REPORT ON PETROLEUM PRODUCTS MARKETS IN THE NORTHEAST

PREPARED FOR THE ATTORNEYS GENERAL OF MAINE, MASSACHUSETTS, NEW HAMPSHIRE, NEW YORK, AND VERMONT

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EXECUTIVE SUMMARY

The states of Maine, Massachusetts, New Hampshire, New York, and Vermont are highly dependent on outside sources for their petroleum needs. This area, home to roughly 10% of the nation's population, does not produce petroleum resources sufficient to satisfy its energy requirements. There are no petroleum refineries situated in Maine, Massachusetts, New Hampshire, New York, or Vermont, and of these states, only New York has crude oil reserves or production (accounting for less than 1% of U.S. crude oil proven reserves and production). Furthermore, of these five states, only New York is connected by pipeline to out-of-state refineries. Nevertheless, Maine, Massachusetts, New Hampshire, New York, and Vermont collectively consume approximately 61 million gallons of petroleum products each day. Regional consumption is not only generated by demand for transportation fuel, but also by the region's dependency on home heating oil for its substantial heating needs. This demand must be met by imports from sources in the United States and from abroad. Ensuring a supply of petroleum products sufficient to meet the region's demand has been and continues to be a chief concern for both federal and state authorities.

The purpose of this report is to examine gasoline and heating oil markets within Maine, Massachusetts, New Hampshire, New York, and Vermont—hereinafter, the "States"—and to develop an accurate understanding of the present and recent history of product distribution, industry participants and market structure. This report examines how and from where petroleum products are transported into the States, how gasoline and home heating oil ultimately make their way to consumers, and how ownership and control of various elements of the supply chains are structured. In addition, the report includes a discussion of the role of futures markets in determining prices. This report has been commissioned by the Attorneys General of Maine, Massachusetts, New Hampshire, New York, and Vermont to provide policy makers and constituents with a better background understanding of petroleum product markets in the States.*

Organization of the Report

Section I provides the reader with background information that will be useful for understanding the discussions and analyses to follow. A brief overview of the petroleum industry is provided, highlighting several major products and describing in general terms the processes by which they are created and distributed to end users. This section introduces the reader to many of the terms and concepts employed throughout the remainder of the report.

In Section II, the report addresses the manner in which major petroleum products are distributed to the States from refineries elsewhere in the U.S. and abroad. The petroleum distribution infrastructure throughout the States is described, with particular attention

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paid to waterway and pipeline shipments of petroleum products to (and within) the States. As will be discussed in greater detail in the text, petroleum products transported into the States arrive at certain terminal locations, and Section III discusses terminal locations, capacities, ownership, and the market structure of the terminalling industry in the States. It includes discussions of measures of market shares held by terminal owners, and the extent of overlap between economic markets served by different terminal centers. Section IV addresses wholesale and retail markets for gasoline within the States. After describing the market structures associated with the provision of wholesale and retail gasoline, this section discusses the distribution of wholesale gasoline from the terminal to the retail outlet. Summary statistics on regional wholesale and retail gasoline prices are discussed. This section also includes a discussion of federal, state, and local regulations that may affect wholesale and retail gasoline markets, such as environmental regulations, state and local excise and sales taxes.

Section V is dedicated to understanding the market for home heating oil. The market structure for retail home heating oil is discussed, and information regarding heating oil prices from 1995 to 2006 is provided. The report examines natural gas as a potential substitute for heating oil, and it highlights certain characteristics of the States that work to prevent natural gas from displacing oil as the primary method by which homes in the area are heated. Section V also presents a discussion of the Northeast Home Heating Oil Reserve and its potential impact on the availability of and prices for home heating oil in the States.

Section VI turns from markets for physical commodities to markets for financial instruments that have a role in the provision of petroleum products to the States. Specifically, Section VI discusses futures markets for crude oil, gasoline, and heating oil. As will be discussed in greater detail below, futures contracts specify the terms of sale for a commodity purchase that happens at some future date. Unlike an option, which gives the participants the right to buy or sell but not the obligation to do so, a futures contract compels the participants to undertake the trade on the date specified, regardless of what might happen to the market price of the commodity in the meantime. Futures contracts are a valuable tool by which purchasers and sellers attempt to shield themselves from the risk associated with the volatility of petroleum product prices, but they can be employed in a purely speculative manner as well. Section VI describes the regulation governing futures contracts for crude oil, gasoline, and heating oil, and it highlights also the presence of non-regulated, "over-the-counter" trades by private parties. We discuss how such transactions could potentially affect the prices for crude oil, gasoline, and heating oil in the States.

The report ends with several concluding remarks and a series of appendices that provide additional information regarding issues discussed in the text. Appendix I contains a glossary of terms employed throughout the report. Technical and ownership details of the petroleum terminals in Maine, Massachusetts, New Hampshire, New York, and Vermont are listed in Appendix II. Market shares for retail gasoline at the county level are provided in Appendix III. Finally, Appendix IV presents data regarding retail heating oil prices, by company and town, throughout the States.

Overall, petroleum markets in the States have functioned relatively smoothly in the recent past. The States completed transition to reformulated fuels relatively easily. State officials have been forward-looking regarding prospective difficulties with adopting new gasoline formulations; working with regional state officials and federal regulators to examine potential sources of supply disruption and potential benefits to regional fuel adoptions. Although the States have experienced nationwide price and output shocks in the recent past (e.g., after the 2005 hurricanes), they have not had localized gasoline price and output shocks as other regions have (e.g., Midwest markets in 2001). Home heating oil markets experienced a shortage and price spike in 2000, prompting the creation of the home heating oil reserve. However, the reserve has not been used, and prices have not displayed systematic excessive volatility relative to the price of crude oil.

<u>Summary of Section II: Petroleum Distribution from Refineries to the States</u>

Petroleum products (which, for the purposes of this report, primarily encompass gasoline and home heating oil) are produced from crude oil extracted from the ground by wells, rigs, or offshore drilling facilities. Crude oil is transported from the well site to refineries, often by pipeline, but also by road, rail, and water-borne tankers and barges. As there are no petroleum refineries in the States, refined petroleum products sold in these states are necessarily imported into the area from facilities elsewhere. Refineries in the Mid-Atlantic, Midwestern, and Gulf Coast regions of the U.S. provide a substantial portion of the refined petroleum products shipped by pipeline into New York, but a large part of the product bound for the States originates from refineries in Canada, Venezuela, and the Virgin Islands. Waterway shipments are of particular importance to each of the States other than Vermont (which has no imports via water), as petroleum products imported via ship or barge amount to approximately 90% of total consumption in the States.[1] Waterway shipments from U.S. ports, Canada, and other foreign countries account for approximately 31%, 15%, and 43%, respectively, of total consumption in the States.

After importation by pipeline, truck, rail, or waterway, refined petroleum products are stored in terminals. According to recent data, there are 161 terminals that distribute refined petroleum products in the States (14 in Maine, 30 in Massachusetts, 7 in New Hampshire, 107 in New York, and 3 in Vermont). The products distributed at these terminals range from jet fuel to gasoline to home heating oil, and different terminals are equipped for the storage and distribution of different types of refined products. After entering the states via pipeline or through a port, refined products are offloaded and stored at major bulk terminals. Product is often shipped from the major terminals through smaller pipelines to regional terminals throughout the states. Regional terminals are equipped with specialized loading stations (or "racks") that load refined products into tanker trucks for distribution to end users such as retail gasoline stations or individual homes in the case of home heating oil. In the case of gasoline, any required oxygenates or special additives used to differentiate one brand from another are often blended into the gasoline in the tank of the delivery truck itself. Other additives are placed into home heating oil in the same manner. Although the names suggest otherwise, home heating oil

[1] Not all waterway imports into the States are consumed in the States—approximately 18% are shipped to other U.S. states.

is essentially identical to diesel fuel. As diesel fuel intended for vehicle operation is taxed at a higher rate than heating oil, however, a method has been developed to try to prevent the illegal use of (less heavily taxed) heating oil in place of (more heavily taxed) diesel fuel in vehicles with diesel engines. Among the additives placed into home heating oil at the tanker truck stage is a red dye that provides an obvious visual clue when individuals attempt to use lower-taxed home heating oil in lieu of higher-taxed diesel fuel for motor vehicle use.

Summary of Section III: Market Structure of Terminals

Terminalling services are an important intermediate market in the production of retail petroleum products since terminals are gateways through which petroleum products enter the States for distribution. As discussed in Section II, refined products are mainly shipped from refineries to different regions of the country via pipeline, water-borne tankers and barges. These refined products are then offloaded into storage tanks at terminalling facilities, and then loaded into tanker trucks through specialized 'racks' for delivery to retailers or end users. Since access to terminalling facilities is necessary for any wholesaler wishing to supply product in a particular geographic area, understanding the ownership and market structure of terminalling facilities is an important component of understanding wholesale gasoline markets.

Section III of the report compiles and presents data from several sources on the locations, ownership and capacities of terminalling facilities in the States. It analyzes data on terminal ownership and capacities, calculating and discussing regional measures of market structure given trucking costs and distances between terminalling centers in the States. Regional calculations are based on fundamental economic measures of competition in homogeneous goods markets and estimates of transportation costs between distribution racks. In particular, we calculate capacity HHI statistics for geographic regions within the States, incorporating potential competitive overlap between terminal locations based on an approximate cost per mile of transporting refined petroleum products. The resulting HHI statistics are not the product of detailed market definition analyses whose purpose would be to delineate relevant markets for antitrust purposes using, for example, the market definition methodology in the *Horizontal Merger Guidelines.* They are instead descriptive statistics useful for further understanding product distribution, industry participants and market structure of the terminalling market in the States. Section III also includes a discussion of issues that affect entry and exit in the terminalling market, including environmental regulations and factors that affect the ability of firms to change the product use of particular terminals in response to changes in relative prices of alternative fuel products.

Summary of Section IV: Wholesale and Retail Gasoline Markets

The price of crude oil is the single largest variable cost in the production of gasoline, accounting for approximately 55% of the retail price of gasoline. Consequently, changes in the world price of crude oil are the primary determinant of changes in retail gasoline prices over time. While there are persistent differences in the level of retail gasoline prices across the various regions of the U.S., regional retail prices tend to move together over time, reflecting the fact that they are all heavily predicated on the same world price of crude oil. For the five States examined in this report, over 80% of observed variation in average retail gasoline prices in recent years is explained by variation in the average price of crude oil. However, there are still many other factors in the distribution of gasoline from the wholesale terminal to the retail gasoline station that may influence both wholesale and retail gasoline prices, including wholesale market structure (part of which was discussed in the section on terminalling), retail market structure, and governmental actions such as environmental regulation and taxes.

Section IV outlines the ways in which gasoline is distributed from wholesalers at distribution racks to retailers who sell to end consumers. There are several ways in which wholesale gasoline is supplied to retail gasoline stations. Some retail stations are owned and operated directly by a refining company that markets retail gasoline (refiner-marketer). Refiner-marketers supply their own retail outlets with gasoline, selling their brand of gasoline directly at the retail level. In some cases, a refiner-marketer might own a gasoline station, but it may also lease the station operation to a franchisee. This retail franchise is typically supplied directly by the refiner, but is operated by the franchisee under the terms of the franchise or lease agreement. In both of these cases, the refiner-marketer directly supplies the retail station with its marketed brand of gasoline. In general, when stations are directly supplied by a refiner-marketer, the refiner has more influence over the wholesale price that each station pays and the retail price that the station charges. The majority of the gasoline stations in the States are not directly supplied by refiner-marketers, but are instead owned by individual proprietors who purchase wholesale gasoline from refiners at the terminal rack. These stations are typically supplied by *jobbers* – intermediate firms that deliver gasoline from terminals to gasoline stations for a fee. Jobbers may supply many individual stations, each of whom markets various brands of gasoline or unbranded gasoline. Jobbers may maintain relationships with multiple sources for refined gasoline, purchasing gasoline from different wholesalers or different distribution racks depending on the relative posted prices of gasoline, giving them some ability to arbitrage persistent price differences that may exist between local distribution racks.

