage. The usual procedure is detailed in Appendix C.

Market Overview

Economically, the shift to ULSD instead of higher sulfur heating oil will increase demand for a better quality product (ULSD) and therefore is likely to result in higher prices to consumers. The volume of ULSD sales as heating oil is expected to average about 62,000 b/d year round (based on 2011 data from EIA *Prime Supplier Sales*), peaking in the winter at levels of about 142,000 b/d in the past two winters.

The current sales level of ULSD in NYS is about 70,000 b/d for on-road consumption. Consequently, the transition to ultra-low sulfur (ULS) heating oil is likely to double ULSD demand on an average basis, and triple demand in peak winter months. This regulation change posed a daunting outlook for the ULSD market in NYS in early 2012 as only the Phillips 66 Linden refinery was scheduled to remain operating in the midst of East Coast closures. However, the rescue of the Philadelphia, PA refinery by a joint venture between the current owner Sunoco and the Carlyle Group, and the purchase of Phillips 66's Trainer, PA refinery,

[116] In the reference case of the *Annual Energy Outlook 2012*, where existing policies are expected to continue into the future, average growth of U.S. GDP is 2.6 percent per year from 2009 to 2035; oil prices reach $145 2010 USD per barrel by 2035.

which was sold to Delta Air Lines, will help alleviate supply constraints generated by the regulation change. The Philadelphia refinery produces ULSD, and although the Trainer refinery will be converted to maximize jet fuel production, the refinery should be able to produce roughly 30,000 b/d of ULSD at capacity. Incremental ULSD supply into the market will have to be shipped into the State by either imports or movements from the Gulf Coast. Colonial pipeline may be able to provide some added supply, but that will depend on their capacity and shipper's nominations (generally Colonial operates near capacity, but has shipped a higher percentage of distillates in winter demand periods). In recent years the U.S. Gulf Coast has exported substantial volumes of ULSD (485,000 b/d in 2011) so adequate supply is available and it will be necessary for industry to resolve logistics difficulties.[117]

Overall, ULSD prices in the NYS market have ranged from $0.05-$0.16/gallon higher than heating oil in the NYS market since 2006, with prices about $0.07/gallon higher in 2010 and 2011.[118] In addition, NYS ULSD prices have averaged about $0.04/gallon over Gulf Coast ULSD prices in the last few years (this is about the cost of shipping ULSD to NYS on Colonial pipeline). If Colonial is at or near capacity, it may be necessary for NYS prices to increase significantly to attract supply from Gulf Coast through more expensive means (Jones Act vessels, if available), or rail, or to attract supply from foreign sources.

Diverting any exports of ULSD from Gulf Coast refineries onto U.S. Jones Act vessels headed to the East Coast is a plausible, but possibly an expensive scenario. Current ULSD price differentials between these coasts, however, have not been able to routinely surmount the freight costs of this voyage.

Regulatory Driven Changes: Reductions in Marine Bunker Fuel Sulfur

North American Emission Control Area (NA ECA)

There are significant changes occurring in 2012 and 2015 which will have serious impacts on refiners and the residual fuel market in the U.S., the Northeast and NYS. Particularly significant for the U.S. is the introduction of the NA ECA starting August 2012 which requires 1-percent sulfur (1.0%S) residual bunker fuel be burned within the territorial waters of the U.S. and Canada, that is 200 nautical miles from a coastal baseline. A second change will be the further reduction of the residual bunker fuel sulfur level from 1 percent to 0.1 percent in 2015. Both of these changes are the result of global changes to reduce emissions in marine fuel oil. Table II-3 below outlines the chronology of these changes and Exhibit II-4 shows the NA ECA region.

[117] EIA. "Petroleum & Other Liquids—Exports, Gulf Coast PADD 3, Annual-Thousand Barrels per Day." Available at: http://www.eia.gov/dnav/pet/pet_move_exp_dc_R30-Z00_mbblpd_a.htm

[118] Based on annual spot price data from EIA, 2006-2011.

Table II-3: Global and Regional Marine Fuel Regulations Timeline

Year	Date	Organization	Regulation
Historical Legislations			
2005	19-May	IMO*	Global sulfur cap of 4.5%S marine fuel
2006	19-May	IMO	Baltic Sea ECA 1.5%S marine fuel cap commences
2006	11-Aug	EU*	Passenger ships to/from European Union ports limited to 1.5%S marine residual fuel
2006	11-Aug	EU	Vessels at all EU ports burning marine distillates are limited to 1.5%S MDO and 0.2%S MGO
2007	1-Jan	CARB*	California - vessel auxiliary engines burn at port: 1.5%S max. MGO & 0.5%S max. MDO
2007	22-Nov	IMO	North Sea/English Channel ECA 1.5%S marine fuel cap commences
2009	1-Jul	CARB	California 24 nautical miles off the coast - vessel main engines burn: 1.5%S max. MGO & 0.5%S max. MDO
2010	1-Jan	EU	EU inland waterway vessels & ships at berth for more than 2 hrs. – 0.1%S max. marine fuel
2010	1-Jan	CARB	California - vessel auxiliary engines burn: 0.1%S max. MGO
2010	1-Jul	IMO	Existing ECAs 1.0%S marine fuel cap
2012	1-Jan	IMO	Global sulfur cap 3.5%S marine fuel
2012	1-Jan	CARB	California 24 nautical miles off the coast - vessel main engines burn: 0.1%S max. MGO
2012	1-Aug	IMO	U.S. & Canada ECA 1.0%S marine fuel cap (200 nautical miles off the coast)
Future Legislations			
2015	1-Jan	IMO	Existing ECAs 0.1%S marine fuel cap restriction
2020/25 *	1-Jan	IMO	Global cap 0.5%S marine fuel

Source: *Poten & Partners database*

Notes: *IMO—International Maritime Organization*

EU—European Union

CARB—California Air Resource Board

** Indicates that the implementation year, 2020 or 2025, is subject to the results of a feasibility study to be completed by 2018.*

Exhibit II-4: North American ECA Regions

Source: Poten & Partners database

Impact of Conversion to 1-percent Sulfur Bunker Fuel in 2012

The shift in residual bunker fuel use to 1-percent sulfur content (1%S) maximum could be significant as it is estimated at up to 25 percent of total U.S. heavy bunkers demand.[119] The anticipated change in residual fuel demand in the U.S. is estimated in Table II-4.

Table II-4: Estimated Shift in U.S. Bunker Fuel Demand from 2011 to 2012 (Mb/d)

Fuel	Thousand Barrels per Day (Mb/d)	
	2011	2012
Residual Fuel >1%	315	235
Residual Fuel < 1%		80
Marine Distillate (1% S)	90	90
Marine Gas Oil (0.1% S)		
Total Demand	**405**	**405**

Source: Poten & Partners estimate

How well the U.S. East Coast residual bunker fuel supply chain adjusts to the coming specification change remains clouded by the uncertain final disposition of three Pennsylvania refineries. If all three plants–Phillips 66's at Trainer and Sunoco's at Marcus Hook and

[119] The specific volume estimate is different.

Philadelphia–remain in operation under new ownership, the industry probably will just make marginal changes to crude slates or residual fuel blendstock imports or exports. With the Trainer and Philadelphia refineries likely to be operational under new ownership, the short-term outlook should be manageable.

To evaluate what the bunker fuel supply landscape might look like if all three of these refineries are closed, it seems instructive to compare output of residual fuel oil[120] (RFO) when the East Coast's full refinery compliment operated in 2008 to RFO output in 2011 when Trainer went offline in September and Marcus Hook stopped operation in December. For 2008, East Coast refineries' produced an average of 2.5 MMbbl per month of residual fuel oil with a sulfur content of no more than 1 percent (see Exhibit II-5). With the assorted refinery closures and low utilization rates experienced in 2011, average monthly production of this grade averaged just shy of one MMbbl – or 60 percent less than 2008. Correspondingly, the output ratio of 1 percent or less RFO to total RFO fell from just over 70 percent in 2008 to around 55 percent in 2011.

Exhibit II-5: U.S. East Coast Refinery Residual Fuel Oil Production (Mb/d)

Source: EIA.

Finding additional imported supplies of RFO with 1 percent or less sulfur seems problematic at best and expensive at worst. In 2011, the East Coast imported an average 66,000 b/d of this fuel. Algeria, with an abundance of low sulfur crude oil and with simple non-residual conversion hydroskimming refineries, supplied nearly three-quarters of these imports. Second ranked Canada supplied a little over six percent. Hence, last year East Coast supply of this moderate sulfur RFO was not diversified and it depended on the exports of basically one country in a geo-political region that proved volatile in 2011. In contrast, imports of this grade RFO in 2008 amounted to about 46,000 b/d from a diverse geographic area. Some 80 percent of these imports came from ten countries with none of these countries having more than a 20 percent share.

The rescue of two of the three Pennsylvania refineries may have at least partially avoided an increased reliance on other markets for this fuel. Without their continuing operation, the market

[120] Residual fuel oil includes heavy fuel oil used for ship bunkering (bunkers), electric utility power generation, commercial heating, etc.

dynamic on the East Coast would have enticed either more imports of this grade or prompt ship operators to bunker elsewhere – especially those vessels shuttling back and forth from the European ECA zones.

Impact of Conversion to 0.1 percent Sulfur Bunker Fuel in 2015

When the bunker fuel sulfur limit in all IMO ECAs (North America and northwestern Europe) is reduced ten-fold from 1.0%S to 0.1%S starting January 1, 2015, burning 1 percent sulfur RFO for bunker demands will not be possible and a key market will disappear. This abrupt change in fuel quality will require vessels to consume marine *distillates*, impacting the availability of diesel fuel in the transportation sector, rather than low-sulfur residual bunker fuel oil within ECA boundaries.

While post-combustion vessel stack gas abatement technologies might allow continued use of non-marine distillate fuels, their acceptance by the shipping industry is low. Until they are accepted, marine gasoil/diesel will be the fuel of necessity for vessels transiting through ECAs. For those East Coast refiners not investing to reduce the sulfur content of all their diesel output to meet mid-2014's requirement of no more than 15 ppm, the sudden appearance in 2015 of a 0.1 percent sulfur marine distillate sink in which to pour their non-compliant distillate will be welcomed. However, the transition to 0.1 percent sulfur marine diesel will increase demands in the region for distillate hydrocarbons (as well as the entire U.S.). The estimated volume impact of this change is shown in Table II-5 below.

Table II-5: Estimated Shift in U.S. Bunker Fuel Demand from 2011 to 2015 (Mb/d)

Fuel	Thousand Barrels per Day (Mb/d)		
	2011 (Mb/d)	2012 (Mb/d)	2015 (Mb/d)
Residual Fuel >1%	315	235	235
Residual Fuel ≤ 1%		80	
Marine Distillate (1%S)	90	90	
Marine Gas Oil (0.1%S)			170
Total Demand	**405**	**405**	**405**

Source: Poten & Partners estimate

The additional marine diesel/gas oil demand at 0.1 percent sulfur is an approximate increase in U.S. distillate demands of about 4 percent, which despite the diesel sulfur level being much higher than ULSD sulfur levels, will tend to drive diesel prices somewhat higher.

Infrastructure Closures, Expansions, and Construction Projects

The petroleum infrastructure supply to NYS is a robust blend of pipeline supply, marine imports, local refinery production and rail supply moved to consumers through additional pipeline, marine, and truck transport. There are a number of changes occurring that may alter the current infrastructure and supply patterns. These changes are occurring due to several factors. One factor is business decisions by refiners to close facilities; a second is regulatory changes related to heating oil quality; a third is upgrades or new infrastructure development.

Refinery Closures

As explained in Section I, Sunoco's 178,000 b/d Marcus Hook refinery was shut in September 2011 and its future prospects of operating as a refinery are grim as the company reviews alternate plans for the facility. In January 2012, Hess Oil announced the shutdown of the 350,000 b/d Hovensa refinery in St. Croix, a joint venture between PDVSA and Hess. Although once planned for closure, Sunoco's Philadelphia and Phillips 66's Trainer refineries have been rescued since their initial announcements to close. Philadelphia Energy Solutions, a joint venture between Sunoco and the Carlyle Group, will continue to operate the Philadelphia refinery. The shuttered Trainer refinery has been sold to a subsidiary of Delta Air Lines, Monroe Energy, who will re-open the refinery in the fall of 2012 after completing modifications to produce more jet fuel.

Although the East Coast refining landscape has staved off substantial capacity losses, the region overall remains exposed to poorer refinery margins due to the high volumes of sweet crude required by most of the area's refineries. To help strengthen these margins, alternative crude sources are being explored and utilized, namely movements of Mid-Continent crude via rail and possibly pipeline in the future. Moreover, refinery modifications have been announced in order to make these facilities more competitive.

Below is a listing of infrastructure changes that were initiated in the past year. Some of these decisions were in direct response to the potential closures of the three Philadelphia area refineries, thus may not come to fruition since the Philadelphia and Trainer refineries are both currently planning to operate. However, the infrastructure changes that do take place will add to the overall flexibility of the entire NYS regional supply system.

Infrastructure Changes Underway or Being Planned

Industry is working to address the issues stemming from refinery closures and regulatory changes.

Buckeye pipeline has purchased the Chevron Perth Amboy terminal in northern New Jersey and will be refurbishing tanks and building a 16-mile pipeline to connect the terminal to the key Buckeye Linden hub. Buckeye will also expand the capacity of its two lines from Linden to Macungie junction near Allentown, PA by 75,000 b/d by 2013. This will enable Buckeye to receive waterborne cargoes that directly feed into Linden and then ship them out into Pennsylvania and upstate New York markets.

Buckeye has also purchased and is expanding the BORCO 21.5 MMbbl terminal in the Bahamas. This facility can accept cargoes of clean products in million barrel vessels for transshipment into the Philadelphia and New Jersey/NYS markets.

While no plans have been disclosed, it is reasonable to anticipate that Sunoco is developing strategies and plans to allow supply to be received into their Philadelphia pipeline sources in the event the Philadelphia refinery is closed. Sunoco announced March 9th that the Eagle Point refinery (closed in 2010) has 3 MMbbl of storage, and 2 million additional barrels being refurbished that will permit receipts of cargoes up to a million barrels of product. Eagle Point can access the Harbor and Laurel pipeline systems, and with some investment by Colonial can receive and deliver into Colonial by 2013. With the refinery likely continuing to operate, this storage and connections actually improves infrastructure flexibility in the region.

In addition, terminal owners and operators are preparing for the conversion to ULSD with tank cleanings and other modifications. Shell (Motiva) Sewaren announced in March that they are converting heating oil tanks to ULSD and biodiesel, clearly preparing for the New York City requirement for 2 percent biodiesel in heating oil in the fall 2012.

Colonial has recently completed two infrastructure projects and announced plans for two subsequent projects related to the NYS and Northeast product markets. The fall of 2011 saw Colonial commission a 100 Mb/d expansion to their mainline that delivers product from Greensboro, NC and serves markets in Philadelphia, New Jersey, and NYS.[121] Then in January 2012, Colonial completed the construction of a 218 Mbbl ULSD tank at its terminal in Linden, NJ.[122] This tank will add storage capacity to the Linden site, which will operate as a supply point of ULSD as demand escalates with the heating oil sulfur specification conversion. In addition, Colonial has also announced improvements in their northern New Jersey intra-Harbor piping system to enable more capacity to transfer ULSD (or other products) into Buckeye Linden and water access terminals in the region which supply NYS consumers.[123] Colonial is also proposing a 125 Mb/d expansion of Line 3 by 2014. Line 3 extends from Greensboro, NC to Linden, NJ. The pipeline expansion is to come in phases with 20 Mb/d to come online by mid-2012, 40 Mb/d by mid-2013, and 65 Mb/d in 2014.[124]

Colonial is also making changes to expand delivery and receipt into the Sunoco Eagle Point terminal in southern New Jersey, and is expanding the capacity of their inter-Harbor piping system in northern New Jersey (this system distributes products to various terminals along the Arthur Kill). Colonial is also adding 2 million more barrels of storage at the facility in 2012.

Colonial is also preparing their current infrastructure network for changes in regulations. Colonial is gauging the interest of shippers to allow a ULSD blend with 5 percent renewable diesel or biodiesel. Changing regulations in NYS heating oil have spurred this interest from shippers.[125]

Instead of upgrading their ability to produce more ULSD, PBF Energy is working to expand its ability to receive Western Canadian Heavy and Bakken crudes. The refinery currently receives 20,000 b/d of crude via rail, but plans to expand this capability to receive over 40,000 b/d by September 2012 and over 110,000 b/d by January 2013.[126]

[121] Colonial Pipeline Company. "Press Release: Colonial Directors Approve New Expansion of Main Gasoline Line." December 21, 2011. Available at: http://www.colpipe.com/press_release/pr_114.asp

[122] Colonial Pipeline Company. "About Colonial Pipeline." Available at: http://www.colpipe.com/home.asp

[123] Platts. "Colonial to expand Line 3 product pipe by 125,000 b/d," *Oilgram Price Report*. March 13, 2012.

[124] Rose Marton-Vitale. "Colonial to expand northeast U.S. pipeline flow," *The Wall Street Journal.* March 12, 2012. Available at: http://www.marketwatch.com/story/colonial-to-expand-northeast-us-pipeline-flow-2012-03-12?reflink=MW_news_stmp

[125] Platts. "Colonial proposes 5% renewable in ULSD," *Oilgram Price Report*. March 13, 2012.

[126] "PBF Energy: Advantaged Crudes a 'Game Changer'." PBF Energy. August 24, 2012. http://www.pbfenergy.com/sites/default/files/PBF%20Announces%20Crude-by-Rail%20Plan%20at%20Del%20City.pdf

Marine Infrastructure

Overview

The following section describes the marine infrastructure of NYS and northern New Jersey. The section is organized as follows:

- Marine Infrastructure along the Northeast Corridor (Ports, Terminals, etc.) by NYS Region
- U.S. Flag Ocean Going Vessels: Description and List of Equipment
- Jones Act
- Impact of Dredging Operations
- Port Congestion Issues
- Spot Charter Rates

Marine Infrastructure along the Northeast Corridor

Table II-6 below details by NYS region the gasoline terminals which can receive and ship products via marine transport. This list focuses on assets in each state which could be a potential origin point or destination point for marine transport from or to NYH locations. Key information on restrictions and physical port structure are included.

See Appendix F for a list of main U.S. Northeast ports for domestic imports of clean petroleum products.

Table II-6: Marine-Access Gasoline Terminals in NYS

Terminal Name	Address	Gasoline Distribution
Hudson River		
[Buckeye] Albany Terminal LLC	301 Normanskill St., Albany, NY 12202	Yes
Global Companies LLC	50 Church Street, Albany, NY 12202	Yes
CITGO - Glenmont	495 River Road, Glenmont, NY 12077	N/A
[Petroleum Fuel & Terminal] Glenmont	Route 144 552 River Road, Glenmont, NY 12077	N/A
Kingston Point Terminal	2-36 Delaware Ave., Kingston, NY 12401	N/A
Global Companies LLC	1096 River Road, New Windsor, NY 12553	Yes
Global Companies LLC	1254 River Road, New Windsor, NY 12553	Yes
Global Companies LLC	1281 River Road, New burgh, NY 12551	Yes
Getty Terminal Company - Port Ewen	15 North Broadway, Port Ewen, NY 12466	Yes
IPT, LLC	End of Riverside Extension, Rennselaer, NY 12144	N/A
Getty Terminals - Rensselaer	49 Riverside Avenue, Rensselaer, NY 12144	Yes
Hess - Rensselaer	367 American Oil Rd., Rensselaer, NY 12144	N/A
Petroleum Fuel & Terminal - Albany	54 Riverside Avenue, Rensselaer, NY 12144	N/A
Sprague Operating Resources LLC - Rensselaer	540 Riverside Avenue, East Greenbush, NY 12144	Yes
Long Island Sound		
Global Companies LLC	300 Shore Rd, Glenwood Landing, NY 11547	Yes
Sprague Operating Resources LLC - Mt. Vernon	40 Canal St., Mount Vernon, NY 10550	Yes
Phillips 66 PL - Riverhead	212 Sound Shore Road, Riverhead, NY 11901	N/A
Global Companies LLC	464 Doughty Blvd, Inwood, NY 11096	Yes
Jamaica Bay		
Motiva Enterprises LLC	74 East Avenue, Lawrence, NY 11559	N/A
Carbo Industries, Inc.	1 Bay Blvd, Lawrence, NY 11559	N/A
East River		
Global/Motiva Enterprises LLC	25 Paidge Ave., Brooklyn, NY 11222	Yes
Metro Terminals Brooklyn	498 Kingsland Avenue, Brooklyn, NY 11222	Yes
Hess - Brooklyn	722 Court Street, Brooklyn, NY 11231	N/A
BP Products North America Inc.	125 Apollo St., Brooklyn, NY 11222	Yes
Getty Terminals - Long Island	30-23 Greenpoint Ave., Long Island City, NY 11101	N/A
South Shore Long Island		
Sprague Operating Resources LLC	3642 Hampton Rd, Oceanside, NY 11572	Yes

Sources: U.S. Department of Treasury, Internal Revenue Service.
NYS Department of Environmental Conservation.
Poten & Partners.
Proprietary Vessel Spot Fixture Database.
Individual company websites.

Types of Ocean-Going U.S.-Flag Vessels

There are a total of 287 ocean-going U.S.-flag vessels currently operating. These vessels operate under the governance of the Jones Act, which regulates the market for ships and barges which carry commercial product in U.S. waters. The Jones Act fleet includes the following vessel types:

- Oil tankers
    - Aframax- size, with a size range of 80,000 -119,999 metric tons (MT)
    - Handymax-size, with cargo size range of 35,000-44,999 MT
- Articulated tug barges (ATBs)
- Regular towed barges

ATBs lock into a notch in the stern of the barge, which makes them more reliable in heavy seas and bad weather compared to regular towed barges. As a result, ATBs have gained wide popularity in almost every trade. Ordinary barges are difficult to tow in heavy seas due to the risk of parted tow lines. Regular barges are also difficult to navigate in congested port areas. The companies K-Sea, Crowley Marine, Reinauer, and Bouchard own and operate the largest number of U.S.-flag ATBs and regular barges (see Table II-7 below).

Currently, there are only nine active Suezmax-size U.S.-flag oil tankers. The number of oil tankers declined following the Oil Pollution Act of 1990 (OPA 90), which phased out tankers and barges with single-bottom, single-hull, and single-side from U.S. waters by 2010. ATBs gained popularity over single-unit oil tankers because barge owners were faster in responding to the regulations of OPA 90 than were ship owners. The Suezmaxes serve the U.S. crude oil trade between Alaska and the U.S. West Coast. The two owners currently operating Suezmax-size crude oil carriers on this trade are BP and Polar Tankers, a subsidiary of Phillips 66. SeaRiver Maritime, a subsidiary of ExxonMobil, is expecting the delivery of two newly built Aframax crude carriers (115,000 deadweight tonnage (dwt), or 820 Mbbl, per vessel) in 2014.

There are 32 ocean-going U.S.-flag Handymax-size tankers currently. Most of these tankers move petroleum products. The publicly traded, NYS-based company, Overseas Shipholding Group (OSG), owns and operates the largest number of Handymax tankers. OSG expanded significantly with the 2006 acquisition of Maritrans Inc., which provided Jones Act-based tanker and barge services. American Shipping is expecting the delivery of two newly built Handymax product tankers (47,000 dwt – or 375 Mbbl – each) in 2013.

Table II-7: Ocean-Going U.S.-Flag Fleet by Vessel Owner and Type of Vessel

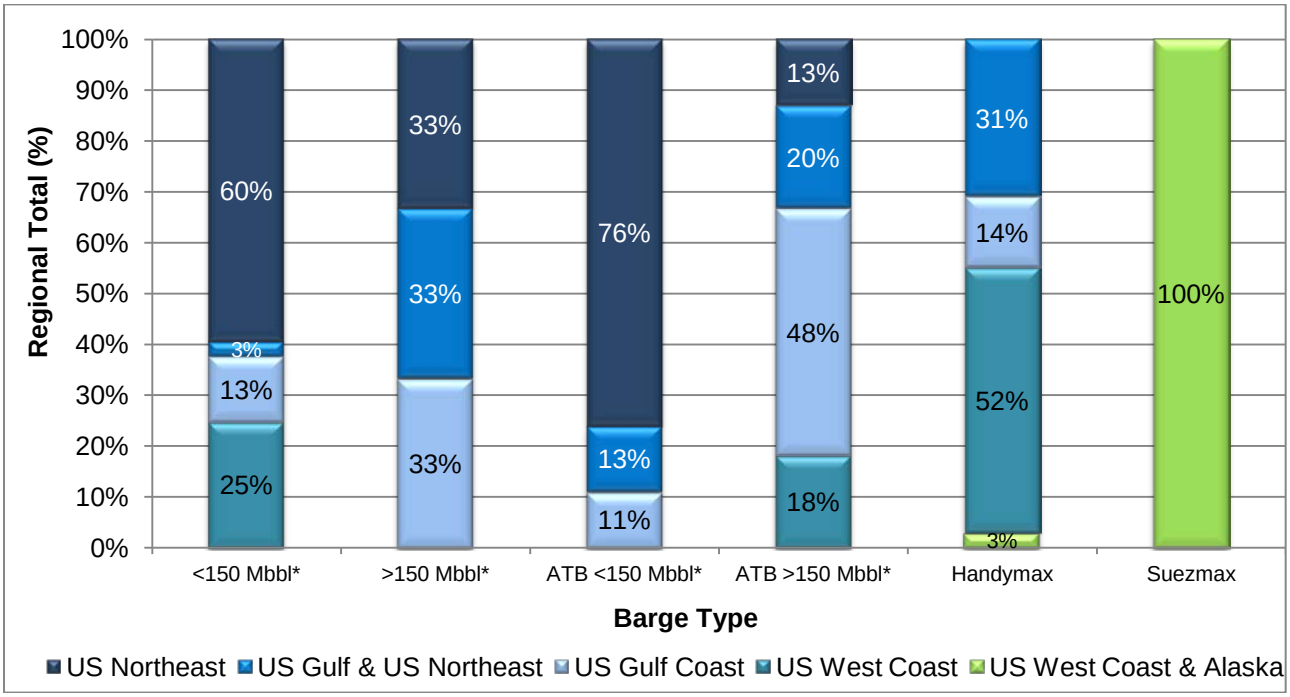
Owner	ATB <150 Mbbl capacity	ATB ≥ 150 Mbbl capacity	Barge <150 Mbbl capacity	Barge ≥ 150 Mbbl capacity	Handymax	Suezmax	Grand Total
K-Sea	9	2	34	-	-	-	**45**
Crowley	-	32	-	-	-	-	**32**
OSG	-	19	-	-	13	-	**32**
Reinauer	11	-	16	-	-	-	**27**
Bouchard	12	5	4	2	-	-	**23**
Penn Maritime	6	2	11	-	-	-	**19**
Vane Line	2	-	12	-	-	-	**14**
U.S. Shipping	2	6	-	-	3	-	**11**
Moran Towing	6	-	4	-	-	-	**10**
Hornbeck Offshore	-	-	9	-	-	-	**9**
Sause Bros.	-	-	7	-	-	-	**7**
Seacor Towing	-	-	6	-	-	-	**6**
Harley Marine	-	-	5	-	-	-	**5**
Saltchuk	-	-	5	-	-	-	**5**
American Petroleum Tankers	-	-	-	-	5	-	**5**
Chevron	-	-	-	-	5	-	**5**
Polar Tankers (Phillips 66 subsidiary)	-	-	-	-	-	5	**5**
Gellatly and Criscione	-	-	4	-	-	-	**4**
Greater NYS	-	-	4	-	-	-	**4**
Allied	-	-	3	1	-	-	**4**
BP	-	-	-	-	-	4	**4**
Keystone Shipping	-	-	1	2	-	-	**3**
Seabulk	-	-	-	-	3	-	**3**
Poling & Cutler	-	-	2	-	-	-	**2**
SeaRiver (ExxonMobil subsidiary)	-	-	-	-	1	-	**1**
Total	**48**	**66**	**127**	**5**	**30**	**9**	**285**

Source: Poten & Partners' Proprietary US Flag Database of Ocean-Going Tankers and Barges

Note: Figures as of January 2012. Table excludes inland barges.

As illustrated in Exhibit II-6, the bulk of the smaller ocean-going ATBs and barges (of < 150 Mbbl capacity) operate in the U.S. Northeast. The bulk of the larger ocean-going ATBs and barges (of ≥ 150 Mbbl capacity) operate in both the U.S. Gulf Coast and the U.S. Northeast. U.S.-flag Suezmax oil tankers ship crude oil from Alaska to the U.S. West Coast. About half of the Handymax oil tankers operate on the U.S. West Coast.

Exhibit II-6: Ocean-Going U.S.-Flag Vessels Region of Operation



Source: Poten & Partners' Proprietary US Flag Database of Ocean-Going Tankers and Barges

** Volume capacity*

The bulk of the U.S.-flagged ATBs and regular barges are spot-chartered. The Handymax and Suezmax oil tankers are employed on a term basis. U.S.-flag regular barge and ATBs utilization levels range between 75 percent and 90 percent. Should utilization levels increase and transportation economics allow it, ship-owners could increase the sizes of their fleets.

U.S.-flag inland tank barges move liquid bulk cargoes primarily on the Gulf Intracoastal Waterway and the Mississippi River. There are over 2,000 operating inland tank barges.

U.S.-flag vessels chartering rates depend on a number of factors such as:

1. Type of oil product shipped
2. Size of the cargo
3. Shipping route
4. Availability of U.S.-flag vessels

The Jones Act

The Jones Act is a section of the Merchant Marine Act of 1920. The Jones Act governs the market for ships and barges that transport commercial cargoes between U.S. ports. The purpose of the Jones Act is to ensure safety standards and promote the existence of a domestic fleet for national security. The Act also helps maintain a domestic mariners' workforce, as well as U.S. shipyard employment. Opponents of the Jones Act point out that the legislation keeps the costs of moving cargo between U.S. ports higher, compared to using foreign flag vessels to transport product. This is because the cost of building vessels in the U.S. is higher compared to the cost of building abroad, namely in South Korea, China, and Japan. Because of their uncompetitive costs, U.S. shipyards do not build vessels for international markets.

The Jones Act

The Merchant Marine Acts of 1920, 41 Stat.,988, as amended, and 1936, 19 Stat., 1985, known collectively as the Jones Act constitute the current cabotage laws of the U.S., laws which originated in 1789. The Jones Act governs the market for ships and barges that transport commercial cargoes between U.S. ports. The Act requires companies to use only U.S.-built vessels, which operate under the U.S. flag. In addition, at least 75 percent of the vessel crew must be comprised of U.S. citizens.

However, the requirement to use Jones Act vessels in moving product from the refining hubs in the Gulf Coast to the Mid-Atlantic or West Coast markets can be very difficult logistically. There are only about 300 Jones Act ships operating throughout the country, with some of them dedicated to routes solely on the West Coast. The ships are typically chartered months in advance, limiting their short-term availability. Assuming a vessel is available to charter from the Gulf Coast to the Northeast, the cost of the charter is typically higher than the cost of using foreign flag vessels and much higher than pipeline tariffs on Colonial pipeline, so these movements rarely occur. In addition, it takes an estimated 20 days round trip to ship product from the Gulf Coast at 10 knots to NY, offload the cargo, and return to the Gulf Coast at the same speed.[127] The difficulties in attaining Jones Act vessels can result in the occasional need for Jones Act waivers in order to locate available tonnage to move products or crude oil.

Waivers to the Jones Act

Application for waivers to the Jones Act must follow a defined and rigorous process as described in this section. The Jones Act requires that American vessels be used between U.S. coastal and inland points. However, in certain cases where a national security declaration has been made, federal law also permits so-called "case-by-case" Jones Act waivers in circumstances where no American vessel is available. Three federal departments/agencies share the responsibilities for considering waiver requests – the Maritime Administration (MARAD), which determines if American vessels are available; U.S. Customs and Border Protection (CBP), which has legal authority to grant the waivers; and the Department of Homeland Security (DHS), which ultimately signs the waivers. The waiver process is governed by 46 U.S.C. § 501(b).

[127] EIA. "Potential Impacts of Reductions in Refinery Activity on Northeast Petroleum Product Markets." EIA. February 27, 2012. Available at: http://www.eia.gov/analysis/petroleum/nerefining/update/pdf/neprodmkts.pdf

EIA. "Additional Information on Jones Act Vessels' Potential Role in Northeast Refinery Closures." May 11, 2012. Available at: http://www.eia.gov/analysis/petroleum/nerefining/update/pdf/add051112.pdf

While generalizations of the conditions under which waivers to the Jones Act are granted may have exceptions, it is still instructive to sketch the most likely scenarios for them being awarded. Waivers might be granted for sudden and unanticipated disruptions caused by natural calamities to the normal workings of domestic distribution of refined petroleum products. The duration of the waivers would be limited to the time required to repair damaged facilities and then resume timely distribution. This type of waiver is typically applicable for only a few weeks. A carefully delineated geographic scope would likely govern the waiver, too. In general, the waiver must be requested by a party intending to charter a vessel to move a product, and the request must be reviewed by MARAD to insure that no Jones Act vessels are available to move the product in the time window needed. At that point other authorizing agencies would rule on the waiver request.

The most compelling need for Jones Act waivers was obvious in the 1994 incident in Texas, when both major Colonial pipelines (the 40 inch gasoline line and the 36 inch distillate line) buried under the San Jacinto River 20 miles east of Houston ruptured and then ignited after massive flooding following Hurricane Rosa.[128] This disruption occurred while the Houston refineries continued to operate, meaning that there was no pipeline outlet for Houston refineries to the Southeast and Northeast. In this case, many shippers petitioned for Jones Act waivers since there was insufficient domestic tonnage available to move product to the Northeast.

Jones Act waivers have also been issued in attempts to squelch sudden upward petroleum price spikes by dumping prompt oil supply into markets. For example, in the spring of 2011, the loss of light, low-sulfur Libyan crude oil from the world's markets drove up the price of similar quality around the world including in the Atlantic basin. Pulled by the rise in crude oil prices, domestic oil product prices also began to rise rapidly. In an effort to mute the magnitude of the rise in product prices to consumers, the Obama Administration announced in June 2011 that 30 MMbbl of oil from the Strategic Petroleum Reserve would be sold. This move was intended to trim the rise of oil's price rise by adding supply. To facilitate moving this oil to waiting refineries along the Gulf Coast, numerous Jones Act waivers were issued as the availability of Jones Act vessels was deemed inadequate. However, the domestic marine industry was very upset that the Obama Administration bypassed the normal case-by case waiver process and "pre-announced" that waivers would be granted.[129]

Therefore, waivers are granted on a case-by-case basis depending on the market conditions or logistics constraints they are anticipated to ameliorate. When there are compelling supply requirements where domestic tonnage is not available (and confirmed by MARAD), it is likely waivers may be granted to be able to use foreign flag vessels. Pushing waivers through their approval process requires balancing the interests of their proponents against their opponents and the national interest. Generally, this balancing effort is not a straightforward task.

[128] National Transportation Safety Board. "Pipeline Special Investigation Report: Evaluation of Pipeline Failures During Flooding and of Spill Response Actions, San Jacinto River Near Houston, Texas, October 1994." 1996. Available at: http://ncsp.tamu.edu/reports/NTSB/ntsbPipeStudy/SIR9604.pdf

[129] "Testimony of Thomas Allegretti… Before the House Transportation and Infrastructure Committee's Coast Guard and Maritime Transportation Subcommittee," June 27, 2012. Available at: http://www.americanwaterways.com/index/AMPTestimonySPRJonesActHearingJune2012.pdf

Dredging

There are three general purposes for dredging:

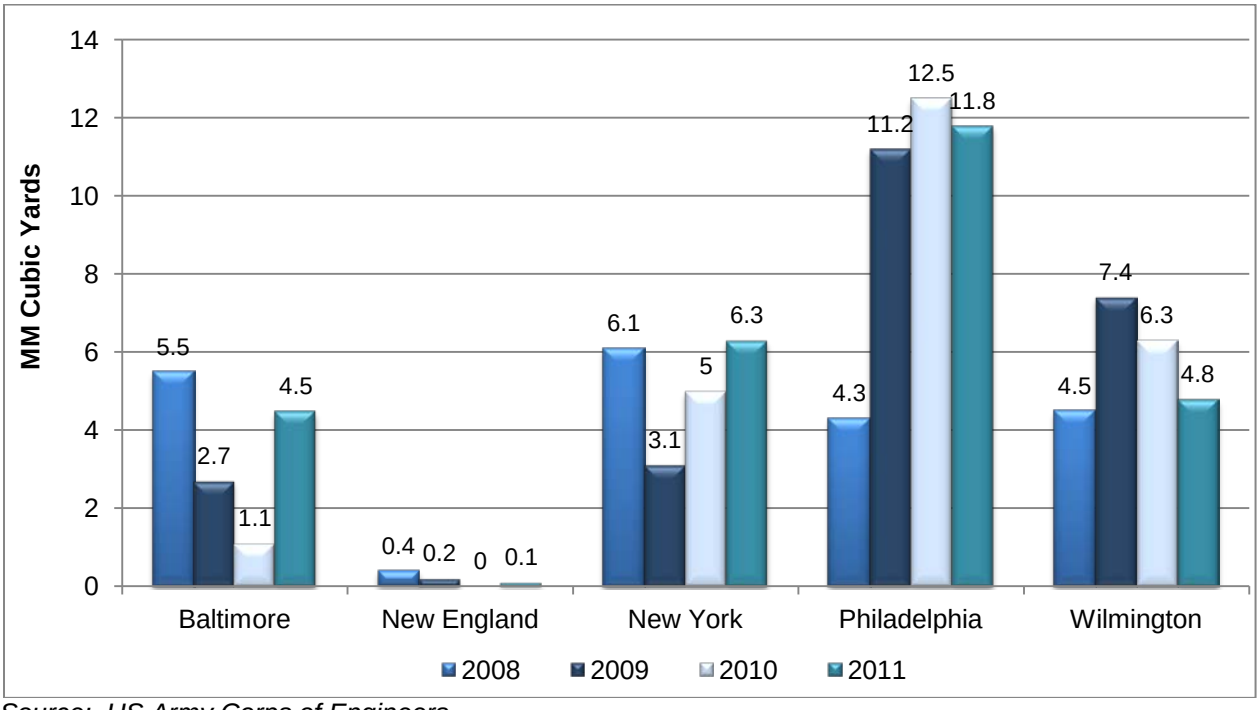
1. For channel deepening in order to accommodate larger ships in the major ports.
2. Maintenance dredging, which keeps channels and harbors free of accumulated buildup.
3. Beach nourishment for the development and maintenance of beaches.

The United States Army Corps of Engineers (USACE), a federal agency, uses congressionally appropriated funds for the dredging contracts for U.S. waterway navigation. USACE contracts private-sector operators for dredging services.

In 2010 and 2011, the following major U.S. Northeast ports had undergone dredging operations: Baltimore, NY, Philadelphia, and Wilmington. The Delaware River is currently being deepened from 40 feet to 45 feet. The dredged area is the 102.5-mile distance from the Philadelphia Harbor to the Delaware Bay. The project is expected to take five years to complete, considering sufficient funding is available throughout the duration of the project.

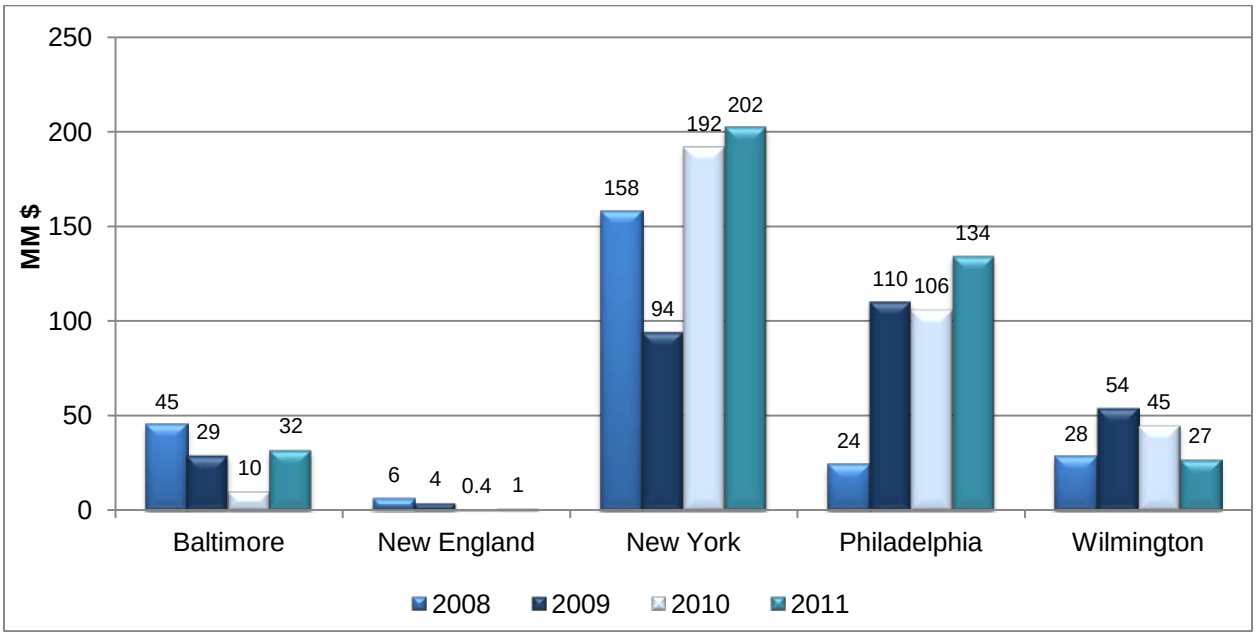
In April 2012, a dredging project was launched, which will deepen the shipping channel between Brooklyn and Staten Island to the depth of 50 feet from the current depth of 45 feet. The project is expected to be completed by 2014 and is managed by the U.S. Army Corps of Engineers and the Port Authority. Exhibit II-7 illustrates the volume of soil dredged throughout the U.S. Northeast, and Exhibit II-8 shows the cost of dredging.

Exhibit II-7: Cubic Yards of Soil Dredged in the U.S. Northeast (MM Cubic Yards)



Source: US Army Corps of Engineers

Exhibit II-8: Cost of Dredging in the U.S. Northeast (MM $)



Source: US Army Corps of Engineers

The main issues surrounding dredging are:

1. Cuts in federal funding for dredging.
2. Scheduling. Regulators have set time windows for dredging in order to minimize the environmental impacts. The NYS Sea Grant and the NYS Department of Environmental Conservation have developed a matrix to streamline and facilitate scheduling of dredging work.
3. Disposal of the dredged material, which can be laden with toxins from marine traffic and the port industry.

Congestion

Port congestion in NYH varies depending on the number of vessel calls, port management, loading/unloading times, pollution, and strikes. NYH vessel congestions do not have the seasonality that some other ports experience. Congestions can occur any time of the year, week or day in NYH. Most delays in the Harbor occur as a result of shoreside mechanical breakdowns, “hot work” (i.e., welding) at the terminal, and dredging. Alternative ports, when congestion occurs, are New Haven, Providence, Bridgeport, Philadelphia, and Boston. In order to alleviate congestion, a few issues should be addressed:

- Dredging, to enable larger vessels to call in a port, in lieu of lighter vessels
- Increasing the air draft
- A virtual, instead of manual, inspection system
- Additions of cranes, pipelines, and other equipment to improve loading/discharging turnaround time

- Alternative ports to a nearby destination
- Pier extensions (dolphins)
- Port capacity expansions

Spot Charter Rates in the Study Area

The cost to ship product by marine equipment in the study area is dependent upon a number of variables. As the charts below show, key variables include: 1) the size of the vessel or barge (cost is cheaper per barrel the larger the vessel or barge); 2) the distance involved (a voyage originating and ending in NYH will be cheaper than a similar voyage to Boston on the same size vessel); and 3) the charter market at the time (the availability of vessels and barges can change based on supply and demand for the equipment). Individual rates can be higher for a specialized trip (for example if the product requires cleaning before or after load and discharge).