Recently, retailers such as BJ's, Costco, and Sam's Club have begun selling retail gasoline. These outlets are often referred to as 'hypermarkets' because they focus on selling large volumes of gasoline, typically at a low margin and typically without a particular gasoline brand name. Depending on the best wholesale price, these firms can purchase from different refiners at different distribution racks or on the spot market. As discussed in greater detail in the text, these different types of ownership structures imply varying levels of refiner control over the retail station and its prices, and so varying abilities for retailers to respond to changes in relative wholesale prices when they differ significantly across suppliers.

This section analyzes survey data on retail gasoline stations in metropolitan and surrounding areas in the States. In each of the States, jobber-supplied retail stations are the most prevalent. Even so, the relative share of retail volume contributed by jobber-supplied stations varies considerably across the States: market shares for such jobbers range from just over 50% in New York to approximately 97% in Vermont. In each of the five States, Mobil (owned by ExxonMobil) is the brand with the largest retail market share, selling between 21% and 31% of total gasoline volumes. Other firms with relatively large shares when measured at the statewide level include Citgo, Exxon, Sunoco, and Shell. (Exxon-branded stations in the States are owned by ConocoPhilips.) Collectively, unbranded stations account for approximately 8% (in Maine) to 20% (in Massachusetts) of gasoline sold at retail in the States.

Section IV then discusses various government regulations that may affect retail and wholesale gasoline prices. For example, differences in state and local excise and sales taxes across states and regions of the country contribute to observed regional differences in gasoline prices. In general, gasoline prices in the Northeast region (which includes the States studied in this report) are higher than in the South or Midwest regions of the country. One significant component of cross-state variation in retail prices is the wide disparity among state and local gasoline taxes. New York, for instance, had motor gasoline taxes of 62.3 cents per gallon as of July 2006, making it the third most heavily taxed state in the country, behind Connecticut and California. Partly due to this, average prices for gasoline in New York are more than 15 cents per gallon above the national average. Of the states examined in this report, Vermont and New Hampshire had the lowest total gas taxes—38.4 cents and 39.0 cents per gallon, respectively—and were approximately 8 cents per gallon below the national average.

Environmental regulations are another important factor that may contribute to persistent differences in wholesale and retail gasoline prices across geographic regions. The Federal Clean Air Act Amendments of 1990 ("CAAA"), administered by the U.S. Environmental Protection Agency ("EPA"), regulates air emissions from stationary and mobile sources. Among other things, the CAAA regulations mandate certain levels of oxygen content in gasoline, prescribe specific requirements associated with the preparation of reformulated gasoline, and establish limits for Reid Vapor Pressure ("RVP"), which measures the propensity of a fuel to evaporate. The three main motor-fuel content requirement programs are the Reid Vapor Pressure Program, the Oxygenated Gasoline Program (which seeks to control the volume of carbon monoxide produced from the combustion of gasoline fuel), and the Federal Reformulated Gasoline Program (which limits the contents of gasoline and sets certain standards for emissions). Because these regulations only affect counties and localities that are in violation of federal air quality standards and those that voluntarily opt-in to one of the programs, the effects of these regulations on gasoline supply vary across the nation.

Within the States, three types of gasoline are predominantly used: conventional gasoline, reformulated gasoline ("RFG"), and fuel characterized by a Reid Vapor Pressure of 7.8 pounds per square inch ("7.8 RVP"). RFG here refers to a particular blend that is used throughout the East Coast from Delaware to New Hampshire. It is sold in high volumes across a large, contiguous geographical area, which helps to mitigate its vulnerability to a potential supply disruption. Massachusetts requires the use of reformulated gasoline statewide, although others of the States mandate its use only in certain areas. For example, New Hampshire requires the use of RFG in populated areas around Manchester and Nashua in the southeastern corner of the state, but it permits the use of conventional gasoline elsewhere. Similarly, New York permits the use of conventional gas throughout most of the state, but not in New York City and its surrounding metropolitan area, where reformulated gasoline blended with ethanol is instead required. Maine allows conventional gasoline during most of the year, but the use of 7.8 RVP fuel is mandated in the summer months. Of the States observed in this report, only Vermont permits the use of conventional gasoline throughout the state on a year-round basis. It is thus not surprising that differences in retail prices for gasoline are observed across the States, given such variations in local regulations (and in the application of federal rules) and the non-uniform mix of fuels.

In February of 2006, the EPA amended its regulations to further allow refiners greater flexibility in the manner in which they blend gasoline to meet emissions and pollution goals. Nationwide, refiners now produce at least fourteen types of "boutique" fuels, so called because of their relatively lower production quantities and specialized blends. Generally speaking, boutique fuels are produced to accommodate state or local regulations and thus are sold in fairly circumscribed geographic areas. One concern with the proliferation of boutique fuels is that areas employing these fuels may be especially susceptible to price spikes in the event of a supply disruption. However, as will be discussed in the text, the precise impact of boutique fuels on retail gasoline prices is not clear, since particular characteristics of market structure can also impact on the degree to which the price of any particular gasoline product can be increased.

Summary of Section V: Retail Home Heating Oil Markets

In each of the States, the majority of the demand for heating oil comes from residential customers. Commercial customers generally use less than half the heating oil volumes demanded by residential customers, and large industrial users consume still less in percentage terms. Even in Vermont, where the proportion of heating oil consumed by industrial customers is the largest among the States, industrial users consume only about 6% of statewide heating oil volumes.

Residential consumers heating their homes with natural gas or electricity typically have few suppliers—and often only one—from which to choose for service. By contrast, consumers that use heating oil generally have a choice of many possible suppliers. These suppliers, moreover, tend to be small and unconcentrated. Indeed, for the five States studied in this report, the average number of employees per heating oil dealer is about ten. Home heating oil is the largest fuel source for home heating in all the States except for New York, where natural gas is the largest fuel source of home heating. Across all the States, 39% of residents use home heating oil. Nevertheless, as with gasoline, the largest component to the price of home heating oil is the volatile input price of its primary ingredient, crude oil. Recent price spikes and supply shortages have prompted many users of heating oil in Massachusetts and New York to consider switching to natural gas. As discussed further in the report, however, it is typically costly and difficult to convert from heating oil to natural gas, preventing many homeowners from switching to an alternative fuel.

Unlike the retail gas stations discussed above, few retail dealers of heating oil are "company-owned" in the sense that a refiner or terminalling company also owns the retail company that ultimately supplies the end user. For the most part, heating oil dealers are more analogous to the jobbers of the retail gasoline industry. They are not typically affiliated with any integrated oil company brand, and they can and do purchase from different wholesalers (wholesale home heating oil is not marketed under a refining brand, unlike diesel sold for motor fuel or gasoline). Heating oil dealers generally own their own delivery equipment and vehicles. Entry barriers to the retail provision of home heating oil are relatively low; while gasoline markets require capital investments in distribution trucks, gas station facilities, and perhaps the land upon which the station is situated, entering a market for heating oil can require little more than an investment in one or more delivery trucks. In general, relatively easy market entry helps to constrain retail margins, since existing firms must compete not only with one another, but also with potential new entrants that could begin providing service in response to increases in retail margins.

Heating oil prices can vary significantly across the States and even within local geographic regions. On average, the highest price in each region observed in this report is 6% greater than the average price for the region. Similarly, the lowest price observed in each area is also about 6% lower than the area's average price. Prices also vary from dealer to dealer, and the differences can be sufficiently large that shopping around for lower prices can yield substantial savings on home heating bills. Given the large number of small, unconcentrated suppliers of retail heating oil in the States, and given that they sell an essentially homogeneous product, this situation may seem counter-intuitive. With many sellers of a commodity product, one would ordinarily expect prices to be very close to one another, if not identical. However, as discussed in greater detail in the report, there are a number of factors that help to explain variances in home heating oil prices throughout the States. Part of the discrepancy appears attributable to differences among "package" services sold to consumers in which heating oil dealers may combine, for example, the purchase of a service contract with the purchase of the oil itself. A variety of service contracts exist, exhibiting a variety of terms of sale, and per-gallon prices for the underlying heating oil are not treated uniformly across packages. Different contract types offered by the dealers appear to offer different benefits and risks for the consumer.

Another factor likely contributing to observed geographic and supplier differences in heating oil prices is the cost that consumers must bear to compare and select from among multiple vendors. Because there is a cost (in terms of both money and time) associated with searching for low prices and switching suppliers, a dealer may find it profitable to charge per-gallon rates somewhat higher than another dealer. However, information technologies such as the Internet could be used to lower average search and switching costs for consumers, which in turn could reduce price dispersion and increase competition among suppliers.

Summary of Section VI: Futures Markets

As noted above, futures contracts specify the terms of sale for a commodity purchase on a specified future date. Unlike an option, which gives the participants the right to buy or sell but not the obligation to do so, a futures contract compels the participants to undertake the trade on the date specified, regardless of what might happen to the market price of the commodity in the meantime. Trades in futures markets are routinely undertaken by buyers and sellers of the underlying commodities to hedge against the risk that they will be adversely affected by a future movement in the commodity price. Buyers of the underlying good seek protection against price increases, while sellers seek protection from price decreases. Futures contracts are thus a valuable tool by which purchasers and sellers attempt to shield themselves from the risk associated with the volatility of petroleum product prices.

For an example of hedging, consider a homeowner concerned in early summer that the price of heating oil will increase significantly by the coming winter. The homeowner could address this risk by entering into a contract with a home heating oil dealer for oil to be delivered later in the year at a price negotiated in the summer. As the price for the contract is set, both parties are assured of it and thus face no price-related risk. However, the homeowner may yet have cause for regret if the price of home heating oil on the winter delivery date turns out to be lower than the price to which she committed earlier in the year. Should the price on the winter delivery date be greater than the contract price, the dealer instead will be regretful. The possibility of regret is balanced by each party against the possibility of the gain that will obtain if its initial concerns turn out to be valid.

While such forward-looking contracts between an end user customer and a dealer are a fairly routine element of retail service, futures trades are more formal and primarily occur on organized exchanges. Traditionally, futures trades for petroleum products have taken place on the New York Mercantile Exchange ("NYMEX") and are subject to the regulation of the Commodities and Futures Trading Commission ("CFTC"), an independent agency overseen by the U.S. Congress. In order to facilitate transactions among interested parties, NYMEX has formalized and standardized the futures contracts being traded. It also acts as a sort of clearinghouse, establishing itself as a counterparty to all trades placed through the exchange; in other words, prospective buyers and sellers of a futures contract officially trade with NYMEX, not one another. The availability of a relatively small number of standardized contracts promotes liquidity in the market, and NYMEX's role as a middleman prevents interested buyers and sellers from having to search for one another to conduct a trade. Exchange trades typically settle on the day they happen, and information regarding demanded quantities and expected future prices are quickly communicated to the market.

The Commodity Futures Modernization Act of 2000 largely deregulated "over-the-counter" (or "OTC") trades, which do not occur between an individual and an exchange but instead typically involve off-exchange, private transactions between two or more parties. Evidence suggests that there has been recent, substantial growth in OTC transactions, which do not take place in a formal exchange and are not ordinarily subject to governmental oversight. As discussed in the report, the prevalence of over-the-counter trades may leave markets for petroleum-based commodities futures vulnerable to manipulation by large petroleum companies (and perhaps other traders of sizeable volumes). Some analysts contend that speculators—who enter into commodity futures contracts primarily as a gamble on the movement of petroleum product prices, rather than as a hedge against price movements—may themselves have contributed to rising oil and gas prices. Investment in U.S. energy markets by mutual funds, pension funds, hedge funds, and the like has increased considerably in recent years, but unreported over-the-counter transactions make it difficult to quantify the total impact of speculation. The lack of available data prevents this report from either substantiating or refuting the hypothesis that speculative trading activity has significantly impacted the price of petroleum products in the States or elsewhere.

I. Overview of the Petroleum Industry

Petroleum products are critical components of everyday life. They are a principal source of energy in the United States, providing fuel for transportation and heat for millions of homes and commercial buildings. Petroleum is also widely employed in the fabrication of plastics, medicines, food items, clothing, and many other common products.

This section provides a brief introduction to the petroleum industry, focusing on major fuel products and describing in general terms the processes by which they are created and distributed to consumers. The discussion begins with an overview of crude oil production, both within the United States and throughout the world. Leading international producers of petroleum are identified, as are the regions and states domestically that are responsible for the bulk of the petroleum supplied to the U.S. Processes for the exploration, extraction, transportation, and refining of crude oil are briefly described, although particular attention is paid to economic conditions faced by refiners that potentially affect the prices ultimately paid by consumers for finished petroleum products. Transportation and distribution of petroleum products downstream of the refinery is also discussed. All this should provide a useful background for the remainder of the report, which addresses issues of concern specific to markets for gasoline and heating oil.

A. Crude oil production

The crude oil that we extract from the ground is primarily a by-product of the decomposing remains of prehistoric plants and animals. Over millions of years, layers upon layers of sedimentary rock and minerals buried decaying organic matter. The pressure and heat generated by this process slowly converted the matter into a thick liquid that saturated the rock in which it was encased. With time, the weight of the earth above it squeezed the oil through layers of rock until it reached porous deposits into which it could collect. Crude oil is extracted from these reservoirs. Crude oil from known reservoirs that can be economically recovered with existing technology and operating conditions is called "proved reserves."

The Middle East is by far the richest region of the world in terms of crude oil proved reserves. By one estimate, 57% of the approximately 1.3 trillion barrels of the world's proved reserves lie beneath the lands of the Middle East, while North America is a distant second with just over 16% of reserves.[2] By itself, the United States is estimated to hold 1.7% to 4.0% of global proved reserves.[3] Despite its relatively low share of the planet's

[2] *See* "Worldwide Look at Reserves and Production," *Oil & Gas Journal* (Dec. 19, 2005), at 24-25; Energy Information Administration, U.S. Department of Energy, INTERNATIONAL ENERGY OUTLOOK 2006 (June 2006), at 28.

[3] *See* "Worldwide Look at Reserves and Production," *Oil & Gas Journal* (Dec. 19, 2005), at 24-25 (U.S. contributing 21.4 billion bbl of oil reserves to the world total of 1,292.5 billion bbl as of January 1, 2006); Cheryl J. Trench, Energy Information Administration, U.S. Department of Energy, "Oil Market Basics: Supply," http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/supply_text.htm (visited Oct. 30, 2006).

known stores, the U.S. is nonetheless the third largest producer of oil in terms of volume (after Saudi Arabia and Russia), extracting approximately 8.2 million barrels per day in 2005. Table 1.1 below lists the petroleum producing countries whose average daily production in 2005 exceeded two million barrels.

TABLE 1.1
LEADING PETROLEUM PRODUCING COUNTRIES, 2005

Rank	Country	Total Oil Production (million barrels per day)
1	Saudi Arabia	11.1
2	Russia	9.5
3	United States	8.2
4	Iran	4.2
5	Mexico	3.8
6	China	3.8
7	Canada	3.1
8	Norway	3.0
9	United Arab Emirates	2.8
10	Venezuela	2.8
11	Kuwait	2.7
12	Nigeria	2.6
13	Algeria	2.1
14	Brazil	2.0

Note: "Total oil production" includes crude oil, natural gas liquids, condensate, refinery gain, and other liquids.

Source: Energy Information Administration, U.S. Department of Energy, "Top World Oil Producers, 2005," http://www.eia.doe.gov/emeu/cabs/topworldtables1_2.html (visited Oct. 30, 2006).

Several of the countries in Table 1.1 are members of the Organization of the Petroleum Exporting Countries ("OPEC"). OPEC is a permanent intergovernmental organization headquartered in Vienna, Austria, that works to coordinate the petroleum policies of its eleven member nations, all of which are major producers and exporters of crude oil. According to the organization, "OPEC's objective is to co-ordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for petroleum producers; an efficient, economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the industry."[4] Ministers from each of

[4] Organization of the Petroleum Exporting Countries, "Brief History," http://www.opec.org/aboutus/history/history.htm (visited Oct. 30, 2006).

OPEC's member countries gather twice per year to review the status of the international oil market, discuss forecasts of future demand and supply conditions, and agree upon actions to promote price stability. While various meetings take place throughout the year to address other issues, decisions regarding the matching of oil production within OPEC countries to expected demand are made during the primary Meeting of the OPEC Conference.[5] Since 1982, this has involved setting quotas and/or limits for crude oil production among the member countries. Originally founded in September, 1960 by Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela, OPEC later admitted eight other members: Qatar; Indonesia; Libya; the United Arab Emirates; Algeria; Nigeria; Ecuador; and Gabon. (Ecuador and Gabon both withdrew from the organization in the early 1990s.) Although Iraq remains a member of OPEC, Iraqi production of crude oil has not been included in OPEC quota agreements since March of 1998.[6]

A substantial fraction of the oil produced by OPEC nations is eventually routed to the United States. Despite its place as the third largest producer of crude oil, the United States is nonetheless also the world's leading importer of petroleum. In 2005, net imports into the United States were just over 12.5 million barrels per day, on average, or approximately 60% of the total product supplied to the country. Of this, imports from OPEC countries averaged approximately 5.6 million barrels per day in 2005, representing more than one-quarter of total supply to the U.S.[7]

For purposes of measuring domestic crude oil production, the United States is partitioned into five major regions that were originally delineated in the 1940s to facilitate oil allocation during World War II. Each of these five "Petroleum Administration for Defense Districts" ("PADDs") encompasses several states, but the PADD regions do not contribute to the nation's oil production equally. As Table 1.2 below shows, the Gulf Coast region of PADD III produces more crude oil each day than the rest of the country combined. Together, the Gulf Coast and the West Coast regions accounted for approximately 84% of daily U.S. production of crude oil in 2005. Federal waters along the Gulf Coast are the single most productive area in the country, followed next by the states of Texas, Alaska, California, and Louisiana.[8]

[5] *See* Organization of the Petroleum Exporting Countries, "Functions," http://www.opec.org/aboutus/functions/functions.htm (visited Oct. 30, 2006).

[6] *See* Energy Information Administration, U.S. Department of Energy, *Monthly Energy Review* (Oct. 2006), at 182; Organization of the Petroleum Exporting Countries, "Brief History," http://www.opec.org/aboutus/history/history.htm (visited Oct. 30, 2006).

[7] *See* Energy Information Administration, U.S. Department of Energy, *Monthly Energy Review* (Oct. 2006), at 15.

[8] Energy Information Administration, U.S. Department of Energy, "Crude Oil Production: Annual—Thousand Barrels per Day," http://tonto.eia.doe.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm (Oct. 2, 2006).

TABLE 1.2
U.S. PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS

PADD	Region	States Included	Crude Oil Production, 2005 (thousand barrels per day)
I	East Coast	PADD 1A (New England): Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont	0
		PADD IB (Central Atlantic): Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania	12
		PADD IC (Lower Atlantic): Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia	11
II	Midwest	Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and Wisconsin	443
III	Gulf Coast	Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas (plus federal offshore areas)	2,804
IV	Mountain	Colorado, Idaho, Montana, Utah, and Wyoming	340
V	West Coast	Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington (plus federal offshore areas)	1,569

Sources: Energy Information Administration, U.S. Department of Energy, "Crude Oil Production: Annual—Thousand Barrels per Day," http://tonto.eia.doe.gov/dnav/pet/pet_crd_crpdn_adc_mbblpd_a.htm (Oct. 2, 2006); Energy Information Administration, U.S. Department of Energy, "Glossary: P," http://www.eia.doe.gov/glossary/glossary_p.htm (visited Oct. 30, 2006).

Firms identify prospective sites for crude oil retrieval through a variety of techniques, such as seismic testing and core sampling, although exploratory drilling is often the only way to confirm the presence of oil. When an exploratory well successfully locates crude oil, additional investigation and drilling is done to determine the size, boundaries, and expected production characteristics of the reservoir. If the conditions of the reservoir are such that extraction of the crude oil appears economically viable, facilities for production are constructed on the site, including wells, storage tanks, pipelines, and processing equipment. While naturally occurring pressure underground is sometimes sufficient to force oil to the surface once the reservoir is tapped, some reservoirs—particularly those that have been producing for some time—may require pumping equipment to extract the oil from the ground. Additionally, some crude oil reservoirs also contain natural gas, and when present, the production site may require facilities at or near the wellhead to separate the gas from the liquid hydrocarbons. Once extracted from the ground, crude oil is commonly transported to refinery facilities via pipeline, tanker ship, or barge.

B. Refining

There are few practical uses for crude oil itself. Nearly all of what is extracted from the ground is refined and transformed into commercially useful products. On average, a 42-gallon barrel of crude oil yields nearly 45 gallons of refined petroleum products. The increase in volume is primarily due to a reduction in the density of the crude oil as it is converted into finished products. Much as water expands when it freezes into ice, the industrial processes that transform crude oil into refined products result in a number of lighter, less dense compounds. In the United States, most crude oil is refined into motor gasoline or distillate fuel oil. In 2004, for instance, the average 42-gallon barrel of crude yielded approximately 20 gallons of refined gasoline and 10 gallons of distillate fuel oil.[9] As Table 1.3 below shows, the remainder of the crude oil barrel is converted into a variety of fuels, gases, lubricants, input materials (“feedstocks”) for industry, and other goods.

[9] *See* Energy Information Administration, U.S. Department of Energy, “Crude Oil Production,” http://www.eia.doe.gov/neic/infosheets/crudeproduction.html (Nov. 2005).

TABLE 1.3
AVERAGE VOLUME OF PETROLEUM PRODUCTS YIELDED
FROM ONE 42-GALLON BARREL OF CRUDE OIL
(2004)

Product	Volume in Gallons
Finished Motor Gasoline	19.65
Distillate Fuel Oil	10.03
Kerosene-Type Jet Fuel	4.07
Residual Fuel Oil	1.72
Still Gas	1.85
Petroleum Coke	2.18
Liquefied Refinery Gas	1.68
Asphalt and Road Oil	1.34
Naphtha for Feedstocks	0.67
Other Oils for Feedstocks	0.55
Lubricants	0.46
Special Naphthas	0.13
Kerosene	0.17
Miscellaneous Products	0.17
Finished Aviation Gasoline	0.04
Waxes	0.04
Total	**44.77**

Source: Energy Information Administration, U.S. Department of Energy, "Crude Oil Production," http://www.eia.doe.gov/neic/infosheets/crudeproduction.html (Nov. 2005).