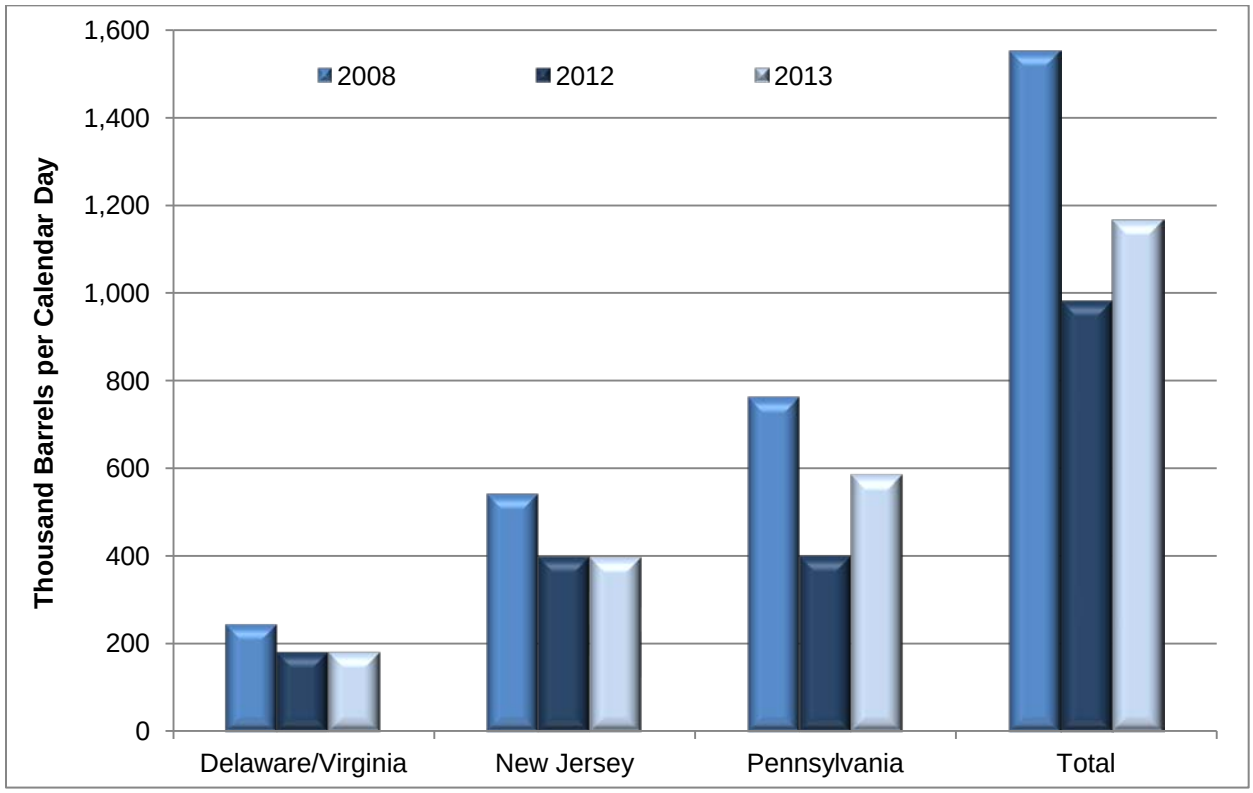
Overall, the cost of marine transport ranges from $0.02-$0.10/gallon ($1/barrel is $0.025/gallon). Barge transit is typically reliable and barge voyages are completed within 1 to 2 days in this market. See Appendix G for exhibits showing assessed spot average monthly rates for selected voyages originating in NYH.

Refining Infrastructure

As indicated in Section I, the refining infrastructure supplying NYS is in the process of transition. At this point it is not fully clear how the final disposition of refinery assets may end. However, this section provides more specific detail on each refinery asset in the region and provides perspective on the viability of the assets.

Exhibit II-9 shows total light fuels refining capacity supplying the NYS region as of January 2008, January 2012, and estimated capacity for January 2013, with the recent announcements affecting the East Coast refining landscape.

Exhibit II-9: U.S. East Coast Coastal Light Fuels Refining Capacity* (Mb/d)



Sources: *EIA. "Petroleum & Other Liquids—Refinery Capacity Reports." 2008 and 2012. Available at: http://www.eia.gov/petroleum/refinerycapacity/.*

Note: *The 2013 capacities reflect changes in refining capacity assuming all current announcements of refinery sales and closures (Phillips 66 Trainer purchase by Delta, Sunoco Marcus Hook closure, and Sunoco Philadelphia joint venture) occur, and assuming all other refineries continue to operate in 2013.*

Table II-8 shows the current (August 2012) refining infrastructure, identifying refineries on the East Coast that have closed in the past several years, and the refineries which have been closed pending sale or operating pending sale. Though the East Coast refining market has been partially rescued, the future possibility of these refineries is still plausible.

2012 U.S. East Coast Non-Asphalt Coastal Refinery Capacity

Table II-8: Start of 2012 Coastal Light Fuels Refining Capacity on U.S. East Coast

Company	Refinery	State	Capacity (Mb/d)	FCC (Mb/d)
Refineries Presently Operating				
Philadelphia Energy Solutions	Philadelphia	PA	335.0	135.0
Phillips 66	Linden in Bayway	NJ	238.0	130.0
PBF Energy	Delaware City	DE	182.2	81.3
PBF Energy	Paulsboro	NJ	160.0	54.0
United Refining	Warren	PA	65.0	24.0
Amerada Hess	Port Reading	NJ		65.0
Delta Air Lines	Trainer	PA	185.0	51.5
Total			**1,165.2**	**540.8**
Refineries with Shutdown Pending Due to Sale or by Conversion to Product Terminal				
Sunoco	Marcus Hook	PA	178.0	98.0
Total			**178.0**	**98.0**
Refineries Closed: Converting to Product Terminal				
Sunoco	Eagle Point in Westville	NJ	145.0	52.0
Western Refining	Yorktown	VA	66.3	27.8
Total			**216.3**	**82.8**

Source: *EIA. "Petroleum & Other Liquids—Refinery Capacity Reports." Data as of June 2012. Available at: http://www.eia.gov/petroleum/refinerycapacity/*

Note: *Delta Trainer, Sunoco Marcus Hook, and Western Yorktown crude and FCC capacities based on 2011 EIA report. Sunoco Eagle Point crude and FCC capacities based on 2009 EIA report.*

An assessment of each of the refineries in Table II-8 is presented below.

Sunoco Inc.

Sunoco has been a major player, supplying the entire Middle Atlantic market for a number of years. Sunoco's three refineries in the greater Philadelphia market have supplied their extensive regional marketing network through Sunoco Logistics, a separate company formed a number of years ago. Sunoco Logistics operates a major pipeline system moving petroleum products from the refining centers in the Philadelphia region into New Jersey and NYS, and north through Pennsylvania.

Sunoco's refineries can only run light, sweet crude oils which are typically far more expensive than heavy and higher sulfur crude oils. Sunoco has in recent years attempted to cut costs and modify operations to maintain profitability, but has decided to get out of the refining business. Sunoco closed the Eagle Point refinery in 2010 and the Marcus Hook refinery in late 2011. The large Philadelphia refinery will remain open via Philadelphia Energy Solutions, a joint venture between Sunoco and the Carlyle Group. Summaries of each refinery follow.

Philadelphia, PA Refinery (Philadelphia Energy Solutions): 335,000 b/d

The Philadelphia refinery emerged from the original Arco and Chevron refineries which were adjacent and consolidated into one refinery by Sunoco. The Arco refinery was the first refinery in the U.S., which began operations in 1865. Similar to its Marcus Hook plant, the Philadelphia refinery also favors processing mainly light, low-sulfur West African crude oils. Despite its dependence on these expensive feedstocks, the Philadelphia refinery, which announced in mid-2011 the refinery would close by July 2012 has, nevertheless, generated some buying interest (among other reasons may be the refinery's ability to process large quantities of ULSD, a product that will be in tight supply with the change in NYS heating oil specifications). On July 2, 2012 Sunoco partnered with the Carlyle Group, a private equity firm, to announce they would continue to operate the refinery through a joint venture. They also announced among other plans, the construction of a "high speed" train unloading facility to bring in crude from the Bakken Shale, which has crude that can substitute for the light, low-sulfur West African crudes the refinery has been processing. The railcar offloading facility is scheduled to be able handle 140,000 b/d of crude oil. Furthermore, the refinery plans to substitute a portion of its current crude slate from the North Sea and Africa to crude oils from the Eagle Ford formation in Texas, and the Niobrara formation in Kansas and Nebraska. The refinery also plans to benefit from relatively low natural gas prices by operating a cogeneration plant at the refinery fueled by gas from the nearby Marcellus Shale.[130] Table II-9 shows the crude imports to Sunoco's Philadelphia, PA refinery for 2008 and 2011.

[130] Platts. "Sunoco, Carlyle in last-chance refinery deal," *Oilgram Price Report*. July 3, 2012.

Table II-9: Sunoco Philadelphia, PA Crude Oil Imports in 2008 and 2011

Country	MMbbl				Sulfur, wt %		API	
	2008	2008 % of Total	2011	2011 % of Total	2008	2011	2008	2011
Algeria	1.1	1.2%	2.8	2.9%	0.07	0.07	44.3	44.6
Angola	6.9	7.2%	12.1	12.8%	0.12	0.26	34.1	33.4
Azerbaijan	17.3	18.0%	7.3	7.7%	0.13	0.13	35.9	36.3
Brazil			2.5	2.7%		0.25		23.2
Cameroon			13.1	13.9%		0.10		21.3
Canada	1.3	1.3%	4.3	4.6%	0.26	0.37	30.2	32.6
Chad	16.6	17.2%			0.08		21.0	
Congo (Brazzaville)	2.5	2.6%			0.04		40.1	
Egypt	0.4	0.4%			0.29		32.5	
Equatorial Guinea	5.7	5.9%			0.15		33.7	
Gabon	6.1	6.3%	0.7	0.7%	0.15	0.13	34.3	35.3
Ghana			1.0	1.1%		0.25		36.7
Ivory Coast			0.3	0.3%		0.31		31.7
Malaysia	0.3	0.3%			0.07		37.2	
Nigeria	42.6	44.2%	42.2	44.9%	0.11	0.12	36.1	36.7
Norway	0.9	1.0%	7.8	8.3%	0.13	0.17	41.9	41.0
Russia	1.0	1.1%			0.21		62.9	
Venezuela	1.7	1.8%			0.18		48.5	
Grand Total	**96.5**		**94.1**		**0.12**	**0.16**	**33.5**	**33.9**

Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Eagle Point, NJ (West Deptford) Storage Terminal (formerly a 145,000 b/d refinery)

Sunoco plans to expand gasoline and heating oil storage at its Eagle Point Terminal. According to an early March 2012 press announcement, this site presently can store 3 MMbbl of refined oil products. The company expects to return an additional 2 MMbbl of refined product storage into service sometime this year, while keeping an unspecified amount of tankage in reserve for future use.

Sunoco has reportedly been upgrading berthing facilities at Eagle Point to accommodate imports via 600 Mbbl LR2 (Aframax) tankers and 1 MMbbl Suezmax tankers. It should be noted that non-U.S.-flag Suezmax-size tankers dedicated to clean refined product service currently represent less than a handful of vessels in this segment's fleet of slightly more than 400 ships as it is much more of a crude carrier. While foreign LR2 tankers are more prevalent than clean Suezmax tankers, the main trading route for LR2s is presently from the Arabian Gulf to the Far East. About 29 percent of the 900-vessel Aframax fleet is geared toward carrying clean, refined products.

Sunoco is planning to increase the terminaling throughput of clean petroleum products through its former refinery at Westlake, NJ. These plans revolve around the use of facilities of the Delaware River to handle product transfers and the possible reversal of Sunoco Logistics 16-inch diameter Harbor products pipeline presently flowing from Woodbridge, NJ to Linden, NJ. According to news stories on Sunoco Logistics Harbor pipeline reversal, clear refined products

might come from additional imports into the Newark area or from expanded deliveries by the Colonial Pipeline system into that area or from both sources.

In late 2011, the Colonial System increased the capacity of its Line 3 pipeline carrying gasoline and distillate into Linden, NJ by 100,000 b/d. The company is also planning to increase the flows through this line from Greensboro, NC to Linden, NJ by 20,000 b/d by summer 2012 and another 40,000 b/d by the middle of next year. A tentative second expansion phase of this line may add another 65,000 b/d of clean petroleum supply into Linden by 2014.

Marcus Hook, PA Refinery: 178,000 b/d

The Marcus Hook refinery was built in 1902 and is designed to process light, sweet crude oil. In 2011, three-quarters of the refinery's crude oil diet came from light, low-sulfur crude oils originating in West African countries. Limitations originally designed into the plant necessitate processing this grade of oil. The loss of much of Libya's light, low-sulfur crude oil production for most of 2011, due to the country's civil crisis, pushed the price of West African oils higher. Moreover, the spread between the cost of these crude oils and the value of the products produced tightened, which made this facility less economical and led Sunoco to close it in late 2011.

Since its closing in late 2011, Sunoco's intended sale of the Marcus Hook refinery has generated little buying interest. Marcus Hook's limited ability to process cheaper, heavy, high-sulfur crude oils undermines its economic viability vis à vis the value of the products it extracts. A significant investment is likely required to upgrade this plant to accommodate cheaper feedstocks while still manufacturing light transportation fuels. The apparent inability to recoup this investment, let alone profit from it, seems to be behind Sunoco's decision to sell the plant or permanently close it if no buyer is found.

Although the price strength of light, low-sulfur crude oils out of West Africa may eventually lessen, compared to the refined products they yield, the continuing draw of this oil to Asia makes this scenario unlikely. Hence, the prospects of the Marcus Hook refinery returning to service in its present configuration are not favorable. Prospects that a sizable investment in the facility would eventually make the facility profitable are also bleak.

Since the global economic retrenchment of 2008, Phillips 66 (formerly ConocoPhillips) implemented a strategy to shed under-performing refineries worldwide. Last year, Phillips 66 closed its 185,000 b/d Trainer, PA refinery after the facility failed to spark purchase offers. The company subsequently sold the Trainer refinery to Delta Airlines and the refinery is planning to restart in the fall of 2012, operated by Monroe Energy.[131]

Bayway, NJ (Linden) Refinery: 238,000 b/d

The Bayway refinery has been a major supplier into the regional market since it began operation near the beginning of the 20th century. Whether or not Phillips 66 will seek to sell its Bayway refinery anytime soon is shrouded by the inner workings of corporate initiatives as well as the future health of East Coast refining margins. Aside from merely speculating on Phillip 66's

[131] McGurty, Janet. "Update 2 – Delta readying Trainer refinery for restart-source." Thomson Reuters, 18 September 2012: New York, NY. Available at: http://www.reuters.com/article/2012/09/18/refinery-operations-monroe-trainer-idUSL1E8KI58620120918

disposition towards the Bayway facility, little insight can be gleaned directly from the company's public statements.

Any required investment to meet more stringent product qualities or other regulations in the future will weigh heavily in any evaluation or strategy by Phillips 66 to keep, sell, or close the Bayway refinery. The facility mainly processes light, low-sulfur crude oil from Canada and West Africa. Although these oils have been pricy lately relative to the East Coast value of products they yield, Bayway has weathered an extremely turbulent and financially painful period in the history of East Coast refining margins. Consequently, even if Phillips 66 someday seeks to sell Bayway, it seems reasonable that another company will likely see value in acquiring the refinery.

Hence, for the foreseeable future, operations at Bayway – irrespective of its ownership – should be sustained barring an extended collapse of refinery margins and/or availability of more competitive supply from other markets. Table II-10 shows the Phillips 66 Bayway, NJ imports for selected years.

Table II-10: Phillips 66 Bayway, NJ Crude Oil Imports in 2008 and 2011

Country	MMbbl				Sulfur, wt %		API	
	2008	2008 % of Total	2011	2011 % of Total	2008	2011	2008	2011
Algeria	1.7	2.0%	1.1	1.4%	0.30	0.30	38.2	38.2
Angola	26.2	30.4%	20.9	25.4%	0.22	0.21	36.1	34.5
Canada	35.9	41.6%	36.6	44.5%	0.69	0.46	29.4	33.0
Congo (Brazzaville)	3.4	3.9%	6.2	7.5%	0.18	0.05	33.8	39.3
Gabon	0.6	0.7%			0.13		37.4	
Ghana			1.0	1.2%		0.53		33.5
Libya	6.2	7.2%			0.10		40.7	
Nigeria	11.5	13.3%	16.5	20.0%	0.13	0.13	37.7	38.6
United Kingdom	0.6	0.8%			0.42		36.0	
Total	**86.2**		**82.2**		**0.40**	**0.30**	**33.7**	**35.0**

Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Trainer, PA Refinery (Delta Air Lines): 185,000 b/d

Crude oil processing operations at Phillips 66's Trainer, PA refinery ceased in the last quarter of 2011. In April 2012, the refinery, originally built in 1921, was sold to a subsidiary of Delta Air Lines, Inc. The refinery will be reconfigured to maximize jet fuel production, a major universal cost to airlines. Delta has arranged agreements with oil majors to help in the operation of the refinery. BP will provide crude oil to the refinery and Delta has agreements with both BP and Phillips 66 to exchange gasoline, diesel, and other refined products from the refinery for jet fuel around the country.[132]

[132] Couret, Jacques. "Delta buys Trainer oil refinery in Pennsylvania," *Atlanta Business Chronicle.* April 30, 2012. Available at: http://www.bizjournals.com/atlanta/news/2012/04/30/delta-buys-trainer-oil-refinery-in.html?page=all

PBF Energy

Delaware City, DE Refinery: 182,200 b/d and Paulsboro, NJ Refinery: 160,000 b/d

PBF Energy bought these refineries from Valero in late 2010. The sites are symbiotic processing-wise as finished and semi-finished petroleum stocks routinely shuttle between them by barge.

Geared toward processing medium to heavy high-sulfur imported crudes oils, the Paulsboro plant is a full upgrading refinery which allows the conversion of residual fuels to gasoline and diesel fuel blendstocks. Other than its sister refinery in Delaware City, it is the only refinery on the East Coast which does not produce residual fuel oil, providing these refineries with a competitive advantage versus the refineries running light sweet crude oils and making residual fuel oil. The Paulsboro facility was commissioned in 1917 and is the site of the world's first Houdry fluid catalytic cracker (started in 1936) to make gasoline. Paulsboro is also able to produce high quality lubricating oils primarily from processing Saudi crude oils.

Oil processing at the Delaware City refinery is focused on a wide variety of heavy, high- and medium-sulfur imported crude oils. These oils are then converted into light transportation fuels by secondary processes. PBF has recently cancelled plans to build a 65,000 b/d mild hydrocracker to increase ULSD production in favor of a much lower cost project to process rail car shipments of Bakken area light, sweet crude oil and Western Canadian heavy crude oil. While it may be possible to produce some ULSD from Bakken, the volumes anticipated would not appear to allow full conversion to ULSD, or to be able to hydrotreat the Paulsboro refinery distillates into ULSD (which the $1 billion dollar mild hydrocracker project would have allowed).

As the U.S. market for greater than 15 ppm sulfur diesel essentially disappears in July 2014, the timeline to implement this project is extremely tight when gauged by typical refining construction schedules. If PBF does not commit to this project, its disposal options for non-compliant diesel could be limited. If the sulfur content of this distillate is less than 0.1 percent sulfur, its use as marine bunkers is possible. Alternatively, higher sulfur distillates could be exported (which would likely be less of a penalty than changing the crude slate to sweeter crudes).

Much of the economic drive behind these PBF refineries stems from capturing the value in usually less expensive heavy, high-sulfur crude oils via its extensive secondary processing units. In times when these crude oils are close to the price of lighter ones, the refinery margins of deep residual conversion refineries such as these are meager. This was the primary driver behind Valero's decision to close the Delaware City refinery in 2009 and then sell both of them in 2010.

Table II-11 and Table II-12 show the crude import data for both the Paulsboro and Delaware City refineries for 2008 and 2011. Delaware City resumed operations in the third quarter of 2011, so crude imports reflect fourth-quarter operations.

Table II-11: Paulsboro, NJ Crude Oil Imports, Valero in 2008 and PBF in 2011

Country	MMbbl				Sulfur, wt %		API	
	2008	2008 % of Total	2011	2011% of Total	2008	2011	2008	2011
Saudi Arabia	36.7	72.0%	20.7	52.1%	2.18	1.86	31.9	32.9
Iraq	1.0	2.0%	7.9	20.0%	2.32	2.19	33.5	31.3
Russia	1.1	2.2%	7.4	18.6%	1.20	1.96	32.7	30.6
Colombia	3.8	7.5%	1.7	4.4%	0.72	0.57	25.8	25.5
UK	-	-	0.6	1.5%	-	0.30	-	39.7
Mexico	0.2	0.3%	0.5	1.4%	1.26	2.17	33.4	38.8
Congo	-	-	0.5	1.2%	-	0.03	-	36.2
Oman	-	-	0.4	0.9%	-	0.08	-	32.1
Canada	4.4	8.6%	-	-	0.48	-	32.4	-
Venezuela	3.8	7.4%	-	-	1.79	-	25.7	-
Total	**51.1**	**100.0%**	**39.7**	**100.0%**	**-**	-	**-**	**-**
Calculated Average					**1.87**	**1.83**	**31.0**	**32.0**

Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Table II-12: Delaware City, DE Crude Oil Imports, Valero in 2008 and PBF in 2011

Country	MMbbl				Sulfur, wt %		API	
	2008	2008 % of Total	2011	2011% of Total	2008	2011	2008	2011
Iraq	-	-	4.5	21.9%	-	2.12	-	30.8
Russia	0.7	2.1%	4.3	20.9%	0.42	2.00	54.8	29.2
Colombia	0.9	2.5%	3.0	14.6%	1.47	1.10	21.7	23.6
Venezuela	12.0	35.1%	2.2	10.6%	1.98	1.55	25.3	22.8
Congo	-	-	1.8	9.0%	-	0.10	-	27.0
Saudi Arabia	18.6	54.6%	1.6	8.0%	2.78	2.67	28.6	28.5
Angola	-	-	1.0	5.1%	-	1.18	-	23.2
Brazil	0.2	0.6%	1.0	4.7%	0.52	0.78	28.3	20.8
UK	-	-	0.6	2.9%	-	0.56	-	37.9
Oman	-	-	0.4	1.7%	-	0.08	-	32.1
Algeria	-	-	0.1	0.4%	-	0.10	-	32.3
Mexico	1.8	5.2%	-	-	1.91	-	26.7	-
Total	**34.2**	**100.0%**	**20.4**	**100.0%**	**-**	**-**	**-**	**-**
Calculated Average					**2.36**	**1.54**	**27.6**	**27.3**

Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/

United Refining

Warren, PA Refinery: 65,000 b/d

United Refining owns and operates a 65,000 b/d refinery in northwestern Pennsylvania.[133] The refinery began operations in 1903. It is a full upgrading refinery although it produces asphalt in lieu of coking the residual component of crude oil.

The refinery receives imported crude oil from Canada via the Enbridge pipeline system connecting to the United-owned Kiantone pipeline in West Seneca, NY (near Buffalo). Product moves from the refinery to markets in NYS, Pennsylvania and Ohio primarily by truck.

The refinery processes over 50 percent Canadian heavy crude and the balance is lighter grades of Canadian crude. These crudes currently have a significant price discount due to growing Canadian supply and constrained capacity to move Canadian crude to the Gulf Coast. Based on this, and the expansion of distillate treating capacity planned in 2012 (to make all ULSD), the United refinery should remain operational and a steady contributor to Western NYS supply. Table II-13 shows the crude imports to United's Warren, PA refinery in 2008 and 2011.

Table II-13: United Refining Warren, PA Crude Oil Imports in 2008 and 2011

Country	MMbbl				Sulfur, wt %		API	
	2008	2008 % of Total	2011	2011 % of Total	2008	2011	2008	2011
Canada	22.0	100.0%	21.2	99.7%	2.24	2.33	27.0	28.0
United Kingdom			0.06	0.3%		1.98		29.7
Grand Total	**22.0**		**21.3**		**2.24**	**2.33**	**27.0**	**28.0**

Source: EIA. "Petroleum & Other Liquids—Company Level Imports." 2012. Available at: http://www.eia.gov/petroleum/imports/companylevel/

Amerada Hess

Port Reading, NJ: Standalone 70,000 b/d Fluid Catalytic Cracker (FCC) Unit and Secondary Processes

The Hess refinery in Port Reading is unusual in that it does not process crude oil, but instead purchases vacuum gas oil to process in its FCC unit. Other secondary units (alkylation, distillate treating and dimersol) allow Hess to manufacture finished petroleum products. Hess has typically purchased gas oil from local refiners and imported gas oil based on market economics and has been able to generate an adequate margin (since they continue to operate).

Press releases by Hess on its commitment to the continuance of operations at Port Reading are opaque. The obligatory caveats that onerous environmental and labor costs, as well as unfavorable oil market conditions (read as refining margins), could adversely impact the plant's operations are routinely sprinkled in the company's announcements. As long as vacuum gas oil and residual fuel oil remain attractively priced feedstocks for the FCC and Hess can readily obtain additional gasoline blending stocks, it seems likely that its Port Reading plant will continue operating.

[133] EIA. "Petroleum & Other Liquids—Refinery Capacity Reports." Data as of January 2012. Available at: http://www.eia.gov/petroleum/refinerycapacity/

Light-Heavy Crude Economic Factors Affecting East Coast Refiners

The price spread between light, low-sulfur crude oils and heavy, high-sulfur crudes fluctuates for a variety reasons. During the period of Valero's margin pain, the decline of oil consumption worldwide had prompted producers to favor output of their lighter, more expensive crude oils to sustain their revenues. Hence, the production of the heavy oils was minimized and their price discount relative to lighter ones contracted. Valero's Paulsboro and Delaware City refineries are configured to benefit from processing cheaper, heavy oil. At times when the price differential between heavy and light crude oils shrink, refineries such as these generate poor margins. If another global economic crisis results in a contraction of the light-heavy crude oil price spread (thus further shrinking their margins), these two refineries could be in jeopardy of being sidelined – either temporarily or permanently.

Propane Infrastructure

In addition to the propane moved by the Enterprise pipeline system and its associated terminals (described earlier in Section II), propane in NYS is transported by rail and truck. Sources of propane in NYS include:

1. Volumes moved from the Gulf Coast on the Enterprise (formerly the TEPPCO) pipeline system into terminals in NYS. This source is likely to change by 2014 as Enterprise will be reversing its pipeline back to the Gulf Coast to move ethane from the Marcellus shale region to petrochemical plants on the Gulf Coast.[134] Propane shipments to NYS will likely continue, but be sourced from the Marcellus shale region natural gas processing plants instead of Gulf Coast supply.
2. Volumes received at railcar terminals. Fuel originates from many sources throughout North America, including the Gulf Coast, Midwest, and Canada. Table II-14 below lists several locations where propane railcars can be offloaded. In 2010, NYS received 1,520 rail cars (45.6 million gallons, or 1.1 million barrels) of propane.
3. Volumes from local regional refineries (United, Phillips 66, and Hess), which may move by truck to NYS customers.

[134] ATEX Express Pipeline. "About the Appalachia-to-Texas (ATEX) Express Pipeline." Available at: http://www.atexexpresspipeline.com/

Table II-14: Possible Rail Destination Locations in New York

Owner/Marketer	City	Rail served/storage
Disanto Jet Gas	Clyde	Private facility
DCP Midstream	Albany	CSX
Enterprise Products	Selkirk	CSX, pipeline, Transport Truck
Global Partners	Albany	CP
Inergy	Peekskill	CSX markets to third parties
Inergy	Bridgehampton	Private facility served by Long Island short line
NORCO/Petrogas	North Collins	Private facility limited marketing
Paraco Gas	Riverhead	Private facility served by Long Island short line
Suburban Propane	Binghamton	Private facility limited use
Suburban Propane	Phoenix	16-30k

Source: New York State Energy Research and Development Authority. Industry sources.

Biofuels Infrastructure

This section describes the infrastructure in NYS that is critical to the sustained supply of ethanol and biodiesel to consumers. The discussion will include the following infrastructure components:

Ethanol supply infrastructure, including:

1. Ethanol in-state supply sources, including ethanol production facilities
2. Ethanol distribution terminals
3. Ethanol transportation

Biodiesel supply infrastructure, including:

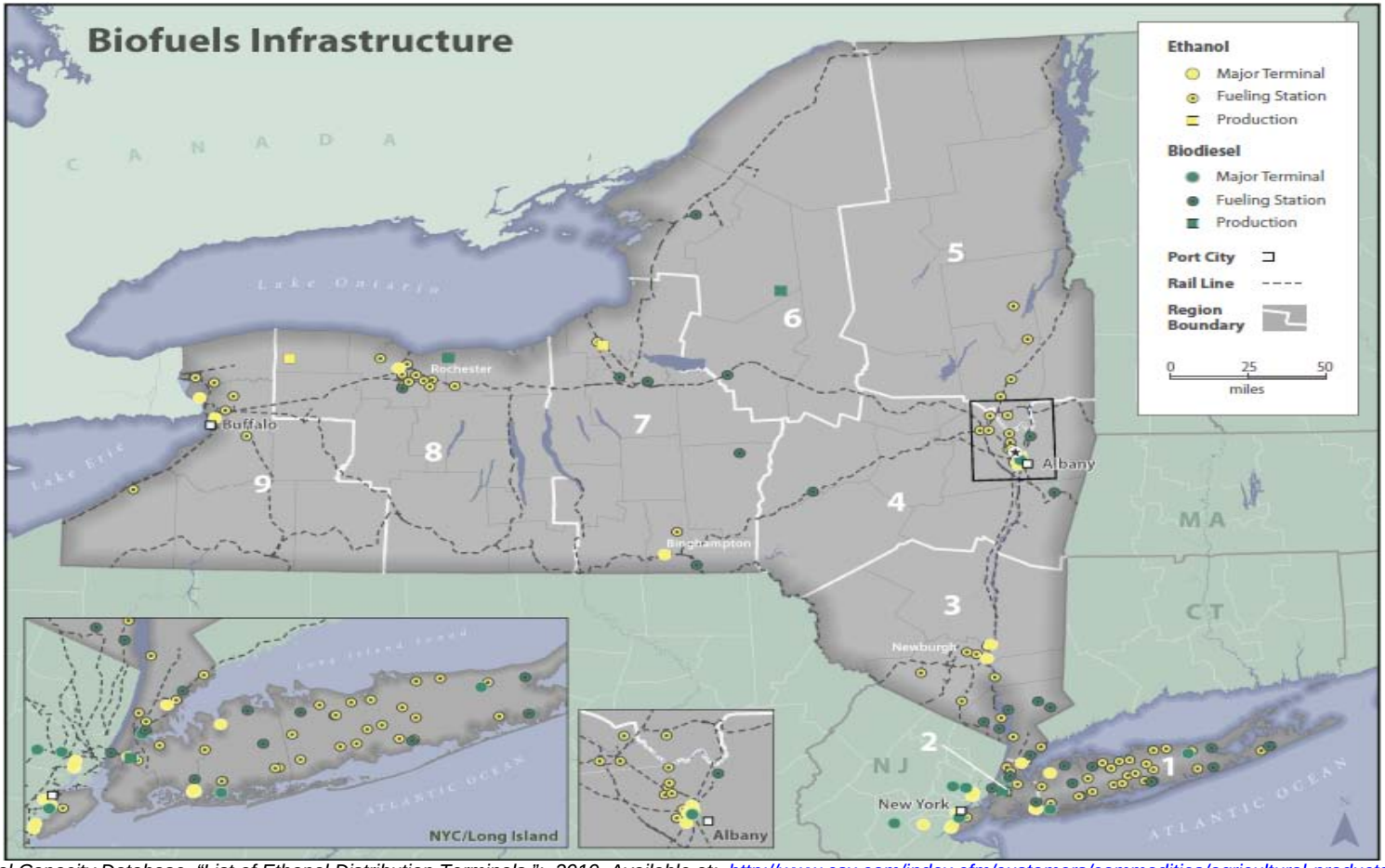
1. Biodiesel in-state supply sources, including biodiesel production facilities
2. Biodiesel storage locations
3. Biodiesel transportation

Potential impact of regulation and policy changes on biofuel infrastructure:

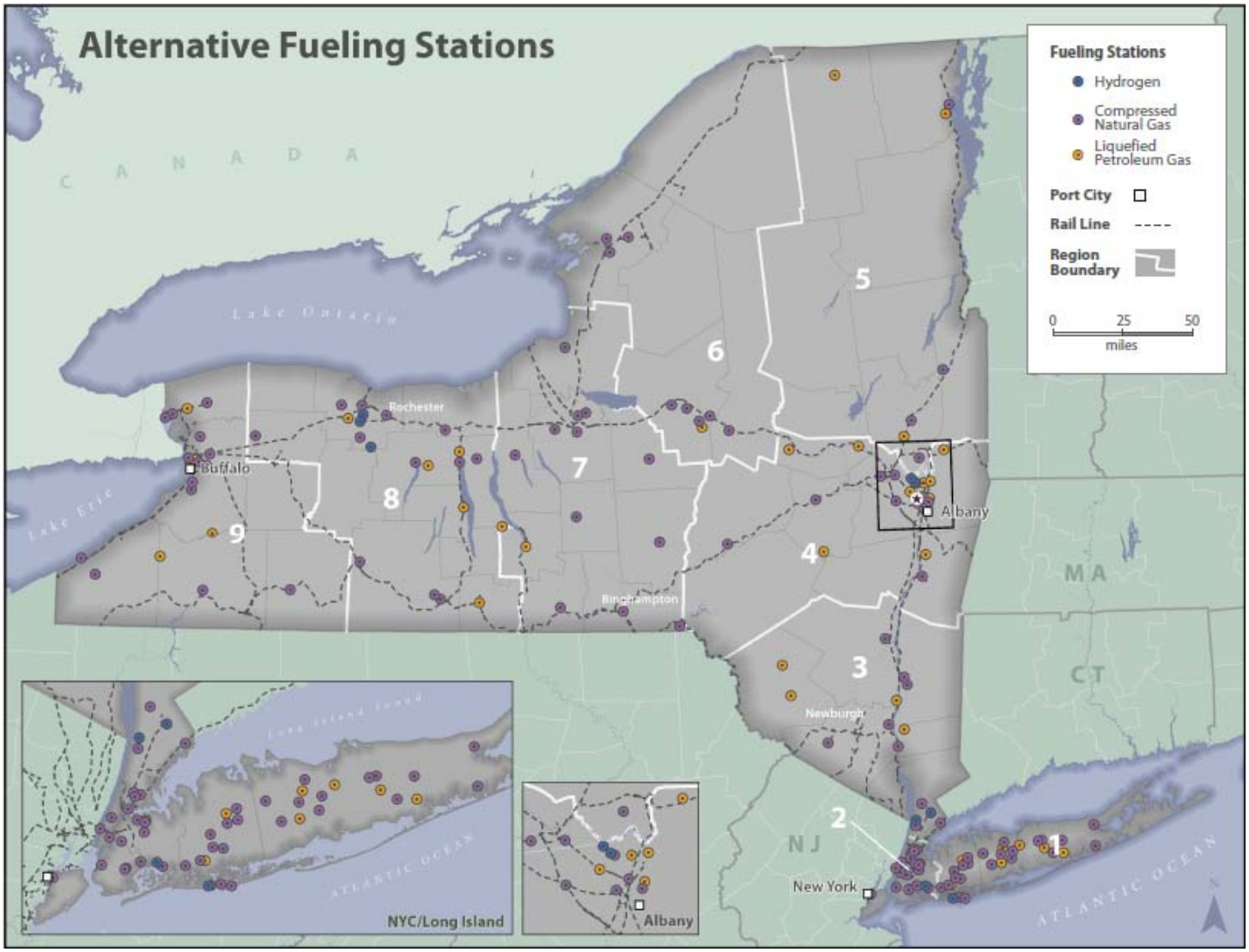
1. Mandate for 2 percent biodiesel in New York City heating oil (2012)
2. RFS2, elimination of ethanol excise tax credits and import tariffs
3. EPA waiver to allow E15

Exhibit II-10 and Exhibit II-11 illustrate NYS's biofuels infrastructure and alternative fueling station distribution throughout the State.

Exhibit II-10: NYS Biofuels Infrastructure Map



Sources: DEC Regional Capacity Database. "List of Ethanol Distribution Terminals.": 2010. Available at: http://www.csx.com/index.cfm/customers/commodities/agricultural-products/services/ethx-express-ethanol-delivery/?keywords=ethanol. Committee on Economic and Environmental Impacts of Increasing Biofuels Production, National Research Council. "Renewable Fuel Standard (pre-publication copy)." 2011: . Available at: http://www.nap.edu/catalog.php?record_id=13105. Renewable Fuels Association. "Biorefinery locations." 2011.: Available at: http://www.ethanolrfa.org/bio-refinery-locations/. Western New York Energy LLC: . "About Western New York Energy." Available at: http://www.wnyenergy.com/index.php?pr=Home. National Biodiesel Board. "NBB Member Plants." 2012: . Available at: http://www.biodiesel.org/buyingbiodiesel/plants/showall.aspx. Metro Fuel Oil Corp. "Company Overview." Available at: http://www.metroenergy.com/company/. Global Partners LP. "Global Partners Announces Ethanol Expansion Initiative with Canadian Pacific Railway." March 11, 2010: . Available at: http://www.globalp.com/news/article.cfm?articleID=235. Kinder Morgan. "Kinder Morgan Terminals." Available at: http://www.kindermorgan.com/business/terminals/ethanol.cfm. Norfolk Southern. "Motiva Enterprises and Norfolk Southern Build Largest Rail-served Ethanol Terminal in New York Harbor." February 2, 2005: . Available at: http://www.nscorp.com/nscportal/nscorp/Media/News%20Releases/2005/motiva.html. Phone interviews with facility operators. Other company websites. Other industry sources.



Source: U.S. Department of Energy. "Alternative Fuels and Advanced Vehicles Data Center Station Locator Database." Available at: http://www.afdc.energy.gov/locator/stations/

Ethanol Supply Infrastructure

Since terminals in NYS converted to E10 over the past few years, ethanol deliveries into the NYS area have increased substantially. With very few marine imports, rail lines have been the primary mode of transportation for ethanol. Ethanol supplies from the Midwest arrive primarily through Albany, NY and northern New Jersey terminals, moving out via barge, truck, and short lines to other terminals. While a small share of ethanol movement into NYS goes on to parts of New England, such as Vermont, the largest share remains in NYS.

Ethanol In-State Supply Sources

NYS has two ethanol refineries as summarized in Table II-15 below, which together supply a small share of the State's total ethanol consumption needs. The actual production volumes of the two ethanol plants are not published; however, in comparison to the net 31,000 b/d of ethanol moved into NYS by rail, even if both plants were at full capacity, in-state supply would only be less than 9,000 b/d.[135]

Table II-15: NYS Ethanol Production Facilities

Company Name	Biofuel Production Start Date	Feedstocks	DEC Region*	Nameplate Capacity, Mb/d (MMg/y)
Sunoco	2010	Corn	7 (Volney, NY)	5.48 (84.0)
Western New York Energy LLC	2007	Corn	8 (Shelby, NY)	3.29 (50.4)

Sources: National Research Council, Committee on Economic and Environmental Impacts of Increasing Biofuels Production. "Renewable Fuel Standard (pre-publication copy)." 2011. Available at: http://www.nap.edu/catalog.php?record_id=13105. Renewable Fuels Association. "Biorefinery Locations": 2011. Available at: http://www.ethanolrfa.org/bio-refinery-locations/. Western New York Energy LLC. "About Western New York Energy." Available at: http://www.wnyenergy.com/index.php?pr=Home. Phone interviews with facility operators. Other company websites.

** For information on DEC Regions, go to: New York State Department of Environmental Conservation. "DEC Regions and Regional Office Information." Available at: http://www.dec.ny.gov/about/50230.html*

Note: Mascoma also has a cellulosic (switchgrass) ethanol pilot facility in Rome, NY, with a nameplate capacity of 0.03 Mb/d. Mascoma. "Our Facilities." Available at: http://www.mascoma.com/pages/sub_business03.php

Ethanol Distribution Hubs

Ethanol is supplied to NYS by in-state ethanol production facilities, domestic and international waterborne imports, and by unit trains that deliver ethanol from production regions around the country, particularly the Midwest. Ethanol is blended into motor gasoline in NYS and is a major source of energy in the transportation sector. Although many terminals that store gasoline also store ethanol, there are major regional distribution hubs located in Albany and northern New Jersey that serve as staging locations for downstream delivery. According to the DEC, NYS

[135] Industry sources.

holds total ethanol capacity of 1.4 MMbbl, concentrated in regions 1 and 2 (close to NYH), as well as Region 4 (Albany).

Ethanol is distributed from production facilities to distribution hubs via rail line, truck, and/or barge. Given the corrosive nature of ethanol, it typically is not transported via pipeline, and is blended at the distribution terminal prior to transport to the final destination. Table II-16 shows NYS' ethanol terminal capacity by DEC region

Table II-16: NYS Ethanol Terminal Capacities by Region

Fuel Type	NYS DEC Petroleum Storage Capacity by DEC Region (Mbbl)									
	1	2	3	4	5	6	7	8	9	Total
Gasoline	1,111	1,542	529	2,327	< 1	357	747	836	635	**8,083**
Gasoline/Ethanol	142	37		1,074			90	41	42	**1,426**

Source: New York State Department of Environmental Conservation. "DEC Regional Capacity Database."

There are two major destination hubs for unit train deliveries from the Midwest. One is the Albany area and the other is the northern New Jersey region along the Arthur Kill. Table II-17 shows the major ethanol distribution hubs in both markets.

Table II-17: Major Ethanol Distribution Hubs into NYS

Source	Location	Main Class I Rail Supply	Ethanol Tank Capacity (Mbbl)	Unit Train Capable	Marine access
Buckeye Albany	Albany, NY	CSX	490	Yes	Yes
Global Partners	Albany, NY	CP	160	Yes	Yes
Kinder Morgan	Linden, NJ	CSX, NS, Conrail	550	Yes	Yes
Kinder Morgan	Perth Amboy, NJ	CSX, NS	72	No	Yes
Kinder Morgan	Carteret, NJ	CSX, NS	178	Yes	Yes
Motiva Enterprises	Sewaren, NJ	CSX	345	Yes	Yes
Apex Oil (CSX)	Rensselaer, NY	CSX	N/A	No	Yes

Sources: CSX. "EthX—Express Ethanol Delivery: List of Ethanol Distribution Terminals." CSX, 2012: Jacksonville, FL. Available at: http://www.csx.com/index.cfm/customers/commodities/agricultural-products/services/ethx-express-ethanol-delivery/

Global Partners LP. "Global Partners Announces Ethanol Expansion Initiative with Canadian Pacific Railway." March 11, 2010. Available at: http://www.globalp.com/news/article.cfm?articleID=235

Clark, Aaron; and Bradley Olson. "Global Partners Boosts Bakken Shipments to Eastern Refiners." Bloomberg Business Week, 18 April 2012: Washington, D.C. Available at: http://www.businessweek.com/news/2012-04-18/global-partners-boosts-bakken-shipments-to-eastern-refiners

Kinder Morgan. "Kinder Morgan Terminals." Available at: http://www.kindermorgan.com/business/terminals/ethanol.cfm

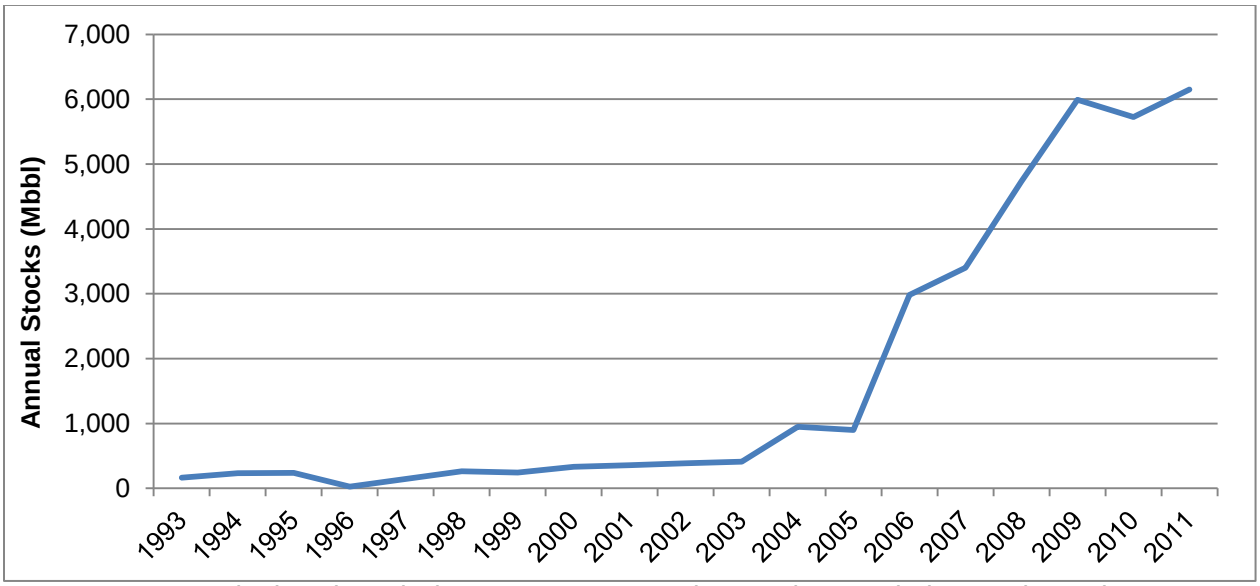
Norfolk Southern (NS). "Motiva Enterprises and Norfolk Southern Build Largest Rail-served Ethanol Terminal in New York Harbor." February 2, 2005. Available at: http://www.nscorp.com/nscportal/nscorp/Media/News%20Releases/2005/motiva.html.