Crude oil is not a single, uniform substance, but rather a mixture of various hydrocarbons. The activity of "refining" is actually a number of different processes by which the various chemical compounds in crude oil are extracted, modified, recombined, or otherwise manipulated to create new substances. Generally speaking, however, three major steps are involved in the refining of crude oil: distillation, conversion, and treatment.[10]

Distillation, also referred to as *separation*, is the initial refining process by which these hydrocarbons in crude oil are separated from one another and segregated for retrieval. Typically, this is achieved by pumping crude oil into a tower-like still and heating it. Different hydrocarbons boil and liquefy at different temperatures, so those with lower boiling points turn gaseous and rise within the tower, while those with higher boiling points remain liquid. Cooler temperatures away from the source of heat allow rising gas to re-condense, forming layers of different liquids or gases within the distillation unit. These strata correspond to broad categories of hydrocarbons (called "fractions"), and different crude oil fractions are employed to make different products. Lighter substances, such as naphtha, straight-run gasoline, and the liquid petroleum gases, butane and propane, are recovered at relatively low temperatures and thus at the highest layers of distillation.[11] Somewhat heavier and denser are mid-level fractions like kerosene, jet fuel, and diesel oil distillates. Heavy gas oil and residual fuel oil sink to the lowest strata in the distillation unit and are recovered at the highest temperatures.

The crude oil fractions separated and recovered by the distillation process are not all valued equally. Consequently, a number of additional refining processes are employed to convert lower-valued distillates (such as heavy gas oil) into higher-valued ones (like gasoline and diesel fuel). Many such *conversion* activities can take place within a refinery, and they typically employ a wide variety of highly complex and specialized facilities. Some conversion processes change the molecular structure of a particular distillate through a chemical reaction, some through a thermal reaction, and some in the presence of a catalytic agent. Other processes take substances produced from prior conversion activities and re-combine them in new ways. Generally speaking, however, much of the conversion activity taking place at refineries is designed to transform low-octane, low-value distillates into diesel, gasoline, or high-octane gasoline components.

"Cracking" is the most commonly employed conversion activity at U.S. refineries. Using a network of furnaces, reactors, and heat exchange units, the cracking process employs heat, pressure, or catalytic agents to break apart heavy hydrocarbon molecules into smaller, lighter ones. For instance, hydrocarbons in the heavy gas oil produced from the distillation unit might be cracked to produce additional quantities of such lighter and

[10] *See*, *e.g.*, Energy Information Administration, U.S. Department of Energy, "Oil Market Basics: Refining," http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/refining_text.htm (visited October 30, 2006).

[11] "Naphtha" is a generic term applied to a petroleum fraction with an approximate boiling range between 122 and 400 degrees Fahrenheit. *See* Energy Information Administration, U.S. Department of Energy, *Monthly Energy Review* (Oct. 2006), at 180.

more valued substances as diesel fuel and gasoline. Alkylation, another conversion process, is essentially the opposite of cracking: it produces gasoline components by combining together certain gasses cast off by the cracking process. Coking takes the heaviest residue recovered from the distillation process and generates dried petroleum coke and lighter feedstocks for further processing. Other major conversion activities include reformation, which transforms naphtha into high-octane gasoline components, and hydrotreating, which removes sulfur from input feedstocks.

The last major step of refining, i.e., *treatment*, encompasses a host of finishing activities intended to create the final products produced by the refinery. Specialized formulations are created by blending together different substances produced by the distillation and conversion processes or by mixing into them certain additives. For example, it is typically during the treatment phase at the refinery that certain characteristics of a particular gasoline product—such as octane level, Reid Vapor Pressure, or high altitude use—are established. For other products like kerosene and heating oil, treatment processes are often employed to improve the quality or purity of the finished substance.

Thus, petroleum refineries are basically massive factories that convert a raw material, crude oil, into commercially valued products. According to the American Petroleum Institute ("API"), there are 144 petroleum refineries in the United States, with a collective refining capacity of more than 17 million barrels of crude oil per day.[12] Just under half of total U.S. refining capacity is situated in the Gulf Coast region of PADD III, approximately 8.1 million barrels per day in 2004, and most of this is in Texas and Louisiana. The Midwest (PADD II) and the West Coast (PADD V) also account for a substantial portion of national refining capacity with approximately 3.6 million and 3.1 million barrels per day, respectively.[13]

Increasing the available capacity of the nation's refineries is generally expensive and difficult. Sprawling complexes of expensive, highly sophisticated equipment, refineries can cost billions of dollars to build and maintain. The last major new refinery built in the United States was constructed in 1976, although improvements and additions to existing facilities have enabled refiners to increase capacity and output incrementally over time.[14] According to recently available public information, currently contemplated expansion projects across the nation's refineries would collectively add up to another 1.3 million

[12] American Petroleum Institute, "Industry Sectors," http://www.api.org/aboutoilgas/sectors/index.cfm (Sept. 21, 2006).

[13] *See* Cheryl J. Trench, Energy Information Administration, U.S. Department of Energy, "U.S. Petroleum Refinery Capacity, by Region: Crude Oil Distillation, 2004," http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/ref_image_usregl_cap.htm (visited Oct. 30, 2006).

[14] *See* American Petroleum Institute, "FYI on Refineries," http://new.api.org/aboutoilgas/sectors/refining/upload/FYI_Refineries.pdf (April 6, 2006).

barrels of daily capacity over the next five years.[15] Substantial capital investment, usually on the order of tens or hundreds of millions of dollars, is required for such expansion or upgrading of existing facilities. Moreover, the permitting process associated with new construction or expansion is typically very complex and may involve oversight by federal, state, and local authorities. Sitting new refinery facilities often provokes public opposition from the communities near a potential expansion, complicating operators' efforts to enlarge production.

As noted previously, crude oil is not a uniform substance. Crude oil extracted from different reservoirs can have very different physical and chemical properties, and such variability impacts the type and quantity of finished petroleum products that can be produced from the oil at a refinery. Sulfur content, heavy metal content, and contaminant levels can all vary substantially, affecting the use and relative price of a particular barrel of crude oil. Among other things, the input price of a particular crude oil (or the difference between the prices of two different streams of crude oil) reflects the oil's relative ease of refining and suitability for specific uses. Refiners typically seek to process an optimal mix, given the cost and availability of crude oils, a refinery's particular equipment and capabilities, and the relative market values of output products. Changes in the crude oil processed by an individual refinery can entail substantial variations in the costs faced by that refinery, as the price of the raw crude oil and the specific mix of conversion and treatment processes undertaken will likely be different. This in turn can have an impact on the quantity and price of finished petroleum products produced by the refinery and sold to wholesalers.

Much of the operating costs of a refinery are variable, changing with the quantity and type of products being produced. However, a substantial portion of costs are fixed and do not vary with the level or type of production being undertaken. Furnaces must be fired, pumps must run, conversion units must operate, and monitoring must occur, often without regard to the specific volume or mix of finished products to be created. The presence of high fixed costs has a significant impact on refiners' operations that gives them an incentive to maximize production output in order to minimize average total costs (i.e. spread the fixed cost over more output units). Since a substantial portion of the costs is fixed, refineries typically operate at or close to full capacity, 24 hours a day, 365 days a year, to yield the lowest average costs and to amortize the expensive facilities over a larger production volume. Indeed, according to the U.S. Department of Energy's Energy Information Administration ("EIA"), refineries throughout the United States have typically been operating at or above 90% capacity for the last decade.[16]

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[15] *See* American Petroleum Institute, "FYI on Refineries," http://new.api.org/aboutoilgas/sectors/refining/upload/FYI_Refineries.pdf (April 6, 2006). Additional projects not yet discussed publicly may also be under consideration.

[16] *See* Energy Information Administration, U.S. Department of Energy, "A Primer on Diesel Fuel Prices," http://www.eia.doe.gov/bookshelf/brochures/diesel/dieselprices2006.html (May 2006), at 3.

One consequence of the high level of capacity utilization maintained by refinery operators is that they may incur substantial costs when adjusting the type or amount of petroleum products they produce. For example, when retail prices for home heating oil rise, a refiner's ability to increase heating oil output is quickly hindered by the costs and operational difficulties associated with scaling back or shutting down other production within the refinery. Due to the large number of steps that can be required to refine particular petroleum products, and because there are generally feedstock substances in process at each intermediate step, it can be quite costly to make rapid changes to a refinery's existing production runs. Again, this can have an effect on the quantity and price of finished petroleum products from the refinery.

C. *Downstream transportation and distribution of petroleum products*

Pipelines. Pipelines are the primary method by which petroleum is transported throughout the country, moving crude oil from land-based or offshore oil fields to refineries and then carrying refined petroleum products to downstream terminals. There are some 165,000 miles of petroleum transmission pipelines in the United States, of which more than 95,000 miles are dedicated to the transportation of refined products.[17] Pipelines for the transmission of crude oil or refined petroleum products typically range between 8 inches and 45 inches in diameter, and many are buried and kept out of sight. The rate at which pipelines move product varies depending on a number of factors—for example, the size of the pipe, the terrain over which the pipeline extends, and the type of product being transported—but speeds of 5 to 8 miles per hour are common. At this rate, it would take two to three weeks for petroleum products to travel from a refinery in Houston, Texas, to a distribution center near New York City.[18]

Different petroleum products can be transported within a single pipeline. Petroleum products are shipped in batches, with a quantity of one product closely followed by a quantity of another. Inevitably, some mixing occurs within the pipeline, especially where the leading edge of one batch meets the trailing edge of the batch ahead of it. When the products are similar (e.g., a batch of low-octane gasoline next to a batch of high-octane gasoline), the mixed portion often gets incorporated into the lower grade product. When the products are not similar, however (e.g., a batch of gasoline next to a batch of home heating oil), the blended portion usually must be removed and sent back to a refinery for re-processing. Occasionally, operators will insert physical separators (called "pigs") between batches of sensitive products to avoid mixing them within the pipeline.[19]

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[17] *See* American Petroleum Institute, "Pipeline," http://www.api.org/aboutoilgas/sectors/pipeline/index.cfm (Nov. 1, 2006); American Petroleum Institute, "Adventures in Energy: Transporting Oil to the Consumer," http://www.adventuresinenergy.org/ (visited Nov. 1, 2006) (interactive menu).

[18] American Petroleum Institute, "Adventures in Energy: Transporting Oil to the Consumer: Pipeline Basics," http://www.adventuresinenergy.org/ (visited Nov. 1, 2006) (interactive menu).

[19] American Petroleum Institute, "Adventures in Energy: Transporting Oil to the Consumer: Batch Management," http://www.adventuresinenergy.org/ (visited Nov. 1, 2006) (interactive menu).

If there are gaps between batches of product, or if there is too little product within the pipeline, the pressure within the system may not be sufficient to keep the contents moving. When this happens, pumps are required to inject additional pressure into the system. As a result, pipelines work most efficiently and inexpensively when there is a steady, uninterrupted stream of petroleum products being transported.[20] Also, like refineries, pipelines are capital-intensive facilities, and their operation is characterized by high fixed costs. For these reasons, pipelines generally seek to operate around the clock, 365 days per year, with optimally full loads.

Terminals and Downstream Distribution. Terminals are large storage facilities for petroleum products that also act as the local source of supply for individual retail outlets. Once produced at a refinery, gasoline, home heating oil, and other such products may be stored in facilities operated by the refinery itself or by a supplier of transmission services (like a pipeline operator). Eventually, however, the refined products are transported to the various major terminals throughout the country that act as the primary repository of petroleum products intended for wholesale and subsequent distribution to retail outlets. Often, transportation of the product from a refinery to a terminal occurs via pipeline, but shipments to petroleum terminals can also arrive by truck, rail, or waterborne tanker or barge. According to the American Petroleum Institute, there are approximately 1,300 terminal locations throughout the country receiving the output of the nation's refineries.[21]

Terminals are mainly comprised of a series of massive tanks, each of which is dedicated to a particular refined petroleum product. Newer, stainless steel tanks can usually accommodate any petroleum product, but the terminal operator is faced with certain costs when attempting to switch the contents of a particular tank from one substance to another. To switch between gasoline and #2 distillate heating oil, for instance, stainless steel tanks typically need only to be drained, dried, and cleaned. Older tanks, however, have higher switching costs. They may have a "heel" at the bottom of the tank, an area in which sludge from the petroleum product collects and remains even after the tank has been drained. Removing this material from the heel usually requires an additional step to pump out all of the sludge before the tank can be steam cleaned.