Other industry sources.

The distribution hubs in NYS and northern NJ above total about 1.8 MMbbl of storage capacity, with the Albany (650 MB) and Rensselaer storage included in the DEC capacities cited above. Actual inventory stock information is not available from EIA at the State or sub-PADD region level; however, overall PADD 1 level inventory is reported. As seen from Exhibit II-12 below, ethanol inventories increased substantially beginning in 2006 and have leveled out at 6.5 MMbbl in 2010-2011.[136]

This inventory is essentially all located in distribution hubs like Albany and northern New Jersey, as well as at individual terminals along pipelines and marine waterways for blending with RBOB and CBOB to produce saleable gasoline.

Exhibit II-12: PADD 1 (East Coast) Fuel Ethanol Stocks by Year (Mbbl)



Source: EIA. "Fuel Ethanol Stocks by Type: East Coast (PADD 1), Annual-Thousand Barrels." 1993-2011. Available at: http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

Albany Ethanol Distribution Hub

Albany is a major destination for ethanol that is shipped via unit trains across the country into NYS for distribution within the State and to other areas throughout the Northeast. In addition, the Hudson River serves as a major supply route for both domestic and international deliveries. As seen earlier in Table II-16, Region 4 (which includes Albany) has over 1 MMbbl of "gasoline/ethanol" storage capacity.[137] Across the river from Albany is Rensselaer, NY, which also has significant petroleum product and ethanol storage capacity.

[136] EIA. "Fuel Ethanol Stocks by Type: East Coast (PADD 1), Annual-Thousand Barrels." 1993-2011. Available at: http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

[137] New York State Department of Environmental Conservation. "DEC Regional Capacity Database."

According to OPIS, Buckeye's Albany terminal is the second largest terminal in DEC Region 4 with over 1.5 MMbbl of total capacity, of which almost one-third is dedicated to ethanol.[138]

Northern New Jersey Ethanol Distribution Hub

Table II-18 shows that DEC regions 1, 2, and 3 have relatively small amounts of ethanol storage capacity considering the area's vast population. As was the case in the petroleum section, this is largely because northern New Jersey serves as the area's distribution center for ethanol supply. As was seen in Albany, ethanol is delivered into northern New Jersey primarily by railroads.

- There are several key ethanol terminal assets in northern New Jersey, all located along the Arthur Kill.
- Shell's (Motiva) Sewaren terminal has the capacity to hold 4.65 MMbbl of product including almost 350 Mbbl of ethanol. This is a major source point for ethanol in the northern New Jersey/NYS region. This terminal can receive ethanol by marine and rail shipments.
- Kinder Morgan (KM) has three major locations which store ethanol.
- The KM Carteret terminal is a 7.8 MMbbl facility with 178 Mbbl of ethanol tankage. It can receive unit trains as well as marine deliveries.[139]
- The KM Linden terminal is an ethanol-only terminal which can hold 550 Mbbl of ethanol; it has access to several rail sources as well as marine.
- The KM Perth Amboy terminal can store about 72 Mbbl of ethanol received by marine vessel.[140]

Ethanol Transportation

In the U.S., ethanol is largely transported via rail cars, though only 15 percent of petroleum blending terminals has rail access, with most relying primarily on marine transport and trucks for ethanol.[141] However, ethanol distribution is increasingly turning to unit trains for long-distance transport of ethanol. The U.S. EPA predicts that 40 unit train receipt facilities nationwide are needed to meet the ethanol requirements under the RFS2 by 2022.[142] Unit train development can take roughly one to two years to develop, and is being developed by nearly all Class I

[138] OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

[139] OPIS/Stalsby. "Petroleum Terminal Encyclopedia." 2012 Edition.

[140] *Ibid.*

[141] U.S. Department of Agriculture. "USDA Biofuels Strategic Production Report." p. 16. June 23, 2010. Available at: http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf

[142] U.S. Department of Agriculture. "USDA Biofuels Strategic Production Report." p. 17. June 23, 2010. Available at: http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf

U.S. Department of Agriculture. "Study of Rural Transportation Issues." April 27, 2010. Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

railroads (UP, BNSF, NS, and CSX).[143] In the meantime, rail-to-truck transloading mechanisms have been developed to move manifest rail car shipments (shipments of less than 80-100 railcar unit trains) from long-distance rail systems to terminals and end-users.[144] In addition to tanker trucks used to transport ethanol short distances, ethanol suppliers also rely on short lines (regional, short-distance trains that deliver product from the long-distance receipt terminals to distribution terminals and final end-users).

Throughout the U.S., over 280,000 carloads (8.4 billion gallons, or 200 million barrels) of ethanol[145] were moved by rail in 2009. Railroad transportation accounts for roughly 70-75 percent of total ethanol transportation nationwide (similar to that seen in NYS), moving ethanol primarily from the production areas in the Midwest to high-demand markets, such as NYS.[146] Class I railroads, such as CSX and Norfolk Southern, transport products long distances (e.g., Midwest-NYS receipt terminal), while the short lines, typically move the product from the main receipt terminals to distribution terminals and final end-users, along with tanker trucks and barges, where available. Rail-based ethanol terminating in NYS accounted for over 5.5 percent (11 million gallons or 262 Mbbl) of U.S. ethanol rail terminations in 2009, while New Jersey and Pennsylvania comprised 16.7 percent and 5.6 percent, respectively.[147]

According to the Association of American Railroads (AAR), NYS has two Class I freight railroads: CSX and Norfolk Southern, as well as two lines running from Canada: Canadian Pacific and Canadian National. In addition, the State has four regional rail lines and 22 line-haul short lines and 7 switching and terminal short lines.[148]

Virtually all ethanol terminating in NYS originates in Illinois, Iowa, Minnesota, Wisconsin, South Dakota, and Indiana. NYS' ethanol sources are not expected to change significantly over the near term, given that the bulk of production will remain in the Midwest. Table II-18 shows the rail shipments of ethanol to NYS and New Jersey.

[143] Business Wire. "Eco-Energy to Partner with NuStar in Development of Ethanol Unit Train and Storage Facility in Northern, VA Market." Business Wire, 30 July 2012: Franklin, TN. Available at: http://www.businesswire.com/news/home/20120730005708/en/Eco-Energy-Partner-NuStar-Development-Ethanol-Unit-Train

U.S. Department of Agriculture. "Study of Rural Transportation Issues." pp. 141, 143. April 27, 2010. Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

[144] U.S. Department of Agriculture. "Study of Rural Transportation Issues." pp. 141, 143. April 27, 2010. Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

[145] 30,000 gallons per car assumed

[146] Association of American Railroads. "Railroads and Ethanol." May 2011. Available at: http://www.aar.org/~/media/aar/Background-Papers/Railroad-Ethanol.ashx

[147] Association of American Railroads. "Railroads and Ethanol." May 2011. Available at: http://www.aar.org/~/media/aar/Background-Papers/Railroad-Ethanol.ashx

[148] Association of American Railroads. "Railroads and Ethanol." May 2011. Available at: http://www.aar.org/~/media/aar/Background-Papers/Railroad-Ethanol.ashx. AAR defines Class I rail lines as those with operating revenues of at least $378.8 million. A regional railroad is a non-Class I, line-haul, freight railroad operating 350 or more miles of track with revenues of at least $40 million, or both. A local railroad is one that is not a Class I or a regional railroad, and engages mainly in line-haul service. A switching and terminal railroad is a non-Class I railroad used primarily for switching and/or terminal services for other rail lines.

Table II-18: Rail Movement of Ethanol to NYS (MMbbl)

Year	Ethanol Rail Shipments (MMbbl)*	
	To NYS (net)	To New Jersey**
2007	8.6	N/A
2008	7.4	N/A
2009	11	33.2
2010	9.8	31.9

Source: Industry sources.

** Assumes per-railcar capacity of 714 bbl (30,000 gallons).*

*** Figures are total rail shipments terminating to New Jersey, with a negligible number of rail shipments of ethanol leaving the State.*

Note: Rail shipments of ethanol out of NYS were very small, relative to volumes carried into NYS.

CSX is NYS' primary supplier of ethanol from the Midwest. Of ethanol coming into NYS and northern New Jersey in 2010, roughly 70 percent arrived in CSX railcars, while nearly 30 percent was transported to the region on Norfolk Southern lines. Another one percent terminated in the Buffalo area in Canadian National railcars.[149]

CSX has an extensive network of unit trains, with main ethanol deliveries into Albany. CSX does not have plans to build additional unit train terminals in the U.S. Northeast, though shipper requirements, as well as supply-demand dynamics, largely dictate infrastructure investment.[150] Roughly 75 percent of the ethanol CSX handles originates in states such as Iowa, Kansas, Minnesota, Nebraska, North Dakota, and South Dakota. The remaining supplies typically come from Illinois, Ohio, Indiana, and Michigan. CSX does not expect this volume mix to change materially over the next several years.

In terms of volumes transported, CSX's ethanol volume shipments were flat in 2011, compared to those of 2010, as the market continues to debate raising the blend rate beyond 10 percent ethanol. Recent EPA rulings allow for newer car models to blend ethanol at 15 percent ethanol, and are expected to increase domestic ethanol consumption gradually. In addition, domestic ethanol may compete in a global market. CSX continues to promote transportation efficiency, a key component in price competitiveness for international ethanol supplies, accordingly.

CSX considers that current rail capacity is sufficient to handle ethanol demand when working with efficient production plants and terminals. Whenever possible, however, CSX does support direct ethanol unloading into tanks to improve asset (car) utilization. If all 36 billion gallons (857 MMbbl) of the RFS were converted to rail quantities, that would equate to less than 4 percent of total North American rail capacity. In terms of distribution to final end users, CSX experience indicates that truck, barge, and pipelines are all used for final delivery.

With regard to expected rail infrastructure trends, individual railroads seek to match available capital with those investments that provide the highest returns. According to industry sources, rail capacity peaked in 2006 before the onset of the economic crisis. Since then, rail car demand

[149] Industry sources.

[150] Phone and email correspondence with CSX representative, April 2012.

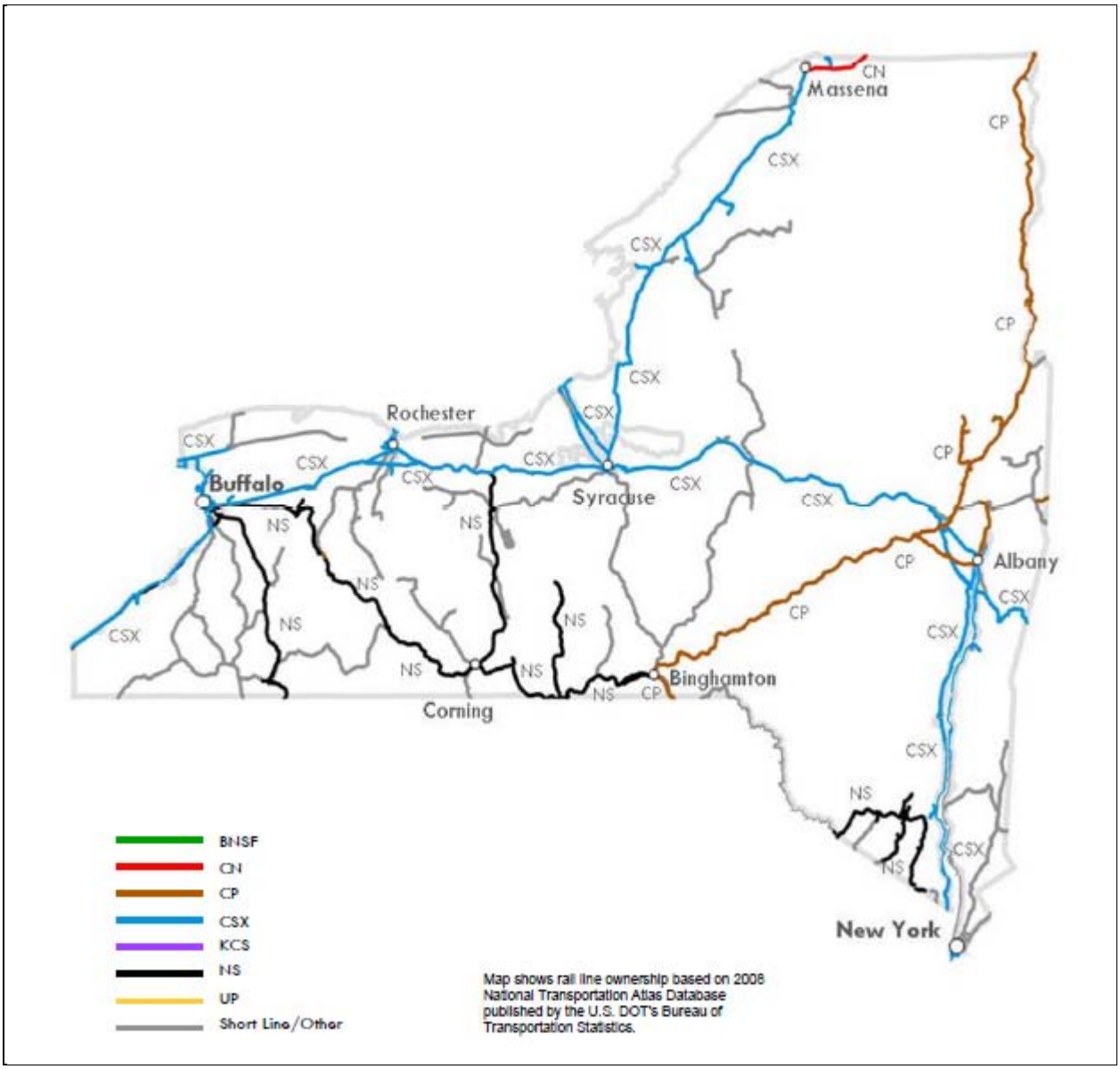
has fallen off 15-20 percent.[151] While shipments were nearing capacity up until 2006, demand has since fallen off. Industry sources anticipate that capacity issues will resurface, and have begun making investments to address this issue preemptively, though near-term capacity constraints are not expected. That said, railroads are a derived demand industry, meaning that demand for rail service is a function of demand in the destination points. *Ceteris paribus*, if ethanol consumption in NYS rises in the years ahead, it is reasonable to assume that shipments of ethanol into NYS will rise in tandem, and vice versa.

See Appendix D for a visual representation of the NYS's transportation infrastructure for CSX, one of the largest ethanol rail transporters, as well as main CSX operating facilities in NYS and New Jersey.

Exhibit II-13 below shows the main routes for Class I, Canadian, and local rail lines throughout NYS.

[151] Industry sources.

Exhibit II-13: Rail Lines in NYS



Source: Association of American Railroads.

Biodiesel Supply Infrastructure

Biodiesel In-State Supply Sources

There are two biodiesel producers[152] located in New York, with a third facility slated to begin production in late 2012. These two current facilities, Northern Biodiesel and TMT Biofuels, support the State's biodiesel demands, along with a number of small-scale facilities and domestic imports from states with production incentive programs. The two current biodiesel facilities together produced roughly 50-73 Mbbl in 2010 and 2011. The third facility, Metro Biofuels, with total production capacity of 110 million gallons (2.6 MMbbl), could add significant biodiesel volumes when production begins. According to Metro Biofuels, the plant has commitments for the first 20 million gallons (476 Mbbl), the majority of which is committed to customers within NYS, with the next level of production scheduled for additional direct sale. Exact first year product levels have not been established, though Metro is gearing up for higher production-level capabilities.[153]

TMT Biofuels is a small biodiesel facility with total annual biodiesel capacity of 250,000 gallons (6 Mbbl). The facility sells approximately 50 percent of its production for on-road biodiesel and 50 percent for off-road and home heating oil applications. TMT sells its fuel directly to local customers in NYS. The loss of state and federal incentives has had a detrimental impact on the business, with the most significant impact from the loss of the federal Biodiesel Mixture Excise Tax Credit. Additionally, greater restrictions of renewable identification number (RIN) sales due to the discovery of fraud in 2011 and 2012 have resulted in TMT selling its RINs below the average market value. (Note: See "Impact of New Regulations and Incentives on the Biofuels Infrastructure" later in this section for details on RIN's fraud.) New incentives, such as the residential and commercial bioheat tax credit, have not directly increased demand for product but have been helpful for customers.[154]

Northern Biodiesel is a small biodiesel facility with total production capacity between 15-20 million gallons (357-476Mbbl) of biodiesel annually. The loss of state and federal biodiesel incentives has also resulted in detrimental impact on the business, with the most significant impact from RINs fraud restrictions. In January 2012, Northern Biodiesel suspended operations as a result of this issue and has not announced a restart date.[155]

Metro Biofuels has been under construction for over five years and expects to begin production in the fourth quarter of 2012. The loss of the State and federal tax credits have impacted existing biofuels contracts in which the tax benefit was included in the contract and then removed. However, the production economics continue to be favorable under present conditions. The most significant regulatory issue to date has been the RFS2 requirement to add a cold soak requirement, which required the addition of a distillation process, significantly changing the scope of the original design.[156] Table II-19 shows the characteristics of NYS' biodiesel producers.

[152] Defined here as production facilities with biodiesel production capacity exceeding 40,000 gallons (roughly 1,000 barrels) per year.

[153] Email interview with Robert Leavy, Metro Biofuels, May 3, 2012.

[154] Phone interview with Tammie Toth, TMT Biofuels, May 2, 2012.

[155] Phone interviews with John Vavalo, Northern Biodiesel, April 25, 2012 and May 2, 2012.

[156] Email interview with Robert Leavy, Metro Biofuels, March 27, 2012.

Table II-19: NYS Biodiesel Production Facilities

Company Name	Biofuel Production Start Date	Main Feedstocks	DEC Region*	Nameplate Capacity, Mb/d (MMg/y)
Metro Fuel Oil Corp	2012 3Q	Recycled cooking oil	2 (Brooklyn, NY)	7.12 (109.2) expected
Northern Biodiesel	2009	Recycled cooking oil	8 (Ontario, NY)	0.98 (15.0) - 1.30 (20.0)
TMT Biofuels, LLC	2008	Waste oil	6 (Port Leyden, NY)	0.02 (0.3)

Sources: National Research Council, Committee on Economic and Environmental Impacts of Increasing Biofuels Production. "Renewable Fuel Standard (pre-publication copy)." 2011. Available at: http://www.nap.edu/catalog.php?record_id=13105.

Renewable Fuels Association. "Biorefinery Locations." January 2011. Available at: http://www.ethanolrfa.org/bio-refinery-locations/.

National Biodiesel Board. "NBB Member Plants." 2012. Available at: http://www.biodiesel.org/buyingbiodiesel/plants/showall.aspx.

Metro Fuel Oil Corp. "Company Overview." 2012. Available at: http://www.metroenergy.com/company/.

Phone interviews with facility operators.

Other company websites.

** For information on DEC Regions, go to: New York State Department of Environmental Conservation. "DEC Regions and Regional Office Information." Available at:* http://www.dec.ny.gov/about/50230.html.

Biodiesel Distribution Hubs

According to the DEC, NYS holds total biodiesel storage capacity of 143 Mbbl, concentrated in Region 1 (Long Island), as shown below in Table II-20. This is less than five percent of capacity within the State to hold diesel fuel, and less than 1 percent of total distillate capacity (which is now all ULSD as of July 1, 2012.

Table II-20: NYS Biodiesel Terminal Capacities by Region (Mbbl)

Fuel Type	NYS DEC Petroleum Storage Capacity by DEC Region (Mbbl)									
	1	2	3	4	5	6	7	8	9	Total
#2 Fuel Oil	2,914	2,777	2,262	4,157	25	407	668	317	293	**13,820**
Diesel	229	261	451	1,064	32	71	332	364	292	**3,094**
Biodiesel	100	33	8	1					1	**143**

Source: New York State Department of Environmental Conservation. "DEC Regional Capacity Database."

Table II-21 shows the main biodiesel terminals in the State, concentrated primarily around NYC markets, where biodiesel demand will be concentrated in high-population areas for heating oil.

Table II-21: Major Biodiesel Terminals in NYS

Company Name	Location	Rail Supply	Biodiesel Tank Capacity (bbl)	Marine Access
Hess Corp. (Bronx Terminal)	Bronx	Yes	--	Yes
Metro Terminal Corp.	Brooklyn			
Sprague Energy Corp.	Rensselaer	No		Yes
Sprague Oceanside Terminal	Oceanside			
Burt's Reliable, Inc.	Southold			
John Ray & Sons	Troy			
Metro Terminals	Calverton			
Mirabito Fuel Group	Oneonta			
New Hyde Park Oil Terminal	New Hyde Park	Yes (New York & Atlantic Freight Co.)	Underground (976) + Above ground (6 cars of 595 bbl/car)	No
Schildwachter & Sons Oil	Bronx	No	12,000	Yes
Suma Energy, LLC	NYS			
TMT Biofuels LLC	Port Leyden		6,000	
Tri-State Biodiesel	Bronx			

Source: New York State Department of Environmental Conservation. "DEC Regional Capacity Database."

Other industry sources.

Table II-22 includes a list of primary distributors, which distribute biodiesel volumes from producers and petroleum bulk terminals to retailers. The mode of transportation is primarily trucks, though barges are sometimes used, as well.

Table II-22: Biodiesel Distributors in NYS and NJ

Biodiesel Distributor (City)	Biodiesel Tankage capacity (bbl)	Biodiesel Type and Markets	Mode of Transport	Rail or Marine Access
NYS				
Ascent Aviation (Syracuse)				
Burt's Reliable (Southold)		B20		
John Ray & Sons (Troy)	35	B5 (soybean), on-road diesel	Trucks	
Mirabito Fuel Group (Oneonta)		B5, B10, B20		
New Hyde Park Oil Terminal (New Hyde Park)		Heating oil, diesel, B2-B99.9		
Schildwachter & Sons Oil (Bronx)	12,000	Soybean oil, heating oil, on-road diesel	Trucks, barges	Marine
Suma Energy, LLC (NYS)				
Tri-State Biodiesel (Bronx)	860	SME (soy oil methyl ester), UCOME, heating oil, on-road diesel	Trucks	Rail (some materials received by rail in NJ)
NJ				
Innovation Fuels (Newark)	310,000	Waste vegetable oil	Trucks, rail, barges	Rail, marine
Mitchell Supreme Fuel (Orange)	0*	Soybean oil, heating oil	Trucks	Rail
Taylor Oil Co., Inc. (Somerville)	0*	B5-B99.9, on-road diesel	Trucks	
TransMontaigne (Carteret)	N/A	Ethanol: E10, E85 Biodiesel: 2%, 5%, 10%, 15%, 20%, 99%	Trucks, rail, barges	Rail, marine

Source: National Biodiesel Board. "Biodiesel Distributors." 2012. Available at: http://www.biodiesel.org/buyingbiodiesel/distributors/showall.aspx

** The facility does not store biodiesel; it is delivered directly to customers from producers.*

Biodiesel Transportation

The biodiesel transportation network is significantly smaller than that for ethanol. Small-scale producers supply local markets, using local trucking companies or short line railroads. In terms of biodiesel shipments into the NYS market, supplies are obtained primarily from nearby states such as Pennsylvania, but can come as far away as Atlanta, GA, according to industry sources, as well as foreign shipments from Canada on occasion. Biodiesel transportation requires specialized, heated cars that keep biodiesel from gelling. This additional infrastructure requirement is a key element in biodiesel's transportation.

Data Sources and Issues: Biofuels

The primary data sources for in-state biofuels production facilities were phone interviews with facility operators, as well as information obtained from the Renewable Fuels Association (RFA) and the National Biodiesel Board (NBB). These sources sometimes differed on plant specifications and production status. Thus, information obtained from the plant operators was considered with greatest integrity. Terminal data were obtained from the DEC, as well as other publicly available information. Rail line information was obtained from publicly available information from rail line websites, as well as phone interviews with selected rail lines operating in NYS. In cases in which volume data were not publicly available, extrapolation was made. The main sources for biofuels production incentives and implications for demand in NYS were obtained from publicly available state information and interviews with industry experts.

Biofuels Policies

This section includes a discussion of policies and government incentives that affect production and use of biofuels in NYS.

Biofuels Regulations and Incentives

Biofuel Legislation and Regulations

State Regulations

Bioheating oil compliance is the most significant in-state regulation for biofuels, but is currently limited to the NYC region. The passage of this legislation through the NY State Legislature and the City of New York in 2010 requires a minimum of B2 blended with heating oil starting no later than October 2012. The Clean Heating Fuel Credit provides a state tax credit for residential and commercial bioheat oil users through 2016. However, a variety of state biofuel incentives lapsed in 2011, including the Biofuel Production Tax Credit and the Alternative Fuel Vehicle and Fueling Infrastructure Funding. In 2010, the Alternative Fueling Infrastructure Tax Credit and the Governor's Executive Order 142 to utilize E85 and B10 in state and public fleets also lapsed. Additional details about these policies are described in the sections below.

Federal Regulations

A host of federal incentives for biofuel production, distribution and utilization were eliminated on December 31, 2011, including the Volumetric Ethanol Excise Tax Credit, Small Ethanol Producer Tax Credit, Cellulosic Biofuels Producer Tax Credit, Accelerated Depreciation Allowance for Cellulosic Biofuel Plant Property, Small Agri-Biodiesel Producer Tax Credit, Biodiesel Mixture Excise Tax Credit, and Biodiesel Income Tax Credit. Additionally, the elimination of the ethanol import tariff in 2012 has opened the U.S. market to competition from abroad. The loss of these incentives and tariff have had mixed impact on the industry, but the Renewable Fuels Standard (RFS2) continues to be the most significant driver of the biofuels industry today. Additionally, the EPA has approved a partial waiver to increase the national blend limit of E10 to E15 for model year vehicles from 2000 through 2013. If the EPA were to approve the full waiver request, it would have a significant impact on ethanol utilization in the State, effectively eliminating the "blend wall" looming on the horizon. Additional details about these policies are described in the sections below.

Bioheating Fuel Compliance

To comply with new national ULSD requirements, NYS passed legislation in 2010 requiring that all residential, commercial or industrial heating oil contains less than 15 ppm of sulfur.[157] In order to meet this standard, state legislation and a local law were passed in 2010 requiring any heating oil sold in New York City's jurisdiction to contain at least 2 percent biofuel (defined as

[157] NYS Section 19-0325. March 2012. http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=$$ENV19-0325$$@TXENV019-0325+&LIST=SEA21+&BROWSER=EXPLORER+&TOKEN=46793871+&TARGET=VIEW

bioheating fuel) by October 2012.[158] Waivers will be permitted for emergency generators, if the price of the bioheating fuel exceeds 15 percent of the comparable fuel oil grade, if the use of the bioheating fuel would void the manufacturer's warranty for that boiler type, or if there is no applicable American Society of Testing and Materials (ASTM) standard or other standard for bioheating fuel.

According to sources, approximately 20 million gallons (476 Mbbl) of biodiesel a year would be needed to meet New York City's B2 heating oil mandate.[159] The mandate could have an impact on the NYS biodiesel industry, but could easily be accommodated by in-state production from producers such as Metro Biofuels, which is currently constructing a 110 million gallon per year (2.6 MMbbl) biodiesel production facility in Brooklyn. In addition to the bioheating fuel compliance requirement, NYS also passed a biofuel heat tax credit to incentivize bioheat use in commercial and residential applications through December 31, 2016. The value of the tax credit is $0.01/gallon for each percent of biodiesel blended with conventional home heating oil, up to a maximum of $0.20/gallon. In recent years, the high price of heating oil has allowed bioheat in blends up to B20 to be less expensive, resulting in significant savings for consumers.

Renewable Fuels Act (RFS2)

The Energy Independence and Security Act (EISA) passed in December 2007 created additional compliance requirements through the EPA for the Renewable Fuels Program (RFS2). The regulations significantly increased the volumes of renewable fuel to 36 billion gallons (857 MMbbl) by 2022 and separated the volume requirements into four categories including cellulosic biofuel, biomass-based diesel, advanced biofuel and total renewable fuel. The regulations also changed the definition of renewable fuels to include a minimum lifecycle greenhouse gas reduction threshold and grandfathered the volume of certain facilities. There were also new restrictions of the types of feedstocks that could be used to make renewable fuels as well as the types of land that could be used to grow and harvest the feedstocks. Finally, the new regulations included specific types of waivers and EPA-generated credits for cellulosic biofuels, to stimulate the production of more advanced biofuels. These new standards went into effect on July 1, 2010 and apply to all gasoline and diesel produced or imported. Renewable fuel producers register their product using a Renewable Identification Number (RIN), which provides a basic currency for the credit, trading and use by obligated parties and fuel exporters to demonstrate compliance and track the volumes of renewable fuels produced and utilized to comply with the RFS2 standard.

[158] Local Law 43. March 2012. http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=660184&GUID=0F06CC07-D87E-42B1-8FB3-A7FB7E27CCCC; NYS Section 24-168.1. March 2012. http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=$$ADC24-168.1$$@TXADC024-168.1+&LIST=SEA39+&BROWSER=EXPLORER+&TOKEN=46793871+&TARGET=VIEW

[159] Biodiesel Magazine. "New York State wants your product!" January 12, 2011. http://www.biodieselmagazine.com/articles/7524/new-york-wants-your-product

Erin Voegele. "New York City passes B2 oilheat mandate," *Biodiesel Magazine*. July 13, 2010. Available at: http://www.biodieselmagazine.com/articles/4320/new-york-city-passes-b2-oilheat-mandate

Note: The references indicate New York City has 1 billion gallons (24 million barrels) per year heating oil consumption. However, EIA prime supplier sales indicate this volume is more indicative of statewide heating oil sales. The B2 requirement includes heating oil that is fuel oil grade No. 2, No. 4, and No. 6.

Though the obligations do not necessarily impact NYS directly, they do apply to fuel providers located within the State and have an incremental effect on the cost of fuel, reduce the greenhouse gas intensity of the fuels over time and work toward increasing the utilization of biofuels in the region. They also present new opportunities for economic development through the production of feedstocks and advanced fuels within in the State, and increase the importation of fuels to the region for purposes of blending with diesel and gasoline.

According to a NYSERDA report published in 2010[160], NYS could produce enough biomass to support a lignocellulosic ethanol industry. Analysts have documented the potential for:

- Between one and 1.68 million acres of non-forest land and 15.8 million acres of available timberland (excluding forest areas in parks and preserves) could be harvested for biomass;
- Sustainable biomass production between 4.2 and 14.6 million dry tons (Mdt) of cellulosic biomass per year, including 6.4 Mdt from forests;
- 5.6 percent to 16 percent of estimated 2020 in-state gasoline consumption;
- Four large-scale centralized lignocellulosic biorefineries with a capacity of 90 to 354 million gallons (2.1 to 8.4 MMbbl) per year, could operate in the State using in-state biomass resources. Alternatively, up to 24 smaller biorefineries with a capacity of 60 million gallons (1.5 MMbbl) per year could be built;
- An estimated GDP between $500 and $900 million if NYS were to produce 5.6 percent of its transportation fuels. At 16 percent of NYS transportation fuels the GDP increases to between $1.8 and $1.9 billion; and
- Robust job growth creating 4,000-14,600 jobs under a variety of different scenarios.

RIN Fraud Setbacks in the Biodiesel Industry

Though the RFS2 has successfully spurred biodiesel industry growth, there have been some setbacks. The discovery of several RINs fraud cases in 2011 and 2012 triggered an industry-wide move to formalize the process of auditing and validating RINs at biodiesel facilities across the country. Small biodiesel companies who rely on RINs sales for a portion of their income are unable to sell them now without undergoing an audit. The auditing requirement has created a significant backlog for the audit services, exacerbating an already lengthy process and causing some smaller producers to stop production. Additionally, the fraud cases have reduced obligated party interest in purchasing RINs from small and medium-sized producers, resulting in a gap of RIN value of 15 to 20cts.

The entire integrity of the RIN system has been questioned in part due to the EPA review process. The obligated parties are concerned about the validity of the RINs due to the length of time it takes to verify a RIN (as long as one year) with producers being expected to financially back RINs for as long as two years.

Although it is unclear what impact this issue will have in New York State in the long-term, as a direct result of these new restrictions by the obligated parties, as of January 1, Northern Biodiesel in Ontario, New York State temporarily suspended production stating an inability to sells its fuel into the RIN market.

Source: Ang, Edgar. "RINs fraud debacle shuts New York State biodiesel plant indefinitely." Oil Price Information Service (OPIS), 14 February 2012: Gaithersburg, MD. Available at: http://www.opisnet.com/

[160] New York State Energy Research and Development Authority. "Renewable Fuels Roadmap and Sustainable Biomass Feedstock Supply for New York State." April 2010.

The expiration of the NYS Biofuels Production Credit in 2011, which provided $0.15/gallon of biodiesel or ethanol produced in NYS up to $10 million over a four year period per taxpayer, may have an impact on the ability of NYS to attract these new in-state investments.

The impact on alternative fuel infrastructure from the RFS2 has been the increased utilization of ethanol blended fuels within gasoline all across the State, utilizing the supply generated from the State's existing ethanol production facilities as well as the importation of fuels from the Midwest. The RFS2 has also had an incremental effect on the biodiesel industry resulting in increased demand by fuel retailers and distributors for B5. In the long term, if RFS2 requirements ramp up, infrastructure investments will continue to expand.

Elimination of Biodiesel Tax Credits

On December 31, 2011, the Small Agri-Biodiesel Producer Tax Credit (SABPTC), Biodiesel Mixture Excise Tax Credit (BMETC), and the Biodiesel Income Tax Credit (BITC) expired without an extension from Congress. The SABPTC provided a tax incentive in the amount of $0.10 per gallon of agri-biodiesel up to 15 million gallons (357 Mbbl) produced annually by a small-scale biodiesel producer (defined as less than 60 million gallons (1.4 MMbbl) per year). The BMETC was available for biodiesel blenders and provided a tax incentive of $1.00 for each gallon of pure biodiesel, agri-biodiesel, or renewable diesel blended with petroleum diesel blended to contain at least 0.1 percent diesel fuel. The incentive could be used against the blender's fuel tax liability and as a direct payment from the IRS. The BITC provided a tax incentive of $1.00 for each gallon of B100 delivered or used by a taxpayer.

Elimination of Ethanol Tax Credits

On December 31, 2011, the Volumetric Ethanol Excise Tax Credit (VEETC) and the Small Ethanol Producer Tax Credit (SEPTC) expired without extension from Congress. The VEETC provided a $0.45 per gallon refundable tax credit for each gallon of ethanol blended with gasoline and the SEPTC provided an excise tax credit of $0.10 per gallon for the first 15 million gallons (357,000 bbl) produced annually by a small-scale ethanol producer (defined as less than 60 million gallons {1.4MMbbl} per year).

Historically, the credits have played a critical role in the development and profitability of ethanol production facilities which allowed the product to compete in the fuel marketplace. However, since January 2012, conventional ethanol producers using corn as a feedstock have not been significantly impacted by the loss of the credits due to high gasoline prices and the mandated utilization of ethanol fuel by the Renewable Fuels Standard. Ethanol producers may experience challenges if fuel prices decline and as ethanol production begins to exceed mandated requirements.[161]

On the other hand, potential cellulosic ethanol manufacturers are in a newly emerging industry and would be impacted. Advanced biofuel producers continue to urge Congress to authorize a five year extension of the Cellulosic Biofuels Producer Tax Credit (PTC) and the Accelerated Depreciation Allowance for Cellulosic Biofuel Plant Property. Advanced biofuels, which use non-

[161] U.S. Department of Agriculture, Economic Research Service. "Impacts of the demise of the volumetric ethanol excise tax credit." January 17, 2012. Available at: http://www.cattlenetwork.com/cattle-news/Impacts-of-the-demise-of-the-volumetric-ethanol-excise-tax-credit-137515803.html

traditional feedstocks such as energy crops, require federal support to attract capital and compete against traditional ethanol producers.[162]

Though the end of the VEETC was considered a "non-event" by the majority of the U.S. ethanol industry according to the Renewable Fuels Association,[163] the greatest impact would be the potential loss of the RFS2, which provides a guaranteed share of ethanol in the market and additional income for producers through the sale of RINs.

Elimination of Ethanol Import Tariffs

On January 1, 2012, the $0.54/gallon tariff on imported ethanol expired, allowing the potential for major ethanol producers, such as Brazil, to flood the market with foreign sources of biofuels.

According to a report prepared for Congress by the University of Iowa, the elimination of an import tariff on ethanol would have almost no impact on corn or ethanol markets. The reason for the small change is related to current Brazilian demand for ethanol relative to production. As of 2010, Brazil had over 10 million FFVs and sales are projected to increase. Exports would most likely occur if the price of ethanol increased, which would make the fuel cost-competitive with U.S. ethanol after the cost of transportation. However, the report does acknowledge this dynamic may change if Brazil significantly increases ethanol production capacity.[164]

Notwithstanding the report, with ethanol trading in a free market environment, the level of Brazilian imports will be based on simple economics of relative markets between the U.S. and Brazil and freight cost. In fact, the U.S. exported 76.3 million gallons (1.8 MMbbl) of ethanol in January 2012, of which approximately 1/3 was shipped to Brazil.[165] However, as (and if) the California Low Carbon Fuel Standard (LCFS) – a bill designed to monitor and regulate greenhouse gas emissions in California – is implemented, it may increase the value of Brazilian ethanol to refiners and blenders in California, since the sugarcane-based ethanol from Brazil has a lower carbon footprint. This could result in the odd dynamic of Brazilian ethanol being imported to California, and Midwest ethanol being exported to Brazil, some perhaps through NYH. This is one reason future carbon management regulations need to carefully weigh the full effect on the market.

EPA Waiver to Allow E15

The Clean Air Act authorized EPA to grant waivers for commercial fuels if it could be demonstrated that the vehicles and engines using the otherwise prohibited fuel could continue to meet the emission standards over their full useful life. In March 2009, Growth Energy (a

[162] Renewable Fuels Association. "Global Leaders in Advanced Biofuels Urge Congressional Leaders to Extend Critical Tax Provisions," February 29, 2012. Available at: http://www.ethanolrfa.org/news/entry/global-leaders-in-advanced-biofuels-urge-congressional-leaders-to-extend-cr/

[163] G. Cooper. "Ethanol Remains a Bargain," *The E-Xchange, Renewable Fuels Association*. January 10, 2012. Available at: http://www.ethanolrfa.org/exchange/entry/ethanol-remains-a-bargain/

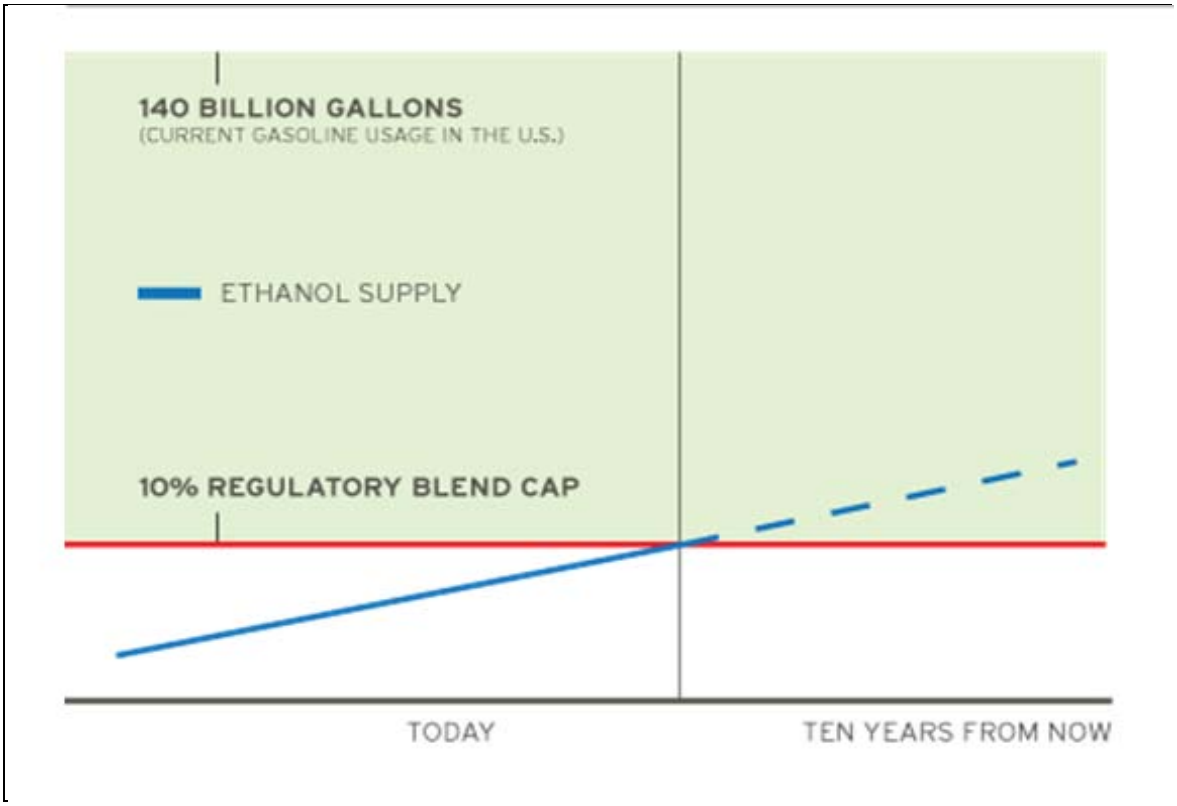
[164] Iowa State University. "Cost and Benefits to Taxpayers, Consumers, and Producers from U.S. Ethanol Policies," Staff Report 10-SR 106. pp. 13-18, 34-39. July 2010.

[165] G. Cooper. "U.S. Ethanol Exports Strong in January; Brazil is Top Market," *The E-Xchange, Renewable Fuels Association*. March 9, 2012. Available at: http://www.ethanolrfa.org/exchange/entry/u.s.-ethanol-exports-strong-in-january-brazil-is-top-market/

coalition of U.S. ethanol supporters) applied for a waiver to allow an increase in the amount of ethanol in gasoline from 10 to 15 percent (E10 to E15). Based on testing data provided by the DOE, EPA permitted a partial waiver allowing manufacturers to introduce E15 for newer light-duty motor vehicles, subject to certain conditions. However, EPA denied E15 use in model years older than 2000 and other off-road and heavy-duty gasoline vehicles due to the lack of testing data. Misfueling mitigation conditions require that a specific label be placed on E15 retail dispensers indicating the restricted vehicle use.[166]

Raising the "blend wall" from E10 to E15 could increase the use of ethanol[167] and potentially displace five billion gallons of gasoline each year in the U.S.. Exhibit II-14 below demonstrates the need to address the blend wall in the near term. The EPA decision to allow for the use of E15 in older model vehicles could have a significant impact on the use of ethanol in NYS, effectively increasing demand by over 30 percent if E15 was utilized at the same rates as E10.

Exhibit II-14: Current Regulatory Cap Preventing Ethanol Expansion in Conventional Gasoline Vehicles



Source: Growth Energy. "E15 Green Jobs Waiver." March 2012. Available at: http://www.growthenergy.org/ethanol-issues-policy/e15-green-jobs-waiver/.

[166] EPA. "E15 (a blend of gasoline and ethanol)." March 2012. Available at: http://www.epa.gov/otaq/regs/fuels/additive/e15/index.htm

[167] Raising the blend wall may increase not only the demand for corn-based ethanol, but also cellulosic ethanol production, though ICF acknowledges that other policies and technology improvements may also have a positive impact on the growth of this sector.

Industry experts have expressed a number of concerns about the timeliness and feasibility of quickly distributing E15 within NYS. As discussed in Section III, E15 faces a number of barriers to implementation including: only about 62 percent of vehicles currently operating would be able to use E15;[168] some vehicle manufacturers do not provide a warranty for E15 use;[169] and only about 50 percent of retailers would currently be able to provide the fuel with potentially expensive upgrades and liability risk.[170]

NYS Low Carbon Fuel Standard

Based on the New York State Climate Action Plan Interim Report, [171] NYS plans to participate in the on-going regional LCFS effort, but it is unclear if NYS would implement an LCFS on its own. Since the passage of California's LCFS, the Northeast States for Coordinated Air Use Management (NESCAUM) has been evaluating the economics and benefits of implementing a similar program in New York, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Rhode Island and Vermont.[172] Any decision about the implementation of an LCFS would most likely occur after a court decision has been reached in California. In December 2011, the U.S. District Court in Fresno ruled that the program violated the Constitution's commerce clause, which prohibits states from discriminating against interstate trade. At the time of publication, no definitive decision had been made about the ruling.

Impact of New Regulations and Incentives on the Biofuels Infrastructure

The impact of the RFS2 and the Clean Air Act has led to the requirement of reformulated gasoline blends and the associated infrastructure to include the unit trains for delivery and further rail movements down to New Jersey for the same reason. The industry has spent funds to get ethanol into gasoline throughout the State and also reformulated blendstock for blending with lower aromatics.

Despite the positive impact of new regulations and incentives related to the biofuels industry, such as RFS2, the loss of existing state and federal incentives has had a significant detrimental impact on the financial stability of in-state producers. The loss of federal biodiesel incentives has also had a detrimental impact on the biofuels industry within NYS, with the biggest impact associated with the fallout from the RIN fraud cases. The high price of oil has buoyed the biofuels industry to some extent in the short-term, but it is unclear how the industry will handle a decline in oil prices in the medium- to long-term.

[168] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. "Statement of Dr. Henry Kelly." April 13, 2011. Available at: http://www1.eere.energy.gov/office_eere/testimony_kelly_041311.html

[169] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine*. June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[170] Kris Bevill. "The Battle for the RFS," *Ethanol Producer Magazine*. June 12, 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[171] "New York State Climate Action Plan Interim Report." New York State Climate Action Council. 9 November 2010. http://nyclimatechange.us/InterimReport.cfm

[172] Northeast States for Coordinated Air Use Management. "Executive Summary: Economic Analysis of a Program to Promote Clean Transportation Fuels in the Northeast/Mid-Atlantic Region." August 2011.

Alternative Fuels, Gasoline, and Diesel Marketing Regions

This section includes:

1. Fueling stations in NYS by type, DEC region, and county
2. Programs for alternative fuel infrastructure expansions in NYS
3. Gasoline type by NYS county

Alternative Fueling Stations in NYS[173]

ICF estimates that, as of July 2012, there are approximately 246 alternative fueling stations in NYS. There are a total of 141 stations that are accessible to the public, including 76 public-access E85 and biodiesel stations that market both alternative fuels and conventional fuels. ICF estimates that there are approximately 104 additional private- or government-access alternative fueling stations.[174] Of the alternative fueling stations in NYS, the breakdown of stations is included in Table II-23 below.

Table II-23: Alternative Fueling Stations in NYS

Entity Type	Number of Stations			
	E85	Natural Gas*	Biodiesel**	Propane
Government	13	68	5	3
Public	69	36	7	29
Private	0	8	6	2
Total	**82**	**112**	**18**	**34**

Source: U.S. Department of Energy. "Alternative Fueling Station Locator." Available at: http://www.afdc.energy.gov/afdc/fuels/stations.html. Accessed 9 July 2012.

** All operational natural gas stations as of March 2012 dispense compressed natural gas (CNG). Two planned public access liquefied natural gas (LNG) stations are included in the public station count.*

*** Includes only stations dispensing biodiesel blends of B20 or greater.*

Programs for Alternative Fuel Infrastructure Expansions in NYS

NYS has implemented a wide variety of incentive programs to encourage the deployment of alternative fuel infrastructure throughout the State, complimented by incentives to encourage the utilization of alternative fuels.

Biofuel Station Initiative Program

NYSERDA administers the Biofuel Station Initiative Program, which provides funding to retail fueling stations offering E85 and biodiesel blends in the State, and to petroleum terminal operators to store, blend, and dispense biofuels. NYSERDA provides a reimbursement of up to

[173] See Section III for a discussion of all service stations in New York

[174] To calculate this number, ICF summed the number of private access E85 stations, biodiesel stations, propane stations, and natural gas stations. ICF also subtracted one station in order to account for a location with both E85 and biodiesel.

50 percent of new biofuel dispensing installation costs, including equipment, storage tanks, and associated piping equipment, up to $50,000 per site. NYSERDA also provides a cost reimbursement of up to 50 percent for new biofuel storage, handling, blending, and rack dispensing equipment, including installation costs, up to $150,000 per site. NYSERDA accepts applications from public access retail fueling station owners and operators in the State. Funding is limited and does not cover facility permitting or engineering costs. A 50 percent cost-shared technical assistance is also available for the following: technical review of design and construction specifications for the biofuel equipment; analysis of existing and proposed equipment; preparation and submission of requests for biofuel specific permits and waivers to local and state code officials; and facility staff training.

Biofuel Distributor Program

In April 2012 NYSERDA released a solicitation targeting biofuel distributors. The objective of The NYS Biofuel Distributor Program is to increase the number of petroleum terminals in NYS offering renewable biofuels such as ethanol or biodiesel to retail refueling stations and fleets throughout NYS. Funds are available to purchase and install equipment for bulk storage, handling and blending of biofuels by petroleum terminals in NYS. Approximately five (5) new Biofuel terminals would be operational as a result of the solicitation.

Clean Fueled Bus Program

NYSERDA administers the Clean Fueled Bus Program, which provides funds to state and local transit agencies, municipalities, and schools for up to 100 percent of the incremental cost of purchasing new alternative fuel buses and associated infrastructure. For the purposes of this program, an alternative fuel bus is any motor vehicle with a seating capacity of at least 15 passengers used to transport passengers on public highways that is powered by compressed natural gas (CNG) (including dual-fuel technology that is factory built and certified or a new diesel engine with a minimum of 75 percent use of CNG during typical operation), propane, methanol, hydrogen, biodiesel, or ethanol, or uses electricity as a primary fuel source (e.g., hybrid electric). Eligible infrastructure projects include fueling equipment installations including, but not limited to, electric vehicle battery charging stations and natural gas fueling stations and depots. A qualified infrastructure project must be necessary to introduce or expand an alternative fuel bus fleet and the funding only covers the cost for items directly associated with making the facility capable of dispensing the fuel.

Electric Vehicle Deployment Grant

As part of a $1 million federal grant and clean transportation fuels fund, NYSERDA announced awards totaling over $4.4 million to ten companies, municipalities and other entities to install over 325 electric vehicle charging stations across NYS. This is the first of two rounds of funding. An additional $10 million in vouchers up to $20,000 per vehicle will be available for the purchase of an EV commercial vehicle weighing over 10,000 pounds.[175]

[175] New York Governor Andrew Cuomo's Press Office. "Governor Cuomo Announces Deployment of 325 Electric Vehicle Charging Stations Across New York State." June 6, 2012. Available at: http://www.governor.ny.gov/press/06062012Charging-Stations

Electric Vehicle Supply Equipment Incentive

Coulomb Technologies' ChargePoint America program offers electric vehicle supply equipment (EVSE) at no cost to individuals or entities in the New York City metropolitan area. To be eligible for a public or commercial charging system, an entity must be located within the New York City metropolitan area and in defined potentially "high use" areas, and provide public access to the charging system. Companies and municipalities may apply on the ChargePoint America website. To be eligible for free home charging stations, individuals living within the specified area must purchase a qualified electric vehicle (EV) or plug-in hybrid electric vehicle (PHEV). Individuals purchasing an eligible EV or PHEV should apply for the ChargePoint America program at the dealership or with the vehicle manufacturer at the time of vehicle purchase. In most cases, installation will be paid for by the EVSE owner; some cities, states, and utilities, however, will provide funding towards installation costs. All participants in the ChargePoint America program must agree to anonymous data collection after installation. Additional restrictions may apply.

Technical Assistance Programs

NYSERDA manages the NYS Clean Cities Sharing Network (Network), which provides technical, policy, and program information about alternative-fuel vehicles (AFVs). Membership is open to all organizations, businesses, and individuals interested in AFVs and members are notified about upcoming funding opportunities and events. The Network publishes information about tax incentives, fueling stations, case studies, and contact information for the Clean Cities program and other industry leaders. The Network also organizes and sponsors technical workshops.

NYSERDA’s Flexible Technical (FlexTech) Assistance Program provides assistance to public, private, and not-for-profit organization fleet managers who want to evaluate the feasibility and cost of adding AFVs and fueling facilities to their operations. Low-cost training for vehicle mechanics is also available through certified institutions.

National Grid provides technical assistance for natural gas vehicle (NGV), electric vehicle, and plug-in hybrid electric vehicle adoption and infrastructure development. Assistance includes technology viability evaluation, funding resource investigation, and high-level project management on a case-by-case basis. These services are only available to current or potential National Grid customers.

Alternative Fuel Tax Exemption and Rate Reduction

E85, compressed natural gas, and hydrogen fuel that is used exclusively to operate a motor vehicle engine is exempt from state sales and use taxes. Additionally, cities and counties may reduce the sales and use tax imposed on 20 percent biodiesel blends (B20) to 80 percent of the diesel fuel tax rate. This exemption and rate reduction expires September 1, 2012.

Bioheat Credit

NYS currently offers a corporate and residential income tax for biodiesel purchases used for residential space heating and water through December 31, 2016. The value of the tax credit is $0.01/gallon for each percent of biodiesel blended with conventional home heating oil, up to a maximum of $0.20/gallon. Biodiesel use in buildings with both residential and non-residential

space and a common oil storage tank is eligible for a partial credit based on the percentage of square footage used for residential purposes. If a taxpayer's allowable credit exceeds their tax liability for a given year, the remaining credit is refunded rather than carried over to a subsequent tax year.

Rural Energy for America Program (REAP)

The U.S. Department of Agriculture (USDA) provides grants and guaranteed loan funding through its Rural Energy for America Program (REAP) for eligible rural businesses to assist with the cost of purchasing and installing FFV pumps for mid-range ethanol blends (including E85) and biodiesel. The grant funds will cover up to 25 percent of the total project cost with grants totaling between $2,500-500,000. State, local, and private funds could be used as eligible cost-share for the grant.[176]

Gasoline Type by NYS County

Gasoline sold in the U.S. is either classified as conventional or reformulated.

Conventional gasoline is the most widely consumed gasoline formulation in the U.S.. Conventional gasoline currently comprises about 65 percent of domestic gasoline consumption.[177] Conventional gasoline can be sold as either traditional, non-oxygenated gasoline, or as a blend of conventional blendstock for oxygenate blending (CBOB) and ethanol to produce E10 gasoline. The revised Renewable Fuel Standard (RFS2) mandates the annual amount of biofuels, including ethanol, which must be blended into liquid fuels. Due to the requirements under RFS2, the Empire State Petroleum Association (ESPA) believes that essentially all gasoline consumed in NYS is blended with ethanol.[178]

Reformulated gasoline (RFG) requirements have been driven by the 1990 Amendments to the Clean Air Act aimed at reducing smog-forming and toxic pollutants. These amendments require large metropolitan areas with high smog levels (and other areas which have chosen to "opt-in" to the program) to mandate the use of reformulated gasoline (RFG) rather than conventional gasoline. RFG is gasoline that is specifically formulated to burn more cleanly. RFG currently contributes to about 35 percent of the gasoline consumption in the U.S..[179]

Reformulated Counties

There are 10 counties required to sell RFG in NYS and they are listed in Table II-24 below. All the counties mandated to sell RFG are located in southern NYS, including all of regions 1 and 2. The three counties in Region 3 are located in the southernmost part of the region. This area of NYS is highly populated and is thus more conducive to producing smog because of its higher density of fossil fuel consumption.

[176] U.S. Department of Agriculture, March 2012, "Rural Energy for America Program," http://www.rurdev.usda.gov/BCP_ReapResEei.html

[177] EIA, Prime Supplier Sales Volumes. http://www.eia.gov/dnav/pet/pet_cons_prim_dcu_nus_a.htm

[178] Industry Source.

[179] EIA, Prime Supplier Sales Volumes. http://www.eia.gov/dnav/pet/pet_cons_prim_dcu_nus_a.htm

Table II-24: NYS RFG Required Counties

County	DEC Region
Bronx	2
Brooklyn	2
Manhattan	2
Nassau	1
Putnam	3
Queens	2
Rockland	3
Staten Island	2
Suffolk	1
Westchester	3

Source: "RFG Areas." Environmental Protection Agency. http://www.epa.gov/otaq/fuels/gasolinefuels/rfg/areas.htm

Counties Opting In and Out

Though some counties in NYS are required by the 1990 Amendments to sell RFG, other counties have "opted-in" and "opted-out" of the program. Three counties in NYS (Dutchess, Essex, and Orange) have decided to opt-in to the RFG program, but only Dutchess opted-in entirely. According to ESPA, only Whiteface Mountain in Essex County and the lower seven towns in Orange County are part of the RFG program.[180]

Conversely, nine counties have been able to opt-out of the RFG program. These are counties that had at one point opted-in to the program and then have since decided to opt-out. In order to opt-out of the RFG program, the governor must submit a petition to U.S. EPA, which must include how RFG has been relied upon by the State in its air quality plans to reduce ozone levels. The counties that have opted out of the program are not required to sell reformulated gasoline. Table II-25 below identifies those counties that have "opted-in" or "opted-out" of the RFG program.

[180] Industry Source.

Table II-25: NYS County RFG Options

County	DEC Region	Option
Dutchess	3	Opt-In
Essex	5	Opt-In (partial)
Orange	3	Opt-In (partial)
Albany	4	Opt-Out
Erie	9	Opt-Out
Greene	4	Opt-Out
Jefferson	6	Opt-Out
Montgomery	4	Opt-Out
Niagara	9	Opt-Out
Rensselaer	4	Opt-Out
Saratoga	5	Opt-Out
Schenectady	4	Opt-Out

Sources: "RFG Areas." Environmental Protection Agency. http://www.epa.gov/otaq/fuels/gasolinefuels/rfg/areas.htm

NYS Department of Conservation

Empire State Petroleum Association

Section III: NYS Transportation Infrastructure Capabilities

Overview

This section focuses on the factors involved in the sustained delivery of petroleum and biofuel products in the NYS transportation fuels infrastructure, both via land and marine shipments. The specific "land" supply chain from terminals to retail markets is described, as well as the primary wholesale and retail players in NYS. The marine transport is focused on the delivery to waterborne terminals, at which point the land transport process begins.

The section provides specific detail on retail markets in NYS and identifies current issues which may impact service station dealers. There is also an assessment of future issues which are likely to impact the NYS market, including Tier-3 gasoline regulations, RFS2 requirements, and issues surrounding increased ethanol blends in gasoline (E15 and E85).

Land Transportation and Distribution of Petroleum Fuels

Wholesale Suppliers and Distributors

The distribution of petroleum products into the retail market in NYS is described in Section I and involves a number of assets covered in Section II (primarily petroleum terminals and other distribution infrastructure). Section I outlines the "players" in the distribution supply chain. This section provides additional information on the specific wholesale distributors (including "jobbers") who market gasoline to retail distributors (dealers) in NYS. This specific portion of the supply chain will also be examined to identify retail market shares and service station margins, as well as key issues facing the retail industry in NYS.

Primary Suppliers in NYS Markets

Wholesale distributors sell product at or via the terminal loading racks. Wholesale distributors can be refiners or wholesale marketers (including blenders or traders). They acquire their product at the terminal by either producing it, or by purchasing it, blending it or exchanging for it, either at the terminal itself or further upstream in the supply chain.

Branded customers are dealers who have a contractual obligation to purchase gasoline from a specific branded supplier (e.g. Shell, Citgo). They are required only to buy product from the branded supplier, and the branded supplier makes sure the dealer maintains the service station and properly displays branded supplier signage and sells lube products, etc. Branded dealers typically pay a higher price for gasoline than dealers who buy unbranded product, since the branded supplier assures gasoline quality and gives supply priority to branded accounts in times of product shortage. Branded dealers can typically receive product either on a delivered basis ("DTW", or dealer Tankwagon Price) at the service station, or, if the dealer is a distributor with his own trucks, at the loading rack.

Distributors and jobbers who purchase unbranded product at a terminal (these include companies such as Kwik Fill, Stewart's, Wilson Farms and others) typically have contracts with multiple wholesale suppliers in a regional market. This provides the unbranded buyer the option to select a "deal of the day" price at a loading rack, which is typically at a discount to branded

sales. When supply is tight, wholesale suppliers will raise unbranded prices above branded to discourage liftings and help the suppliers preserve supply for their branded accounts. So while unbranded buyers can often receive substantial rack discounts, they are exposed to supply price and availability risk during periods of supply shortfalls or disruptions.

Specific volume data on wholesale suppliers in NYS is company confidential information. However, it is possible to examine the key markets in NYS by looking at the OPIS published rack locations to provide an assessment of the major wholesale suppliers in NYS. Table III-1 below examines suppliers in multiple markets, and identifies if the supplier is marketing branded or unbranded gasoline. The table illustrates that while downstate markets are required to use some version of E10, upstate markets such as Binghamton/Vestal, Buffalo, Rochester, Syracuse, and Utica may also sell at least some conventional gasoline (without ethanol additives). At this point virtually all upstate fuel sales are E10. The table highlights several important points regarding the wholesale suppliers in NYS.

1) Several wholesale suppliers have a presence throughout the three major market areas of the State, NYC Metro, Hudson North, and upstate New York. These include Sunoco, ExxonMobil (XOM), Valero, Citgo, Global, Gulf, Hess and Phillips 66 (PSX).
2) All of these parties except ExxonMobil sell unbranded gasoline (Sunoco sells through Sunoco R&M), although not necessarily at every rack.
3) Some suppliers concentrate on the downstate NY metropolitan area (Shell, Sprague), while others focus on the Upstate market, including Albany (Apex, Buckeye, Griffith).

It is important to recognize that the wholesale supplier rack sales type (branded or unbranded) list may not clearly “translate” to retail service station outlets. For example, sellers of branded gasoline will clearly have branded service station outlets in NYS. However, a wholesale supplier listed as unbranded could still have branded stations if they have company owned and operated stations. A good example of this is Hess, which has all company owned and operated stations and therefore they do not sell to independent Hess dealers at a branded price.

Table III-1: Gasoline and Distillate Resellers in NYS by City

Retailer	Branded and Unbranded Wholesalers in NYS (B: Branded, U: Unbranded)													
	NYC Metro Area			Hudson North	Upstate New York									
	New York City*	Long Island**	Newburgh	Albany	Binghamton/ Vestal		Buffalo		Rochester		Syracuse		Utica	
	3	3	3	1	1	2	1	2	1	2	1	2	1	2
Apex				U						U	U	U	U	U
Bayside	U													
BP	B													
Buckeye				U	U	U	U	U	U	U	U	U	U	U
Citgo	B	B	B	B, U	B	B, U	B		B		B	B	B	B, U
Coastal	B	U	B				B	B	B	B	B	B		
Global	U	U	U	U					U	U	U	U		
Griffith							U	U			U	U		
Gulf	B	B	B	B	B	B	B		B	B	B	B		
Gulf-GIE	U	U	U	U	U	U	U		U	U	U	U	U	U
Hess	U		U	U		U			U	U	U	U	U	U
Irving				B, U										
Lukoil	B	B		B										
Musket						U								
Mystik			B	B										
Noco				U			U	U		U		U		
Nwenglptr				U										
PFI				U										
Phillips 66 (PSX)		U	U	U		U			U	U	U	U	U	U
Shamrock	B	B			B	B								B
Shell	B, U	B, U	B, U	B, U										
Sprague	U	U	U	U										
Sunoco†	B, U	B, U	B, U	B	B, U	B, U	B, U	B, U	B, U	B, U	B, U	B, U	B, U	B
Valero	B, U	B, U	B, U	B, U	B, U	B, U	B	B	B, U	B, U	B, U	B, U	B, U	B, U
Warex			U											
Wst Vernon	U													
XOM	B		B	B			B	B	B	B	B	B	B	B

Source: Oil Price Information Service (OPIS). "PADD 1 Report." OPIS, 14 May 2012: Gaithersburg, MD.

Note: "1" denotes CBOB Ethanol 10% 9.0 RVP. "2" denotes Conv Clear 9.0 RVP. "3" denotes RFG Ethanol 10%.

** Includes Inwood and the Bronx*

*** Includes Holtsville and Lawrence*

† Sold under brand name Sunoco and unbranded under Sunoco Refining & Marketing (S. R. & M.)

Example of a NYS Market Supply Chain: Refiner-to-Retail

Exhibit III-1 below illustrates a refinery to retail supply chain based on actual generic market prices from May 14, 2011, average margin data from OPIS and estimated transportation costs. The analysis begins with the processing of a West African crude (Bonny Light) at the Phillips 66 refinery in Linden, N.J. The refinery produces a conventional blendstock at 84 octane suitable for blending with ethanol at a terminal in upstate New York. The market price for the "CBOB" (conventional blendstock for oxygenate blending) in NYH was $2.64/gallon. Phillips could sell the blendstock in the NYH market or into the Buckeye pipeline at that price, but instead chooses to ship the product to the Buckeye Rochester terminal at a pipeline tariff of $0.045/gallon. The laid down cost (LDC) at the terminal is therefore $2.685/gallon. Phillips would want to sell the product at the terminal rack at a price higher than this to justify the shipment to Rochester.

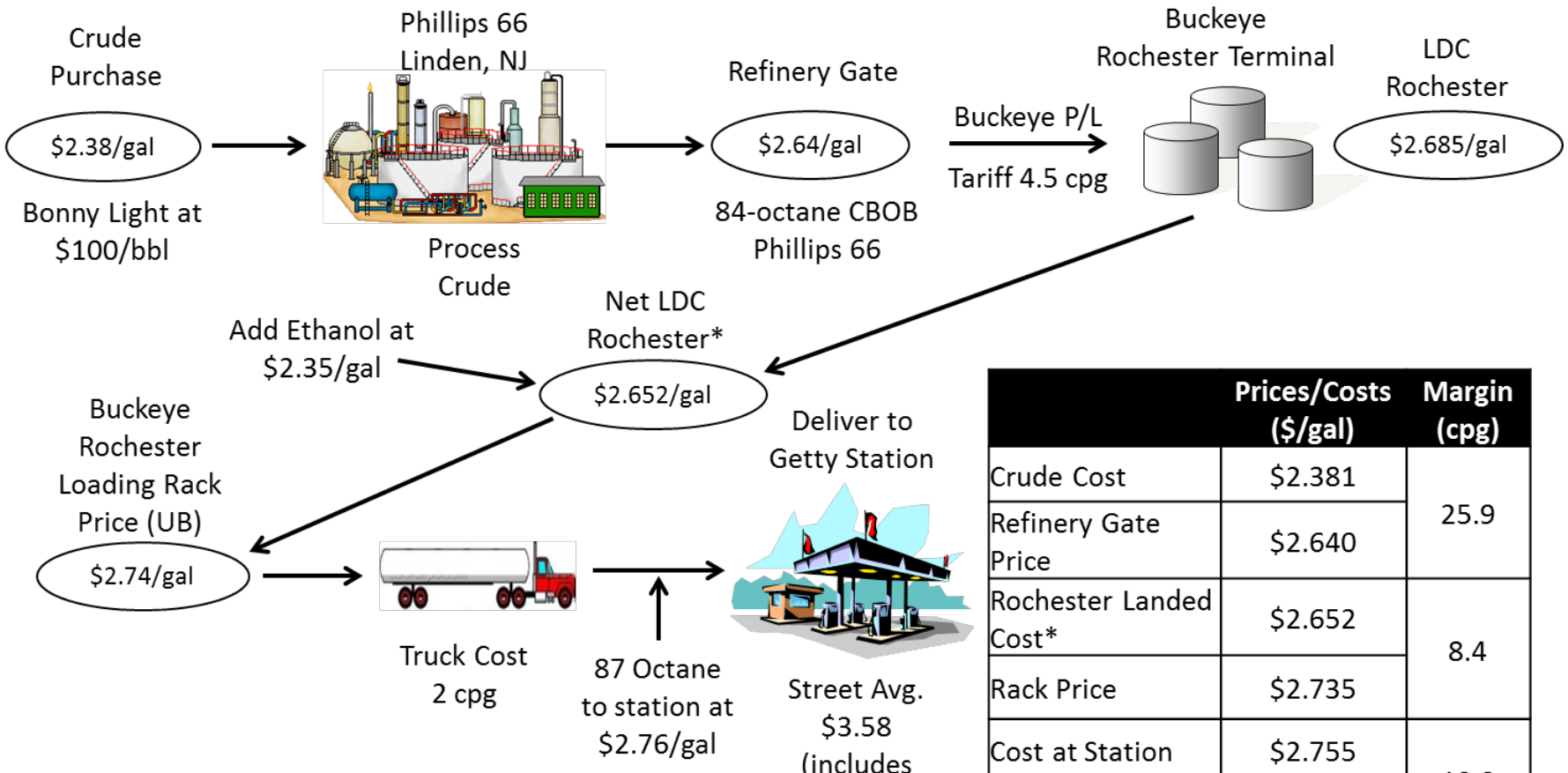
In order to produce 87 octane E10 from the CBOB shipped to Rochester, Phillips adds 10 percent ethanol into the CBOB as the product is being loaded into a truck. The ethanol price in Rochester is estimated at $2.35/gallon, which reflects the NYH barge cost of $2.15/gal for the fuel plus an estimated $0.20/gallon transportation cost by truck to the Rochester terminal. Since ethanol is cheaper than the LDC of the CBOB plus Buckeye tariff, the "cost" of the E10 to Phillips is lowered somewhat to $2.652/gal. Phillips unbranded rack price at Rochester was $2.735/gal on May 14th, so an unbranded sale at the rack would net Phillips $0.084/gallon profit compared to their alternative to sell the product at the refinery gate.

The service station receives product at the rack price plus an estimated $0.02/gallon transportation cost to the service station. In this example, a Getty station is shown as receiving the Phillips unbranded product.[181] Assuming the Getty station is posting a street price with the Rochester-average 2011 retail gross margin of $0.19/gallon, the resulting street price (including taxes) would be about $3.58/gallon.

The ultimate price to consumers varies considerably based on the price of crude, the prevailing refining margins at the time, as well as the wholesale and retail margins. Even taxes can vary considerably since in NYS, county level taxes are linked to the price of the petroleum (See New York Gasoline Taxes section).

[181] Getty may or may not purchase Phillips 66 unbranded product; Getty is shown only as an example

Exhibit III-1: Refinery-to-Retail Transaction Supply Chain Example



	Prices/Costs ($/gal)	Margin (cpg)
Crude Cost	$2.381	25.9
Refinery Gate Price	$2.640	
Rochester Landed Cost*	$2.652	8.4
Rack Price	$2.735	
Cost at Station	$2.755	19.0
Street - Tax	$2.945	
Street	$3.577	

*Phillips 66 cost at loading rack (90% CBOB at $2.685/gal and 10% ethanol at $2.35/gal = E10 at $2.652/gal)
LDC – Laid Down Cost
UB – Unbranded Sales

Fuels Marketed and Distributor Infrastructure

The parties who purchase rack volume include distributors and jobbers who resell the product to customers who could include 1) the distributor or jobbers' own service station network; 2) independent dealers who contract with the reseller for supply; 3) branded outlets who contract with the distributor for ongoing supply.

In some cases distributors and jobbers in some cases may have their own trucking fleet, however, many rely on some of the many petroleum truck transport companies supporting NYS.

Distributors and jobbers will rely on their own fleet (if they have a fleet) or in-chartering to manage supply needs, typically arranging contracts with trucking companies to cover their normal needs (this allows the trucking companies to insure they have adequate transport needs for their demands).

Retail dealers with small numbers of stations depend on the jobbers and the truck transport companies to keep their stations supplied. In many cases these retail dealers have several outlets with convenience stores and rely on the jobbers to handle their gasoline supply so they can focus on store operations.

Most distributors and jobbers are supplying gasoline with 10 percent ethanol to retail stations in NYS, buying E10 at the terminal racks (either using RBOB in reformulated areas downstate or CBOB in non-reformulated areas upstate). There are about 113 traditional stations in NYS (less than 3 percent of the total number of public fueling stations) that market ethanol-free gasoline.[182] These stations are primarily in the North and Western regions of NYS.

Trucking Availability

There are a number of trucking companies in NYS and New Jersey that provide transport services to the petroleum industry. Some of these are cited in the above section and there are a number of others.

Overall, there are 8,597 trucks certified by the U.S. Department of Transportation (DOT) to deliver petroleum products in NYS; most of these trucks are within either the 26,000 – 36,000 or 80,000 – 90,000 pounds gross vehicle weight (GVW) classes.[183] Discussions with industry participants have indicated that the trucking industry is very responsive to petroleum needs.

Petroleum suppliers have indicated that trucking costs tend to depend on several factors, including labor costs (for drivers) as well as the cost per mile for fuel and fleet maintenance. In order to estimate costs for a particular transport delivery, the key information needed is: 1) origin terminal and destination location and miles; 2) estimated transit time from terminal and back (round trip); 3) cost of truck fuel (on-road diesel); 4) driver rate; and 5) transport volume.

One industry source indicated that when all transport companies expenses are calculated, at today's (June 22, 2012) diesel prices, the delivery cost per mile is roughly $1.05/mile, and has

[182] "The list of ethanol-free gas stations in the U.S. and Canada." http://pure-gas.org/index.jsp?stateprov=NY

[183] New York State Highway Use Tax Permit Database. Office of Tax Policy Analysis, New York State Tax Department.

been as high as $1.45/mile. Not all of this cost is diesel fuel as noted above, just labor rate for the driver alone is roughly $60 hourly. So knowing the route, miles and transit time, a total cost for the delivery can be determined as well as the cost per gallon delivered. This method is only an estimate and individual trucking firms may have different costs of doing business that could result in higher or lower fees for transport.

In periods of supply shortages it may be necessary to route trucks to remote terminals rather than the normal supply sources. In these cases clearly the cost for the transport increases both due to distance and possible overtime fees for the drivers. In addition, it may be necessary for the petroleum suppliers to request waivers for the drivers so that they can work overtime hours (there are limitations on maximum driving hours to ensure on-road safety). Several distributors contacted indicated that truck availability is not a major concern in the event of supply disruptions.

Changes in the Structure of the Industry

ICF does not foresee any fundamental changes in the structure of the wholesale to retail distribution system in NYS.

Retail Market Analysis

Overview

The retail gasoline market in NYS is supplied primarily from the terminal system and the wholesale suppliers noted earlier (although some gasoline is sold retail to fleet accounts; for example, rental car companies or corporate or government fleets). The discussion here will focus on retail supply through service stations.

The service stations on the street can receive gasoline in a number of different ways based on the ownership of the station and supply contracts with the refiners or wholesale suppliers at the terminal. Simply put, there are two primary categories of retail gasoline: branded and unbranded gasoline.

Gasoline Branding

Branded Gasoline

Company-owned and operated stations: The supplier (*i.e.*, BP, Citgo) owns the service station and use salaried employees to run the station. The company loads trucks at the terminal and determines the street pricing to meet the company's goals for the station's profitability. The only transaction that takes place is with the consumers' purchase.

Increasingly, major oil companies have been divesting these outlets and selling them to independent dealers who market their branded product. Station profit levels are not substantial and typically require convenience store income and/or repair-shop income to be profitable. The major suppliers have seen this as providing minimal uplift to their business for the number of resources and capital involved.

Dealer-operated stations: Independent dealers contract with major suppliers to sell branded gasoline at a price set by the major supplier. The supplier provides gasoline on a delivered

basis at the station tanks. The price is intended to simulate a local “rack price” plus trucking cost, but the supplier will often set the price to the service station based on the market “zone” where the station is located. A station in an affluent area, or an area with minimal alternative retail outlets, may be able to charge a higher retail gasoline price than a dealer located adjacent to a lower priced Walmart or Costco outlet. The use of “zone pricing” is common in the industry and in NYS.

Independent dealers may be “lessee-dealers” who lease the service station from the oil company supplier, or the dealers could own the station and land themselves. The specific contractual obligations of each may differ. Dealers who may own several stations can negotiate better pricing terms than individual dealers; however, even dealers with a single station can negotiate discounts for sales volume levels above a contractual target level.

Dealer-operated stations can also be supplied by a “jobber”. A jobber is a wholesale distributor who may operate a fleet of trucks and buy branded gasoline at the terminal “rack” price posted by the branded supplier and then transport the gasoline to an independent dealer selling that gasoline brand. Jobbers may also be dealers themselves and basically buy branded gasoline at the terminal rack to use and supply their own station chains.

The branded gasoline contains any proprietary additives that the wholesale supplier warrants are in their gasoline (additives are injected at the terminal as the branded gasoline is loaded in the truck).In all the above cases, the branded retail dealer (service station operator) is obligated to purchase and sell branded gasoline from the supplier whose “flag” the station is flying.

Unbranded Gasoline

As noted earlier, unbranded gasoline is sold at the terminal rack to jobbers who may supply their own stations or other independent service stations in a market. Jobbers who own multiple service stations and have their own truck fleets can buy at the terminal rack from multiple suppliers that they have unbranded contracts with. This assures them the best pricing on any day. Moreover, jobbers can then contract with other independent dealers on terms that allow the jobber to make money by selling at a rack based price and buying the “deal of the day”.

Unbranded buyers – both jobbers and the dealers they supply – can typically purchase product at prices lower than branded rack prices when supply is ample in a market. However, when supply becomes tight, wholesale suppliers will tend to raise unbranded prices above branded in order to conserve supply for their branded customers. If an individual branded supplier has a supply shortage, increasing the unbranded price effectively drives jobbers to other unbranded suppliers; when all suppliers are short, all the unbranded prices will increase above branded and the jobbers buying unbranded will have to pay more for supply. They also take the risk that in very severe shortages they may not have supply (as the branded suppliers will preferentially keep their branded dealers supplied).

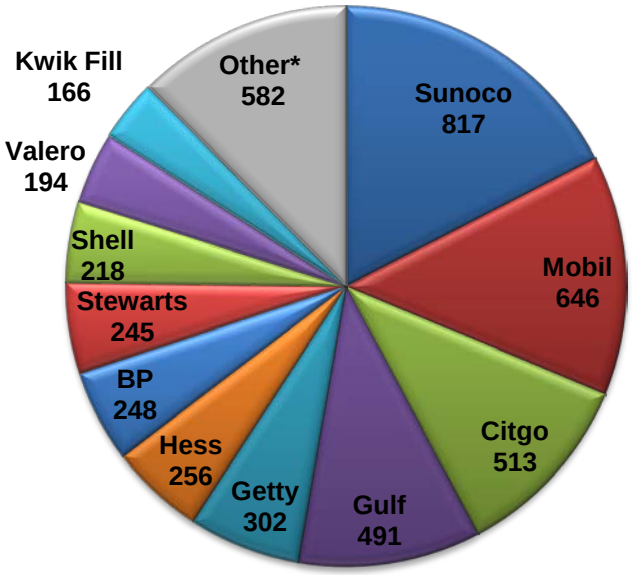
Retail Service Stations in NYS

NYS has a number of locations where gasoline fuel is dispensed. Overall, NYS DEC sources and NYS Department of Agriculture and Markets sources appear to indicate a total of about

6,000 fueling locations within NYS.[184,185] In addition to traditional service stations, there are also marinas and private fueling locations that are not reported as fueling businesses in the North American Industry Classification System (NAICS) data.

Using NAICS data as an alternative source, there appear to be about 4,743 traditional service stations in NYS, with about 4,678 of these stations conventional fueling stations (about 76 of these stations also sell alternative fuels, and the remaining 65 stations sell only alternative fuels).[186] The number of stations tracked by OPIS (the Oil Price Information Service) total 4,426 stations, or 95 percent of the NAICS-reported stations identified in NYS. The OPIS listing excludes stations operated by companies with fewer than 15 outlets, which would exclude a number of individual-owned stations and very small retail chains. Based on information provided by OPIS[187], Exhibit III-2 shows the breakdown of service stations by company in 2011 for NYS. The data clearly show that Sunoco, Mobil, Citgo, and Gulf are the primary marketing outlets in NYS, with roughly 53 percent of all the conventional service stations.

Exhibit III-2: Market Share in NYS by Conventional Outlet Counts (Total: 4,678)



Sources: *Oil Price Information Service (OPIS). "OPIS Retail Year in Review & 2012 Profit Outlook." OPIS, 2012: Gaithersburg, MD. P. 142.*

DOE. "Alternative Fueling Stations." DOE, 9 Mar 2012: Washington, D.C. Available at: http://www.afdc.energy.gov/afdc/fuels/stations.html

** Includes Fastrac, Tops, Nice N Easy, Noco, Lukoil, Wilson Farms, Byrne Dairy, 7-Eleven, Ok Petroleum, Xtramart, Delta Sonic, BJ's, and other conventional fuel stations*

[184] NYS Department of Environmental Conservation. "Petroleum Bulk Storage Registration Database." July 2012. Phone interview with Jack Aversa, Chief, Registration and Permits Section.

[185] NYS Department of Agriculture. "Retail Gas Stations by County Database." July 2012. Phone interview with Mike Sikula, Assistant Director, Bureau of Weights & Measures.

[186] See Appendix E for the total public-access stations in NYS, which total 4,819 because the 76 stations that sell both conventional and alternative fuels have separate NAICS codes for each business and thus are "double counted" as sites in the table.

[187] Oil Price Information Service (OPIS). "OPIS Retail Year in Review & 2012 Profit Outlook." OPIS, 2012: Gaithersburg, MD. P. 142.

Market Share and Throughput

While OPIS does not publish specific market share data for individual states, it is not unreasonable to approximate the market share based on the number of service stations (outlets). Table III-2 below includes the share of total service station market share in NYS (by outlet counts) for the top ten gasoline sales marketers.

Table III-2: Market Share by Branded Outlet Counts for Top 10 Marketers in NYS

Brand	Market Share by Outlet Counts (%)
Sunoco	17.5%
Mobil[188]	13.8%
Citgo	11.0%
Gulf	10.5%
Getty	6.5%
Hess	5.5%
BP	5.3%
Stewarts	5.2%
Shell	4.7%
Valero	4.1%

Source: Oil Price Information Service (OPIS). "OPIS Retail Year in Review & 2012 Profit Outlook." OPIS, 2012: Gaithersburg, MD. P. 142.

Average service station throughputs in NYS can be estimated from reported EIA total gasoline sales of about 15.02 MMg/d (358,000 b/d) (2011) and the reported total of 4,678 *conventional* service stations, or roughly 1.17 MMg/y (28,000 b/y) for each service station (just under 100,000 gallons per month {2,400 b/month}). Typically, volumes can run significantly higher in some locations than others, with high-volume stations exceeding 3 MMg/y (71,000 b/y) and stations in rural locations at several hundred thousand gallons annually. The volumes are an important consideration in evaluating the profitability of service stations, as higher-volume stations, which are able to seize on economies-of-scale, are typically associated with higher profit margins.

Retail Consumer Patterns

Analysis of EIA Prime Supplier Sales in NYS shows that total gasoline sales in NYS peaked in 2002/2003 at over 16 MMg/d (381,000 b/d), and then declined. Prime Supplier Sales have been almost identical from 2008 to 2011 at about 15 MMg/d (357,000 b/d). Over this period, there was a sustained increase in the volume of regular unleaded sales from 2000 to 2011. At the same time, wholesale sales of premium gasoline declined by over 40 percent in NYS, and midgrade gasoline declined by 80 percent. In general, the decline in volumes sold of higher cost premium grades reflected consumer response to higher retail gasoline prices over the period.

[188] By Federal Trade Commission (FTC) decree, ExxonMobil must market in some states as Mobil and others as Exxon. In NYS, ExxonMobil must market at Mobil. Source: U.S. Federal Trade Commission (FTC). "Exxon/Mobil Agree to Largest FTC Divestiture Ever in Order to Settle FTC Antitrust Charges." FTC, 30 November 1999: Washington, D.C. Available at: http://www.ftc.gov/opa/1999/11/exxonmobil.shtm

The percentage of midgrade sales declined to about 2 percent of prime supplier sales in 2011. See Table III-3 below.

Table III-3: Gasoline Sales/Deliveries by Prime Supplier in NYS by Grade (b/d)

Year	Barrels per Day (b/d)			
	Regular Gasoline	Midgrade Gasoline	Premium Gasoline	Total Gasoline
2000	249,000	27,286	75,119	351,405
2001	267,881	26,310	75,619	369,810
2002	282,810	26,857	78,905	388,571
2003	293,690	25,571	72,119	391,381
2004	284,429	22,095	60,476	367,000
2005	298,524	19,476	53,833	371,833
2006	311,976	16,190	47,333	375,500
2007	309,667	14,119	46,667	370,452
2008	306,571	11,119	39,833	357,524
2009	303,095	10,095	42,762	355,952
2010	303,221	9,588	44,112	356,921
2011	307,652	8,498	41,462	357,612

Source: EIA. "Data 1: Motor Gasoline by Grade and Formulation." EIA, 1 November 2012: Washington, D.C. Available at: http://www.eia.gov/dnav/pet/pet_cons_prim_dcu_SNY_a.htm

It should be noted that EIA reports Prime Supplier sales, which are typically terminal rack sales. It is possible (and indeed likely) that some distributors purchase 87 octane conventional gasoline and add 10 percent ethanol to produce 89 octane mid-grade. With ethanol prices typically below rack gasoline prices, the distributor could market the gasoline as either 89 or 87 octane and have a lower cost of supply due to the ethanol price, while also attaining RIN[189] credits. The distributor must have access to ethanol directly, rather than as a blended product, to gain this advantage.

Service Station Retail Pricing and Gross Margin Analysis

This discussion analyzes retail pricing data gathered by OPIS in two areas. These are 1) retail premiums for premium grade and midgrade gasoline versus regular unleaded and 2) retail service station gross margins. These data are collected by OPIS through analysis of credit card transactions at retail service stations, tax regimens in specific markets, and wholesale supply costs to each market.

Gasoline Grade Premiums

Table III-4 and Table III-5 below show the respective retail pricing of midgrade and premium gasoline in 2010 and 2011 versus 87 octane regular unleaded gasoline in NYS. The data are presented for each of the top marketers in NYS (all marketers with over 100 service stations).

[189] A RIN is a 38-character numeric code that is generated by the producer or importer of renewable fuel representing gallons of renewable fuel produced/imported and assigned to batches of renewable fuel that are transferred (change of ownership) to others (See Definitions)

Table III-4: Premium vs. Regular Price Differential for Selected Brands in NYS ($/gallon)

Brand	Premium vs. Regular ($/gallon)		Premium Change ($/gallon)
	2010	2011	
Sunoco	$0.212	$0.228	$0.016
Mobil	$0.243	$0.262	$0.019
Citgo	$0.240	$0.246	$0.007
Gulf	$0.269	$0.259	-$0.010
Getty	$0.228	$0.227	-$0.001
Hess	$0.223	$0.239	$0.016
BP	$0.221	$0.226	$0.005
Stewarts	$0.226	$0.227	$0.000
Shell	$0.255	$0.278	$0.024
Valero	$0.187	$0.219	$0.032
Kwik Fill	$0.201	$0.202	$0.001

Source: Oil Price Information Service (OPIS). "OPIS Retail Year in Review & 2012 Profit Outlook." OPIS, 2012: Gaithersburg, MD.

Table III-5: Midgrade vs. Regular Price Differential for Selected Brands in NYS ($/gallon)

Brand	Midgrade vs. Regular ($/gallon)		Premium Change ($/gallon)
	2010	2011	
Sunoco	$0.11	$0.12	$0.02
Mobil	$0.14	$0.15	$0.01
Citgo	$0.14	$0.14	$0.00
Gulf	$0.15	$0.14	($0.01)
Getty	$0.12	$0.12	($0.01)
Hess	$0.12	$0.13	$0.01
BP	$0.12	$0.12	($0.01)
Stewarts	$0.13	$0.13	($0.00)
Shell	$0.16	$0.16	$0.00
Valero	$0.08	$0.11	$0.03
Kwik Fill	$0.10	$0.10	($0.00)

Source: Oil Price Information Service (OPIS). "OPIS Retail Year in Review & 2012 Profit Outlook." OPIS, 2012: Gaithersburg, MD.

The prices indicate a number of findings, including:

1) Premium gasoline prices were $0.202-$0.278/gallon above regular unleaded in 2011. This was an increase (on average) of about $0.01/gallon over 2010 for the companies with over 100 stations.

2) The highest "premiums" for premium gasoline tended to be the major oil companies. Shell was the highest, followed by Mobil, Gulf and Citgo. Not surprisingly, Kwik Fill, a "discount" player, had the lowest premium. Several major marketers (Sunoco, Getty, BP, Stewart's) are well below the highest priced majors (by $0.04-$0.05/gallon) in their

pricing strategy. (There is no specific sales information by marketer to assess who sells the highest percentage of premium or midgrade gasoline.)

3) Midgrade gasoline prices show a similar disparity in price premiums versus regular unleaded gasoline, ranging from $0.101-$0.157/gallon in 2011. These premiums increased on average only about $0.004/gallon from 2010 to 2011.

4) Similar to the premium grade, Shell had the highest price premium for mid-grade versus regular unleaded at $0.157/gallon, with Mobil at $0.147/gallon and Citgo and Gulf at $0.136/gallon. Kwik Fill was the lowest at $0.101/gallon and a number of other major marketers were in the middle.

The premiums charged at retail service stations for premium grade and midgrade gasoline are typically above the “rack prices” for these gasoline grades. This represents an additional income to service station dealers above the retail margins for regular unleaded gasoline. In 2011 for example, analysis of rack prices for premium gasoline in all Upstate locations showed a premium spread of $0.197/gallon over regular unleaded, whereas OPIS data above showed a retail range of $0.202-$0.277/gallon. For mid-grade, the average rack spread was $0.063/gallon in 2011, and the service station retail price spreads versus regular unleaded were $0.101-$0.157/gallon.