Other, greater constraints may be present that make switching over a tank from one use to another difficult. For example, not all tanks are fitted with the equipment necessary for the storage of certain petroleum products. Tanks for home heating oil do not necessarily require a system to recover vapor and return it to a liquid state while gasoline tanks do require such equipment. Thus, if a tank is to be switched from the storing heating oil to gasoline, a vapor recovery system may need to be installed, requiring additional capital investment by the terminal operator. In some cases, switching or upgrading tanks may necessitate seeking approval from regulatory authorities. For example, there may be different regulatory limits on the emissions allowable at terminal facilities from different

[20] American Petroleum Institute, "Adventures in Energy: Transporting Oil to the Consumer: Batch Management," http://www.adventuresinenergy.org/ (visited Nov. 1, 2006) (interactive menu).

[21] *See* American Petroleum Institute, "Marketing," http://www.api.org/aboutoilgas/sectors/marketing/ index.cfm (Sept. 25, 2006).

petroleum products. A storage tank or dispensing station that meets one set of environmental requirements might not meet the other, so the changes undertaken by the terminal owner could be useless without re-permitting for additional emissions. Similarly, the terminal might face capacity constraints with regard to certain of its physical facilities. Even if the relevant storage or dispensing capacity could be added by the terminal operator, limitations of the underlying infrastructure or a lack of regulatory approval could prevent or otherwise hinder the use of that additional capacity. In the short run, such operational and regulatory constraints work to restrict the ability of a terminal owner to switch the products stored in a given tank. As with refinery operators, the owners of terminals may thus incur substantial costs when adjusting the type or amount of petroleum products they have available. Again, this can have an effect on the quantity and price of finished petroleum products provided by the terminal to retail outlets.

Leaving the major bulk terminals, refined petroleum products are often shipped to smaller bulk stations or fuel oil dealers before being transported to final retail outlets. This last leg of the process is typically performed by tanker trucks that fill at specialized loading stations (or "racks") before delivering to local retail outlets. The tanker trucks that deliver gasoline and diesel fuel to retail stations often have several separate compartments within them that allow the trucks to carry different formulations of fuel (e.g., regular unleaded, premium unleaded, and diesel) to the retail station in a single trip. Such trucks typically also incorporate mechanisms to capture the fuel vapor within their tanks and to convert it back into a useable liquid product. In the case of gasoline, the ethanol or special additives that are used to differentiate one brand from another are often blended into the gasoline right in the tank of the delivery truck itself. Other additives are placed into home heating oil in the same manner.

D. Retail provision of gasoline

The gasoline-powered "horseless carriage" was invented in 1893, and the first gasoline filling station is believed to have followed just fourteen years later. The oldest recorded station, established in Seattle in 1907 by Standard Oil of California, predates Henry Ford's mass production of the Model T automobile. A few years later, the first drive-in station opened in Pittsburgh, PA, beginning service in December of 1913.[22] Today, there are more than 167,000 locations throughout the United States selling gasoline, including service stations, truck stops, convenience stores, "big-box" retailers, and marinas.[23] Some of these retail stations are owned by the same firms that refine crude oil into gasoline, but the majority are owned and operated by other, non-affiliated firms and individuals.

[22] *See* American Petroleum Institute, "Marketing," http://www.api.org/aboutoilgas/sectors/marketing/index.cfm (Sept. 25, 2006).

[23] *See* American Petroleum Institute, "Marketing," http://www.api.org/aboutoilgas/sectors/marketing/index.cfm (Sept. 25, 2006) (citing National Petroleum News data).

The wholesale price of gasoline and the terms of sale to gasoline retailers depend on the contractual relationship between the wholesaler and the retail station. Section IV presents a discussion of these contractual relationships for the sale and distribution of wholesale gasoline to retail stations. Some retail stations are owned and operated directly by refiner-marketers that supply their own gasoline to the station. In some cases, a franchisee may lease the station from the refiner-marketer. Here, the station is still supplied directly by the refiner, but is operated by the lessee. In general, when stations are directly supplied by a refiner-marketer, the refiner has more influence over the wholesale price that each station pays, and the retailer has very limited ability, if any at all, to switch suppliers in response to changes in competitive conditions.

Many other retail stations are owned by individual proprietors who purchase wholesale gasoline from refiners at the terminal rack. These stations are typically supplied by *jobbers* – intermediate firms that deliver gasoline from terminals to gasoline stations for a fee. Jobbers may supply many individual stations, each of whom markets various brands of gasoline or unbranded gasoline. Jobbers may maintain relationships with multiple sources for refined gasoline, purchasing gasoline from different wholesalers or different distribution racks depending on the relative posted prices of gasoline. Thus, jobber-supplied stations often have greater ability to arbitrage wholesale price differences between distribution racks and refiners/wholesalers than direct-supplied stations do.[24]

Recently, retailers such as BJ's, Costco, and Sam's Club have begun selling gasoline at retail that they often purchase directly from refiners. These outlets are often referred to as 'hypermarkets' because they focus on selling large volumes of gasoline, typically at a low margin. Depending on the best wholesale price, these firms can purchase from different refiners at different distribution racks or on the spot market. These different types of ownership structures imply varying levels of refiner versus retailer influence over the retail station operation and prices, and so varying abilities for retailers to respond to changes in relative wholesale prices when they differ significantly across suppliers.

Gasoline prices at the pump include taxes levied by federal, state, and sometimes local authorities. Generally speaking, revenues from gasoline taxes are primarily used to fund transportation initiatives, such as the building or repairing of roads and bridges. As of mid-2006, the weighted average motor gasoline tax in the U.S. was approximately 46.8 cents per gallon—18.4 cents per gallon for federal excise taxes and 28.4 cents for state taxes.[25] According to an estimate by the EIA, federal and state taxes (not including

[24] "Arbitrage" is the practice of purchasing a good in one market where the price is low and selling it in a separate market where it is high. More generally, it is the ability of a buyer to switch readily from a high priced supplier to a low priced supplier, or for a supplier to switch from a low-paying customer to a high-paying customer. The result is that prices tend to equalize across markets and suppliers, a result of increasing the degree of competition between them.

[25] *See* American Petroleum Institute, "Marketing," http://www.api.org/aboutoilgas/sectors/marketing/index.cfm (Sept. 25, 2006). *But see also* Energy Information Administration, U.S. Department of Energy, *A Primer on Gasoline Prices*, http://www.eia.doe.gov/bookshelf/brochures/gasolinepricesprimer/eia1_2005primerM.html (May 2006), at 1-2 (noting federal excise taxes of 18.4 cents per gallon but average state excise taxes of 21.0 cents per gallon).

county or other local taxes) accounted in 2005 for an average of approximately 19% of the price of a gallon of gasoline in the United States.[26] Other components of the retail price of gasoline include the price of crude oil, operating costs and profits of refineries, and costs and profits associated with the distribution, marketing, and retail sale of gasoline. EIA estimates that in 2005, these elements accounted for approximately 53%, 19%, and 9%, respectively, of the price of an average gallon of gasoline in the U.S.[27]

These figures, however, are just averages. As will be discussed in greater detail with respect to petroleum markets in the States, retail gasoline prices vary considerably from location to location, as do the underlying costs contributing to the retail price of gas. Geographic differences in retail gasoline prices may also be explained by (i) the proximity and availability of supply; (ii) wholesale and retail market structure; (iii) differences in operating costs across regions; (iv) differences in the taxes assessed across various locations; (v) varied local environmental regulations, such as those regarding the specific types and formulations of gasoline that can be sold; and (vi) differences in consumer preferences or consumer behavior across markets.

Even within a particular geographic location, gasoline prices can and do change over time. Demand for gasoline is highly seasonal, and the increased fuel consumption prompted by vacations and favorable weather in summer months tends to put upward pressure on gasoline prices. To meet the increased demand for gasoline, the supply of gasoline increases as well. However, as is generally the case in all industries, supply cannot expand without raising the marginal cost of producing gasoline. Thus, the price rises both to reflect the increased cost of production (and induce firms to produce more gasoline) and to temper the demand for gasoline. According to federal estimates, summertime gasoline demand tends to increase gasoline prices about 5%, on average. Holding other influences constant, one would thus expect retail gasoline prices to change by 10 to 20 cents per gallon over a six-month period.[28] Next, the world price for crude oil varies over time, and these changes are largely expressed in retail prices for refined petroleum products. As noted above, on average the cost of crude oil accounts for more than half of the retail price of a gallon of gas. Changes in the available supply of crude oil to U.S. refineries – such as might occur with changes in OPEC quotas, the development of a new crude oil reservoir, political instability or violence in a producing country – can have a substantial effect on downstream prices for refined products.

[26] *See* Energy Information Administration, U.S. Department of Energy, *A Primer on Gasoline Prices*, http://www.eia.doe.gov/bookshelf/brochures/gasolinepricesprimer/eia1_2005primerM.html (May 2006), at 1.

[27] *See* Energy Information Administration, U.S. Department of Energy, *A Primer on Gasoline Prices*, http://www.eia.doe.gov/bookshelf/brochures/gasolinepricesprimer/eia1_2005primerM.html (May 2006), at 1-2.

[28] *See* Energy Information Administration, U.S. Department of Energy, *A Primer on Gasoline Prices*, http://www.eia.doe.gov/bookshelf/brochures/gasolinepricesprimer/eia1_2005primerM.html (May 2006), at 3.

Imbalances between demand and supply also occur from time to time, potentially influencing retail prices. If production or refining capacity is unexpectedly curtailed (as happened quite dramatically in the wake of the major hurricanes of 2005), gasoline inventories can be rapidly depleted and prices can quickly rise. Surges in demand can have a similar effect. In the case of diesel fuel oil for home heating, for example, an unusually cold winter can force upward both demand and prices for such fuel. At a more general level, however, it should be understood that gasoline is basically a commodity, and—as in markets for other commodities—temporary price fluctuations are normal. The fact that consumers are generally limited in their ability to substitute between fuels in response to a change in prices also can contribute to the relative volatility of gasoline prices. If the price of beef increases, consumers can readily switch to chicken. If the price of gasoline increases, however, one's car cannot suddenly begin running on an alternate fuel like diesel, natural gas, or electricity.

E. Retail provision of home heating oil

According to the U.S. Energy Information Administration, residential space heating is the primary use for heating oil. Approximately 8.1 million of the nation's 107 million households employ heating oil as the primary method of warming their homes, although these appear to be highly concentrated geographically.[29] Of the 8.1 million heating oil households, more than three-quarters (i.e., approximately 6.3 million households) are located in the northeastern United States. This area, running from the Central Atlantic region up through New England, collectively accounted for 82% of the nation's total residential fuel oil sales in 2004.[30]

The demand for heating oil is highly seasonal, with most consumption taking place each year between October and March. Indeed, EIA estimates that a homeowner in the northeastern United States might use 650 to 1,000 gallons of heating oil during a typical winter but consume very little during the rest of the year.[31] Not surprisingly, there is pronounced seasonal variation in retail prices for home heating oil, with the increased demand of winter months driving up prices. Recognizing this, some consumers purchase home heating oil during other parts of the year, when prices are lower, and store it until needed. Nevertheless, most residential storage tanks are not large enough to store sufficient volumes of heating oil to provide for heating throughout an entire winter. More commonly, homeowners are required to refill their tanks several times during the heating

[29] *See* Energy Information Administration, U.S. Department of Energy, "Energy Information Administration Brochures: Residential Heating Oil Prices," http://www.eia.doe.gov/neic/brochure/heatingoil/index.html (Dec. 2005).