Therefore, service station dealers have the opportunity to adjust their premium and midgrade prices versus regular unleaded to influence the sales of both grades and relative profit levels. Branded dealers often work with branded suppliers to determine the optimal pricing points for each grade, and independent dealers also use analytical methods to determine pricing strategies.

Retail Service Station Gross Margins

The retail service station business has always been a low-margin, challenging business. Today’s service station “model” includes income streams from gasoline sales, convenience store sales, lube and repair shop sales, and in some cases other revenue sources. In some cases a service station dealer will set the gasoline prices low versus other stations to attract customers for the convenience store sales; in other cases, dealers may want to secure higher gasoline margins by charging higher prices.

Over time the retail business has evolved into a very competitive market. Hypermarketers like Walmart and Costco tend to push margins lower in a given market by reducing price to stimulate higher levels of consumption. Meanwhile, independent dealers have developed partnerships with both convenience store suppliers and major fast food chains to attract consumers to their stations, which in turn helps to increase revenues from gasoline sales as well as other non-petroleum products sales.

This analysis focuses on the retail gasoline margins at service stations, again utilizing OPIS data from service stations in key demographic markets in NYS to show relative margins. The service station dealers purchase gasoline at some price set by the branded dealer (or at some rack price plus transportation for unbranded dealers), and sell gasoline at prices competitive with other local gasoline stations. The basic gasoline “gross margin” is determined simply by the spread between the purchased price of gasoline and the pump price, less all taxes. This measure, typically expressed as regular gasoline price spreads, can vary considerably based on a large number of factors.

Table III-6 shows the OPIS reported margins for various markets in NYS. The results include information on retail margins in several locations in northern New Jersey and Connecticut for comparison. The primary takeaways from this analysis include the following:

1) The highest gross margins in NYS are in New York City and Long Island locations. Gross margins are very high in Bridgeport, CT and northern New Jersey locations.
2) The upstate New York market supplied by Buckeye and Sunoco pipelines appears to be a highly competitive market, and retail margins are significantly lower than other regions.
3) Retail gross margins increased by (on average) about $0.04/gallon from 2010 to 2011.
4) Retail street prices in New Jersey are considerably lower than NYS or Connecticut locations primarily due to an over $0.30/gallon lower tax structure.

It is important to recognize that the variation in retail gross margins does not necessarily reflect that retail dealers are making more profits in one location versus another. The reasons for higher or lower gross margins can be a function of a number of variables, including:

- The retail dealers' cost of operation. This could include rent, property taxes, labor cost, transportation cost, etc. Dealers in New York City may have higher taxes and labor costs than other markets and therefore dealers may push street prices higher to cover costs.
- Service station volumes. Lower volume stations may push street prices and margins higher to cover costs.
- Pricing strategy. Some dealers may lower street prices and margins to increase traffic for convenience store sales volume gains.

To provide some perspective on the profit potential from gasoline sales, if the average service station sales volume (throughput) in NYS is about 1.17 MMg/y (28,000 b/y), the range of gross margin could be as low as $150,000 in Syracuse and as high as $370,000 in New York City. This does not include other revenue streams such as convenience store profits, repair services, tire sales, car wash, etc. However, the amount of revenue from gasoline sales is a key factor in service station profitability and, barring the other revenue sources, is not a substantial margin by itself to cover the costs of operating a service station.

Table III-6: 2011 Annual Rack-to-Retail Gross Margin Rankings by Market ($/gallon)

Market	($/gallon)					
	Retail	Taxes*	Net	Rack	Gross Margin**	2010 Gross Margin**
New York City Metro Area						
New York, NY	$3.880	$0.652	$3.228	$2.903	$0.325	$0.233
Nassau-Suffolk, NY	$3.831	$0.642	$3.189	$2.904	$0.285	$0.205
Dutchess County, NY	$3.795	$0.634	$3.161	$2.933	$0.229	$0.162
NYS Hudson North						
Albany-Schenectady-Troy, NY	$3.693	$0.623	$3.070	$2.866	$0.204	$0.168
Newburgh, NY	$3.740	$0.632	$3.108	$2.929	$0.179	$0.138
Upstate New York						
Glens Falls, NY	$3.690	$0.597	$3.093	$2.867	$0.226	$0.194
Elmira, NY	$3.716	$0.632	$3.084	$2.890	$0.194	$0.115
Rochester, NY	$3.706	$0.632	$3.074	$2.886	$0.189	$0.153
Buffalo-Niagara Falls, NY	$3.726	$0.653	$3.073	$2.895	$0.178	$0.158
Utica-Rome, NY	$3.733	$0.666	$3.067	$2.899	$0.168	$0.149
Binghamton, NY	$3.715	$0.633	$3.082	$2.918	$0.164	$0.146
Jamestown, NY	$3.699	$0.614	$3.085	$2.922	$0.163	$0.183
Syracuse, NY	$3.667	$0.620	$3.047	$2.912	$0.134	$0.148
Northern New Jersey						
Bergen-Passaic, NJ	$3.471	$0.301	$3.170	$2.892	$0.279	$0.217
Jersey City, NJ	$3.462	$0.301	$3.161	$2.888	$0.273	$0.217
Trenton, NJ	$3.475	$0.301	$3.174	$2.902	$0.272	$0.223
Newark, NJ	$3.461	$0.301	$3.160	$2.892	$0.269	$0.216
Middlesex-Somerset-Hunterdon, NJ	$3.443	$0.301	$3.142	$2.889	$0.253	$0.214
Connecticut						
Bridgeport, CT	$3.903	$0.625	$3.278	$2.917	$0.361	$0.280
New Haven-Meriden, CT	$3.783	$0.625	$3.158	$2.912	$0.246	$0.190

Source: Oil Price Information Service (OPIS). "OPIS Retail Year in Review & 2012 Profit Outlook." OPIS, 2012: Gaithersburg, MD. Pp. 62-64.

** Defined as "Retail" less "Net"*

*** Defined as "Net" less "Rack"*

Issues Currently Impacting Retail Business Patterns

As noted earlier in the discussion of service station margins, the amount of gross margin provided by gasoline sales can be thin, and income highly dependent upon sales volumes and dealer costs. ICF's perspective on the retail market is primarily focused on the gasoline margins in this study, and not on the other income streams (convenience stores, etc.).

The retail gasoline market has become even more competitive in recent years. Service station dealers have developed business models including convenience stores, partnerships with major fast food chains and maintenance and repair business income streams. This competitive industry, however, continues to face threats from a number of diverse sources. The primary threats include the following issues.

Credit Card Usage Fees

Credit card transaction fees carry a 2-3-percent fee on the dollar value of the sale. So with gasoline at $4/gallon, the station will have to pay $0.08-$0.12/gallon to the credit card company. If gas is $3/gallon, the fee drops to $0.06-$0.09/gallon. In other words, credit card companies get a windfall when prices rise. If typical service station gross margins in NYS are $0.10-$0.15/gallon, this cost can significantly limit the profitability of the retail dealer. With NYS retail gross margins as low as $0.13/gallon in some markets, the retail dealer can be seriously impacted by credit card fees. Industry sources say that these costs are now the second largest cost for retailers (next to labor).

CAFE Standards

Gasoline consumption volumes are on the decline nationwide, including NYS, as seen earlier in Table III-3. Consumers are conserving more due to gasoline price levels and new CAFE standards that are gradually introduced as the vehicle fleet turns over. Dealers have to change how they price to try to compensate for revenue losses, but fewer and less frequent customers translates to less income from all sources for dealers.

Competitive Market Changes

The market for retail dealers continues to become more competitive based on the first three issues identified. In addition, the trend to convenience stores is rapidly making the convenience store the "street" attraction to consumers. An industry source in NYS reports that outside of New York City, 75 percent of convenience stores have gasoline pumps, with this figure rising to 90 percent if only the most recently opened convenience stores, over the last few years, are included. Currently, the trend towards large grocery stores and big-box retailers such as Walmart, BJ's and others opening gasoline stations has not had a major impact on NYS gasoline retailing, however, it remains a price threat.

With gasoline prices near record highs, and average vehicle fuel efficiency continuously rising, gasoline retailers are seeing their margins squeezed on declining sales. Another key marketing issue is the widespread transformation of information technology, which allows any driver with a smart phone to compare prices across a wide range of gasoline stations, is forcing further changes on the retailers to be price competitive. This of course also affects margins.

NYS Gasoline Tax Burden

The information in Table III- shows that in 2011 the overall gasoline tax burden on New York consumers was $0.60-0.67/gallon, depending on location. With federal taxes fixed at $0.184/gallon, this means overall state and local taxes on motor fuel in New York were roughly $0.41-$0.49/gallon.

In 2006, NYS amended the sales and use tax statute to cap the State's sales tax on motor fuel and highway diesel motor fuel at 8 cents per gallon. Counties and cities were also permitted to change their existing percentage rate sales tax structure, to a cents-per-gallon methodology. Initially 14 counties and 2 cities elected to cap their local sales taxes at fixed per gallon amount determined by multiplying $2 per gallon times their prevailing local sales tax rate. However, during the interim period, almost all of these localities have repealed their cap. and returned to a percentage rate structure, with only Seneca County and the City of Auburn opting for a cents-per-gallon method. The typical local percentage rate in NYS is 4 percent, but rates range from 3.5 percent to 4.75 percent. Even at a 4 percent tax rate, the local taxes on a percentage basis provide significantly increased revenues for local governments from motor fuel as gasoline prices rise.

In 2006, NYS also capped the Metropolitan Commuter Transportation District (MCTD) sales tax on motor fuels at ¾ cents per gallon. The MCTD is a public benefit corporation overseeing public transportation in southeastern New York. The MCTD includes the counties of New York (Manhattan), Bronx, Kings (Brooklyn), Queens, Richmond (Staten Island), Rockland, Nassau, Suffolk, Orange, Putnam, Dutchess, and Westchester. Within the MCTD, the combined State/MCTD sales and use tax is $0.0875 per gallon and outside of the MCTD the rate is $0.08/gallon.[190]

On alternative fuels, NYS has a favorable tax structure for most products, including E85, B20, compressed natural gas, liquid natural gas, and hydrogen, which exempt the fuels from the majority of state taxes. However, there are several tax issues which are not as favorable as noted below:

- As the NYS statute is currently written, LPG (propane) is only exempt from the NYS petroleum business tax when used in highway vehicles.
- Biodiesel blends, other than B20, are taxed at the same rate as diesel, which impacts the incentive to blend at different levels.
- The expiration of federal retail tax credits in 2011, such as the Alternative Fuel Credit and Alternative Fuel Mixture Credit (with the exception of a $0.50/gasoline gallon equivalent credit for liquefied hydrogen fuel), may also result in an increased tax burden for alternative fuels in 2012 and beyond.

Table III- below shows bottom line total taxes in New York for various fossil and alternative fuels. This chart includes all taxes except the New York local taxes (most of which are on a percentage basis).

[190] NY State Department of Taxation and Finance, "Publication 718-F," March 2012, available online at: http://www.tax.ny.gov/pdf/publications/sales/pub718f.pdf.

Table III-7: Federal Excise Tax and New York State Taxes for Gasoline, Diesel and Alternative Transportation Fuels

Fuel Type	Federal Excise Tax (GGE)	NYS Excise Tax	NYS Petroleum Business Tax	NYS Sales & Use Tax (non-MCTD/MCTD)	Total State & Federal (non-MCTD)	Total State & Federal (MCTD)
Gasoline	$0.184	$0.0805	$0.178	$0.08/$0.0875	$0.5225	$0.53
Diesel	$0.244	$0.08	$0.1605	$0.08/$0.0875	$0.5645	$0.572
Biodiesel (B20)	$0.244	$0.064	$0.1284	$0.06/$0.066	$0.4964	$0.5024
Other Biodiesel Blends	$0.244	$0.08	$0.1605	$0.08/$0.0875	$0.5645	$0.572
E85	$0.184	$0.0005	$0.00	$0.00	$0.1845	$0.1845
Propane (LPG)	$0.183	$0.0805	$0.00	$0.08/$0.0875	$0.3430	$0.3510
CNG	$0.183	$0.0005	$0.00	$0.00	$0.1835	$0.1835
LNG	$0.243	$0.0005	$0.00	$0.00	$0.2435	$0.2435
Hydrogen	$0.184	$0.0005	$0.00	$0.00	$0.1845	$0.1845

Sources: International Revenue Service, "Form 720: Quarterly Federal Excise Tax Return," OMB No. 1545-0023, January 2012, available online at: http://www.irs.gov/pub/irs-pdf/f720.pdf

New York State Department of Taxation and Finance, "Publication 908: Fuel Tax Rates," Article 12-A Rates, January 2012, available online at: http://www.tax.ny.gov/pdf/publications/multi/pub908.pdf

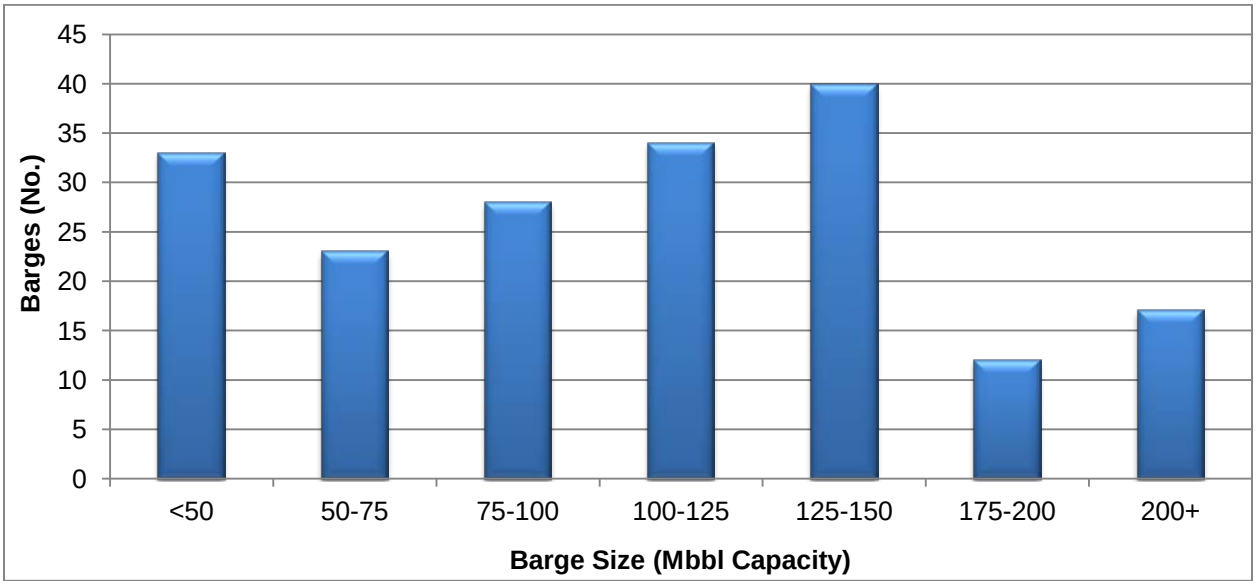
New York State Department of Taxation and Finance, "Publication 908: Fuel Tax Rates," Article 13-A Rates, January 2012, available online at: http://www.tax.ny.gov/pdf/publications/multi/pub908.pdf

New York State Department of Taxation and Finance, "Sales and Use Tax on Qualified Motor Fuel and Highway Diesel Motor Fuel," March 2012, available online at: http://www.tax.ny.gov/pdf/2013/st/st810_10i_0313.pdf

Marine Transportation and Distribution of Petroleum Fuels

Ocean going barges that usually ply the waters along the U.S.' Gulf and East Coast and are compliant with the U.S. Jones Act comprised a 196 barge subset of the total barge fleet of 246 at the beginning of 2012. About 45 percent of these 196 barges were specifically designated to transport clean petroleum products; their cargo capacity is 30 percent of the aggregate of the barge subset. Roughly 82 percent of the barges in the subset have an individual cargo capacity of less than 150 Mbbl. The total of these barges' cargo capacity represents 48 percent of the aggregate capacity of this barge subset of the overall Jones Act barge fleet. The overall fleet census includes barges used for clean and dirty petroleum streams as well as chemicals, lubes and asphalt. Exhibit III-3 below shows the distribution of barges by size.

Exhibit III-3: Capacity Distribution of Ocean Barges Trading in USGC/USEC (early 2012)



Source: Poten & Partners data.

A barge typically trades within a routine geographical sphere of operation as its chartered voyages are relatively short in distance. Although longer trips from the Gulf Coast to the East Coast occasionally occur, these moves have a higher per barrel freight cost than local moves. Repositioning a barge from one coast to the other incurs costs for their operators which discourages them from doing so on a routine basis. Also, regional familiarity of a given barge's characteristics facilitates their acceptance by charterers, meaning that those chartering specific barges become accustomed to barge types they have used in the past.

At the beginning of 2012, approximately 30 Handysize tankers were in the Jones Act fleet. Only eight of these vessels carry clean products and also typically trade in the Gulf Coast/East Coast region. The remainder of the fleet trade is comprised of tankers that carry crude oil, or clean products and chemicals in other regions. None of the nine Suezmax Jones Act compliant tankers carry clean products.

During 2010, some 64 percent of the total 301.8 MMbbl of petroleum products loaded onto barges in NYS and New Jersey stayed within these states (see Table III-8). The active

petroleum storage/blending/transfer region characterized as NYH encompasses areas of both these states. Transfers of products to New England represented 28 percent of loadings. Connecticut received the majority of these movements at 15 percent, while movements to Rhode Island and Massachusetts comprised some 5 percent each. The total of transfers to Maine and New Hampshire amounted to slightly more than 3 percent. States south of New Jersey received only about 8 percent of these loadings.

As seen in Table III-8 below, the source of petroleum for the 301.8 MMbbl of 2010's NYS and New Jersey product loadings mainly came from a combination of the production of refineries in New Jersey and Pennsylvania, pipeline transfers predominantly from the Gulf Coast and imports of petroleum stocks. Foreign sources supplied 207.0 MMbbl into NYH during 2010, according to EIA. Included in these imports were 129.5 MMbbl of gasoline and diesel.

Table III-8: NY/NJ 2010 Domestic Marine Petroleum Product Movements, MMbbl

Load	Discharge State (MMbbl)					
Inter NY/NJ	**NJ**	**NYS**				**Inter NY/NJ**
New Jersey	68.1	85.4				153.4
NYS	23.6	16				39.6
Total	**91.6**	**101.4**				**193**
Share	*30.40%*	*33.60%*				*63.90%*
New England	**CT**	**RI**	**MA**	**NH**	**ME**	**New England**
New Jersey	42.7	13.1	13.6	2.7	6.8	78.9
NYS	3.6	0.7	1.4		0.8	6.5
Total	**46.2**	**13.8**	**15**	**2.7**	**7.6**	**85.3**
Share	*15.30%*	*4.60%*	*5.00%*	*0.90%*	*2.50%*	*28.30%*
South of NJ	**DE**	**PA**	**VA**	**MD**		**South of NJ**
New Jersey	7.1	4.9	3.9	6		22
NYS	0.6		0.4	0.5		1.5
Total	**7.8**	**4.9**	**4.3**	**6.5**		**23.5**
Share	*2.60%*	*1.60%*	*1.40%*	*2.20%*		*7.80%*
Total						
New Jersey						254.2
NYS						47.6
Total						**301.8**

Source: U.S. Army Corps of Engineers

Transportation and Pricing of Biofuels

Transportation

Ethanol

As noted in Section II, NYS benefits from significant access to rail supply of ethanol via rail and unit trains into Albany and northern New Jersey regional distribution hubs, as well as several individual terminals in the Buffalo region. This infrastructure is also complemented by the ability to receive and ship ethanol via marine movements. This flexibility and the volume of ethanol storage capacity provides a significant cushion for meeting NYS's ethanol demand.

Movement of ethanol into local distribution terminals for blending with RBOB or CBOB products at the loading rack appears to primarily be via truck movements. None of the terminals on the Buckeye system have access to direct rail supply[191], therefore these terminals are likely supplied by tanker truck from the two Upstate ethanol terminals noted in Section II, or by tanker truck from the Albany ethanol distribution hub. Terminals in the Binghamton market may be supplied from Albany or NYH sources.

Costs of these movements based on the trucking cost estimate formula presented in the Trucking Availability section above may range as follows (assuming current diesel fuel price[192]):

- Albany to Marcy $.053/gallon
- Albany to Binghamton $.073/gallon
- Albany to Rochester $.0113/gallon
- Sewaren (NJ) to Binghamton $.095/gallon
- Sewaren (NJ) to Rochester $.0166/gallon

Overall, the movement of ethanol into terminals has appeared to function adequately from a logistics perspective. It is unlikely that terminals without rail facilities could justify an investment to add rail connections, especially since investment would also be needed for rail companies (e.g., CSX) to build spur lines to the locations.

Biodiesel

As discussed in Section II, biodiesel is typically transported via specialized trucks (and in some cases, retrofitted rail cars) that are heated to keep the biodiesel from gelling. Aggregate information on biodiesel volumes moving into and around NYS is opaque, though biodiesel feedstocks are often trucked into NYS from faraway states, depending on pricing and supply-demand issues in the State. As biodiesel continues to make inroads in heating and on-road applications, NYS may benefit from improvements in data-gathering of biodiesel at the state- and local-levels to enable better assessment of biodiesel supply and demand trends.

[191] From a review of supply sources in the "OPIS Petroleum Encyclopedia, 2012 Edition."

[192] Nominally $4.00/gallon, www.gasbuddy.com, Rochester, NY, June 25, 2012.

Retail Prices for E85 versus RBOB

Table III-9 shows the absolute prices and the price spread for E10 (RBOB-based gasoline) and E85 in 2011 and early 2012, using data from the U.S. Department of Energy's Energy Efficiency and Renewable Energy's (EERE) reported Public Refueling Station Average Price for all transportation fuels for the Middle Atlantic. This is reported quarterly in the Clean Cities Alternative Fuel Price Report. These data show that E85 has ranged from $0.34/gal to $0.59/gal below E10 gasoline at the retail pump.

Table III-9: Mid-Atlantic Retail Price Averages for E85 and E10

Quarter	$/gallon		
	E85	E10 (RBOB-based)	E85-E10
2011 Q1	$3.25	$3.65	($0.40)
2011 Q2	$3.23	$3.82	($0.59)
2011 Q3	$3.22	$3.56	($0.34)
2011 Q4	$3.22	$3.57	($0.35)
2012 Q1	$3.41	$3.98	($0.57)

Sources: Department of Energy's Alternative Fuels & Advanced Vehicles Data Center, a unit of the DOE's Energy Efficiency & Renewable Energy Center.

While the Middle Atlantic region may not directly assess NYS' price comparisons, the price range is likely illustrative of the relative price differences in NYS. However, while E85 may have been a cheaper product per gallon for consumers over this period, consumers using E85 have significantly lower mileage for their vehicles, since the energy Btu content of E85 is roughly 30 percent lower than E10 gasoline. Table III-10 shows a similar comparison, except with both prices converted to a gasoline gallon equivalent (GGE) price, highlighting the significant rise in price for E85 on an energy equivalent basis.

Table III-10: GGE[193] Adjusted[194] Mid-Atlantic Retail Price Averages for E85 and E10

Quarter	$/gallon		
	GGE E85*	GGE E10 (RBOB-based)**	E85-E10
2011 Q1	$4.29	$3.77	$0.52
2011 Q2	$4.26	$3.95	$0.32
2011 Q3	$4.25	$3.68	$0.57
2011 Q4	$4.25	$3.69	$0.56
2012 Q1	$4.50	$4.11	$0.39

Sources: Department of Energy's Alternative Fuels & Advanced Vehicles Data Center, a unit of the DOE's Energy Efficiency & Renewable Energy Center. Conversions available at: http://www.eia.gov/totalenergy/data/monthly/pdf/sec13_1.pdf

** Adjusted to reflect the gasoline gallon equivalent (GGE) price of E85, as one E85 gallon is the equivalent in energy content to 1.32 gallons of regular gasoline*

*** Adjusted to reflect the GGE price of RBOB (10% ethanol), as one RBOB gallon is equivalent in energy content to 1.03 gallons of regular gasoline*

The consumers who purchase E85 will have lower travel range on a full tank of gasoline, and therefore require more frequent service station visits. Sales growth in E85, as noted in prior sections, is highly dependent on consumers having vehicles that can handle higher proportions of ethanol blends, and having cost-competitive E85 available for retail purchase.

1) Biofuels Infrastructure Investment Constraints for Retail Service Stations

E15 and E85 Investment Issues

In order to meet future RFS standards, retailers may be encouraged, or even required, by the petroleum industry to install E15 and E85 equipment at service stations as biofuel requirements continue to ramp up and the E10 blend wall is reached.

E15

E15 faces a number of barriers to implementation including 1) only about 62 percent of vehicles currently operating would be able to use E15;[195] 2) most vehicle manufacturers provide an engine warranty for no more than E10 use;[196] and 3) only about 50 percent of retailers would currently be able to provide the fuel with additional financing challenges as discussed in the retail section.[197]

[193] Gasoline-Gallon Equivalent (GGE) basis

[194] Adjusted to reflect the energy content equivalent of each fuel

[195] U.S. Department of Energy, EERE, "Statement of Dr. Henry Kelly," April 13, 2011, available online at: http://www1.eere.energy.gov/office_eere/testimony_kelly_041311.html

[196] Kris Bevill, "The Battle for the RFS," *Ethanol Producer Magazine*, June 12, 2012, available online at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

[197] Kris Bevill, "The Battle for the RFS," *Ethanol Producer Magazine*, June 12, 2012, available online at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

E15 is not currently being sold in NYS, as there are no companies in NYS that have registered to blend E15. In fact, only one company in the U.S. Northeast, LD Commodities Ethanol Merchandising, LLC, is registered to blend E15.[198] Although the EPA recently approved the retail sale of E15, final sale of E15 is unlikely, given a number of reasons.[199] First, retailers wishing to sell E15 must install separate E15 pumps and storage tanks, as E15 supplies must be properly labeled and remain separated from E10 and conventional fuels. E15 can only be used in vehicles produced during 2001 or after, so the clear labeling is meant to deter misfueling. Third, a recent study found that use of E15 led to a number of vehicle failures, including damaged valves, lower vehicle performance, engine damage, and poor fuel economy.[200]

E15 standards approved by the EPA in 2012 have provided an option for retailers to distribute higher blend ethanol product to the public. However, E15 presents a number of concerns to retailers, including liability risks, upgrade costs for E15 compatible equipment and uncertainty about the demand for E15 fuel. According to the Petroleum Marketers Association of America (PMAA) nearly 90 percent of the 160,000 stations nationwide have two underground storage tanks (UST), one for premium and one for regular gasoline (mid-grade fuel is blended from these two tanks), with very few stations having the space to install another UST. Many retail stations would either need to convert a regular gasoline tank to E15 and only service 2001 or newer vehicles[201] or convert the premium grade UST (and therefore the mid-grade), which account for approximately 17 percent of all gasoline sales nationwide, with a great deal of uncertainty about the market demand for E15.[202] If equipment is not compatible with E15, it would need to be purchased or upgraded. For example, a new fuel dispenser would cost approximately $20,000 (the average store having four dispensers) and any additional work to replace or upgrade USTs could increase expenses ten-fold.[203]

By far, the greatest uncertainty is the liability risk from a consumer misusing the fuel and potentially being fined or sued under the Clean Air Act for equipment damage, warranty voiding or personal injury. The fine for allowing misfueling under the Clean Air Act could be as much as $37,500 per day. Historically, the EPA fined retailers in the 1980s for not physically preventing

[198] Confirmed with Vice President Bruce R. Chapin, LD Commodities Ethanol Merchandising LLC, a subsidiary of Louis Dreyfus Corp. 40 Danbury Rd/ PO Box 810, Wilton, CT 06897-0810.

[199] NACS Online. "Washington Report: EPA Gives Final Approval to E15 Sale." NACS Online, 20 June 2012: Alexandria, VA. Available at: http://www.nacsonline.com/NACS/News/Daily/Pages/ND0620121.aspx

[200] Pender, Annemarie. "15% Ethanol Fuel Raises Consumer Concerns; New Study Demonstrates Vehicle Failures in Popular Models." Global Automakers, 16 May 2012: Washington, D.C. Available at: http://www.globalautomakers.org/media/press-release/15-ethanol-fuel-raises-consumer-concerns-new-study-demonstrates-vehicle-failures

[201] Platts, "Fuel retailers see isolated sales of high-ethanol blend for up to a decade," February 24, 2012, available online at: http://www.platts.com/RSSFeedDetailedNews/RSSFeed/Oil/6988482

[202] National Association of Convenience Stores, "Challenges Remain Before E15 Usage is Widespread," p. 2, 2011, available online at: http://www.nacsonline.com/NACS/Resources/campaigns/GasPrices_2011/Documents/ChallengesRemainBeforeE15UsageIsWidespread.pdf

[203] National Association of Convenience Stores, "Challenges Remain Before E15 Usage is Widespread," p. 3, 2011, available online at: http://www.nacsonline.com/NACS/Resources/campaigns/GasPrices_2011/Documents/ChallengesRemainBeforeE15UsageIsWidespread.pdf

consumers from adding leaded gasoline into unleaded vehicles, despite the use of fill pipe-nozzle restrictions designed to prevent misfueling. The PMAA predicts that, given these obstacles, it may take as long as five to 10 years to achieve a 20 percent market penetration rate in the U.S.[204] To date, E15 is not offered in NYS and there are many uncertainties as to when the fuel may be available.

E85

E85 is another option for retailers to expand biofuel consumption. As of May 2012, NYS had 68 publicly-accessible E85 retail locations.[205] In-state incentives are available to assist retailers, such as the Biofuel Station Initiative Program, which covers up to 50 percent of qualified biofuel dispensing installation costs through grant funding. However, grant funding in NYS is limited on a first-come, first-serve basis and does not cover permitting or engineering costs. Nationwide, only about 2,500 E85 locations are currently operational,[206] a portion of which are not publicly-accessible, even after 20 years of education programs and funding assistance through federal, state, and local tax incentives, grants and rebate programs.

According to the Brattle Group, another 28,000 E85 stations would be needed over the next 10 years to raise the national E85 refueling rate to 70 percent (assuming the stations are efficiently located to maximize access), in order to accommodate the necessary biofuel blends by 2022.[207] Since E85 requires special tanks and pumps, upgrading a system can cost at least $11,000 and replacing an entire system can be upwards of $150,000.[208] Furthermore, according to EPA estimates, FFVs only make up about 7.3 million of the 240 million vehicles on the roads, and of those vehicle owners, an estimated 40 percent do *not* even know they can use E85 fuel.[209] Significant efforts to expand E85 refueling locations and educate FFV consumers will need to be achieved in NYS before E85 could be a substantial contributor to RFS requirements.

Blender pumps, which have a dedicated gasoline and ethanol tank and blend the ethanol on site, are ideal for E15 and E85 distribution and provide consumers with a variety of ethanol blend options, but only 2,500 blender dispensers (with multiple dispensers per site) exist

[204] Platts, "Fuel retailers see isolated sales of high-ethanol blend for up to a decade," February 24, 2012, available online at: lhttp://www.platts.com/RSSFeedDetailedNews/RSSFeed/Oil/6988482

[205] U.S. Department of Energy, "Alternative Fueling Stations," March 9, 2012, available online at: http://www.afdc.energy.gov/afdc/fuels/stations.html

[206] U.S. Department of Energy, "Alternative Fueling Station Total Counts by State and Fuel Type," May 31, 2012, available online at: http://www.afdc.energy.gov/afdc/fuels/stations_counts.html

[207] The Brattle Group, "Can the U.S. Congressional Ethanol Mandate be Met?", May 2010, p. 7, available online at: http://www.brattle.com/_documents/uploadlibrary/upload849.pdf

[208] The Brattle Group, "Can the U.S. Congressional Ethanol Mandate be Met?", May 2010, p. 7, available online at: http://www.brattle.com/_documents/uploadlibrary/upload849.pdf

[209] Brian Wallheimer, "U.S. lacks infrastructure to consume more ethanol," *Western Farm Press*, available online at: http://westernfarmpress.com/rice/us-lacks-infrastructure-consume-more-ethanol

nationwide.[210] Only one blender pump in Glenville has been identified in NYS.[211] According to the USDA, the average cost to install a new blender pump is about $120,000.[212]

Whether installing dedicated equipment or upgrading existing equipment, these costs present significant economic challenges to the majority of fuel retail/convenience stores. Based on a National Commission on Energy Policy (NCEP) study in 2007, the average retailer reported a pre-tax profit of only $23,335.[213] (These profits are not gross profits as cited earlier in the OPIS analysis, but rather reflect inclusion of all costs such as labor, credit card fees, station maintenance, rent, etc.) With increasing pressure on retailer profits as discussed earlier (credit card fees, vapor pressure monitoring, decreasing volumes, etc.), it is very unlikely independent dealers will invest in significant station infrastructure for deploying E15 or E85 sales.

With the loss of the federal tax Alternative Fuel Infrastructure Tax Credit in 2011 and the expiration of the state Alternative Fueling Infrastructure Tax Credit in 2010, new state incentives and private financing assistance may be necessary in order to deploy E15 and E85 infrastructure at the rates necessary to comply with the RFS requirements. However, it is unclear how state funding may be arranged to meet a federally mandated standard.

[210] Platts, "Fuel retailers see isolated sales of high-ethanol blend for up to a decade," February 24, 2012, available online at: http://www.platts.com/RSSFeedDetailedNews/RSSFeed/Oil/6988482

[211] Information based on data collected by ICF International on behalf of the Alternative Fuels and Advanced Vehicles Database. Information not yet published.

[212] U.S. Department of Agriculture (USDA), "USDA Boosts Blender Pump Assistance," April 12, 2011, available online at: http://www.nacsonline.com/NACS/News/Daily/Pages/ND0412111.aspx

[213] National Commission on Energy Policy, "Section Force on Biofuels Infrastructure," p. 14, available online at: http://bipartisanpolicy.org/sites/default/files/biofuels-taskforce.pdf

Conclusions

This report examined the current and near-term demands for liquid transportation fuels in NYS. The report has also examined the infrastructure existing and required to support the supply of these fuels and the means by which fuels are dispersed to NYS consumers. Looking at the current situation and the short-term outlook, ICF has attempted to identify any current and emerging trends related to the liquid fuels infrastructure that warrant close attention from NYSERDA. Weighing the data, estimates of future demand, regulatory plans, and industry trends, and assuming that both Delta Air Lines and Philadelphia Energy Solutions (the JV between Sunoco and the Carlyle Group) are successful in running their newly acquired refineries, ICF has concluded that the infrastructure for the traditional petroleum based liquid fuels is largely satisfactory and that NYSERDA's concerns should be directed to the infrastructure for alternative fuels and particularly the potential CNG/LNG infrastructure. In addition, changing trends in the larger petroleum market will likely affect the supply of liquid transportation fuels and the reliability of the supply chain and so continued monitoring of existing infrastructure and evolving fuel types is warranted.

The trends that potentially are of concern to NYS fall into several categories. They are as follows:

- Future demand for motor gasoline and the changes that will affect this demand such as fuel specifications and the CAFE changes.
- Future demand for biofuels, the regulatory drivers and the problem with supply.
- Changes to and the reliability of the supply chain driven in large part by changes in the refining industry.

These factors are assessed in the report and they have been gathered together in the following section to facilitate evaluation.

Potential Future Issues Affecting the Petroleum and Biofuels Supply Chain

Overview

Most of the issues in this section impact the refiners and blenders who supply NYS customers. These include demand outlooks, product quality requirement regulations and RFS2 standards, and the potential for resulting refinery closures as costs increase and margins may be flat.

The RFS2 regulations also impact retail dealers as they may be required to invest in infrastructure to comply in the delivery of advanced fuels to consumers (and that of course assumes there are sufficient FFVs to increase ethanol levels to E85). The impact on the retail dealers is discussed at the end of Section III. The major concerns facing NYSERDA are as follows:

Demand Outlooks

The EIA's *2012 Annual Energy Outlook* (AEO) assumes motor gasoline consumption will decline 1.1 percent annually between 2010 and 2035 in the Mid-Atlantic region (which includes

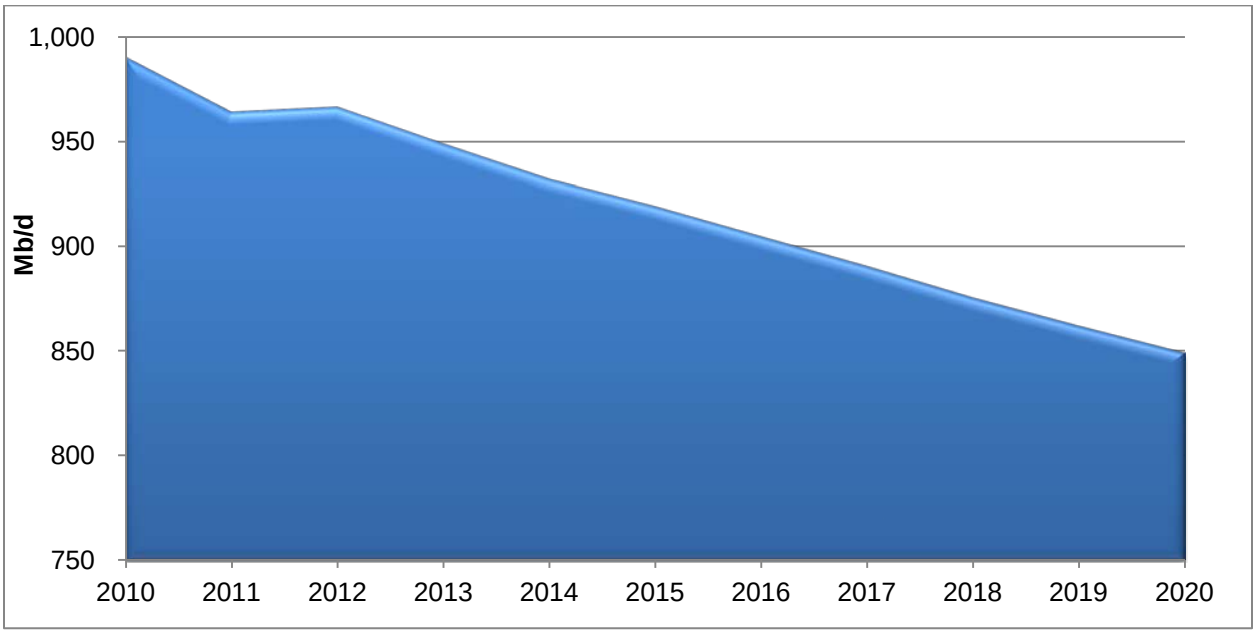
NYS).[214] The AEO further assumes that significant volumes of E85 will be consumed only after 2032. Annual growth of E85 from 2010 to 2035 is 20.1 percent but starts from a miniscule base. NYS gasoline consumption patterns are not expected to deviate significantly from the declining Middle Atlantic trend. Unlike gasoline diesel is expected to grow by an annual rate of 2.1 percent during this period. There is also a positive annual growth of new car sales. New car sales alternative light-duty vehicles will grow at an annual rate of 3.8 percent. Alternative cars range from FFVs to the various forms of hybrids to fuel cell driven vehicles. The combination of increasing fuel economy, declining gasoline consumption, little expectation that E85 fuel consumption will rise markedly, and the uncertainty surrounding E15 sales (discussed below) indicate that gasoline and ethanol shipments to NYS are unlikely to rise to any large degree.

NYS has the ideal infrastructure to handle increased fuels and biofuels shipments, with access to marine imports, rail capacity for ethanol imports from the Midwest, trucking infrastructure from northern New Jersey, and ample storage capacity in key areas. Exhibit IV-1 below illustrates the forecast reduction in total motor gasoline consumption for the Mid-Atlantic region, based on the 2012 AEO. The AEO is forecasting a reduction in gasoline demand of 116,000 barrels/day between 2010 and 2020 (about 14%), declining from nearly 990,000 barrels per day in 2010 to fewer than 850,000 barrels per day in 2020. The forecasted loss in gasoline demand over the period is roughly the equivalent gasoline production of a refinery with 200,000-250,000 barrels/day capacity (as the gasoline yield from crude production is roughly 45%-50%).

The decline in gasoline consumption has a number of short- and long-term drivers. The most important short-term to mid-term driver of declining gasoline usage is the price of gasoline set against an economic picture of high unemployment and a slow and uncertain recovery. As the Exhibit I-10 in Section I shows, VMT are flat and declining for the first time. Consumer demand will be constrained by economic growth and relatively high gasoline prices. Other changes, such as the CAFE standards, and the changes in fuel specifications are longer term in their impact.

[214] EIA. *Annual Energy Outlook 2012*, Middle Atlantic Energy Consumption by Sector and Source. EIA, June 25, 2012: Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm

Exhibit IV-1: Middle Atlantic Motor Gasoline Consumption Forecast*



Source: EIA. "Annual Energy Outlook 2012," Middle Atlantic Energy Consumption by Sector and Source. EIA, June 25, 2012. Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm

** Assumes 5,208,000 Btu/barrel (124,000 Btu/gallon)*

Note: Gasoline consumption figures include 10 percent ethanol content.

The 2012 AEO includes the implemented CAFE raising the average fleet mpg to 35 mpg, but does not include the heavy-duty vehicle and the second light-duty vehicle standards. The National Highway Traffic Safety Administration's (NHTSA) Environmental Impact Statement on the heavy-duty vehicle CAFE[215] assumes that petroleum fuels, largely diesel, will continue to be the fuel of choice and that the percentage of petroleum transportation fuels will continue to rise. This translates to approximately 30 quads (240 billion gallons or 5.7 MMbbl) by 2013, and nearly 32 quads (256 billion gallons or 6.1 MMbbl) by 2035.[216] Table IV-1 below is an adaptation of Table 3.2.3-1 in the EIS estimating fuel savings due to the heavy-duty (HD) CAFE.

[215] NHTSA, Final Environmental Impact Statement, Medium and Heavy-duty Fuel Efficiency Improvement Program, June 2011.

[216] *Ibid*, p3-11

Table IV-1: Heavy-Duty Vehicle Estimated Fuel Savings from the CAFE

Fuel Use	Total Billion Gallons Estimate (2014-2050)	
	No Action Alternative	Preferred Alternative
Fuel Consumption		
HD Pickups and Vans	342.3	312
Vocational Vehicles	435.6	409.1
E Tractor Trucks	1,493.40	1,337.60
All HD Vehicles	2,271.20	2,058.60
Fuel Savings Compared to the No Action Alternative		
HD Pickups and Vans	-	30.3
Vocational Vehicles	-	26.6
Tractor Trucks	-	155.8
All HD Vehicles	-	212.6

Source: Based on Table 3.2..3-1, page 3-12, NHTSA, Final Environmental Impact Statement, June 2011

There has been considerable controversy over the methodological approach used in the HD EIS. Public comment has noted that fuel savings are achieved solely through technological advances to the engines. Public criticism has focused on the fact that NHTSA did not evaluate the impact of switching fuels from diesel to natural gas. Many analysts believe the EIS will have to be revisited by NHTSA specifically to examine the impact of natural gas.

Switching from diesel to natural gas in the HD vehicle market is constrained by limited infrastructure, by the greater cost of the natural gas engines, and by the fact that natural gas whether as CNG or LNG is less energy dense than diesel and thus has less energy. The Wall Street Journal estimates that natural gas powered engines are approximately $30,000 more than conventional engines.[217] This is balanced by the fact that natural gas prices are substantially lower than diesel. Currently, the growth of fuel substitution can be found mostly in local and regional companies that operate fleets. Waste Management stated that 80 percent of the garbage trucks it will purchase over the next 5-year period will be powered by natural gas[218].

Even the big rig companies are looking into the possibility of natural gas as a fuel. Navistar, Cummings and General Motors are all investing in HD natural gas engines. In addition movements are underway to solve the problem of limited cross country natural gas fueling infrastructure. Flying J and other major fuel depots for the big cross country trucking rigs are moving to install natural gas refueling stations in their depots.

Assuming the continued development of shale gas and a market price lower than diesel, ICF believes that, despite the higher capital costs of the natural gas engines, the lower density of the fuel, and the current infrastructure problems, that natural gas vehicles will continue to seize an ever growing portion of the HD diesel market certainly in the local and regional markets. The implications of this trend for NYS is that there would be even less demand for petroleum products, diesel in this case, and that the concern would be adequate expansion of natural gas infrastructure.

[217] *Wall Street Journal*, May 24, 2012

[218] *Ibid.*

NHTSA has recently completed the analysis to support the new CAFE for light-duty vehicles that was negotiated between the industry and the administration and signed in July 2011[219]. The final rule was issues on August 28, 2012. This new regulation raises the average mpg for light-duty vehicles to 54.5 mpg. The analysis shows that the cumulative consumption for the years 2017-2060, if the *status quo* is maintained would range from 6,052 - 6,562 billion gallons of gasoline equivalent, or 144-156 billion barrels (this includes gasoline, diesel, and alternative fuels). Under the preferred alternative the volume of fuels consumed would be reduced to 4,694 to 5,054 billion gallons of gasoline equivalent (112-120 billion barrels), a fuels savings of over 1,000 billion gallons (23.8 billion barrels). This greater efficiency will possibly be combined with a number of start-up companies that are developing new technologies to improve even more the efficiency of the internal combustion engine, If these new developments pan out combined with the new CAFEs demand for petroleum transportation fuels should likely decline quite rapidly over the next decade or two.

Tier-3 Specifications

In February 2000 EPA's Tier-2 Vehicle and Gasoline Sulfur Program was finalized. This program targeted vehicles systems by setting stricter tailpipe and evaporative emissions standards for vehicles beginning with model year 2004 and phasing in through 2009.[220] The program also set fuels restrictions, which lowered the sulfur content of gasoline to an annual corporate average of 30 parts per million (ppm) in 2005, with sulfur restrictions continuing to tighten in subsequent years.

The proposed rule, Control of Air Pollution from Motor Vehicles: Tier-3 Motor Vehicles Emission and Fuel Standards, (Tier-3) was designed to address the impact of vehicle use on air quality and human health. The proposed rule will establish new standards for vehicles and reduce the amount of sulfur and Reid vapor pressure (RVP) of gasoline.[221] The proposed sulfur specification will lower sulfur limits to 20 ppm on an individual batch basis and 10 ppm on a corporate average basis. In addition, the proposed rule will lower the nationwide (excluding California) summer gasoline RVP limit to 7 pounds per square inch absolute (psia).[222]

The Tier-3 regulation is welcomed by proponents who anticipate social benefits including environmental improvement, reduction of the impacts of vehicle fuel use on human health, and addition of jobs to the economy through manufacturing and installation of new equipment. Opponents argued against the added cost burden to oil refineries stressing that refinery margins are already thin, and this regulation will require expensive equipment upgrades to produce the more expensive fuel, which may lead to refinery closures, loss of gasoline production, and

[219] National Highway Traffic Safety Administration (NHTSA). "Corporate Average Fuel Economy Standards; Passenger Cars and Light Trucks, Model Years 2017-2025, Final Environmental Impact Statement." NHTSA, July 2012: Washington, D.C. Available at http://www.nhtas.gov

[220] "SBAR Panel #41: Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards." U.S. Environmental Protection Agency (EPA). Accessed August 2012: Washington, DC. Available at: http://www.epa.gov/rfa/tier3.html

[221] Reid Vapor Pressure (RVP) - An indirect measure of the rate at which petroleum liquids evaporate. It's the absolute vapor pressure of a crude oil, or of single or mixed liquid petroleum products, as measured by the Reid Method (ASTM Method D 323).

[222] Tamm, David C.; Kevin P. Milburn; and Richard X. Thomas. "Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline." American Petroleum Institute (API), July 2011: Washington, D.C. Available at: http://www.api.org/Newsroom/upload/110715_LowerSulfur_LowerRVP_Final.pdf

increased imports of gasoline into the U.S. The exact cost this regulation will have on industry is being debated.

According to economists at Navigant Economics, an economic and financial analysis firm, the Tier-2 regulation added a two-cent-per-gallon increase to refinery costs for processing crude oil into gasoline due to equipment upgrades. Navigant noted that the cost increase had no material impact on the retail price of gasoline. Meanwhile, they estimate the cost of Tier-3 gasoline as adding a $0.01/gallon cost to the oil refiners, which will again have minimal impacts on the retail sale of gasoline.[223]

Conversely, a study conducted by Baker and O'Brien in July 2011, commissioned by the American Petroleum Institute (API), estimated upfront capital costs to be $10-$17 billion with annual compliance costs at an estimated $5-$13 billion, which equates to a marginal cost of $0.12-$0.25/gallon to oil refiners under the proposed Tier-3 regulation. A subsequent Baker and O'Brien study from March 2012 just looked at the cost associated with sulfur reductions and estimated capital costs to be nearly $10 billion and compliance costs to be about $2.4 billion, or a $0.06-$0.09/gallon marginal cost.[224]

ICF has not reviewed either of these reports within the scope of this project, however, the disparity in cost is striking. The primary sulfur bearing component in gasoline is blendstock from the Fluid Catalytic Cracker (FCC). Many refineries already have high severity FCC gas oil hydrotreaters in place in front of the FCC to extract sulfur, or milder gasoline desulfurizers to clean up the produced FCC gasoline blendstock. However, based on our perspective, reducing gasoline sulfur levels to 10 ppm will require extracting more difficult to remove sulfur than current processing can achieve. It is not unreasonable that more hydrotreating capacity may be required for the further sulfur reductions that Tier-3 requires. However, in recent years liquid to liquid extraction technology has been developed (Z-Sorb technology is one example) to extract sterically hindered sulfur which cannot easily be extracted by the various hydrotreating technologies. This may make the process somewhat cheaper.

Reducing vapor pressure requires additional expansion or efficiency of fractionators within the refinery that remove pentanes and butanes from the gasoline blendstock streams (FCC gasoline, reformate, alkylate, etc.). Improvements will require capital investment and moreover, the extraction of butane material from the gasoline pool is a significant margin downgrading (butane market value versus gasoline value).

On balance, our perspective is that the Baker and O'Brien study more closely reflects the industry impact. What this means to NYS is a continued threat to the local refineries supplying the Northeast, as their base competitive position is weaker than Gulf Coast or Midwest

[223] "Navigant Economics Releases Study on Impact of Tier 3 Gasoline Regulation." *Business Wire*. June 14, 2012. http://www.businesswire.com/news/home/20120614005143/en/Navigant-Economics-Releases-Study-Impact-Tier-3

[224] Tamm, David C. and Kevin P. Milburn. "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline." Prepared for: the American Petroleum Institute. March 2012. Prepared by: Baker & O'Brien Incorporated. Available at: http://www.api.org/news-and-media/news/newsitems/2012/mar-2012/~/media/Files/News/2012/12-March/Addendum-Potential-Impacts-of-Lower-Sulfur-Lower-RVP-Gasoline-Report.ashx

refineries. Should Tier-3 specifications be implemented, it is possible this could threaten remaining local refinery economic operation.

RFS2 Requirements

As discussed in Section I, the Renewable Fuels Program (RFS2) passed by the Energy Independence and Security Act (EISA) in December 2007, is a federal policy which has significantly increased the utilization of biofuels in the U.S. The RFS2 requires obligated parties (i.e. petroleum refineries, importers and blenders)225 to blend traditional fuels with a pre-determined volume of renewable fuels, increasing each year through 2022 as shown in Table IV-2. One of the significant differences between RFS1 and RFS2 was the creation of four categories of fuel and required volumes for each: cellulosic biofuels, biomass-based diesel, advanced biofuels, and renewable fuels. The EPA is required to finalize the volumes for the next year for each category in November of the previous year to ensure compliance. Implementation of the RFS2 requirements related to cellulosic and advanced biofuels is lagging and may not occur within the stipulated time frame for a number of reasons, including the slow construction of cellulosic facilities and difficulty predicting when commercially available volumes would be available.

Table IV-2: RFS2 Projected Volumes 2012-2022 (MMbbl)

Year	Million Barrels (MMbbl)			
	Cellulosic Biofuel Requirement	Biomass-Based Diesel Requirement	Total Advanced Biofuel Requirement	Total Renewable Fuel Requirement
2012	0.29	24	48	362
2013	24	31	65	394
2014	42	TBD*	89	432
2015	71	TBD*	131	488
2016	101	TBD*	173	530
2017	131	TBD*	214	571
2018	167	TBD*	262	619
2019	202	TBD*	310	667
2020	250	TBD*	357	714
2021	321	TBD*	429	786
2022	381	TBD*	500	857

Source: EPA, "EPA Finalizes Regulations for the National Renewable Fuel Standard Program for 2010 and Beyond," February 2010, p.3, available online at: http://www.epa.gov/otaq/renewablefuels/420f10007.pdf

Note: The total advanced biofuel requirement is the sum of cellulosic biofuels and biomass-based diesel fuel. The total renewable fuel requirement includes the advanced biofuels and all other renewable fuels. RFS2 fuel requirements for 2013 and beyond may change based on the availability of renewable fuels.

* Clean Air Action Section 211 (o) specifies the minimum volume for biomass-based diesel for years 2013 and later to be at least one billion gallons and final rulings for volume will be available on a year-to-year basis.

[225] EPA, "2012 Renewable Fuel Standards," 40 CFR Part 80, December 2011, p. 1320, available online at: http://www.gpo.gov/fdsys/pkg/FR-2012-01-09/pdf/2011-33451.pdf

Refinery Closures

Sections I and II both provide some discussion of potential refinery closures and possible alternative supply options into the East Coast. Additional losses in refineries operating in New Jersey, Pennsylvania, or Delaware in all likelihood can be tolerated even if, over time, all refineries are closed. Clearly closure of more refineries will impact the availability of "ready" supply in the NYS market. However, the transportation fuel demand level in the Middle Atlantic market, while shrinking from 2.97 to 2.75 quadrillion Btu according to the 2012 AEO over the 2010 to 2020 period (about 7%), remains a very large market. The size of this market will attract product from domestic Gulf Coast and Midwest markets, as well as Middle East and Asian markets.

As noted in the Section II Infrastructure changes, companies such as Buckeye and Kinder Morgan are making investments in additional storage for imports, both in northern New Jersey and in the offshore Borco facility owned by Buckeye in the Bahamas. Hess is re-structuring the Hovensa site to handle importation of products into the U.S. and Caribbean markets.

The NYS markets' existing infrastructure plus announced new facilities will greatly assist in the management of new sources of supply, whether by import, domestic waterborne movements or by pipeline, should refinery closures continue.

ICF does not anticipate that refinery closures will occur en masse, and the staged closure process, as has occurred in 2011 and 2012, will result in increases and decreases in refining margins as NYH product markets react to announcements and shutdowns. This rising and falling of markets will keep some refineries operational and cause others to find buyers, and the ultimate shutdown of refineries in PADD 1 may take many years to occur.

Certainly this has been seen in 2012 as partnerships have been formed that have resurrected the former Phillips 66's Trainer refinery and that will sustain the operation of the Sunoco. If Sunoco operates and Trainer restarts (and Sunoco Marcus Hook remains closed), it is likely supply in the region will not materially change. Since the two refineries closed in the fall of 2011, total regional crude processing has not declined significantly, with Sunoco Philadelphia increasing crude runs and the two PBF refineries also increasing crude runs to offset the closures. Loss of the two refineries (Trainer and Marcus Hook) has reduced local supply and flexibility of the system to respond in the event of an outage on Colonial or local refinery outage. However, the sustained operation of Philadelphia, restart of Trainer and commitment of new owners to operate near capacity with improved economics may mean very little supply loss from prior operation in the Northeast.

The current sales level of ULSD in NYS is about 70,000 b/d for on-road consumption. Consequently, the transition to ultra-low sulfur heating oil is likely to double ULSD demand on an average basis, and triple demand in peak winter months. This regulation change posed a daunting outlook for the ULSD market in NYS in early 2012 as only the Phillips 66 Linden refinery was scheduled to remain operating in the midst of East Coast closures. However, the rescue of the Philadelphia, PA refinery by a joint venture between the current owner Sunoco and the Carlyle Group, and the purchase of Phillips 66's Trainer, PA refinery, which was sold to Delta Air Lines, will help alleviate supply constraints generated by the regulation change. The Philadelphia refinery produces ULSD, and although the Trainer refinery will be converted to maximize jet fuel production, the refinery should be able to produce roughly 30,000 b/d of ULSD at capacity. Incremental ULSD supply into the market will have to be shipped into the State by

either imports or movements from the Gulf Coast. Colonial pipeline may be able to provide some added supply, but that will depend on their capacity and shipper's nominations (generally Colonial operates near capacity, but has shipped a higher percentage of distillates in winter demand periods). In recent years the U.S. Gulf Coast has exported substantial volumes of ULSD (485,000 b/d in 2011) so adequate supply is available and it will be necessary for industry to resolve logistics difficulties.[226]

In the longer term, the easing of demand for ULSD by the heavy-duty vehicle portion of the market if natural gas continues to penetrate the heavy-duty market will also somewhat relieve the pressure on the ULSD market. This report has repeatedly stressed that the transportation fuels market is in flux and is potentially undergoing major shifts both in the type of fuels used and in the volumes of fuels. To some extent, the pace of the changes will be dictated by macroeconomics and by the global market that sets the overall prices for petroleum. Although natural gas is slowly becoming an international commodity, with the growth of LNG, this trend has not yet been realized, given that prices are still set in the regional markets. Assuming that the growth of shale gas continues, there will likely be a radical transformation of the heavy-duty vehicle market with the emergence of major fuel substitution trends. This, coupled with the growing efficiency of all vehicles, is likely to have a greater impact on the transportation fuel market in the U.S. and in NYS. The major energy projections, at least in the period they cover, all concur that a decline in gasoline consumption is expected, while diesel consumption is expected to rise, along with a vehicle fuel efficiency. Most projections, however, have not yet factored in potential vehicle use of natural gas. Again, most projections agree these will be the main drivers in transportation fuel markets and biofuels growth will have a relatively minor impact on the industry.

[226] EIA. "Petroleum & Other Liquids—Exports, Gulf Coast PADD 3, Annual-Thousand Barrels per Day." Available at: http://www.eia.gov/dnav/pet/pet_move_exp_dc_R30-Z00_mbblpd_a.htm

Bibliography and Data Sources

Executive Summary: Sources

American Recovery and Reinvestment Act. Public Law 111–5. February 17, 2009. Available at: http://www.gpo.gov/fdsys/pkg/PLAW-111publ5/pdf/PLAW-111publ5.pdf.

Consumer Reports. "EPA issues final approval for sale of E15 ethanol fuel." Consumers Union of U.S., 21 June 2012: Washington, D.C. Available at: http://news.consumerreports.org/cars/2012/06/epa-issues-final-approval-for-sale-of-e15-ethanol-fuel.html

Phone and email correspondence with CSX representative, April 2012.

Tamm, David C.; Kevin P. Milburn; and Richard X. Thomas. "Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline." American Petroleum Institute (API), July 2011: Washington, D.C. Available at: http://www.api.org/Newsroom/upload/110715_LowerSulfur_LowerRVP_Final.pdf

U.S. Energy Information Administration (EIA). *Annual Energy Outlook 2012*, Middle Atlantic Energy Consumption by Sector and Source. EIA, June 25, 2012: Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm

General Overview and Section I: Sources

Petroleum Sources

2011 SEC Company 10-K Filings.

Bloomberg 95RON ARA Spot Price (ticker symbol: MOGE95FB Index).

Bloomberg, "Dated Brent Spot Price" (ticker symbol: EUCRBRDT Index).

Bloomberg, "Ethanol New York Harbor Spot Prices".

Bloomberg, "Gasoline NYMEX Price" (ticker symbol: XB1 COMB Comdty).

Bloomberg, "Heating Oil NYMEX Price" (ticker symbol: HO1 COMB Comdty).

Bloomberg, "No. 2 Heating Oil Spot Price" (ticker symbol: NO2INYPR Index).

Bloomberg, "RBOB NYH Spot Price" (ticker symbol: RBOB87PM Index).

Bloomberg, "ULSD NYH Spot Price" (ticker symbol: DIEINULP Index).

Bloomberg, "WTI Cushing, OK Spot Price" (ticker symbol: USCRWTIC Index).

Buckeye Partners, L.P. "System Map." Buckeye Partners, L.P., 2005: Breinigsville, PA. Available at: http://www.buckeye.com/Portals/0/ShipperBook/SystemMap.pdf

Buckeye Pipe Line Company, L.P. “Local Tariff for Refined Petroleum Products from points in New Jersey and Pennsylvania to Points in New York State.” Buckeye Pipe Line Company, L.P., 2011: Breinigsville, PA. Available at: http://www.buckeye.com/tariffs/BPL%20F441.2.0_EPS-NorthLine.pdf

Center for Transportation Analysis . “Freight Analysis Framework Data Extraction Tool.” Center for Transportation Analysis funded by the Federal Highway Administration, September 2012: Washington, DC. Available at: http://faf.ornl.gov/fafweb/Extraction1.aspx

Clark, Aaron; and Bradley Olson. “Global Partners Boosts Bakken Shipments to Eastern Refiners.” Bloomberg Business Week, 18 April 2012: Washington, D.C. Available at: http://www.businessweek.com/news/2012-04-18/global-partners-boosts-bakken-shipments-to-eastern-refiners

Clean Diesel Fuel Alliance. “Locomotive, marine and non-road diesel fuel standards begin at later dates (except in California).” Clean Diesel Fuel Alliance: Washington, D.C. Available at: http://www.clean-diesel.org/nonroad.html

Enterprise Products Partners L.P. “2011 SEC 10-K Filing”, p.31. Enterprise Products Partners, L.P., 2011: Houston, TX. Available at: http://www.sec.gov/Archives/edgar/data/1061219/000106121912000006/epdform10k_123111.htm

Federal Reserve Bank of New York. “Index of Coincident Economic Indicators.” Federal Reserve Bank of New York, August 2012: Albany, NY. Available at: http://www.newyorkfed.org/research/regional_economy/coincident_summary.html

New York State Energy Research and Development Authority (NYSERDA). “Statewide Feasibility Study for a Potential New York State Biodiesel Industry.” NYSERDA, June 2003. Available at: http://www.ascensionpublishing.com/BIZ/newyorkplan.pdf

Oil Price Information Service, “CBOB Barge NYH Spot Price.”

Oil Price Information Service, “CBOB Buckeye Pipeline Spot Price.”

Oil Price Information Service, “CBOB New York Harbor Spot Prices.”

Oil Price Information Service, “CBOB Rack Prices for Albany, NYS and Rochester, NY.”

Oil Price Information Service, “Gasoline Rack Pricing.”

Oil Price Information Service, “RBOB Barge NYH Spot Price.”

Oil Price Information Service, “RBOB New York Harbor Spot Prices.”

Oil Price Information Service, “RFG New York, NYS Rack Price.”

Oil Price Information Service, “ULSD Barge NYH Spot Price.”

Oil Price Information Service, “ULSD Buckeye Pipeline Spot Price.”

Oil Price Information Service, "ULSD Rack Prices for Albany, New York State, and Rochester, NY."

Organization of the Petroleum Exporting Countries (OPEC). "World Oil Outlook 2011." Organization of the Petroleum Exporting Countries, 2011: Vienna, Austria. Available at: http://www.opec.org/opec_web/en/publications/340.htm

"PBF Energy: Advantaged Crudes a 'Game Changer'." PBF Energy. August 24, 2012. http://www.pbfenergy.com/sites/default/files/PBF%20Announces%20Crude-by-Rail%20Plan%20at%20Del%20City.pdf

Platts. "Sunoco, Carlyle in last-chance refinery deal." Oilgram Price Report, July 3, 2012.

U.S. Energy Information Administration (EIA). "Refinery, Bulk Terminal, and Natural Gas Plant Stocks by State." EIA, accessed 2012: Washington, DC. Available at: http://www.eia.gov/dnav/pet/pet_stoc_st_a_EPD0_STR_mbbl_a.htm

U.S. Energy Information Administration (EIA). "Refinery Capacity Report." EIA, accessed 2012: Washington, DC. Available at: http://www.eia.gov/petroleum/refinerycapacity/

U.S. Energy Information Administration (EIA). "Company Level Imports." EIA, 2012: Washington, DC. Available at: http://www.eia.gov/petroleum/imports/companylevel/

U.S. Energy Information Administration (EIA). *Annual Energy Outlook 2012*. EIA, June 25, 2012: Washington, DC. Available at: http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf

U.S. Energy Information Administration (EIA). "Prime Supplier Sales Volume." EIA, June 2012: Washington, DC. Available at: http://www.eia.gov/dnav/pet/pet_cons_prim_dcu_SNY_a.htm.

U.S. Energy Information Administration (EIA). "Spot Prices of Crude Oil in Dollars per Barrel, Products in Dollars per Gallon." EIA, 2012: Washington, DC. Available at: http://www.eia.gov/dnav/pet_pri_spt_s1_d.htm

U.S. Energy Information Administration (EIA). "State Energy Data System." EIA, June 2012: Washington, DC. Available at http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/total/use_tot_NYa.html&mstate=New York State

U.S. Energy Information Administration (EIA). "Stocks by Type: East Coast (PADD 1) Fuel Ethanol in Annual-Thousand Barrels." EIA, 2012: Washington, DC. Available at: http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

Alternative Fuel Sources

ABC News. "Train derailment forces evacuations in Galveston Co." ABC News, 14 September 2011: Hitchcock, TX. Available at: http://abclocal.go.com/ktrk/story?section=news/local&id=8353574

Associated Press. “Ohio Train Fire Contained After Explosion.” AOL News, 6 February 2011. Available at: http://www.aolnews.com/2011/02/06/train-derailment-in-arcadia-ohio/

Bevill, Kris. “The Battle for the RFS.” Ethanol Producer Magazine, 12 June 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

CSX. “EthX—Express Ethanol Delivery: List of Ethanol Distribution Terminals.” CSX, 2012: Jacksonville, FL. Available at: http://www.csx.com/index.cfm/customers/commodities/agricultural-products/services/ethx-express-ethanol-delivery/

Groom, Debra J. “Ethanol plant in Volney moves closer to full production.” Syracuse Online, LLC, 5 January 2010: Volney, NY. Available at: http://www.syracuse.com/news/index.ssf/2010/01/ethanol_plant_in_volney_moves.html

International Energy Agency (IEA). “World Energy Outlook 2011.” IEA, 2011.

Interview with John Vavalo, Senior Vice President. Northern Biodiesel. April 3, 2012.

Kinder Morgan Energy Partners, LP. “KMP Begins Commercial Operations of Ethanol Transportation on Central Florida Pipeline System.” Kinder Morgan Energy Partners, L.P., 2 December 2008. Available at: http://phx.corporate-ir.net/phoenix.zhtml?c=119776&p=irol-newsArticle&ID=1231520&highlight=

Lane, Jim. “Kinder Morgan completes ethanol pipeline between New Jersey and New York.” Biofuels Digest, 4 April 2012. Available at: http://www.biofuelsdigest.com/bdigest/2012/04/04/kinder-morgan-completes-ethanol-pipeline-between-new-jersey-and-new-york/

Lane, Jim. “U.S. Senate group starts up “seed to wheel” review of U.S. Renewable Fuel Standard.” Biofuels Digest, 30 May 2012. Available at: http://www.biofuelsdigest.com/bdigest/2012/05/30/us-senate-group-starts-up-seed-to-wheel-review-of-us-renewable-fuel-standard/

Mascoma Corporation. “Our Facilities.” Mascoma Corporation, updated 2011: Waltham, MA. Available at: http://www.mascoma.com/pages/sub_business03.php.

National Biodiesel Board. “Biodiesel and the RFS-2 Summary of the Final Rule.” National Biodiesel Board, February 2010. Available at: http://vtbio.org/VTBIO_News_files/NBB%20Summary%20-%20Final%20RFS-2%20Rule%20(2-3-10).pdf.

New York State Department of Taxation and Finance. “Gasoline and Petroleum Business Tax: Monthly Statistical Report.” New York State Department of Taxation and Finance, June 2012. Available at: http://www.tax.ny.gov/

New York State Department of Taxation and Finance. “Publication 718-F.” New York State Department of Taxation and Finance, March 2012. Available at: http://www.tax.ny.gov/pdf/publications/sales/pub718f.pdf

New York State Department of Taxation and Finance. “Sales and Use Tax on Qualified Motor Fuel and Highway Diesel Motor Fuel.” New York State Department of Taxation and Finance, March 2012. Available at: http://www.tax.ny.gov/pdf/2013/st/st810_10i_0313.pdf.

New York State Energy Research and Development Authority (NYSERDA). “Statewide Feasibility Study for a Potential New York State Biodiesel Industry.” NYSERDA, June 2003: Albany, NY. Available at: http://www.ascension-publishing.com/BIZ/newyorkplan.pdf

Organization of the Petroleum Exporting Countries (OPEC). “World Oil Outlook 2011.” Organization of the Petroleum Exporting Countries, 2011: Vienna, Austria. Available at: http://www.opec.org/opec_web/en/publications/340.htm.

Pear, Robert. “After Three Decades, Tax Credit for Ethanol Expires.” The New York Times, 1 January 2012: Washington, DC. Available at: http://www.nytimes.com/2012/01/02/business/energy-environment/after-three-decades-federal-tax-credit-for-ethanol-expires.html

Sioux City Journal. “Arthur tornado rated an EF2; Galva twister an EF1.” Sioux City Journal. April 10, 2011: Sioux Falls, SD. Available at: http://siouxcityjournal.com/news/local/article_c9730e84-63a4-11e0-a34b-001cc4c002e0.html

Sofia, Mannos. “Ohio Train Fire Contained After Explosion.” Associated Press, 6 February 2011: Arcadia, OH. Available at: http://www.aolnews.com/2011/02/06/train-derailment-in-arcadia-ohio/.

Thomson Reuters. “Kinder Morgan completes New Jersey ethanol pipeline.” Thomson Reuters, 3 April 2012. Available at: http://www.reuters.com/article/2012/04/03/kinder-morgan-ethanol-pipeline-idUSL2E8F36VZ20120403

USA Today. “Fiery train derailment in Illinois leads to evacuation.” USA Today, 7 October 2011: Tiskilwa, IL. Available at: http://www.usatoday.com/news/nation/story/2011-10-07/us-derailment-fire-illinois/50687066/1

U.S. Department of Agriculture (USDA). “Biofuels Strategic Production Report.” U.S. Department of Agriculture (USDA), 23 June 2010: Washington, DC. Available at: http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf

U.S. Department of Agriculture (USDA). “Study of Rural Transportation Issues.” USDA, 27 April 2010: Washington, DC . Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

U.S. Department of Agriculture (USDA). “USDA Biofuels Strategic Production Report.” Annual ethanol truck shipments as of March 2010. USDA, 23 June 2010: Washington, DC. Available at: http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf

U.S. Department of Energy (DOE). “Alternative Fuels & Advanced Vehicles Data Center.” DOE, accessed 2012: Washington, DC. Available at: http://www.afdc.energy.gov

U.S. Department of Transportation, Office of Highway Policy Information (OHPI). "Monthly Motor Fuels Report by States Tax Agencies Source." OHPI, accessed 2012. Available at: http://www.fhwa.dot.gov/policyinformation/travel/tvt/history/

U.S. Energy Information Administration (EIA). "Company Level Imports." EIA, 2012: Washington, DC. Available at: http://www.eia.gov/petroleum/imports/companylevel/

U.S. Energy Information Administration (EIA). "New York State: Ethanol Plants." EIA. 2012. http://www.eia.gov/state/state-energy-profiles-data.cfm?sid=NY#Environment

U.S. Energy Information Administration (EIA). "State Energy Data System (SEDS): Table F4: Fuel Ethanol Consumption Estimates." EIA, 2010. Available at: http://www.eia.gov/state/seds/hf.jsp?incfile=sep_fuel/html/fuel_use_en.html

U.S. Energy Information Administration (EIA). "Stocks by Type: East Coast (PADD 1) Fuel Ethanol in Annual-Thousand Barrels." EIA, 2012. Available at: http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

U.S. Environmental Protection Agency (EPA). "2012 Renewable Fuel Standards: 40 CFR Part 80." EPA, December 2011: Washington, DC. Available at: http://www.gpo.gov/fdsys/pkg/FR-2012-01-09/pdf/2011-33451.pdf

U.S. Environmental Protection Agency (EPA). "EPA Finalizes Regulations for the National Renewable Fuel Standard Program for 2010 and Beyond." EPA, February 2010: Washington, DC. Available at: http://www.epa.gov/otaq/renewablefuels/420f10007.pdf

U.S. Federal Highway Administration (FHWA). "Freight Analysis Framework Data Extraction Tool." FHWA, accessed 2012: Washington, DC. Available at: http://faf.ornl.gov/fafweb/Extraction0.aspx

Wald, Matthew. "A Fine for Not Using a Biofuel that Doesn't Exist." New York Times, 9 January 2012. Available at: http://www.nytimes.com/2012/01/10/business/energy-environment/companies-face-fines-for-not-using-unavailable-biofuel.html?_r=3

Wilson, Kimberly A.C. "Train derailment near Scappoose: Crews keep distance from 2 alarm hazmat fire." Oregon Live, 5 May 2011. Available at: http://www.oregonlive.com/pacific-northwest-news/index.ssf/2011/05/hazmat_crews_firefighters_respond_to_train_derailment_near_scappoose.html

Marine Sources

U.S. Energy Information Administration (EIA). "U.S. Ports Domestic Marine Throughput Movements of Petroleum Products." EIA, 2009 & 2010: Washington, DC.

Section II: Sources

Petroleum Sources

101st Congress. "Clean Air Act Amendments of 1990." S-1630, 101st Congress, 3 April 1990. Available at: http://thomas.loc.gov/cgi-bin/query/C?c101:./temp/~c1013Eb50D

American Fuel & Petrochemical Manufacturers. "New York State." American Fuel & Petrochemical Manufacturers, February 2012. Available at: http://www.afpm.org/content.aspx?id=1453

"Buckeye: New Gasoline Line Capacity Coming to Pennsylvania." Reuters, 8 March 2012. Available at: http://www.reuters.com/article/2012/03/08/harbor-gasoline-buckeye-idUSL2E8E8DJI20120308?type=companyNews

"Buckeye Partners, L.P. Announces Agreement to Acquire Liquid Petroleum Products Terminal in New York Harbor." *The Wall Street Journal*, 10 February 2012: Houston, TX. Available at: http://www.marketwatch.com/story/buckeye-partners-lp-announces-agreement-to-acquire-liquid-petroleum-products-terminal-in-new-york-harbor-2012-02-10

Buckeye Partners, L.P. "Form 10-K." U.S. Securities and Exchange Commission. Fiscal Year: 31 December 2010. Available at: http://www.sec.gov/Archives/edgar/data/805022/000095012311019864/h78808e10vk.htm

Buckeye Partners, L.P. "Form 10-K." U.S. Securities and Exchange Commission. Fiscal Year: 31 December 2011. Available at: http://www.sec.gov/Archives/edgar/data/805022/000119312512082021/d266743d10k.htm

Buckeye Partners, L.P. "System Map." Buckeye Partners, L.P., 2005: Breinigsville, PA. Available at: http://www.buckeye.com/Portals/0/ShipperBook/SystemMap.pdf

Cardwell, Diane, et al. "As price of oil soars, users shiver and cross their fingers." New York State Times, 21 January 2012. Available at: http://www.nytimes.com/2012/01/22/business/heating-oil-costs-surge-and-many-in-northeast-cant-switch.html?pagewanted=1&tntemail0=y&_r=1&emc=tnt

Clark, Aaron; and Bradley Olson. "Global Partners Boosts Bakken Shipments to Eastern Refiners." Bloomberg Business Week, 18 April 2012: Washington, D.C. Available at: http://www.businessweek.com/news/2012-04-18/global-partners-boosts-bakken-shipments-to-eastern-refiners

Colonial Pipeline. "Colonial Directors Approve New Expansion of Main Gasoline Line." Colonial Pipeline. 21December 2011. Available at: http://www.colpipe.com/press_release/pr_114.asp

Colonial Pipeline. "System Map." Colonial Pipeline, 2008: Available at: http://www.colpipe.com/ab_map.asp

Di Cosimo, Vincent. “A Market in Transition.” Enterprise Products Partners, 2006. Available at: http://www.naseo.org/Events/shopp/2006/Presentations/Vincent%20Di%20Cosimo%20SHOPP%202006.pdf

Graphic Information Systems (GIS) ESRI ArcGIS Mapping Software.

Hess Corporation. “2011 SEC 10-K Filing.” Hess Corporation, 31 December 2011. Available at: http://www.sec.gov/Archives/edgar/data/4447/000119312512081827/d270298d10k.htm

Hovensa. **“**HOVENSA Announces Closure of St. Croix Refinery.” Hovensa, 18 January 2012. Available at: http://www.hovensa.com/

Huber, John. “Ultra-low Sulfur Diesel Fuel/Heating Oil.” NASEO, 11 Oct 2011. Available at: http://www.naseo.org/events/winterfuels/2011/John%20Huber%20Presentation.pdf

Interview with Bill Kolwaite, Lead Terminal Operator. Buckeye Marcy Terminal. March 1, 2012.

Interview with John Maniscalco, CEO of the New York State Oil Heating Association. March 6, 2012.

Interview with John Ryan, Lead Terminal Operator. Buckeye Albany Terminal. March 1, 2012.

Kohlman, Matthew and Ramasamy, Esa. “Colonial Proposes 5% Renewable in ULSD.” Platts, 13 March 2012.

Marton-Vitale, Rose. “Colonial to Expand Northeast U.S. Pipeline Flow.” The Wall Street Journal, 12 March 2012. Available at: http://www.marketwatch.com/story/colonial-to-expand-northeast-us-pipeline-flow-2012-03-12?reflink=MW_news_stmp

McGurty, Janet. “Buckeye Says NJ Terminal Deal Gives Access to Water.” Reuters, 10 February 2012. Available at: http://www.reuters.com/article/2012/02/10/buckeye-pipeline-perthamboy-idUSL2E8DA8AC20120210

McGurty, Janet. “Update 2 – Delta readying Trainer refinery for restart-source.” Thomson Reuters, 18 September 2012: New York, NY. Available at: http://www.reuters.com/article/2012/09/18/refinery-operations-monroe-trainer-idUSL1E8KI58620120918

Motiva Enterprises LLC. “ULSD Heating Oil and Biodiesel at Sewaren Terminal.” Motiva Enterprises LLC, 15 March 2012. Available at: http://www.motivaenterprises.com/home/content/motiva/media_center/20120314012_bio.html

New York State Department of Environmental Conservation. “Issued Title V Permits: All.” New York State Department of Environmental Conservation, accessed August 2012. Available at: http://www.dec.ny.gov/dardata/boss/afs/issued_atv.html

New York State Department of Environmental Conservation. “Regions.” New York State Department of Environmental Conservation, accessed August 2012. Available at: http://www.dec.ny.gov/about/50230.html

New York State Department of Environmental Conservation. “Tanks Storage Capacity by Product.” Major Oil Storage Facility Program, NYS Department of Environmental Conservation, March 3, 2011.

Northville Industries. “Long Island Pipeline System.” Northville Industries, accessed August 2012. Available at: http://www.northville.com/Lipipeline.aspx

Oil Price Information Service. “Petroleum Terminal Encyclopedia”, OPIS/Stalsby, 2012 Edition. OPIS, September 2012.

“PBF Announces Major Project at the Delaware City Refinery.” PBF Energy, 21 December 2011. Available at: http://www.pbfenergy.com/site2/sites/default/files/PBF%20News%20Release%20Clean%20Fuels%20Dec%202011.pdf

“PBF Energy: Advantaged Crudes a ‘Game Changer’.” PBF Energy. August 24, 2012. http://www.pbfenergy.com/sites/default/files/PBF%20Announces%20Crude-by-Rail%20Plan%20at%20Del%20City.pdf

Peckham, Jack. “New York State, Connecticut Spearheading Ultra-Low-Sulfur Heating Oil Laws in the U.S.” World Fuels, 30 June 2010. Available at: http://www.worldfuels.com/wfExtract/exports/Content/a8c2093c-8356-4fab-965b-e20a52a3eb70.html

Penn Energy. “Buckeye Partners Buys First Reserve’s Interest in BORCO Bahamas Marine Oil Terminal for $1.4B.” Penn Energy, 20 December 2010. Available at: http://www.pennenergy.com/index/petroleum/display/4639851805/articles/pennenergy/petroleum/pipelines/2010/12/buckeye-partners_buys.html

Phillips 66. “2011 SEC 10-K Filing.” Phillips 66, 31 December 2011. Available at: http://www.sec.gov/Archives/edgar/data/1163165/000119312512070636/d267896d10k.htm

Phillips 66 Company. “Phillips 66 Seeks Buyer for Trainer, Pa., Refinery.” Phillips 66 Company, 27 September 2011. Available at: http://www.Phillips 66.com/EN/newsroom/news_releases/2011news/Pages/09-27-2011.aspx

State of New Jersey Department of Environmental Protection. “Air Pollution Control Operating Permit Significant Modification and Preconstruction Approval. Hess Corporation.” Department of Environmental Protection, November 29, 2011. Available at: http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pdflist_handler?COUNT=1&PI_NUMBER=43676&ACTIVITY_CLASS_CODE=BOP&ACTIVITY_NUMBER=110003

Sunoco, Inc. “2011 SEC 10-K Filing.” Sunoco, Inc., 31 December 2011. Available at: http://www.sec.gov/Archives/edgar/data/95304/000119312512085407/d264773d10k.htm

Sunoco, Inc. “Sunoco Takes Steps to Ensure Reliability of Supply.” Sunoco, Inc., March 2012. https://www.piersystem.com/go/doc/3433/1334479/

Sunoco, Inc. “Sunoco to Exit Refining and Conduct Strategic Review of the Company.” Sunoco Inc., 6 September 2011. Available at: http://phx.corporate-ir.net/phoenix.zhtml?c=99437&p=irol-newsArticle&ID=1603618&highlight=

Sunoco, Inc. “Sunoco to Idle Main Processing Units at Marcus Hook Refinery.” Sunoco Inc., 1 December 2011. Available at: http://phx.corporate-ir.net/phoenix.zhtml?c=99437&p=irol-newsArticle&ID=1635429&highlight=

Sunoco Logistics. “Asset Map.” Sunoco Logistics, accessed August 2012. Available at: http://www.sunocologistics.com/Customers/Business-Lines/Asset-Map/130/

U.S. Energy Information Administration (EIA). *Annual Energy Outlook 2011*. EIA, June 25, 2012: Washington, DC. Available at: http://www.eia.gov/forecasts/aeo/data.cfm

U.S. Energy Information Administration (EIA). “Company Level Imports.” EIA, 2012: Washington, DC. Available at: http://www.eia.gov/petroleum/imports/companylevel/

U.S. Energy Information Administration (EIA). “Exports.” EIA, March 2012: Washington, DC. Available at: http://www.eia.gov/dnav/pet/pet_move_exp_dc_R30-Z00_mbblpd_m.htm

U.S. Energy Information Administration (EIA). “Prime Supplier Sales Volumes.” EIA, 21 March 2012: Washington, DC. Available at: http://www.eia.gov/dnav/pet/pet_cons_prim_dcu_SNY_m.htm

U.S. Energy Information Administration (EIA). “Ranking of U.S. Refineries.” EIA, June 2011: Washington, DC. Available at: http://www.eia.gov/neic/rankings/refineries.htm

U.S. Energy Information Administration (EIA). “Refinery Capacity Report.” EIA, 24 June 2011. Available at: http://205.254.135.24/petroleum/refinerycapacity/

U.S. Energy Information Administration (EIA). “Spot Prices.” EIA, March 2012. Available at: http://www.eia.gov/dnav/pet/pet_pri_spt_s1_a.htm

U.S. Environmental Protection Agency. “RFG Areas.” EPA, May 2007. Available at: http://www.epa.gov/otaq/fuels/gasolinefuels/rfg/areas.htm

U.S. Securities and Exchange Commission (SEC). “United Refining Company Form 10-K.” SEC, 31 August 2011. Available at: http://www.sec.gov/Archives/edgar/data/101462/000119312511324609/d257760d10k.htm

Alternative Fuel Sources

Ang, Edgar. “RINs fraud debacle shuts New York biodiesel plant indefinitely.” Oil Price Information Service (OPIS)., 14 February 2012. Available at: http://www.opisnet.com/

Association of American Railroads. “Railroads and Ethanol.” May 2011: . Available at: http://www.aar.org/~/media/aar/Background-Papers/Railroad-Ethanol.ashx

ATEX Express Pipeline. “About the Appalachia-to-Texas (ATEX) Express Pipeline.” Available at: http://www.atexexpresspipeline.com/

Bevill, Kris. “The Battle for the RFS.” Ethanol Producer Magazine. , 12 June 2012. Available at: http://www.ethanolproducer.com/articles/8857/the-battle-for-the-rfs

Biodiesel Magazine. “New York wants your product!” Biodiesel Magazine., 12 January 12, 2011. Available at: http://www.biodieselmagazine.com/articles/7524/new-york-wants-your-product

Business Wire. “Eco-Energy to Partner with NuStar in Development of Ethanol Unit Train and Storage Facility in Northern, VA Market.” Business Wire, 30 July 2012: Franklin, TN. Available at: http://www.businesswire.com/news/home/20120730005708/en/Eco-Energy-Partner-NuStar-Development-Ethanol-Unit-Train

Committee on Economic and Environmental Impacts of Increasing Biofuels Production, National Research Council. “Renewable Fuel Standard (pre-publication copy).” National Research Council, 2011. Available at: http://www.nap.edu/catalog.php?record_id=13105.

Cooper, G. “Ethanol Remains a Bargain.” Renewable Fuels Association, 10 January 10, 2012. Available at: http://www.ethanolrfa.org/exchange/entry/ethanol-remains-a-bargain/

Cooper, G. “U.S. Ethanol Exports Strong in January; Brazil is Top Market.” Renewable Fuels Association, 9. March 9, 2012. Available at: http://www.ethanolrfa.org/exchange/entry/u.s.-ethanol-exports-strong-in-january-brazil-is-top-market/

CSX. “EthX—Express Ethanol Delivery: List of Ethanol Distribution Terminals.” CSX, 2012: Jacksonville, FL. Available at: http://www.csx.com/index.cfm/customers/commodities/agricultural-products/services/ethx-express-ethanol-delivery/

Gasoline and Petroleum Business Tax: Monthly Statistical Report. New York State Department of Taxation and Finance. June 2012. http://www.tax.ny.gov/

Global Partners LP. “Partners Announces Ethanol Expansion Initiative with Canadian Pacific Railway.” Global Partners LP, 11 March 11, 2010. Available at: http://www.globalp.com/news/article.cfm?articleID=235

Interview with Carl Mas. NYSERDA. June 15, 2012.

Interview with John Vavalo, Senior Vice President. Northern Biodiesel. April 25, 2012 and May 2, 2012.

Interview with Robert Leavy, Director of Energy, Supply, and Distribution. Metro Biofuels. March 27, 2012 and May 3, 2012.

Interview with Tammie Toth, Member-Owner. TMT Biofuels. May 2, 2012.

Interviews with industry sources, including facility operators.

Iowa State University, Staff Report 10-SR 106. “Cost and Benefits to Taxpayers, Consumers, and Producers from U.S. Ethanol Policies. Staff Report 10-SR 106.” Iowa State University, Released: July 2010. Available at: http://www.card.iastate.edu/publications/dbs/pdffiles/10sr106.pdf

Kelly, Henry. “Statement of Dr. Henry Kelly.” U.S. Department of Energy., 13 April 13, 2011. Available at: http://www1.eere.energy.gov/office_eere/testimony_kelly_041311.html

Kinder Morgan. “Kinder Morgan Terminals.” Kinder Morgan., 2012. Available at: http://www.kindermorgan.com/business/terminals/ethanol.cfm

Metro Fuel Oil Corp. “Overview.” Metro Fuel Oil Corp., 2012. Available at: http://www.metroenergy.com/company/.

National Academy of Sciences. “Renewable Fuel Standard (pre-publication copy).” National Academy of Sciences, 2011. Available at: http://www.nap.edu/catalog.php?record_id=13105

National Biodiesel Board (NBB). "Biodiesel Distributors." NBB, National Biodiesel Board (NBB). 2012. Available at: http://www.biodiesel.org/buyingbiodiesel/distributors/showall.aspx

National Biodiesel Board (NBB). “NBB Member Plants.” NBB, 2012. Available at: http://www.biodiesel.org/buyingbiodiesel/plants/showall.aspx

New York State Department of Environmental Conservation. “Regional Capacity Database.” NYS Department of Environmental Conservation, accessed August 2012.

New York State Department of Environmental Conservation. “Regions.” New York State Department of Environmental Conservation, accessed August 2012. Available at: http://www.dec.ny.gov/about/50230.html

New York State Energy Research and Development Authority (NYSERDA). “Renewable Fuels Roadmap and Sustainable Biomass Feedstock Supply for New York.” NYSERDA., April 2010. Available at: http://www.nyserda.ny.gov/Publications/Research-and-Development/Biomass-Solar-Wind/~/media/Files/Publications/Renewable%20Fuels%20Roadmap/report_10_05_Renewable%20Fuels%20Roadmap.ashx

New York State Environmental Conservation Law. “Sulfur Reduction Requirements”, Section Article 19, -0325Title 3. Laws of New York, Accessed: March 2012. Available at: http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=$$ENV19-0325$$@TXENV019-0325+&LIST=SEA21+&BROWSER=EXPLORER+&TOKEN=46793871+&TARGET=VIEW

New York State Governor's Press Office. "Governor Cuomo Announces Deployment of 325 Electric Vehicle Charging Stations Across New York State." New York State Governor's Press Office, June 6, 2012. http://www.governor.ny.gov/press/06062012Charging-Stations

New York State Law. "New York City Administrative Code", Title 24, Chapter 1, Sub Chapter 8. Laws of New York, accessed March 2012. Available at: NYS Section 24-168.1. Accessed: March 2012. http://public.leginfo.state.ny.us/LAWSSEAF.cgi?QUERYTYPE=LAWS+&QUERYDATA=$$ADC24-168.1$$@TXADC024-168.1+&LIST=SEA39+&BROWSER=EXPLORER+&TOKEN=46793871+&TARGET=VIEW

Norfolk Southern. "Motiva Enterprises and Norfolk Southern Build Largest Rail-served Ethanol Terminal in New York Harbor." Norfolk Southern., 2 February 2, 2005. Available at: http://www.nscorp.com/nscportal/nscorp/Media/News%20Releases/2005/motiva.html

Northeast States for Coordinated Air Use Management (NESCAUM). "Executive Summary: Economic Analysis of a Program to Promote Clean Transportation Fuels in the Northeast/Mid-Atlantic Region." NESCAUM., August 2011.