[30] *See* Energy Information Administration, U.S. Department of Energy, "Energy Information Administration Brochures: Residential Heating Oil Prices," http://www.eia.doe.gov/neic/brochure/heatingoil/index.html (Dec. 2005).

[31] *See* Energy Information Administration, U.S. Department of Energy, "Energy Information Administration Brochures: Residential Heating Oil Prices," http://www.eia.doe.gov/neic/brochure/heatingoil/index.html (Dec. 2005).

season.[32] Converting a residence from heating oil to natural gas is typically costly and difficult, preventing many homeowners from switching to an alternative fuel when prices of heating oil rise disproportionately.

As with gasoline, the price of crude oil accounts for the majority of the cost of a gallon of heating oil. EIA estimates that crude oil accounted for approximately 57% of the cost of heating oil in 2004. Costs and profits associated with distribution and marketing accounted for another 29%, and the remaining 14% of the cost of heating oil in 2004 was associated with refinery processing costs and profits.[33] Like retail gasoline, retail prices for home heating oil vary considerably from location to location. Again, geographic differences in retail heating oil prices may be influenced by the following factors: (i) the proximity and availability of supply; (ii) the market structure of retail and wholesale home heating markets (iii) differences in operating costs across regions and (iv) regional differences in consumer preferences, demographics and purchasing behavior. Taxes and local environmental regulations on heating oil are not as significant in explaining variance in prices for home heating oil as they are for gasoline and other motor fuel. Indeed, the fact that home heating oil is not heavily taxed by federal and state authorities leads to an unusual concern regarding an alternative use of heating oil. Although the names suggest otherwise, home heating oil is essentially identical to motor diesel fuel. As diesel fuel intended for vehicle operation is taxed at a higher rate than heating oil, however, a method has been developed to try to prevent the illegal use of (less heavily taxed) heating oil in place of (more heavily taxed) diesel fuel in vehicles with diesel engines. Among the additives placed into home heating oil at the tanker truck stage is a red dye that provides an obvious visual clue when individuals attempt to use lower-taxed home heating oil in lieu of higher-taxed diesel fuel for motor vehicle use.

As was discussed above, refinery operators run at or near capacity and thus can find it difficult to change quickly the output of a particular petroleum product. This is true in the case of heating oil as well, and refiners have limited ability to increase their production of heating oil in response to heightened winter demand. Because a barrel of crude oil is refined to create multiple different petroleum products, increasing production of home heating oil entails the production of additional quantities of other substances as well, for which demand may or may not exist in winter months. For this reason, a substantial portion of heating oil produced by refineries throughout the year is typically stored in anticipation of winter use. Nevertheless, the cold and inclement weather of the winter months, particularly in the northeastern United States, can have an adverse effect on the ability to get refined heating oil to wholesalers and retail customers. Just as residential demand for heating oil peaks, ports and waterway distribution channels tend to freeze, and land-based delivery systems often face weather-related interruptions. Anticipating

[32] *See* Energy Information Administration, U.S. Department of Energy, "Energy Information Administration Brochures: Residential Heating Oil Prices," http://www.eia.doe.gov/neic/brochure/heatingoil/index.html (Dec. 2005).

[33] *See* Energy Information Administration, U.S. Department of Energy, "Energy Information Administration Brochures: Residential Heating Oil Prices," http://www.eia.doe.gov/neic/brochure/heatingoil/index.html (Dec. 2005).

these developments, sellers of home heating oil may bid up prices as they seek to store supply ahead of time.

Residential consumers heating their homes with natural gas or electricity typically have few suppliers—and often only one within a particular franchise area—from which to choose. By contrast, consumers that use heating oil generally have a choice of many possible suppliers. These suppliers, moreover, tend to be small and unconcentrated. Unlike the retail gas stations discussed above, few retail dealers of heating oil are "company-owned" in the sense that a refiner or terminalling company also owns the retail company that ultimately supplies the end user. For the most part, heating oil dealers are more analogous to the jobbers of the retail gasoline industry. They are not typically affiliated with any integrated oil company brand, and they can and do purchase from different wholesalers (wholesale home heating oil is not marketed under a refining brand, unlike diesel sold for motor fuel or gasoline). Heating oil dealers generally own their own delivery equipment and vehicles.

Entry barriers to the retail provision of home heating oil are low, which is not surprising given that home heating oil dealers are often very small organizations. While gasoline markets require capital investments in distribution trucks, gas station facilities, and perhaps the land upon which the station is situated, entering a market for heating oil can require no more than an investment in one or more delivery trucks. In general, relatively easy market entry helps to constrain retail margins, since existing firms must compete not only with one another, but also with potential new entrants that could begin providing service in response to increases in retail margins.

Prices for home heating oil vary from dealer to dealer, and the differences can be sufficiently large that shopping for lower prices can yield substantial savings on home heating bills. Given the large number of small, unconcentrated suppliers of retail heating oil, and given that they sell an essentially homogeneous product, this situation may seem counter-intuitive. With many sellers of a commodity product, one would ordinarily expect prices to be very close to one another, if not identical. However, there are a number of factors that help to explain variances in home heating oil prices. Part of the discrepancy appears attributable to differences among "package" services sold to consumers in which heating oil dealers may combine, for example, the purchase of a service contract with the purchase of the oil itself. A variety of service contracts exist, exhibiting a variety of terms of sale, and per-gallon prices for the underlying heating oil are not treated uniformly across packages. Different contract types offered by the dealers appear to offer different benefits and risks for the consumer.

Another factor likely contributing to observed geographic and supplier differences in heating oil prices is the cost that consumers must bear to compare and select from among multiple vendors. Because there is a cost (in terms of both money and time) associated with searching for low prices and switching suppliers, a dealer may find it profitable to charge per-gallon rates somewhat higher than does another dealer. However, information technologies such as the Internet could be used to lower average search and switching costs for consumers, which in turn could reduce price dispersion and increase competition among suppliers.

With the broad overview of the petroleum industry in this section of the report as background, the remaining sections will focus in depth on key parts of the petroleum industry in the States. Section II describes the manner in which major petroleum products are distributed to the States from refineries elsewhere in the U.S. and abroad. Section III discusses terminals in the States, including capacity, ownership, and the market structure of the terminalling industry. Section IV looks at the distribution of gasoline to retail outlets. It also provides an overview of gasoline prices in the States and factors that may affect prices. Section V focuses on home heating oil, including discussions on prices, distribution, and the Northeast Home Heating Reserve. Finally, Section VI turns from markets for physical commodities to markets for financial instruments that have a role in the provision of petroleum products to the states.

II. PETROLEUM DISTRIBUTION FROM REFINERIES TO THE STATES

There are no refineries in the States. All refined products consumed must be imported from outside the region. Figure 2.1 shows a map of refinery locations in the United States. Refineries are represented by circles on the map, where the size of the circle is proportional to the refinery's production capacity. Hence, larger circles represent larger refining centers. Refined products are supplied to the States from refineries in the Mid-Atlantic, Midwestern, and Gulf Coast regions of the country, as well as from Canada.

FIGURE 2.1
U.S. PETROLEUM REFINERIES

Source: Energy Information Administration, 2006.

The United States receives 27% of its refined products through imports from Europe and South America.[34] The refined products are transported into the States via barge (tanker), pipeline, and truck. Products flow into the States via barge or tanker through major port terminals located in Boston, New York/New Jersey, Portland, and Portsmouth, as well as New Haven, CT and Providence, RI. Products also flow into New York and New Jersey via the Colonial pipeline from the Gulf Coast. Once product has entered the States via port or pipeline, the gasoline is distributed within the States via pipeline and tanker truck. The primary refined product pipelines operating in the States are Buckeye Pipelines,

[34] *See* Energy Information Administration, U.S. Department of Energy, http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_m.htm and http://www.eia.doe.gov/neic/infosheets/petroleumproductsconsumption.htm.

Sunoco Logistics (Sun), and ExxonMobil.[35] The following three subsections provide (1) an overview of the petroleum distribution infrastructure in the States; (2) a description of the sources of waterway shipments of petroleum products to the States; and (3) a description of pipeline transportation of petroleum products to and within the States.

A. Overview of the States' petroleum distribution infrastructure

Tables 2.1 through 2.5 provide background information on the petroleum infrastructure and petroleum consumption for each of the five states.

[35] Two oil pipelines cross the States en route to refineries located outside of the States. The Portland-Montreal pipeline transports oil from Portland to refineries in Montreal. The Kiantone Pipeline transports oil from Buffalo, where it interconnects with the Enbridge pipeline system, to a 65,000 bpd refinery in Warren, Pennsylvania owned by United Refining Company. See United Refining Company, SEC Form 10-K for the fiscal year ended August 31, 2005, p. 3.

TABLE 2.1
MAINE – GENERAL OVERVIEW

Maine's petroleum distribution infrastructure consists of port and terminal facilities in Portland, ExxonMobil's Portland to Bangor pipeline, and the Portland-Montreal pipeline that transports oil from Portland to refineries in Montreal. Maine uses conventional gasoline in the winter and 7.8 RVP gasoline in the summer. Fuel oil dominates the heating fuel market with an 80% share, while wood ranks second with a 6% share.

General Overview

- Population: 1,321,505 (2005) ranked 40th
- Per Capita Income: $31,252 (2005) ranked 35th
- Total Energy Consumption: 0.5 quadrillion Btu (2002), ranked 41st
- Per Capita Energy Consumption: 362 million Btu (2002), ranked 22nd
- Total Petroleum Consumption: 5.4 million gallons per day (2004), ranked 40th
- Gasoline Consumption: 2.0 million gallons per day (2004), ranked 40th
- Distillate Fuel Consumption: 2.2 million gallons per day (2004), ranked 31st
- Liquefied Petroleum Gas Consumption: 0.1 million gallons per day (2004), ranked 43rd
- Jet Fuel Consumption: 0.1 million gallons per day (2004), ranked 38th

Petroleum Supply (Upstream)

- Crude Oil Proved Reserves: None
- Crude Oil Production: None
- Total Producing Oil Wells: None
- Rotary Rigs in Operation: None

Transportation

- **Major Pipelines:**
  - Crude Oil - Portland outbound to Montreal
  - Product - Buckeye, Exxon/Mobil in-state Portland to Bangor
  - Liquefied Petroleum Gas – None
- **Ports & Waterway Systems:** Bucksport (Port), Searsport (Port), Portland (Port), Bangor (Port), Brewer (Port), Yarmouth (Port), Wiscasset (Port).

Refining & Marketing (Downstream)

- Refineries: There are no refineries located in Maine.
- Gasoline Stations: 1,036 outlets (2006), or about 0.9% of U.S. total.

Source: http://tonto.eia.doe.gov/oog/info/state/me.html.

TABLE 2.2
MASSACHUSETTS – GENERAL OVERVIEW

Massachusetts is one of five states that require the use of federal reformulated gasoline statewide. Massachusetts has several major ports, including Boston harbor, and has a single product pipeline (owned by ExxonMobil) that runs from Providence, Rhode Island, to Springfield, Massachusetts. Heating oil is the dominant home heating fuel with a market share of 44%, followed by natural gas with a 39% share.