Oil Price Information Service. "Petroleum Terminal Encyclopedia", OPIS/Stalsby, 2012 Edition. OPIS, September 2012.

Peterka, Amanda. "Skeptical judges question EPA's approval of E15." Greenwire. 17 April 2012. Available at: http://www.eenews.net/Greenwire/2012/04/17/1

Petroleum Terminal Encyclopedia. OPIS/Stalsby. 2012 Edition.

Renewable Fuels Association (RFA). "Biorefinery locations." RFA, January 2011. Available at: www.ethanolrfa.org/bio-refinery-locations/

Renewable Fuels Association (RFA)."Global Leaders in Advanced Biofuels Urge Congressional Leaders to Extend Critical Tax Provisions." Renewable Fuels Association, February 29, 2012. http://www.ethanolrfa.org/news/entry/global-leaders-in-advanced-biofuels-urge-congressional-leaders-to-extend-cr/

The New York City Council. "Local Law 43." The New York City Council. Accessed: March 2012. Available at: http://legistar.council.nyc.gov/LegislationDetail.aspx?ID=660184&GUID=0F06CC07-D87E-42B1-8FB3-A7FB7E27CCCC

U.S. Department of Agriculture (USDA).

U.S. Department of Agriculture (USDA). "Biofuels Strategic Production Report.", Release Date: 23 June 23, 2010. Available at: http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf

U.S. Department of Agriculture (USDA). "Impacts of the demise of the volumetric ethanol excise tax credit." USDA/ERS. January 17, 2012. http://www.cattlenetwork.com/cattle-news/Impacts-of-the-demise-of-the-volumetric-ethanol-excise-tax-credit-137515803.html

U.S. Department of Agriculture (USDA). "Rural Energy for America Program." USDA, March 2012. Available at: http://www.rurdev.usda.gov/BCP_ReapResEei.html

U.S. Department of Agriculture (USDA). "Study of Rural Transportation Issues." USDA, 27 Released: April 27, 2010. Available at: http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5084088

U.S. Department of Energy (DOE). "Alternative Fueling Stations." DOE, accessed August 2012: Washington, DC. Available at: http://www.afdc.energy.gov/afdc/fuels/stations.html

U.S. Energy Information Administration. "Fuel Ethanol Stocks by Type: PADD 1." U.S. Energy Information Administration (EIA), 2012. http://www.eia.gov/dnav/pet/pet_stoc_typ_c_r10_epooxe_mbbl_a.htm

U.S. Environmental Protection Agency (EPA). DEC Regional Capacity Database.

U.S. Environmental Protection Agency (EPA). "E15 (a blend of gasoline and ethanol)." EPA., March 2012. Available at: http://www.epa.gov/otaq/regs/fuels/additive/e15/index.htm

U.S. Environmental Protection Agency (EPA). "E15 Background." Growth Energy., March 2012. Available at: http://www.growthenergy.org/ethanol-issues-policy/e15-green-jobs-waiver/e15-background/

Voegele, Erin. "New York City passes B2 oilheat mandate." Biodiesel Magazine. July 13, 2010. Available at: http://www.biodieselmagazine.com/articles/4320/new-york-city-passes-b2-oilheat-mandate

Western New York Energy LLC. "About Western New York Energy." Western New York Energy LLC, accessed 2012. Available at: http://www.wnyenergy.com/index.php?pr=Home

Marine Sources

Colton, Tim. "The U.S. Marine Market: Its Status and Prospects." Marine Business Strategies, January 2009.

Online Port Information. "Port Information Database." Accessed August 2012. Available at: www.findaport.comhttp://www.findaport.com

PennWell. "Refined Products Atlas of the United States & Canada." PennWell, 2000: Durango, CO.

Poten & Partners, Inc. "Assessed Spot Average Rates for Selected U.S. Barge Voyages." Poten & Partners, Inc., accessed 2012, proprietary database.

Poten & Partners, Inc. "Barge Fixture Database." Poten & Partners, Inc., accessed 2012, proprietary database.

Poten & Partners, Inc. “U.S.-Flag Database of Ocean-Going Tankers and Barges.” Poten & Partners, Inc., accessed 2012, proprietary database.

U.S. Army Corps of Engineers.

U.S. Army Corps of Engineers. “Number of Cubic Yards and Total Bid Dollars by Corps of Engineers District and Fiscal Year.” U.S. Army Corps of Engineers, March 2012. A available at: http://www.ndc.iwr.usace.army.mil/dredge/drgcorps.htm

U.S. Department of the Treasury. “Active Fuel Terminals.” Department of the Treasury: IRS, May 2012: Washington, DC. Available at: http://www.irs.gov/pub/irs-utl/tcn_db.pdf

U.S. Energy Information Administration (EIA). “Company Level Imports.” EIA, 2012: Washington, DC. Available at: http://www.eia.gov/petroleum/imports/companylevel/

U.S. Energy Information Administration (EIA). “Refinery Capacity Report.” EIA, 2008 and 2011: Washington, DC. Available at: http://www.eia.gov/petroleum/refinerycapacity/

Section III: Sources

Petroleum Sources

American Petroleum Institute. "State Gasoline Tax Reports: April 2012 Summary Reports." American Petroleum Institute, April 2012. Available at: http://www.api.org/Oil-and-Natural-Gas-Overview/Industry-Economics/Fuel-Taxes.aspx.

Analysis of Future Options for Connecticut's Gasoline Dispensing Facility Vapor Control Program (Draft Report)." Prepared for: Connecticut Department of Energy and Environmental Protection., 8 December 8, 2011. Prepared by: Klausmeier, Rob, de la Torre Klausmeier Consulting, Inc. Available at: http://www.ct.gov/dep/lib/dep/air/siprac/2011/gasoline_dispensing_facility_vapor_control.pdf

Business Wire. "Navigant Economics Releases Study on Impact of Tier 3Tier-3 Gasoline Regulation: De minimus cost to refineries not likely to impact consumers." Business Wire., 14 June 14, 2012. Available at: http://www.businesswire.com/news/home/20120614005143/en/Navigant-Economics-Releases-Study-Impact-Tier-3

California Air Resources Board. In-Station Diagnostics: Vapor Recovery Monitoring Systems. California Air Resources Board, accessed August 2012. http://www.sbcapcd.org/eng/compliance/gasoline/isd-job-aid.pdf

GasBuddy.com. "Rochester, NYS Retail Gasoline Price." Accessed June 25, 2012. Available at: www.gasbuddy.com.

Hokin, Sam. "The list of ethanol-free gas stations in the U.S. and Canada". Pure-gas.org, accessed August 2012. Available at: http://pure-gas.org/index.jsp?stateprov=NY

Klausmeier, Rob, de la Torre Klausmeier Consulting, Inc. "Alternative Fueling Stations". U.S. Department of Energy, Energy Efficiency and Renewable Energy. March 9, 2012. http://www.afdc.energy.gov/afdc/fuels/stations.html

New York State Department of Taxation and Finance. "Publication 718-F." NYS State Department of Taxation and Finance, March 2012. Available at: http://www.tax.ny.gov/pdf/publications/sales/pub718f.pdf.

New York State Department of Taxation and Finance. "Publication 908: Fuel Tax Rates." NYS State Department of Taxation and Finance, January 2012. Available at: http://www.tax.ny.gov/pdf/publications/multi/pub908.pdf.

New York State Department of Taxation and Finance. "Sales and Use Tax on Qualified Motor Fuel and Highway Diesel Motor Fuel." NYS State Department of Taxation and Finance, March 2012. Available at: http://www.tax.ny.gov/pdf/2013/st/st810_10i_0313.pdf.

Oil Price Information Service. OPIS Retail Year in Review & 2012 Profit Outlook. Oil Price Information Service, 2012.

Oil Price Information Service. PADD 1 Report. Oil Price Information Service, 14 May 14, 2012.

Tamm, David C. and Kevin P. Milburn. "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline." Prepared for: the American Petroleum Institute. March 2012. Prepared by: Baker & O'Brien Incorporated. Available at: http://www.api.org/news-and-media/news/newsitems/2012/mar-2012/~/media/Files/News/2012/12-March/Addendum-Potential-Impacts-of-Lower-Sulfur-Lower-RVP-Gasoline-Report.ashx

Tamm, David C. et al. "Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline. Prepared for: the American Petroleum Institute. July 2011. Prepared by: Baker & O'Brien Incorporated. Available at: http://www.api.org/Newsroom/upload/110715_LowerSulfur_LowerRVP_Final.pdf

U.S. Department of Energy (DOE). "Alternative Fueling Stations." DOE, accessed August 2012: Washington, DC. Available at: http://www.afdc.energy.gov/afdc/fuels/stations.html

U.S. Energy Information Administration (EIA). "Company Level Imports." EIA, 2012: Washington, DC. Available at: http://www.eia.gov/petroleum/imports/companylevel/

U.S. Energy Information Administration (EIA). *Annual Energy Outlook 2012*. "Middle Atlantic Energy Consumption by Sector and Source." EIA. June 25, 2012. Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm

U.S. Environmental Protection Agency (EPA). "SBAR Panel #41: Control of Air Pollution from Motor Vehicles: Tier 3Tier-3 Motor Vehicle Emission and Fuel Standards." EPA, accessed August 2012. Available at: http://www.epa.gov/rfa/tier3.html.

U.S. International Revenue Service (IRS). "Form 720: Quarterly Federal Excise Tax Return." OMB No. 1545-0023. January 2012. http://www.irs.gov/pub/irs-pdf/f720.pdf.

Alternative Fuel Sources

Gas Buddy. http://www.gasbuddy.com

New York State Department of Taxation and Finance. "Gasoline and Petroleum Business Tax: Monthly Statistical Report." June 2012. Available at: http://www.tax.ny.gov/

New York State Department of Taxation and Finance. "Publication 718-F." March 2012. Available at: http://www.tax.ny.gov/pdf/publications/sales/pub718f.pdf

New York State Department of Taxation and Finance. "Sales and Use Tax on Qualified Motor Fuel and Highway Diesel Motor Fuel." March 2012. Available at: http://www.tax.ny.gov/pdf/2013/st/st810_10i_0313.pdf.

Oil Price Information Service. "Petroleum Encyclopedia", OPIS, 2012 Edition.

U.S. Department of Energy (DOE). "Alternative Fuels & Advanced Vehicles Data Center." DOE, Accessed August 2012. Available at: http://www.afdc.energy.gov

Conclusions: Sources

National Highway Traffic Safety Administration (NHTSA). "Corporate Average Fuel Economy Standards; Passenger Cars and Light Trucks, Model Years 2017-2025, Final Environmental Impact Statement." NHTSA, July 2012: Washington, D.C. Available at http://www.nhtas.gov

National Highway Traffic Safety Administration (NHTSA). "Final Environmental Impact Statement, Medium and Heavy-duty Fuel Efficiency Improvement Program." NHTSA, June 2011: Washington, D.C.

Tamm, David C. and Kevin P. Milburn. "Addendum to Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline." Prepared for the American Petroleum Institute. March 2012. Prepared by Baker & O'Brien Incorporated. Available at: http://www.api.org/news-and-media/news/newsitems/2012/mar-2012/~/media/Files/News/2012/12-March/Addendum-Potential-Impacts-of-Lower-Sulfur-Lower-RVP-Gasoline-Report.ashx

Tamm, David C. et al. *"Potential Supply and Cost Impacts of Lower Sulfur, Lower RVP Gasoline*. Prepared for the American Petroleum Institute. July 2011. Prepared by Baker & O'Brien Incorporated. *Available at:* http://www.api.org/Newsroom/upload/110715_LowerSulfur_LowerRVP_Final.pdf

U.S. Energy Information Administration (EIA). *Annual Energy Outlook 2012*, "Middle Atlantic Energy Consumption by Sector and Source." EIA, June 25, 2012: Washington, D.C. Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm

U.S. Environmental Protection Agency (EPA). "SBAR Panel #41: Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards." EPA, accessed August 2012: Washington, DC. Available at: http://www.epa.gov/rfa/tier3.html

Wall Street Journal, May 24, 2012.

Appendices

Appendix A: Petroleum Market Players

The petroleum supply chain involves a number of different parties involved in the delivery of gasoline and other fuels to consumers in NYS. Much of this activity is focused in NYH. These parties include:

Petroleum Suppliers: Petroleum suppliers are the entities that provide wholesale supply to distributors, service stations, and other petroleum suppliers. Petroleum suppliers have customers in multiple markets in NYS, and contract for pipeline shipments or marine movements to make sure their product gets to the destinations where their customer's demand is based.

Petroleum suppliers could be local refiners who have customers in NYS, or they could be refiners from the Gulf Coast who move product into the NYS region from the Gulf Coast. Suppliers could be companies that buy product from refiners at "spot" prices and then ship the product by pipeline or barge to their customers. Suppliers could be parties that import product and then ship by pipeline or barge to their customers. Basically, suppliers can have multiple "sources" for their supply but they are in general the parties who ship, store, and sell wholesale gasoline and other fuels in NYS.

Suppliers must carefully assess their ongoing demands in the region and then determine what their most economic source of supply will be for each terminal, and also the cheapest means to provide the supply. Suppliers arrange barge movements and nominate shipments on pipelines timed to replenish their supply in terminals where they have demands.

Refiners: Refiners operate refineries, and are a sub-set of suppliers. Local refiners were identified in both sections I and II. Refiners can move product directly to their customers, or exchange product with other parties, or sell their product into the "spot" market. Refiners are basically suppliers with a refinery behind them to provide steady supply into the region.[227]

Blenders: Blenders are parties that do not necessarily refine crude oil, but instead purchase "unfinished" petroleum products and then blend them with other purchased products to make saleable gasoline or distillate fuels that meet certain regulations or specifications. For example, a blender may import or purchase a gasoline blendstock (i.e. reformate or alkylate), store the product in a tank, and then purchase additional partially refined products to blend together and produce a product that can be shipped to terminals for delivery to customers.[228]

Blenders are a key part of the supply chain. They utilize the extensive storage infrastructure in New York Harbor (see Section II) to import or buy blendstocks, oxygenates, and various

[227] Product exchanges are used to balance supply efficiently. For example, if a refiner (Company A) has surplus supply in an area, (for example Philadelphia), they may deliver product to Company B in the Philadelphia area, and receive the same volume of product back from Company B in a different market (for example Ohio). This saves Company B the cost of shipping product to Philadelphia for their customers and saves Company A the cost of shipping to Ohio.

[228] Reformate is a high octane gasoline blending component produced in a refinery; Alkylate is another gasoline blending component manufactured in refineries that has high octane and good blending characteristics

additives for formulation into finished products which are sold bulk to wholesale suppliers for delivery to product terminals.

Traders: Most parties in the petroleum supply chain employ traders. The trader's role can be varied. For refiners, blenders, and suppliers, the traders who work for these companies have a role to buy or sell product on a spot market basis to optimize the cost for those parties to deliver product to terminals. For example, a refiner may be "short" product due to high demands or perhaps a period of refinery maintenance. The refinery inventory and distribution personnel ("schedulers") would identify the timing and volume of purchases needed to meet required shipments on pipelines or marine equipment. The traders would act on that information and negotiate and finalize a "trade" (purchase or sale) to meet the companies' needs.

However, there are some companies who are structured to be primarily trading companies. These companies (Vitol, Glencore, Westport, and others) make money primarily by buying petroleum products in one location and selling in another. They focus on market pricing anomalies and volatility (spikes and dips in market prices) and arrange physical movements of product to capture these imbalances by (for example) buying product in discounted markets and selling in other markets. These companies must manage their price exposure carefully (through NYMEX hedging for example), and they provide a key role in the smooth movement of global petroleum supply. For example, a trading company may see low priced gasoline blendstocks available in Europe. They can assess the cost to purchase and ship the product to NYS, and if the NYS price is higher than the purchase cost plus freight, they will buy the European product, charter a vessel, and immediately re-sell it into the NYS market to lock in their profit.

Pipeline Companies: Pipeline companies provide a service by transporting petroleum products from "origin" points (where product is delivered to the pipeline) to destination points (terminals along the pipeline route). Pipelines neither own product nor buy or sell product. They move product along the pipeline based on shipments "nominated" by suppliers for movement from origin points to terminals. If capacity exists to meet all nominations, the pipeline coordinates with shippers to determine the optimum scheduling of deliveries for each pipeline cycle.[229] The pipeline uses sophisticated controls to manage the delivery of volume to multiple terminals along the pipeline system consistent with the delivery schedule. Pipelines collect a regulated tariff for all barrels shipped on the line (most pipelines are common carrier systems regulated by the Federal Energy Regulatory Commission (FERC)).

Marine Companies: Similar to pipeline companies, marine companies provide a transportation service for a fee. Marine movements can be by ship or by barge and tug combinations. Marine movements are scheduled by suppliers from terminals with water access to terminals with water access. Unlike pipeline companies, the cost of the marine movements may vary based on the prevailing market for vessels. Most marine movements of petroleum product in the NYS market are by spot charters arranged between suppliers and the marine companies. Similar to pipelines, the marine companies do not take custody of the product they are transporting.

Distributors: Distributors (or "jobbers") are near the end of the petroleum supply chain. A distributor is a party who would purchase gasoline and/or diesel fuel or heating oil from a terminal's loading rack from a petroleum supplier. The supplier would have a contract with the

[229] A pipeline moves product continuously in cycles. Within one pipeline, over a 5-day "cycle," the pipeline company may move unleaded gasoline for 2 days, premium gasoline for 0.5 days, jet fuel for 0.5 days, and then diesel for the remaining 2 days. The next cycle would begin again with unleaded gasoline.

distributor to sell a certain volume of product monthly or annually to the distributor at a given terminal at the suppliers' posted "rack" price. The distributor will load the product into their truck and deliver the gasoline and/or diesel to their customers. A distributor may own one or many gasoline stations in a region, or may re-sell the product to an independent dealer. Distributors make money by purchasing wholesale at the rack and then re-selling wholesale to the independent service station (charging a price that covers trucking cost and provides a profit) or by delivering the rack supply directly into their own service stations and charging a "street price" to consumers that provides a profit and covers shipping and service station costs.

Service Station Dealers: Service station dealers are operators of retail gasoline stations who purchase product from either suppliers or distributors and who make money by reselling to consumers at the service station pump. Dealers who market a specific "brand" (e.g. Shell or Exxon) are required to purchase gasoline on a "branded" basis, which means they agree to only market Shell or Exxon product using their proprietary additives. The supplier can either sell to the dealer at the "rack" price (for dealers who are distributors) or on a "delivered" price (DTW or dealer tankwagon price), where the supplier or distributor/jobber delivers the product by truck to the service station, and charges a DTW price that includes a transport fee.

There are some individual service stations or companies operating service stations which will purchase "unbranded" supply from distributors. These service stations may sell product under a brand name of their choosing. The unbranded supply is made available at loading racks by suppliers typically at a discount to branded pricing to allow the supplier to "move" product in excess of their branded demand, but does not have proprietary additives in the delivered gasoline.

Appendix B: Petroleum Terminals in NYS and Northern New Jersey

Table B-1: Petroleum Terminals and NYS and Northern NJ

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
[BUCKEYE] ALBANY TERMINAL	ALBANY	ALBANY	IV	1,522,530	Marine, Rail, Truck	Marine, Rail, Truck
GLOBAL COMPANIES LLC ALBANY TERMINAL	ALBANY	ALBANY	IV	1,165,000	Marine, Rail, Truck	Marine, Rail, Truck
BUCKEYE TERMINALS LLC	BREWERTON	OSWEGO	VII	361,000	Pipeline, Truck	Pipeline, Truck
CASTLE PORT MORRIS TERMINALS, INC.	BRONX	BRONX	II	879,300	Marine, Truck	Marine, Truck
HESS CORPORATION - BRONX TERMINAL	BRONX	BRONX	II	533,933	Marine, Truck	Marine, Truck
BP PRODUCTS NORTH AMERICA, INC.	BROOKLYN	KINGS	II	53,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
HESS CORPORATION BROOKLYN TERMINAL	BROOKLYN	KINGS	II	665,845	Marine, Truck	Marine, Truck
METRO TERMINALS CORP.	BROOKLYN	KINGS	II	207,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
MOTIVA ENTERPRISES, LLC	BROOKLYN	KINGS	II	50,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
BUCKEYE TERMINALS, LLC. BUFFALO TERMINAL	Buffalo	ERIE	IX	282,900	Pipeline, Truck	Pipeline, Truck
I.P.T. LLC	EAST GREENBUSH	RENSSELAER	IV	487,584	Marine, Truck	Marine, Truck
[NORTHVILLE] SETAUKET TERMINAL	EAST SETAUKET	SUFFOLK	I	900,000		
BUCKEYE TERMINALS, LLC	GENEVA	ONTARIO	VIII	224,628	Pipeline, Truck	Pipeline, Truck
CITGO ALBANY TERMINAL	GLENMONT	ALBANY	IV	895,827	Marine, Truck	Marine, Truck
NORTH ALBANY TERMINAL COMPANY/ [petroleum fuel & terminal] GLENMONT TERMINAL	GLENMONT	ALBANY	IV	2,145,127	Marine, Truck	Marine, Truck
GLOBAL COMPANIES LLC GLENWOOD TERMINAL	GLENWOOD LANDING	NASSAU	I	104,200	Marine, Truck	Marine, Truck
[NORTHVILLE] HOLTSVILLE TERMINAL	HOLTSVILLE	SUFFOLK	I	380,000	Pipeline, Truck	Pipeline, Truck
CARBO CONCORD OIL	INWOOD	NASSAU	I	25,000		
GLOBAL COMPANIES LLC INWOOD TERMINAL	INWOOD	NASSAU	I	325,700	Pipeline, Marine, Truck	Pipeline, Marine, Truck
CONCORD TERMINAL CORP.	LAWRENCE	NASSAU	I	133,766	Pipeline, Marine, Truck	Pipeline, Marine, Truck
MOTIVA ENTERPRISES LLC	LAWRENCE	NASSAU	I	222,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
GETTY LONG ISLAND CITY TERMINAL	LONG ISLAND CITY	QUEENS	II	29,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
BUCKEYE TERMINALS LLC	Marcy	ONEIDA	VI	156,169	Pipeline, Truck	Pipeline, Truck
BUCKEYE TERMINALS, LLC	MARCY	ONEIDA	VI	560,158	Pipeline, Truck	Pipeline, Truck
SPRAGUE ENERGY CORP.	MOUNT VERNON	WESTCHESTER	III	82,170	Marine, Truck	Marine, Truck
GLOBAL COMPANIES LLC - NEWBURGH TERMINAL	NEW WINDSOR	ORANGE	III	403,000	Marine, Truck	Marine, Truck
GLOBAL COMPANIES LLC	NEW WINDSOR	ORANGE	III	199,000	Marine, Truck	Marine, Truck

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
GLOBAL COMPANIES LLC	NEW WINDSOR	ORANGE	III	240,000	Marine, Truck	Marine, Truck
GLOBAL COMPANIES LLC	NEW WINDSOR	ORANGE	III	709,785	Marine, Truck	Marine, Truck
HESS CORPORATION ROSETON TERMINAL	NEWBURGH	ORANGE	III	1,369,782	Marine, Truck	Marine, Truck
SPRAGUE OCEANSIDE TERMINAL	OCEANSIDE	NASSAU	I	80,263	Marine, Truck	Marine, Truck
ENTERPRISE PRODUCTS OPERATING LLC (LPG TERMINAL)	Oneonta	Otsego	IV	2,800	Pipeline	Pipeline
SPRAGUE ENERGY, OSWEGO TERMINAL	OSWEGO	OSWEGO	VII	453,162	Marine, Truck	Marine, Truck
GLOBAL COMPANIES - COMMANDER TERMINALS LLC	OYSTER BAY	NASSAU	I	3,062,610	Marine, Truck	Marine, Truck
GETTY TERMINALS CORP.- PELHAM MANOR	PELHAM MANOR	WESTCHESTER	III	23,000	Marine, Truck	Marine, Truck
BRAY TERMINALS, Inc.	Plattsburgh	Clinton	V	79,800	Truck	Truck
GETTY TERMINALS CORP	RENSSELAER	RENSSELAER	IV	400,791	Marine, Truck	Marine, Truck
HESS CORPORATION - RENSSELAER TERMINAL	RENSSELAER	RENSSELAER	IV	668,462	Marine	Marine
PETROLEUM FUEL & TERMINAL COMPANY	RENSSELAER	RENSSELAER	IV	723,000	Marine, Truck	Marine, Truck
SPRAGUE ENERGY CORP.	RENSSELAER	RENSSELAER	IV	979,664	Marine, Truck	Marine, Truck
TRANSMONTAIGNE PRODUCT SERVICES, INC.	RENSSELAER	RENSSELAER	IV	479,036		
PHILLIPS 66 COMPANY	RIVERHEAD	SUFFOLK	I	4,765,500	Marine, Truck	Marine, Truck
BUCKEYE TERMINALS, LLC	ROCHESTER	MONROE	VIII	125,000	Pipeline, Truck	Pipeline, Truck
BUCKEYE TERMINALS, LLC	ROCHESTER	MONROE	VIII	224,100	Pipeline, Truck	Pipeline, Truck
HESS ROCHESTER LT. TERMINAL	ROCHESTER	MONROE	VIII	169,754	Pipeline, Truck	Pipeline, Truck
ROCHESTER TERMINAL	ROCHESTER	MONROE	VIII	276,000	Pipeline, Truck	Pipeline, Truck
[SUNOCO LOGISTICS] ROCHESTER TERMINAL	ROCHESTER	MONROE	VIII	178,500	Pipeline, Truck	Pipeline, Truck
[UNITED REFINING] ROCHESTER TERMINAL	ROCHESTER	MONROE	VIII	190,000	Pipeline, Rail, Truck	Pipeline, Rail, Truck
FINGER LAKES LPG STORAGE (LPG TERMINAL)	Savona	Steuben	VIII	1,900,000	Pipeline, Rail, Truck	Rail, Truck
ENTERPRISE PRODUCTS OPERATING LLC (LPG TERMINAL)	Selkirk	Albany	IV	6,428	Pipeline, Rail, Truck	Pipeline, Rail, Truck
CASTLE NORTH TERMINALS, INC.	SLEEPY HOLLOW	WESTCHESTER	III	19,000	Marine, Truck	Marine, Truck
KINDER MORGAN STATEN ISLAND TERMINAL	STATEN ISLAND	RICHMOND	II	2,939,334	Pipeline, Marine,	Pipeline, Marine
MARATHON PETROLEUM LLC	TONAWANDA	ERIE	IX	116,000	Marine, Truck	Marine, Truck
NOCO ENERGY CORP.	TONAWANDA	ERIE	IX	969,750	Pipeline, Marine, Rail, Truck	Pipeline, Marine, Rail, Truck
[SUNOCO] TONAWANDA ATLANTIC TERMINAL	TONAWANDA	ERIE	IX	332,113	Pipeline, Rail, Truck	Pipeline, Rail, Truck
UNITED REFINING COMPANY	TONAWANDA	ERIE	IX	325,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
BUCKEYE TERMINALS, LLC-UTICA TERMINAL	UTICA	ONEIDA	VI	184,200	Pipeline, Truck	Pipeline, Truck
BUCKEYE TERMINALS LLC	VESTAL	BROOME	VII	369,015	Pipeline, Truck	Pipeline, Truck

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
BUCKEYE TERMINALS LLC - BINGHAMTON TERMINAL	VESTAL	BROOME	VII	101,300	Pipeline, Truck	Pipeline, Truck
CITGO PETROLEUM CORPORATION	VESTAL	BROOME	VII	124,898	Pipeline, Truck	Pipeline, Truck
HESS CORPORATION SYRACUSE TED PARK TERMINAL	WARNERS	ONONDAGA	VII	376,900	Pipeline	Pipeline
Enterprise Products Operating LLC (LPG TERMINAL)	Watkins Glen	Schuyler	VIII	1,200,000	Pipeline	Pipeline
[UNITED REFINING] WEST SENECA TERMINAL (CRUDE OIL TERMINAL)	WEST SENECA	ERIE	IX	485,000	Pipeline	Pipeline

Table B-2: Petroleum Terminals and NYS and Northern NJ

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
ALBANY INTERNATIONAL AIRPORT	ALBANY	ALBANY	IV			
BAY TERMINALS OF ROCKAWAY, INC.	ARVERNE	QUEENS	II			
ASTORIA ENERGY LLC AND ASTORIA ENERGY II LLC	ASTORIA	QUEENS	II			
ASTORIA GAS TURBINE POWER	ASTORIA	QUEENS	II			
ASTORIA GENERATING STATION	ASTORIA	QUEENS	II			
CHARLES POLETTI POWER PROJECT	ASTORIA	QUEENS	II			
NEW ATHENS GENERATING COMPANY, LLC	ATHENS	GREENE	IV			
PECKHAM MATERIALS CORP.	ATHENS	GREENE	IV			
PECKHAM MATERIALS CORP.	ATHENS	GREENE	IV			
ANHEUSER-BUSCH INC	BALDWINSVILLE	ONONDAGA	VII			
COLD SPRINGS TERMINAL LLC	BALDWINSVILLE	ONONDAGA	VII			
SUPREME ENERGY COLD SPRINGS TERMINAL	BALDWINSVILLE	ONONDAGA	VII			
FRANK BROS. FUEL CORP	BAY SHORE	SUFFOLK	I			
SELKIRK YARD	BETHLEHEM	ALBANY	IV			
GRIFFITH ENERGY, INC.	BIG FLATS	CHEMUNG	VIII			
RYAN OIL	BILLINGS	DUTCHESS	III			
BINGHAMTON CO-GENERATION PLANT	BINGHAMTON	BROOME	VII			
SOUTH FORK TERMINAL	BRIDGEHAMPTON	SUFFOLK	I			
OKAR EQUIPMENT CO. INC.	BROCKPORT	MONROE	VIII			
FRED M. SCHILDWACHTER & SONS, INC.	BRONX	BRONX	II		Marine	Marine
CO-OP CITY POWER PLANT	BRONX	BRONX	II			
TWIN PINES FUELS, L.L.C.	BRONX	BRONX	II			

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
BAYSIDE FUEL OIL DEPOT CORP.	BROOKLYN	KINGS	II			
BAYSIDE FUEL OIL DEPOT CORP.	BROOKLYN	KINGS	II			
BAYSIDE FUEL OIL DEPOT CORP.	BROOKLYN	KINGS	II			
BAYSIDE FUEL OIL DEPOT CORP.	BROOKLYN	KINGS	II			
HUDSON AVENUE GENERATING STATION TANK FARM	BROOKLYN	KINGS	II			
NARROWS GAS TURBINES TANK FARM	BROOKLYN	KINGS	II			
NORTH FIRST STREET FUEL OIL TERMINAL	BROOKLYN	KINGS	II			
STARRETT CITY TOTAL ENERGY PLANT	BROOKLYN	KINGS	II			
THE REFINERY LLC	BROOKLYN	KINGS	II			
FILL-UP PETROLEUM	CALVERTON	SUFFOLK	I			
METRO TERMINALS OF LONG ISLAND LLC	CALVERTON	SUFFOLK	I			
KINGSTON OIL SUPPLY CORP. - CATSKILL TERMINAL	CATSKILL	GREENE	IV			
R.E. SMITH FUEL CO.DIVISION OF MAIN-CARE	CATSKILL	GREENE	IV			
BUFFALO NIAGARA INT. AIRPORT-AVIATION FUEL FARM	CHEEKTOWAGA	ERIE	IX			
VALLEY OIL COMPANY, INC.	CLAVERACK	COLUMBIA	IV			
SKAGGS-WALSH, INC.	COLLEGE POINT	QUEENS	II			
CORTLAND ASPHALT PRODUCTS	CORTLAND	CORTLAND	VII			
POLKVILLE ASPHALT STORAGE FACILITY	CORTLANDVILLE	CORTLAND	VII			
MEENAN OIL COMPANY, L.P.	Courtland	Cortland	VII			
GEORGE M. TAYLOR & SON, INC.	DOVER PLAINS	DUTCHESS	III			
SCHENCK FUELS	EAST HAMPTON	SUFFOLK	I			
HURON REAL ESTATE ASSOCIATES LLC	ENDICOTT	BROOME	VII			
FAR ROCKAWAY POWER STATION	FAR ROCKAWAY	QUEENS	II			
OWENS CORNING, DELMAR PLANT	FEURA BUSH	ALBANY	IV			
ALLIED AVIATION COMPANY OF NEW YORK, INC.	FLUSHING	QUEENS	II	142,857		
LEFFERTS OIL TERMINAL, INC.	FLUSHING	QUEENS	II			
ENVIRONMENTAL DIVISION	FORT DRUM	JEFFERSON	VI			
FREEPORT ELECTRIC, POWER PLANT #2	FREEPORT	NASSAU	I			
SUNOCO FULTON ETHANOL PLANT	FULTON	OSWEGO	VII			
WINDSOR FUEL CO., INC.	GLEN COVE	NASSAU	I			
BETHLEHEM ENERGY CENTER	GLENMONT	ALBANY	IV			
GLENWOOD GAS INTERNAL	GLENWOOD	NASSAU	I			

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
COMBUSTION SITE	LANDING					
GLENWOOD GAS TURBINE SITE	GLENWOOD LANDING	NASSAU	I			
COMMANDER OIL CORP.	GREAT NECK	NASSAU	I			
SLOMINS INC.	HICKSVILLE	NASSAU	I			
TBG COGEN PARTNERS	HICKSVILLE	NASSAU	I			
IBM EAST FISHKILL	HOPEWELL JUNCTION	DUTCHESS	III			
E.F. BARRETT POWER STATION	ISLAND PARK	NASSAU	I			
CORNELL UNIVERSITY, CENTRAL HEATING PLANT	ITHACA	TOMPKINS	VII			
ALLIED NEW YORK SERVICES, INC.	JAMAICA	QUEENS	II	571,429		
PETRO, INC.	KINGS PARK	SUFFOLK	I			
KINGSTON POINT TERMINAL, INC.	KINGSTON	ULSTER	III			
GM COMPONENTS HOLDINGS, LLC	LOCKPORT	NIAGARA	IX			
RAVENSWOOD GENERATING STATION	Long Island City	QUEENS	II			
MIDLAND ASPHALT MATERIALS, INC.	LYONS	WAYNE	VIII			
SCLAFANI PETROLEUM, INC.	MAHOPAC	PUTNAM	III			
MOHAWK HOME COMFORT SERVICES	MARCY	ONEIDA	VI			
ALCOA, INC.	MASSENA	ST LAWRENCE	VI			
WESTERN NEW YORK ENERGY, LLC	MEDINA	ORLEANS	VIII			
NEW HYDE PARK OIL TERMINAL, INC	NEW HYDE PARK	NASSAU	I			
STEWART INTERNATIONAL AIRPORT	NEW WINDSOR	ORANGE	III			
EAST RIVER GENERATING STATION	NEW YORK	NEW YORK	II			
GOLDWATER MEMORIAL HOSPITAL	NEW YORK	NEW YORK	II			
DYNEGY DANSKAMMER GENERATING STATION	NEWBURGH	ORANGE	III			
DYNEGY ROSETON GENERATING STATION	NEWBURGH	ORANGE	III			
NYANG, 105TH AIRLIFT WING (105AW)	NEWBURGH	ORANGE	III			
NORTHPORT POWER STATION	NORTHPORT	SUFFOLK	I			
E.F. BARRETT GAS TURBINE SITE	OCEANSIDE	NASSAU	I			
SUNY ONEONTA	ONEONTA	OTSEGO	IV			
PLUM ISLAND ANIMAL DISEASE CENTER	ORIENT POINT	SUFFOLK	I			
PARADISE HEATING OIL, INC.	OSSINING	WESTCHESTER	III			
NOVELIS CORP	OSWEGO	OSWEGO	VII			
OSWEGO HARBOR POWER	OSWEGO	OSWEGO	VII			

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
SOUTH OSWEGO TERMINAL	OSWEGO	OSWEGO	VII			
LOCKHEED MARTIN MISSION SYSTEMS & SENSORS OWEGO	OWEGO	TIOGA	VII			
SWEZEY FUEL CO., INC.	PATCHOGUE	SUFFOLK	I			
WYETH PHARACEUTICALS	PEARL RIVER	ROCKLAND	III			
MEENAN OIL CO., LP	PEEKSKILL	WESTCHESTER	III			
GRIFFITH OIL TERMINAL	PLATTSBURGH	CLINTON	V		Marine, Truck	Marine, Truck
WESTMORE FUEL CO. NORTH	PORT CHESTER	WESTCHESTER	III			
KINGSTON OIL SUPPLY CORP.	PORT EWEN	ULSTER	III			
PORT JEFFERSON POWER STATION	PORT JEFFERSON	SUFFOLK	I			
EFFRON FUEL OIL CO.DIV. OF MEENAN OIL CO.,L.P.	POUGHKEEPSIE	DUTCHESS	III			
DUTCHESS TERMINAL INC	POUGHKEEPSIE	DUTCHESS	III			
IBM CORPORATION	POUGHKEEPSIE	DUTCHESS	III			
EMPIRE GENERATING PROJECT	RENSSELAER	RENSSELAER	IV			
GORMAN TERMINALS LLC	RENSSELAER	RENSSELAER	IV			
RENSSELAER MAINTENANCE FACILITY	RENSSELAER	RENSSELAER	IV			
EASTMAN KODAK COMPANY	ROCHESTER	MONROE	VIII			
GRIFFITH ENERGY, INC.	ROCHESTER	MONROE	VIII			
GRIFFISS UTILITY SERVICE CORPORATION	ROME	ONEIDA	VI			
GENERAL ELECTRIC COMPANY	SCHENECTADY	SCHENECTADY	IV			
MOHAWK ASPHALT EMULSIONS, INC.	SCOTIA	SCHENECTADY	IV			
SELKIRK COGENERATION PROJECT	SELKIRK	ALBANY	IV			
SHOREHAM ELECTRIC GENERATING STATION	SHOREHAM	SUFFOLK	I			
SHOREHAM ENERGY, LLC	SHOREHAM	SUFFOLK	I			
WADING RIVER GENERATING STATION	SHOREHAM	SUFFOLK	I			
SOUTHAMPTON COAL AND PRODUCE COMPANY	SOUTHAMPTON	SUFFOLK	I			
NYCDOT STATEN ISLAND FERRY	STATEN ISLAND	RICHMOND	IX			
SUNY AT STONY BROOK	STONY BROOK	SUFFOLK	I			
PANCO PETROLEUM COMPANY	STONY POINT	ROCKLAND	III			
LANDMARK AVIATION SYRACUSE MAIN FUEL FARM	SYRACUSE	ONONDAGA	VII			
INTERNATIONAL PAPER	TICONDEROGA	ESSEX	V			
LOVETT GENERATING STATION	TOMKINS	ROCKLAND	III			

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
	COVE					
MIDLAND ASPHALT MATERIALS, INC.	TONAWANDA	ERIE	IX			
BROOKHAVEN NATIONAL LABORATORY	UPTON	SUFFOLK	I			
DEFENSE FUEL SUPPORT POINT VERONA	VERONA	ONEIDA	VI			
MEENAN OIL CO., L.P.	WANTAGH	NASSAU	I			
NEW HAMBURG TERMINAL CORP.	WAPPINGERS FALLS	DUTCHESS	III			
MPM SILICONES, LLC	waterford	SARATOGA	V			
WATERVLIET ARSENAL	WATERVLIET	ALBANY	IV			
HERITAGENERGY, WAWARSING FACILITY	WAWARSING	ULSTER	III			
NATIONAL GRID WEST BABYLON GT SITE	WEST BABYLON	SUFFOLK	I			
BOWLINE PT. GENERATING STATION	WEST HAVERSTRAW	ROCKLAND	III			
GENERAL TERMINALS	WEST ISLIP	SUFFOLK	I			
UNITED STATES MILITARY ACADEMY (USMA)	WEST POINT	ORANGE	III			
HART'S FUEL SERVICE, INC.	WYNANTSKILL	RENSSELAER	IV			
CAITHNESS LONG ISLAND ENERGY CENTER	YAPANK	SUFFOLK	I			
AMERICAN SUGAR REFINING, INC.	YONKERS	WESTCHESTER	III			

Table B-3: Primary Terminals in Northern New Jersey

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
Hess Corporation	Bayonne	Hudson	N/A	1,689,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
IMTT	Bayonne	Hudson	N/A	15,400,000	Pipeline, Marine, Rail, Truck	Pipeline, Marine, Rail, Truck
BP Products North America, Inc.	Carteret	Middlesex	N/A	1,445,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Kinder Morgan Liquids Terminals LLC	Carteret	Middlesex	N/A	7,862,912	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Hess Corporation	Edgewater	Bergen	N/A	608,000	Marine, Truck	Marine, Truck
Allied Aviation Services	Elizabeth	Union	N/A			
CITGO Petroleum Corporation	Linden	Union	N/A	3,669,250	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Phillips 66	Linden	Union	N/A		Pipeline, Marine, Truck	Pipeline, Marine, Truck
Phillips 66	Linden	Union	N/A			
Gulf Oil, Limited Partnership	Linden	Union	N/A	568,374	Pipeline, Truck	Pipeline, Truck

Terminal Name	City	County	DEC Region	Total Capacity (bbl)	Receipt Methods	Outload Methods
NuStar Energy LP	Linden	Union	N/A	365,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
NuStar Energy LP	Linden	Union	N/A	4,116,000	Pipeline, Marine	Pipeline, Marine
Center Point Terminal Newark, LLC	Newark	Essex	N/A	1,018,300	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Getty Terminals Corp.	Newark	Essex	N/A	237,881	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Hess Corporation	Newark	Essex	N/A	611,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Motiva Enterprises LLC	Newark	Essex	N/A	1,113,000	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Sunoco Logistics Partners L.P.	Newark	Essex	N/A	505,457	Pipeline, Marine, Truck	Pipeline, Marine, Truck
Chevron Products Company	Perth Amboy	Middlesex	N/A	2,700,000	Marine, Rail, Truck	Marine, Rail, Truck
Hess Corporation	Perth Amboy	Middlesex	N/A	4,995,921	Pipeline, Marine	Pipeline, Marine
Kinder Morgan Liquids Terminals LLC	Perth Amboy	Middlesex	N/A	3,552,908	Pipeline, Marine, Rail	Pipeline, Marine, Rail
Sunoco Logistics Partners L.P.	Piscataway	Middlesex	N/A	91,127	Pipeline, Truck	Pipeline, Truck
BP Products North America, Inc.	Port Newark	Union	N/A		Pipeline, Marine, Truck	Pipeline, Marine, Truck
Hess Corporation	Port Reading	Middlesex	N/A	5,961,000	Pipeline, Marine, Rail, Truck	Pipeline, Marine, Rail, Truck
Motiva Enterprises LLC	Sewaren	Middlesex	N/A	5,000,000	Pipeline, Marine, Rail, Truck	Pipeline, Marine, Rail, Truck

Appendix C: Details on Cleaning and Re-Activation of Tanks

In order to turn over tanks previously used to store and transport high-sulfur DFO to store ULSD or low-sulfur heating oil, tank-cleaning is required. This section briefly illustrates this process. This process would vary depending on the product previously stored in the tank and what product the owner plans to store in the tank. After preliminary preparation procedures such as examining the history of products stored in the tank (i.e. determining whether it previously contained leaded products or was cleaned and certified lead-free), obtaining entry permits to enter the tank for cleaning, and removal of products and sources of ignition from the designated tank for cleaning, water or distillate fuel may be injected into the tank through fixed connections to float residues out of the tank. These residues are then isolated from all piping connected to the tank by closing valves nearest the tank and then inserting blinds in pipes on the tank side of the valve to prevent vapors from entering the tank from the lines.

In cone-shaped, fixed-roof tanks, a portable ventilator situated at a hatch on the top of the tank is set at high-speed to draw air and vapors through an opened hatch at the bottom of the tank. Vapors, if any, are then either collected through a vertical tube located at the bottom hatch or directed to a vapor recovery system, if the latter is deemed necessary. Remaining residue in the tank can be washed down or removed through the open bottom hatch using water and suction hoses. In tanks that previously stored sour crude or high-sulfur residual products, the inside of the tank should be kept wet to blanket the residue from air and prevent spontaneous heat and ignition of the residue. Once monitoring of vapors at the point of ventilation indicates that the flammable vapor level in the tank is safe for entry or is below the level established by regulatory agencies or company policies, personnel authorized with an entry permit and equipped with air-supplied respiratory protection can enter the tank for inspection. Tank inspectors are tasked with assessing physical hazards such as falling roofs, weak supports, or holes in the tank floor.

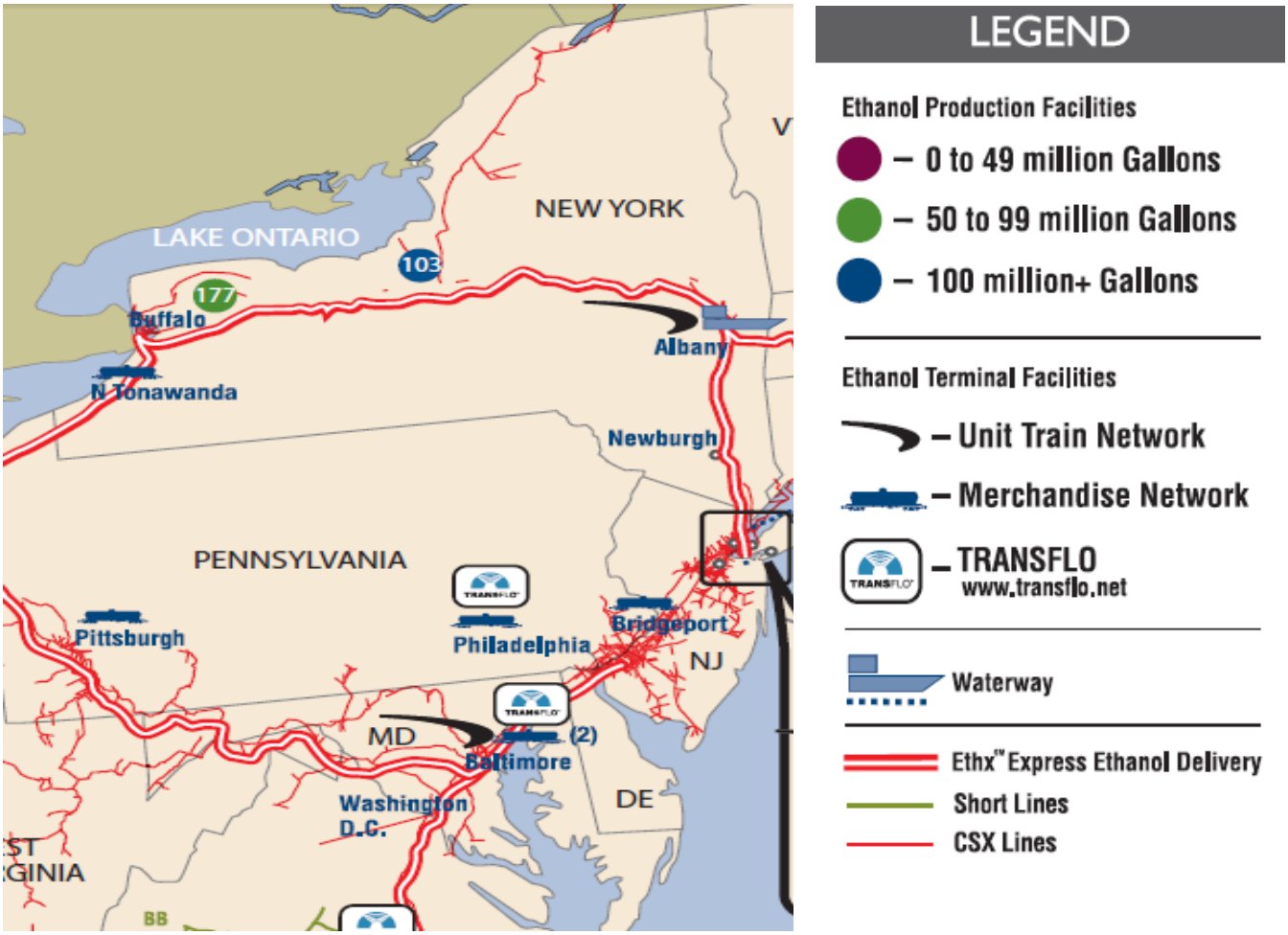
Cleaning of the tank by authorized personnel for entry can also commence at this stage of the tank conversion process, although the level of oxygen and flammable vapors continues to be monitored. Any exceedance of the accepted level for entry into the tank would result in immediate removal of personnel and expiration of the entry permit. Once the tank has been cleaned and dried, final inspection, testing, and any permit issuance for repair work would then be underway. Blast cleaning, painting the outside of the tank, and returning the tank back into service are the remaining steps. The latter involves closing hatches, removing blinds, connecting removed piping to the tank, unlocking, opening, and aligning valves, and reactivating mechanical and electrical devices. Tanks are hydrostatically tested to detect leaks, and then emptied and readied for receipt of product.[230]

[230] Kraus, Richard S. “Storage and transportation of crude oil, natural gas, liquid petroleum products and other chemicals.” Storage. Encyclopedia of Occupational Health and Safety. Fourth edition. International Labor Organization. 1998. http://www.ilo.org/safework_bookshelf/english?content&nd=857171254

Appendix D: CSX's Ethanol Transportation Infrastructure in NYS

CSX, one of the primary Class I rail lines supplying the NYS ethanol market from the Midwest, operates facilities around the State, as well as in northern New Jersey through a combination of unit trains, manifest rail cars, transloading rail-to-truck systems, and tanker trucks. Exhibit D-1 illustrates CSX's transportation infrastructure in NYS and New Jersey.

Exhibit D-1: CSX's Ethanol Transportation Infrastructure in NYS

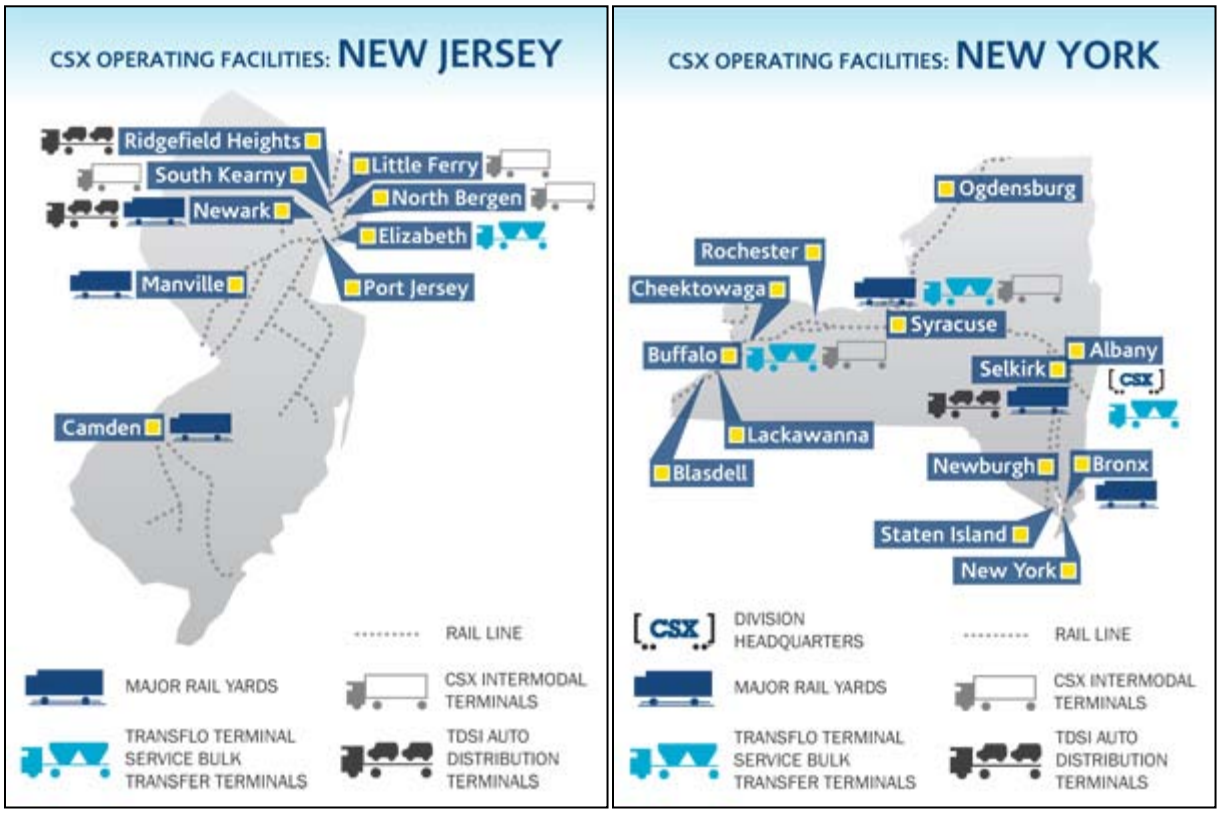


Source: CSX Corporation. "CSX Ethanol Production and Distribution." CSX, 2012: Jacksonville, FL. Available at: http://www.csx.com/share/wwwcsx_mura/assets/File/Customers/Commodities/Agricultural_Products/EthxMap2008Rsg2WEBmap.pdf

Note: 103: Sunoco (formerly Northeast Biofuels) ethanol production facility in Volney, NY; 177: Western New York Energy ethanol production facility in Shelby, NY. Unit Train Networks in/into NYS: 1) Buckeye (formerly Logibio and Cibro Petroleum) Albany Terminal in Albany, NY; 2) Motiva Enterprises Terminal in Sewaren, NJ; and 3) Motiva Enterprises Terminal in Linden, NJ.

Exhibit D-2 illustrates the freight transportation network for CSX. The NYS and northern New Jersey network includes a combination of rail lines, rail-to-truck trans-loading facilities, tanker trucks, and distribution terminals. In addition to ethanol, products shipped include passenger vehicles, municipal and construction waste, coal, wheat, and perishable food products.[231]

Exhibit D-2: CSX Operating Facilities in New Jersey and NYS



Source: CSX. "CSX and New Jersey" and "CSX and New York State." CSX Corporation, 2010: Jacksonville, FL. Available at: http://www.csx.com/index.cfm/about-csx/company-overview/state-fact-sheets/new-jersey/?keywords=ethanol and http://www.csx.com/index.cfm/about-csx/company-overview/state-fact-sheets/new-york/?keywords=ethanol

[231] CSX. "CSX and New Jersey" and "CSX and New York State." CSX, 2010: Jacksonville, FL. Available at: http://www.csx.com/index.cfm/about-csx/company-overview/state-fact-sheets/new-jersey/?keywords=ethanol and http://www.csx.com/index.cfm/about-csx/company-overview/state-fact-sheets/new-york/?keywords=ethanol

Appendix E: Fuel Stations in NYS by DEC Region and County

Table E-1: Publicly Accessible Gasoline and Alternative Fueling Stations in NYS

DEC Region	Conventional Gasoline*	E85	LPG	Natural Gas^	Biodiesel+
DEC Region 1					
Nassau County	402	4	2	3	
Suffolk County	470	21	5	8	
Region 1 Total	**872**	**25**	**7**	**11**	**0**
DEC Region 2					
Bronx County	98			1	1
Kings County	210			2	
NYS County	69			2	
Queens County	268	1		3	
Richmond County	47			1	
Region 2 Total	**692**	**1**	**0**	**9**	**1**
DEC Region 3					
Dutchess County	107			1	
Orange County	122	4			
Putnam County	44		1		
Rockland County	58	2			1
Sullivan County	44		1		
Ulster County	93		1		
Westchester County	299	5		2	3
Region 3 Total	**767**	**11**	**3**	**3**	**4**
DEC Region 4					
Albany County	92	6	2	2	
Columbia County	34				
Delaware County	38				
Greene County	32		1		
Montgomery County	31		2		
Otsego County	40				1
Rensselaer County	60		2		1
Schenectady County	64	3		1	
Schoharie County	19	1			
Region 4 Total	**410**	**10**	**7**	**3**	**2**
DEC Region 5					
Clinton County	63				
Essex County	28				
Franklin County	29		1		
Fulton County	22				
Hamilton County	9				
Saratoga County	87	3			
Warren County	42	2			
Washington County	27				
Region 5 Total	**307**	**5**	**1**	**0**	**0**
DEC Region 6					
Herkimer County	21				
Jefferson County	59				
Lewis County	15				
Oneida County	79		1	1	
St. Lawrence County	58				

DEC Region	Conventional Gasoline*	E85	LPG	Natural Gas^	Biodiesel+
DEC Region 6 (cont.)					
Region 6 Total	**232**	**0**	**1**	**1**	**0**
DEC Region 7					
Broome County	91	1		1	
Cayuga County	28				
Chenango County	31				
Cortland County	18				
Madison County	20				
Onondaga County	142			3	
Oswego County	59				
Tioga County	22				
Tompkins County	30		2		
Region 7 Total	**441**	**1**	**2**	**4**	**0**
DEC Region 8					
Chemung County	37				
Genesee County	32				
Livingston County	33				
Monroe County	209	9		1	
Ontario County	41		2		
Orleans County	18				
Schuyler County	12				
Seneca County	16				
Steuben County	56				
Wayne County	42	1			
Yates County	9		1		
Region 8 Total	**505**	**10**	**3**	**1**	**0**
DEC Region 9					
Allegany County	26				
Cattaraugus County	30		1		
Chautauqua County	56	1		1	
Erie County	256	3	3	2	
Niagara County	64	2	1	1	
Wyoming County	20				
Region 9 Total	**452**	**6**	**5**	**4**	**0**
Total	**4,678**	**69**	**29**	**36**	**7**

Source: DOE. "Alternative Fueling Stations." 9 Mar 2012. Available at: http://www.afdc.energy.gov/afdc/fuels/stations.html

** Gasoline Stations at 4471 NAICS Level. Source: U.S. Census Bureau. "County Business Patterns." 28 Feb 2012. Available at: http://www.census.gov/econ/cbp/.*

+ Includes only stations dispensing biodiesel blends of B20 or greater.

^ All operational natural gas stations as of March 2012 dispense compressed natural gas (CNG). Two planned public access liquefied natural gas (LNG) stations are included in the public station count.

Table E-2: Privately Accessible Alternative Fueling Stations in NYS

DEC Region	E85	LPG	Natural Gas	Biodiesel+
DEC Region 1				
Nassau County			8	3
Suffolk County	1		4	5
Region 1 Total	**1**	**0**	**12**	**8**
DEC Region 2				
Bronx County			3	
Kings County			3	
NYS County	2		1	1
Queens County	2		2	
Richmond County	1			
Region 2 Total	**5**	**0**	**9**	**1**
DEC Region 3				
Dutchess County			1	
Orange County	2		4	
Putnam County				
Rockland County	1			1
Ulster County			2	
Westchester County			1	1
Region 3 Total	**3**	**0**	**8**	**2**
DEC Region 4				
Albany County	1		2	
Columbia County			1	
Delaware County			1	
Montgomery County			1	
Otsego County			1	
Rensselaer County		1	1	
Schoharie County		1	1	
Region 4 Total	**1**	**2**	**8**	**0**
DEC Region 5				
Clinton County			1	
Saratoga County		1	2	
Warren County				
Washington County			2	
Region 5 Total	**0**	**1**	**5**	**0**
DEC Region 6				
Jefferson County			2	
Oneida County			3	
St. Lawrence County			1	
Region 6 Total	**0**	**0**	**6**	**0**
DEC Region 7				
Cayuga County			1	
Chenango County			2	
Madison County			1	
Onondaga County	1		1	
Oswego County			1	
Tioga County			1	
Region 7 Total	**1**	**0**	**7**	**0**
DEC Region 8				
Chemung County		1	1	
Monroe County	1	1	4	

DEC Region	E85	LPG	Natural Gas	Biodiesel+
DEC Region 8 (cont.)				
Ontario County			2	
Seneca County			1	
Steuben County			2	
Wayne County			1	
Region 8 Total	**1**	**2**	**11**	**0**
DEC Region 9				
Allegany County			1	
Cattaraugus County			1	
Chautauqua County			1	
Erie County	1		5	
Niagara County			2	
Region 9 Total	**1**	**0**	**10**	**0**
Total	**13**	**5**	**76**	**11**

Source: DOE. "Alternative Fueling Stations." 9 Jul 2012. Available online at: http://www.afdc.energy.gov/afdc/fuels/stations.html

+ Includes only stations dispensing biodiesel blends of B20 or greater.

Note: Counties with no alt fuel stations - Sullivan County (DEC 3); Greene and Schenectady Counties (DEC 4); Essex, Franklin, Fulton, and Hamilton Counties (DEC 5); Herkimer and Lewis Counties (DEC 6); Broome, Cortland, and Tompkins Counties (DEC 7); Genesee, Livingston, Orleans, Schuyler and Yates Counties (DEC 8); and Wyoming County (DEC 9)

Appendix F: Main U.S. Northeast Ports for Domestic Imports of Clean Petroleum Products and Their Restrictions

Table F-1: Main Ports in the U.S. Northeast for Domestic Petroleum Imports

State	Port	Terminal Name	Terminal Owner	Terminal Operator	Berth Type	Tidal Restrictions	Max Deadweight, tons	Max Length Overall (LOA), feet	Min Length Overall (LOA), feet	Air Draught, feet	Max Beam in Width, feet	Max Draft at Approaches, feet
CT	Bridgeport	MOTIVA	Motiva Enterprises LLC	Motiva Enterprises LLC	OIL	Yes	45,000	640	0	0	110	33
CT	Bridgeport	UNITED ILLUMINATING			OIL	No	66,040	736	0	0	102	27
CT	Bridgeport	SHELL TERMINAL	SHELL	SHELL	OIL	No	40,000	699	0	0	110	38
CT	New Haven	GATEWAY NEW HAVEN	Gateway Terminal	Gateway Terminal	OIL	Yes	70,000	735	-	0	110	36
CT	New Haven	GULF OIL TERMINAL	Gulf	Gulf	OIL	Yes	48,000	725	-	0	98	35
CT	New Haven	NEW HAVEN TERMINAL			OIL	Yes	37,000	660	-	0	106	31
CT	New Haven	NEW HAVEN TERMINAL			OIL	Yes	40,000	660	0	0	150	32
CT	New Haven	MAGELLAN (EX - WILLIAMS)	Magellan	Magellan	OIL	Yes	40,000	700	-	0	106	36
CT	New Haven	MAGELLAN (EX - WILLIAMS)	Magellan	Magellan	OIL	Yes	40,000	750	-	0	105	36
CT	New Haven	MOTIVA (EX - CARGILL ENERGY)	Motiva	Motiva	CHEMICAL/OIL	Yes	48,000	700	0	0	106	35
DE	Delaware City	DELAWARE BAY	PBF ENERGY	PBF	OIL	No	0	0	0	0	0	55
DE	Delaware City	VALERO (Ex-MOTIVA)			OIL	Yes	142,000	923	0	188	145	32
DE	Delaware City	VALERO (Ex-MOTIVA)			OIL	Yes	100,000	800	0	188	135	31
DE	Delaware City	VALERO (Ex-MOTIVA)			OIL	No	35,000	600	0	188	135	28
DE	Wilmington	MAGELLAN (Ex-SICO)/DELAWARE TERMIN			OIL	Yes	71,120	1,000	0	183	140	37
MA	Boston	AMOCO/NE PET			OIL	No	38,608	660	0	0	85	36
MA	Boston	COASTAL OIL			OIL	Yes	38,608	661	0	0	90	35
MA	Boston	COASTAL OIL			OIL	No	50,800	900	0	0	125	38
MA	Boston	BOSTON EDISON			OIL	Yes	28,448	630	0	0	90	32
MA	Boston	PHILLIPS 66 (Formerly TOSCO)			OIL	Yes	32,000	660	0	0	90	34
MA	Boston	PHILLIPS 66 (Formerly TOSCO)			OIL	Yes	40,462	630	0	0	106	36
MA	Boston	CITGO			OIL	Yes	28,000	660	0	0	106	36
MA	Boston	GULF			OIL	Yes	28,448	660	0	0	90	30
MA	Boston	GLOBAL PETROLEUM (IRVING)			OIL	Yes	36,000	700	0	0	106	35
MA	Boston	GLOBAL PETROLEUM (IRVING)			OIL	Yes	38,000	660	0	0	90	36
MA	Boston	PRESIDENT ROADS			OIL	No	0	0	0	0	0	40
MA	Boston	QUINCY			OIL	Yes	35,000	680	0	0	106	35
MD	Piney Point	NUSTAR (EX - STEWART PETROLEUM)	NUSTAR	NUSTAR	OIL	Yes	76,200	850	-	-	130	36
ME	Portland	GLOBAL (EX NEPCO Ex AMOCO)			CHEMICAL/OIL	Yes	50,000	690	0	0	106	38
ME	Portland	GULF (Ex Chevron)			OIL	Yes	0	750	0	0	106	36
ME	Portland	BP OIL TERMINAL			OIL	No	42,000	700	0	-	93	33
ME	Portland	EXXONMOBIL	ExxonMobil	ExxonMobil	CHEMICAL/OIL	Yes	0	730	270	0	120	37

State	Port	Terminal Name	Terminal Owner	Terminal Operator	Berth Type	Tidal Restrictions	Max Deadweight, tons	Max Length Overall (LOA), feet	Min Length Overall (LOA), feet	Air Draught, feet	Max Beam in Width, feet	Max Draft at Approaches, feet
ME	Portland	PORTLAND PIPELINE			CHEMICAL/OIL	Yes	170,000	960	500	0	175	51
ME	Portland	PORTLAND PIPELINE			OIL	Yes	170,000	960	500	0	175	51
ME	Portland	CITGO (EX. MOTIVA)			OIL	Yes	42,000	720	0	0	106	34
ME	Portland	SPRAGUE ENERGY			OIL	Yes	47,000	700	0	0	106	35
ME	Searsport	SPRAGUE TANKER			OIL	No	60,000	700	0	-	106	35
ME	Searsport	BANGOR AND AROOSTOOK			CHEMICAL/OIL	No	40,000	700	0	-	100	34
NH	Portsmouth	FUEL STORAGE NEWINGTON (DORCHESTER)			CHEMICAL/OIL	Yes	38,608	695	0	130	105	36
NH	Portsmouth	NORTHEAST PET (NEWINGTON)			OIL	Yes	50,800	700	0	130	105	36
NH	Portsmouth	SPRAGUE/ATC			OIL	Yes	45,720	735	0	135	105	34
NH	Portsmouth	SPRAGUE/ATC			OIL	Yes	58,928	695	0	134	105	35
NJ	Paulsboro	VALERO			OIL	No	150,000	-	900	-	-	33
NY	Albany	AGWAY			OIL	No	32,000	500	0	0	100	28
NY	Albany	BRAY/GETTY			OIL	Yes	28,000	630	0	130	90	23
NY	Albany	CIBRO			OIL	Yes	62,000	750	0	130	110	31
NY	Albany	TRANSMONTAIGNE RENSSELAER			OIL	Unknown	50,000	550	0	130	75	29
NY	Albany	EXXONMOBIL			OIL	No	40,000	655	0	133	110	28
NY	Albany	NIAGRA MOHAWK			OIL	Unknown	40,640	700	0	130	95	30
NY	Albany	SEARS			OIL	No	50,000	725	0	133	110	31
NY	Albany	PET.FUEL & TERMINAL / APEX			CHEMICAL/OIL	No	0	699	0	0	100	23
NY	Albany	HESS RENSSELAER			OIL	Yes	0	750	0	134	0	30
NY	Albany	IPT-RENSSELEAR			OIL	Yes	-	600	-	-	100	24
NY	New York	AMOCO			OIL	No	0	399	0	0	0	19
NY	New York	AMOCO			OIL	No	0	199	0	0	0	15
NY	New York	COASTAL (Ex Howard Ross/Belcher)			OIL	Yes	66,040	800	0	212	125	36
NY	New York	COASTAL (Ex Howard Ross/Belcher)			OIL	Yes	0	450	0	212	73	24
NY	New York	ASTORIA	Castle Oil	Castle Oil	OIL	Yes	50,800	600	0	126	0	35
NY	New York	ASTORIA	Castle Oil	Castle Oil	OIL	Yes	109,728	1,001	0	126	150	30
NY	New York	CHEVRON PERTH AMBOY	Chevron USA., Inc.	Chevron USA., Inc.	OIL	Yes	110,000	850	0	138	150	37
NY	New York	PHILLIPS 66 TREMLEY POINT (EX CITGO)			CHEMICAL/OIL	Yes	50,800	700	0	135	105	36
NY	New York	PHILLIPS 66 TREMLEY POINT (EX CITGO)			OIL	Yes	0	405	0	135	115	28
NY	New York	BP/COASTAL			OIL	Yes	55,880	800	0	144	140	31
NY	New York	CON EDISON			CHEMICAL/OIL	Yes	81,280	830	0	123	125	34
NY	New York	EXXONMOBIL BAYONNE			CHEMICAL/OIL	Yes	50,000	640	400	212	120	25
NY	New York	KINDER MORGAN CARTERET			CHEMICAL/OIL	Yes	41,000	760	0	133	112	31

NY	New York	KINDER MORGAN CARTERET			CHEMICAL/OIL	Yes	0	415	0	130	112	24

State	Port	Terminal Name	Terminal Owner	Terminal Operator	Berth Type	Tidal Restrictions	Max Deadweight, tons	Max Length Overall (LOA), feet	Min Length Overall (LOA), feet	Air Draught, feet	Max Beam in Width, feet	Max Draft at Approaches, feet
NY	New York	GATX	GATX	GATX	OIL	Yes	40,640	750	0	130	85	33
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	CHEMICAL/OIL	Yes	0	400	0	0	0	16
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	OIL	Yes	0	400	0	0	0	18
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	OIL	Yes	30,000	660	0	0	85	24
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	CHEMICAL/OIL	Yes	35,560	650	0	138	0	28
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	CHEMICAL/OIL	Yes	0	699	0	0	105	24
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	OIL	Yes	100,000	900	0	212	0	33
NY	New York	HESS	Amerada Hess-Hudson River	Amerada Hess-Hudson River	OIL	Yes	96,520	900	0	145	0	33
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	OIL	Yes	0	350	0	212	130	15
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	CHEMICAL/OIL	Yes	0	375	0	212	110	21
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	CHEMICAL/OIL	Yes	50,000	650	0	212	93	28
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	OIL	Yes	0	510	0	212	80	30
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	OIL	Yes	0	400	0	212	130	16
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	OIL	Yes	50,000	700	0	212	115	35
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	OIL	Yes	130,000	875	0	212	0	44
NY	New York	I.M.T.T. BAYONNE	IMTT Corp	IMTT Corp	OIL	Yes	60,000	750	0	146	0	38
NY	New York	CASTLE	Castle Oil	Castle Oil	OIL	Yes	100,000	899	0	135	150	35
NY	New York	VALERO LINDEN			OIL	Yes	50,000	750	0	130	115	35
NY	New York	KINDER MORGAN (Ex STOLTHAVEN)			OIL	Yes	80,000	1,000	0	143	0	33
NY	New York	KINDER MORGAN (Ex STOLTHAVEN)			OIL	Yes	0	400	0	143	0	20
NY	New York	MOTIVA-SHELL SEWAREN			OIL	Yes	40,000	700	100	135	106	30
NY	New York	MOTIVA-SHELL SEWAREN			OIL	Yes	80,000	801	125	135	135	32
NY	New York	MOTIVA-SHELL SEWAREN			OIL	Yes	80,000	801	125	135	135	32
NY	New York	STAPLETON			OIL	No	0	0	0	212	0	45
NY	New York	PHILLIPS 66 (EXBAYWAY/TOSCO)			CHEMICAL/OIL	Yes	150,000	810	0	135	131	37
NY	New York	PHILLIPS 66 (EXBAYWAY/TOSCO)			OIL	No	150,000	1,000	0	-	150	36
NY	New York	I.M.T.T. CON HOOK	IMTT Corp	IMTT Corp	OIL	Yes	130,000	930	218	212	150	45
NY	New York	I.M.T.T. CON HOOK	IMTT Corp	IMTT Corp	OIL	Yes	90,000	832	0	212	150	38
NY	New York	I.M.T.T. CON HOOK	IMTT Corp	IMTT Corp	OIL	Yes	90,000	700	0	212	125	35
NY	New York	I.M.T.T. CON HOOK	IMTT Corp	IMTT Corp	OIL	No	0	320	0	212	0	22
NY	New York	KMI STATEN ISLAND (Ex: PORT MOBIL)			OIL	No	50,000	650	0	135	0	25
NY	New York	KMI STATEN ISLAND (Ex: PORT MOBIL)			OIL	Yes	50,000	650	0	135	125	23

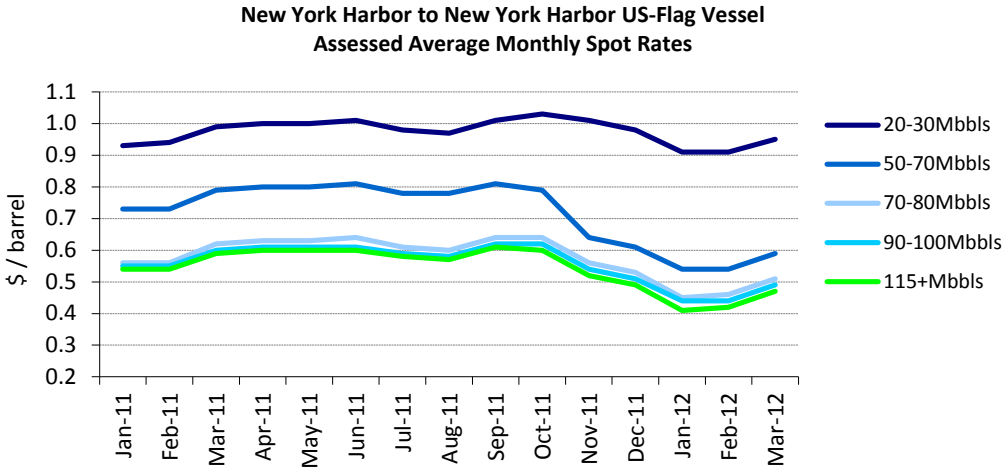
State	Port	Terminal Name	Terminal Owner	Terminal Operator	Berth Type	Tidal Restrictions	Max Deadweight, tons	Max Length Overall (LOA), feet	Min Length Overall (LOA), feet	Air Draught, feet	Max Beam in Width, feet	Max Draft at Approaches, feet
NY	New York	MOTIVA SHELL BROOKLYN			OIL	Yes	0	400	0	0	0	12
NY	New York	COMMANDER OYSTER BAY			OIL	Yes	0	300	0	0	65	5
NY	New York	TOSCO TREMLEY PT			OIL	Yes	0	445	0	0	60	18
NY	New York	TOSCO TREMLEY PT			CHEMICAL/OIL	Yes	0	500	0	0	0	28
NY	New York	EXXONMOBIL COLD SPRING HARBOR			OIL	Yes	6,000	350	0	0	60	16
NY	New York	GLOBAL TERMINAL (EX:EM GLENWOOD LANDING)			OIL	Yes	6,000	350	0	0	65	10
NY	New York	GLOBAL TERMINAL INWOOD (EX: EXXONMOBIL I)			OIL	Yes	0	350	0	52	65	11
NY	New York	GORDON	Gordon	Gordon	OIL	Unknown	50,000	810	0	212	120	37
NY	New York	MOTIVA-SHELL			OIL	Yes	0	735	0	0	99	17
NY	New York	SUNOCO			OIL	Yes	0	900	0	0	0	16
NY	New York	FEDERAL EPORT (EXCROWN)	Federal Lorco Petroleum LLC	Federal Lorco Petroleum LLC	OIL	Yes	0	550	0	0	85	17
NY	New York	MARINE OIL SERVICE			OIL	No	-	-	-	-	-	-
NY	New York	VALERO			OIL/GAS	No	150,000	900	160	-	-	33
NY	Port Jefferson	KINDER MORGAN - NORTHVILLE			OIL	Yes	35,560	650	0	0	90	35
PA	Philadelphia	SUNOCO PHILADELPHIA REFINERY			OIL	Yes	152,400	1,000	0	183	0	37
PA	Philadelphia	SUNOCO PHILADELPHIA REFINERY			OIL	Yes	81,280	1,000	0	183	0	34
PA	Philadelphia	PAULSBORO (EX - BP) - OUT OF SERVICE			OIL	No	99	325	3	3	3	3
PA	Philadelphia	PAULSBORO (EX - BP) - OUT OF SERVICE			CHEMICAL/OIL	No	99	325	3	3	3	3
PA	Philadelphia	SUNOCO			OIL	Yes	40,000	600	0	131	105	32
PA	Philadelphia	SUNOCO			CHEMICAL/OIL	Yes	65,000	750	0	131	130	32
PA	Philadelphia	SUNOCO			CHEMICAL/OIL	Yes	120,000	1,000	0	183	175	37
PA	Philadelphia	HESS (DELAIR - PENNSAUKEN)			CHEMICAL/OIL	Yes	50,000	750	0	130	0	23
PA	Philadelphia	HESS (DELAIR - PENNSAUKEN)			CHEMICAL/OIL	Yes	100,000	900	0	130	130	40
PA	Philadelphia	KOCH			OIL	Yes	40,640	0	0	183	110	30
PA	Philadelphia	PACIFIC ENERGY (EX - MANTUA)			OIL	Yes	81,280	800	0	183	125	37
PA	Philadelphia	PBF PAULSBORO (EX - VALERO PAULSBORO)			OIL	Yes	280,000	1,100	0	183	0	37
PA	Philadelphia	PBF PAULSBORO (EX - VALERO PAULSBORO)			OIL	No	150,000	900	160	188	-	33
PA	Philadelphia	PBF PAULSBORO (EX - VALERO PAULSBORO)			OIL	Yes	20,000	600	0	183	0	28
PA	Philadelphia	SUNOCO MARCUS HOOK			OIL	Yes	145,000	1,000	0	183	200	40
PA	Philadelphia	SUNOCO MARCUS HOOK			OIL	Yes	35,560	500	0	183	0	32
PA	Philadelphia	SUNOCO MARCUS HOOK			OIL	Yes	50,000	750	0	183	200	36
PA	Philadelphia	SUNOCO MARCUS HOOK			OIL	Yes	80,000	850	0	183	200	38
PA	Philadelphia	MARITANK			OIL	Yes	30,480	675	0	130	0	33

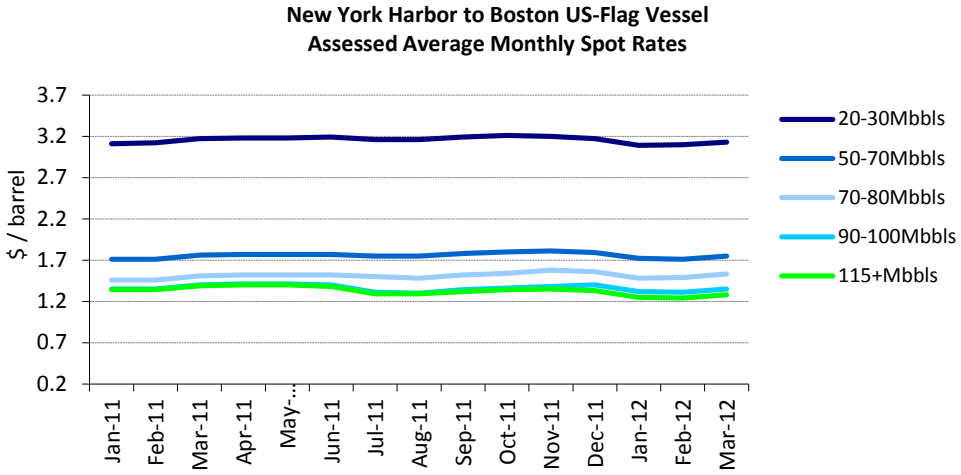
PA	Philadelphia	SUN (Ex COASTAL EL PASO) EAGLE POINT			OIL	Yes	50,000	750	0	183	0	37
State	**Port**	**Terminal Name**	**Terminal Owner**	**Terminal Operator**	**Berth Type**	**Tidal Restrictions**	**Max Deadweight, tons**	**Max Length Overall (LOA), feet**	**Min Length Overall (LOA), feet**	**Air Draught, feet**	**Max Beam in Width, feet**	**Max Draft at Approaches, feet**
PA	Philadelphia	SUN (Ex COASTAL EL PASO) EAGLE POINT			OIL/GAS	Yes	101,600	900	0	183	0	37
PA	Philadelphia	TOSCO (TRAINER)			OIL	No	0	574	0	0	0	30
PA	Philadelphia	TOSCO (TRAINER)			OIL	Yes	150,000	902	0	188	0	34
PA	Philadelphia	TOSCO (TRAINER)			OIL	No	0	574	0	183	0	30
PA	Philadelphia	TOSCO (TRAINER)			OIL	No	0	305	0	183	0	20
PA	Philadelphia	SUNOCO (POINT BREEZE)			OIL	Yes	0	400	0	130	65	32
RI	Providence	CAPITAL WILKES BARRE (JETTY)			OIL	Yes	42,500	811	0	189	106	40
RI	Providence	EXXONMOBIL	EXXONMOBIL	EXXONMOBIL	OIL	Yes	80,000	810	0	197	138	39
RI	Providence	EXXONMOBIL	EXXONMOBIL	EXXONMOBIL	OIL	Yes	0	600	0	197	90	26
RI	Providence	SPRAGUE	Sprague Energy	Sprague Energy	OIL	Yes	40,640	700	0	189	100	32
RI	Providence	MOTIVA ENTERPRISE	Motiva Enterprises	Motiva Enterprises	CHEMICAL/OIL	Yes	40,000	715	0	189	90	39
RI	Providence	MOTIVA ENTERPRISE	Motiva Enterprises	Motiva Enterprises	CHEMICAL/OIL	Yes	40,000	600	0	0	100	24
RI	Providence	CARGILL			OIL	Unknown	-	699	-	194	105	34
RI	Providence	CITGO PTA			OIL	Unknown	-	610	-	194	-	28
RI	Providence	GULF OIL			OIL	Unknown	40,640	676	-	187	98	31
RI	Providence	HUDSON TERMINAL	Hudson Asphalt	Hudson Asphalt	OIL	Unknown	-	699	-	194	82	27
RI	Providence	STAR ENTERPRISE			OIL	Unknown	42,500	712	-	194	89	25
RI	Providence	TEPPCO	Texas Eastern	Texas Eastern	OIL	Unknown	-	709	-	194	-	-
RI	Providence	TEPPCO	Texas Eastern	Texas Eastern	OIL	Unknown	-	699	-	194	-	33
RI	Providence	CAPITAL TERMINAL	Capital Terminals	Capital Terminals	OIL	Unknown	-	797	-	194	197	38

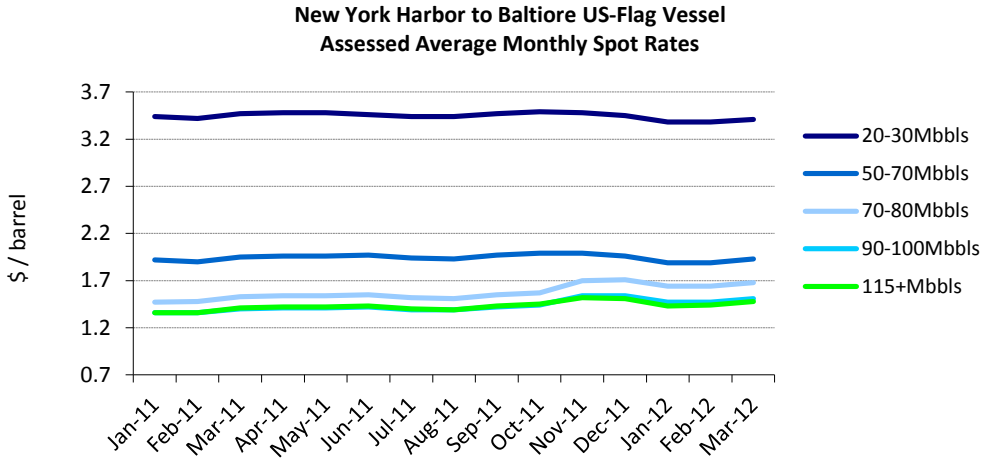
Source: Shipping Guides, Ltd. "World Port Information Online." Shipping Guides, 2012: Surrey: UK. Available at: www.findaport.com

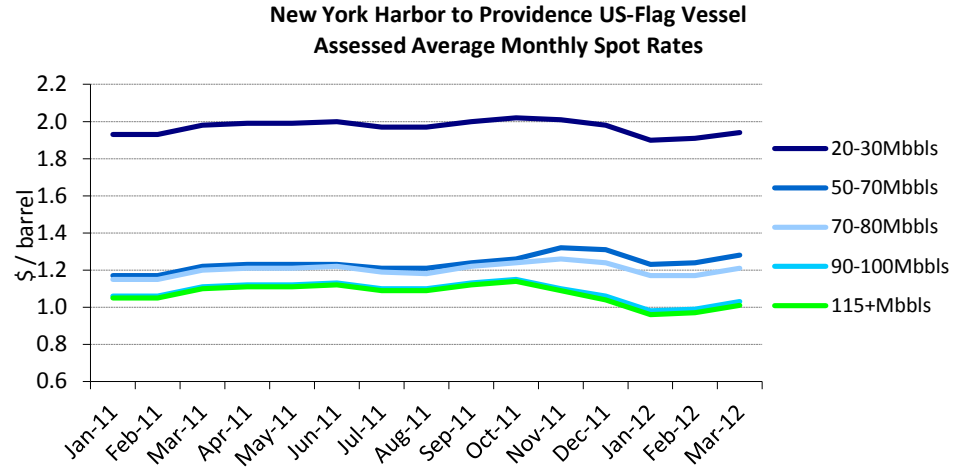
Appendix G: Monthly Rates for Voyages Originating in NYH

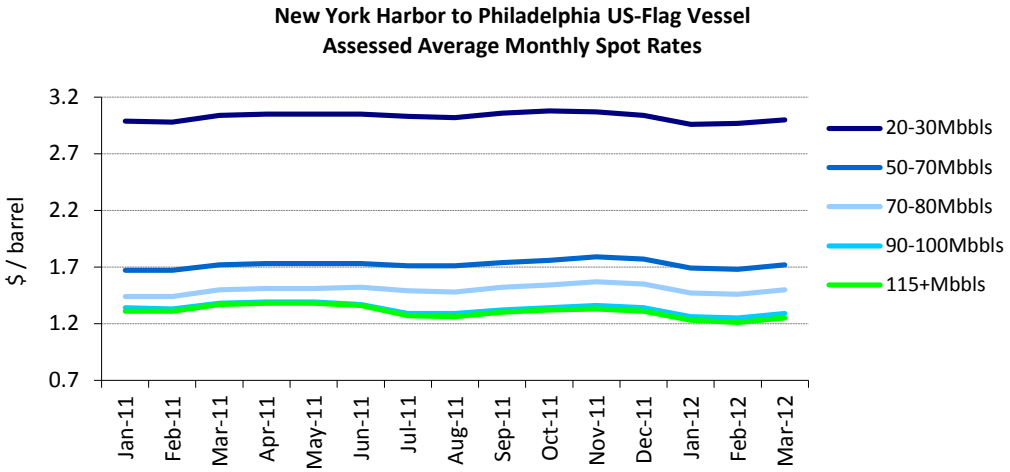
Exhibit G-1: Assessed Spot Average Monthly Rates for Selected Voyages Originating in NYH

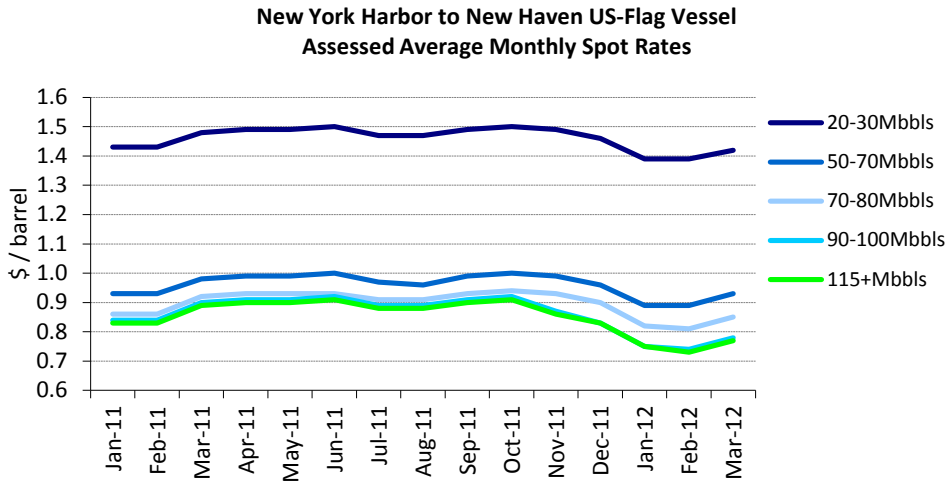












Source: Poten & Partners' US-Flag Desk