General Overview

- Population: 6,398,743 (2005) ranked 13th
- Per Capita Income: $44,289 (2005) ranked 3rd
- Total Energy Consumption: 1.6 quadrillion Btu (2002), ranked 23rd
- Per Capita Energy Consumption: 243 million Btu (2002), ranked 47th
- Total Petroleum Consumption: 15.6 million gallons per day (2004), ranked 18th
- Gasoline Consumption: 7.9 million gallons per day (2004), ranked 16th
- Distillate Fuel Consumption: 4.4 million gallons per day (2004), ranked 12th
- Liquefied Petroleum Gas Consumption: 0.2 million gallons per day (2004), ranked 38th
- Jet Fuel Consumption: 0.9 million gallons per day (2004), ranked 21st

Petroleum Supply (Upstream)

- Crude Oil Proved Reserves: None
- Crude Oil Production: None
- Total Producing Oil Wells: None
- Rotary Rigs in Operation: None

Transportation

- **Major Pipelines:**
  - Crude Oil – None
  - Product - Exxon/Mobil from East Providence (Rhode Island) to Springfield, Buckeye from New Haven (Connecticut) to Springfield
  - Liquefied Petroleum Gas – None
- **Ports & Waterway Systems:** Boston (Port), Braintree (Port), Weymouth (Port), Quincy (Port), Fall River (Port).

Refining & Marketing (Downstream)

- Refineries: There are no refineries located in Massachusetts.
- Gasoline Stations: 2,700 outlets (2006), or about 1.6% of U.S. total.

Source: http://tonto.eia.doe.gov/oog/info/state/ma.html.

TABLE 2.3
NEW HAMPSHIRE – GENERAL OVERVIEW

New Hampshire requires reformulated gasoline in the populated areas around Manchester and Nashua in the southeast corner of the state, while conventional gasoline is used in the rest of the state. New Hampshire has relatively little petroleum distribution infrastructure except for port and terminal facilities in Portsmouth and a crude oil pipeline (the Portland-Montreal pipeline) that traverses the state on its way to refineries near Montreal. Fuel oil is the dominant home heating fuel with a 58% share, followed by natural gas with an 18% share.

General Overview

- Population: 1,309,940 (2005) ranked 41st
- Per Capita Income: $38,408 (2005) ranked 7th
- Total Energy Consumption: 0.3 quadrillion Btu (2002), ranked 45th
- Per Capita Energy Consumption: 256 million Btu (2002), ranked 42nd
- Total Petroleum Consumption: 4.3 million gallons per day (2004), ranked 42nd
- Gasoline Consumption: 2.0 million gallons per day (2004), ranked 39th
- Distillate Fuel Consumption: 1.3 million gallons per day (2004), ranked 42nd
- Liquefied Petroleum Gas Consumption: 0.3 million gallons per day (2004), ranked 31st
- Jet Fuel Consumption: 0.1 million gallons per day (2004), ranked 43rd

Petroleum Supply (Upstream)

- Crude Oil Proved Reserves: None
- Crude Oil Production: None
- Total Producing Oil Wells: None
- Rotary Rigs in Operation: None

Transportation

- **Major Pipelines:**
    - Crude Oil - traversed by the Portland-Montreal pipeline (no offloading in New Hampshire)
    - Product – None
    - Liquefied Petroleum Gas - None
- **Ports & Waterway Systems:** Portsmouth (Port)

Refining & Marketing (Downstream)

- Refineries: There are no refineries located in New Hampshire.
- Gasoline Stations: 800 outlets (2006), or about 0.5% of U.S. total.

Source: http://tonto.eia.doe.gov/oog/info/state/nh.html.

TABLE 2.4
NEW YORK – GENERAL OVERVIEW

New York requires reformulated gasoline blended with ethanol in New York City and surrounding metropolitan areas and conventional gasoline in the other regions of the state. Beginning January 1, 2004, both New York and Connecticut banned the use of methyl tertiary butyl ether ("MTBE") as a smog reducing gasoline additive. The state has no petroleum refineries but relies partly on nearby refineries in New Jersey for its petroleum supplies. Several pipelines carry petroleum products from refineries and ports located along the Delaware River near Philadelphia, Pennsylvania, to population centers in the northern of New York near Syracuse. In addition, a major liquefied petroleum gas pipeline traverses the state and terminates at Selkirk, New York. Natural gas is the dominant home heating fuel with a market share of nearly 52%, followed by fuel oil with a 33% share.

General Overview

- Population: 19,254,630 (2005) ranked 3rd
- Per Capita Income: $40,507 (2005) ranked 6th
- Total Energy Consumption: 4.1 quadrillion Btu (2002), ranked 4th
- Per Capita Energy Consumption: 216 million Btu (2002), ranked 50th
- Total Petroleum Consumption: 38.8 million gallons per day (2004), ranked 4th
- Gasoline Consumption: 15.8 million gallons per day (2004), ranked 4th
- Distillate Fuel Consumption: 11.0 million gallons per day (2004), ranked 2nd
- Liquefied Petroleum Gas Consumption: 1.0 million gallons per day (2004), ranked 15th
- Jet Fuel Consumption: 2.2 million gallons per day (2004), ranked 8th

Petroleum Supply (Upstream)

- Crude Oil Proved Reserves: Accounts for less than 1% of U.S. crude oil proved reserves.
- Crude Oil Production: 540 barrels per day (2005), ranked 28th (29th including Federal Offshore). Accounts for less than 1% of U.S. crude oil production.
- Total Producing Oil Wells: 3,270 (2005)
- Rotary Rigs in Operation: 4 (2005)

TABLE 2.4
NEW YORK – GENERAL OVERVIEW (CONT.)

Transportation
• **Major Pipelines:**
  • Crude Oil - Kiantone from W. Seneca to Warren (Pennsylvania)
  • Product - Buckeye from Macungie (Pennsylvania) to Utica and from Macungie (Pennsylvania) to Buffalo; Sunoco from Marcus Hook (Pennsylvania) to Syracuse and from Philadelphia (Pennsylvania) to Buffalo
  • Liquefied Petroleum Gas – TEPPCO
  • Ports & Waterway Systems: Albany (Port), New York (Port), Port Chester (Port), Manhasset (Port), Hempstead Harbor (Port), Oyster Bay (Port), Cold Spring Harbor (Port), Northport (Port), Port Jefferson (Port), and Northville (Port).
 	
Refining & Marketing (Downstream)
• Refineries: There are no refineries located in New York.
• Gasoline Stations: 7,050 outlets (2006), or about 4.2% of U.S. total.

Source: http://tonto.eia.doe.gov/oog/info/state/ny.html.

TABLE 2.5
VERMONT – GENERAL OVERVIEW

Vermont uses conventional gasoline statewide. Vermont has no petroleum pipelines and instead relies on railcar and tanker trucks for its petroleum supply. Like other New England states, Vermont relies heavily on fuel oil for home heating, accounting for more than 58% of home heating fuel use, followed by propane with a 14% share.

General Overview

- Population: 623,050 (2005) ranked 49th
- Per Capita Income: $33,327 (2005) ranked 23rd
- Total Energy Consumption: 0.2 quadrillion Btu (2002), ranked 51st
- Per Capita Energy Consumption: 256 million Btu (2002), ranked 43rd
- Total Petroleum Consumption: 2.1 million gallons per day (2004), ranked 50th
- Gasoline Consumption: 1.0 million gallons per day (2004), ranked 48th
- Distillate Fuel Consumption: 0.7 million gallons per day (2004), ranked 49th
- Liquefied Petroleum Gas Consumption: 0.2 million gallons per day (2004), ranked 37th
- Jet Fuel Consumption: 0.04 million gallons per day (2004), ranked 47th

Petroleum Supply (Upstream)

- Crude Oil Proved Reserves: None
- Crude Oil Production: None
- Total Producing Oil Wells: None
- Rotary Rigs in Operation: None

Transportation

- **Major Pipelines:**
  - Crude Oil - traversed by the Portland-Montreal pipeline (no offloading in Vermont)
  - Product – None
  - Liquefied Petroleum Gas – None
- **Ports & Waterway Systems:** None

Refining & Marketing (Downstream)

- Refineries: There are no refineries located in Vermont.
- Gasoline Stations: 621 outlets (2006), or about 0.4% of U.S. total.

Source: http://tonto.eia.doe.gov/oog/info/state/vt.html.

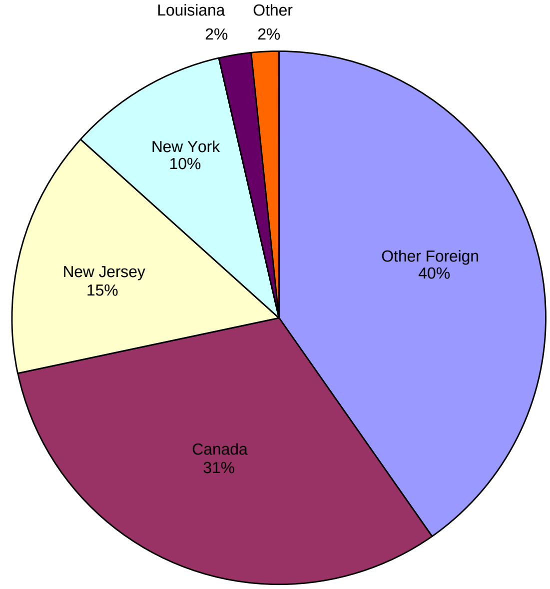
B. *Sources of waterway shipments of petroleum products*

The States are heavily dependent on imports through port terminals. While New York has pipelines coming into the state, the New York harbor area and the Hudson River valley receive significant shipments of petroleum products that are used throughout New York and neighboring states. Shipments of petroleum products by waterway into Maine, Massachusetts, New Hampshire, and New York totaled 65 million tons in 2004.[36] Figures 2.2 through 2.5 show the origin of waterway shipments into Maine, Massachusetts, New Hampshire, and New York. New York received 58% of total petroleum product waterway shipments into these four states, Massachusetts 28%, Maine 10%, and New Hampshire 3%.

Maine, Massachusetts, New Hampshire, and New York, all received more than 70% of their petroleum products transported via waterway from outside the United States. For all four states, approximately 1/3 of these imports came from Canada and 2/3 from other foreign countries. While the data showing shipments to each state do not indicate which foreign countries were the sources of the petroleum products, the EIA does give the quantity of gasoline from each country imported into East Coast states (i.e., PADD 1). Most gasoline shipments in 2004 came from Europe, especially the United Kingdom, the Netherlands, France, Russia, Italy, and Latvia. Other than Europe and Canada, Venezuela and the Virgin Islands are the only other two substantial exporters of gasoline into PADD 1.

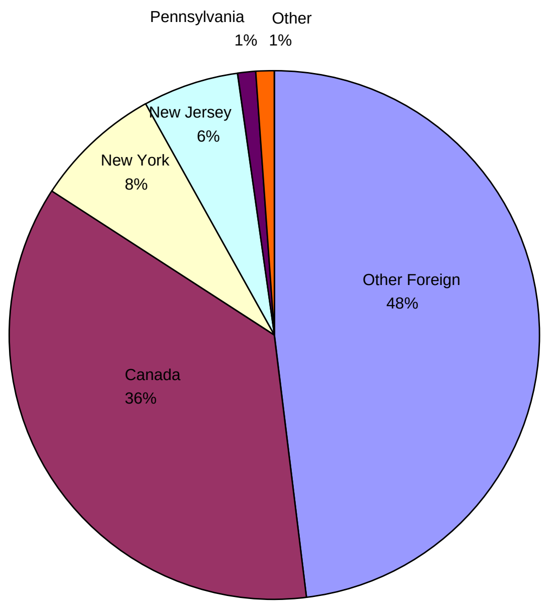
[36] "Petroleum products" includes refined products such as gasoline, diesel, and asphalt. It does not include crude oil. Because of the mixture of products, it is difficult to translate tonnage into barrels, but if the only product were gasoline, then 65 million tons would be approximately 500 million barrels. These data come from the U.S. Army Corps of Engineers and include shipments to both ports and river docks. Their data do not identify any waterway shipments into Vermont. However, a small percentage of total between-state shipments are classified as "other" when reporting the shipments would reveal the identity of the shipper.

FIGURE 2.2
ORIGIN OF PETROLEUM PRODUCTS WATERWAY SHIPMENTS INTO MAINE IN 2004
TOTAL = 6.6 MILLION TONS



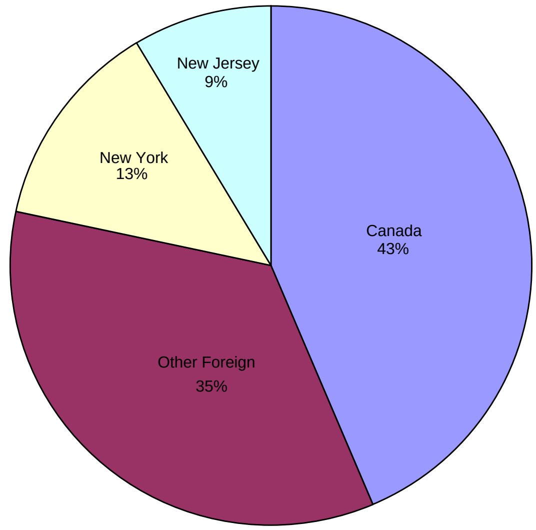
Source: US Army Corps of Engineers 2004 Commodity Movements from the Public Domain Database.

FIGURE 2.3
ORIGIN OF PETROLEUM PRODUCTS WATERWAY SHIPMENTS INTO MASSACHUSETTS IN 2004
TOTAL = 18.3 MILLION TONS



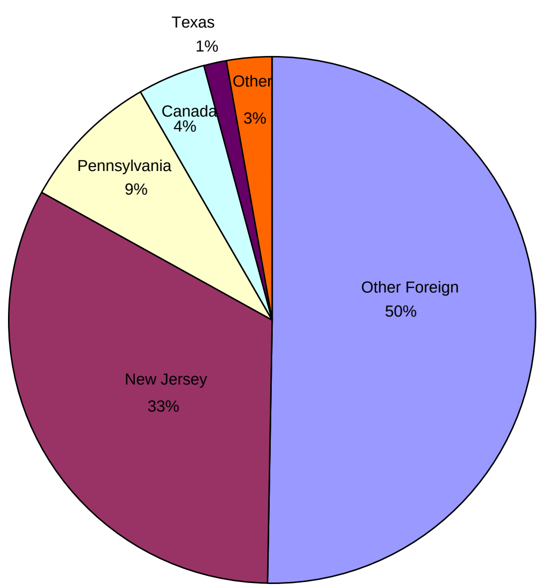
Source: US Army Corps of Engineers 2004 Commodity Movements from the Public Domain Database.

FIGURE 2.4
ORIGIN OF PETROLEUM PRODUCTS WATERWAY SHIPMENTS INTO NEW HAMPSHIRE IN 2004
TOTAL 2.2 MILLION TONS



Source: US Army Corps of Engineers 2004 Commodity Movements from the Public Domain Database.

FIGURE 2.5
ORIGIN OF PETROLEUM PRODUCTS WATERWAY SHIPMENTS INTO NEW YORK IN 2004
TOTAL = 37.9 MILLION TONS



Source: US Army Corps of Engineers 2004 Commodity Movements from the Public Domain Database.

With the above information, we can calculate waterway imports as a percentage of total consumption of petroleum products on a state-by-state basis. Table 2.6 below shows the results. In 2004, there were no appreciable shipments by water in Vermont, but each of the other States was characterized by substantial waterway imports of petroleum products. In Maine and Massachusetts, waterway imports actually exceeded statewide consumption of petroleum products in 2004, indicating that at least some of what was transported into Maine and Massachusetts along their waterways passed through the states for consumption elsewhere or was stored in-state for future use. Petroleum products imported into New York via ship or barge accounted for nearly 90% of consumption, and almost half of total consumption in New Hampshire was received via waterway shipments.

TABLE 2.6
ECONOMIC IMPORTANCE OF WATERWAY IMPORTS

State	Waterway Imports as a Percentage of Total Consumption of Petroleum Products	Canadian Waterway Imports as a Percentage of Total Consumption of Petroleum Products	Other Foreign Waterway Imports as a Percentage of Total Consumption of Petroleum Products	U.S. Waterway Imports as a Percentage of Total Consumption of Petroleum Products
Maine	111.6	34.6	44.6	32.4
Massachusetts	107.1	38.6	51.4	17.1
New Hampshire	46.7	20.1	16.4	10.3
New York	89.2	3.6	44.6	41.0
Vermont	0.0	0.0	0.0	0.0

Sources: US Army Corps of Engineers 2004 Commodity Movements from the Public Domain Database, and http://tonto.eia.doe.gov/oog/info/state/me.html, ma.html, nh.html, ny.html, and vt.html.

C. Pipeline transportation of petroleum products to and within the States

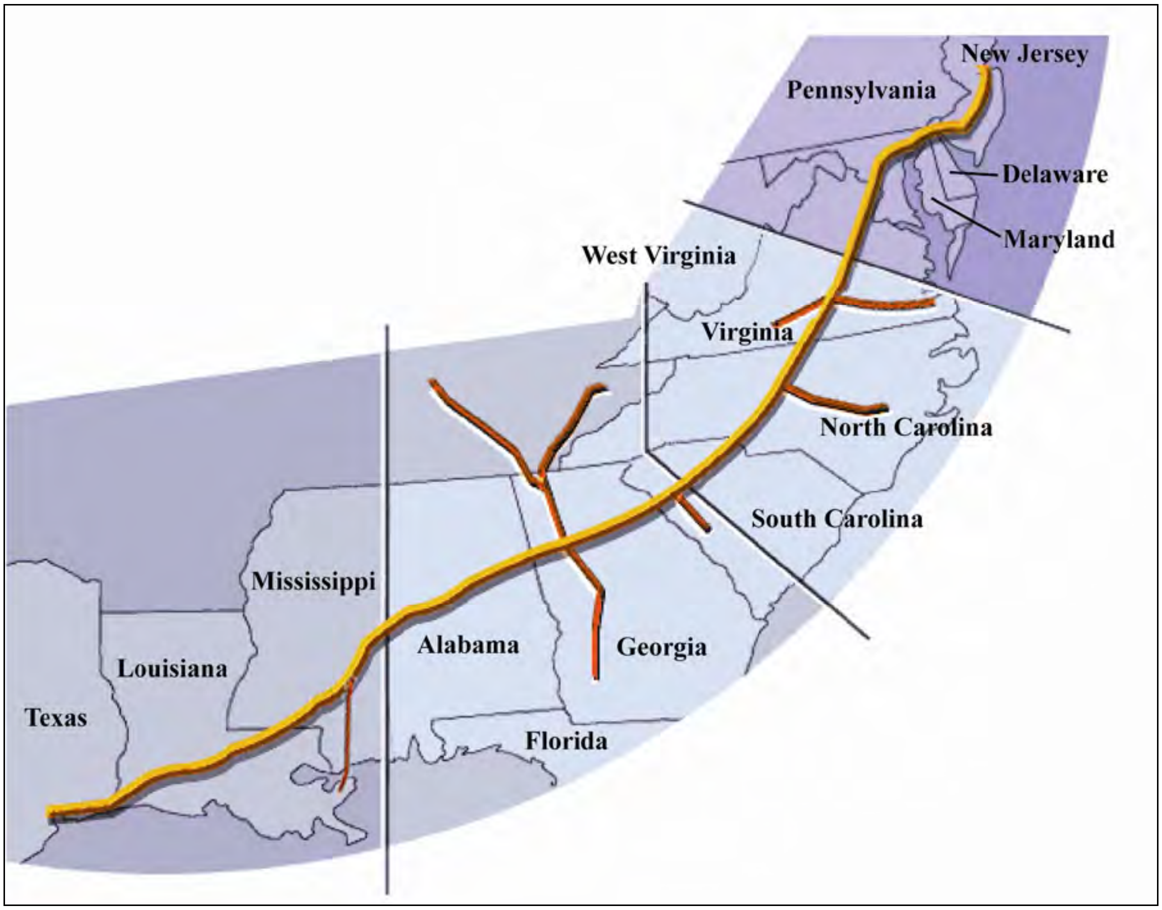
The Colonial pipeline transports refined petroleum products form the Gulf Coast to New Jersey and New York. Pipeline transportation within the States is provided primarily by Buckeye Pipelines, Sunoco Logistics (Sun), and ExxonMobil. Because these are all interstate pipelines, their rates and common carrier terms of service are regulated by the Federal Energy Regulatory Commission ("FERC").

Colonial Pipeline. Colonial Pipeline is a joint venture wholly owned by the following companies:

28.09%	Koch Capital Investment Company, LLC
23.44%	HUTTS, LLC
16.12%	Shell Pipeline Company LP
15.80%	CITGO Pipeline Holding I, LLC
8.53%	ConocoPhillips Pipe Line Company
8.02%	Phillips Petroleum International Investment Company
Source: http://www.colpipe.com/ab_oc.asp	

As shown in Figure 2.6, Colonial Pipeline owns and operates 5,519 miles of petroleum products pipeline stretching from Houston, Texas to Linden, NJ (New York Harbor) and also leases storage tanks at major distribution points along the pipeline. It serves more than 80 customers, including integrated oil companies like BP or Shell, petroleum terminalling companies like Sprague Energy and Global Companies, and even airlines such as U.S. Airways and Southwest Airlines.

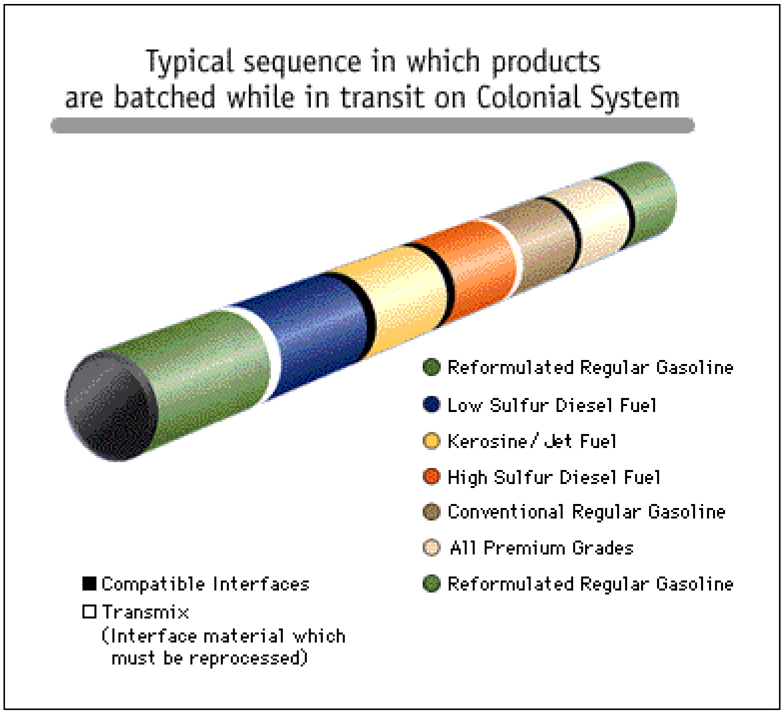
FIGURE 2.6
COLONIAL PIPELINE EAST COAST PIPELINE SYSTEM



Source: www.colpipe.com/ab_map.asp.

Refined products pipelines transport a variety of different petroleum products. As shown in Figure 2.7, different petroleum products are shipped in "batches." On the Colonial pipeline system, for example, batches range in size from 75,000 barrels to 3.2 million barrels. Each batch on that pipeline takes on average 18.5 days to move the entire length of the main pipeline from Houston to the New York harbor.[37] The cost to ship gasoline from Houston to Linden is approximately 2.5 cents per gallon.[38]

FIGURE 2.7
BATCHES OF PETROLEUM PRODUCTS
SHIPPED BY PIPELINE



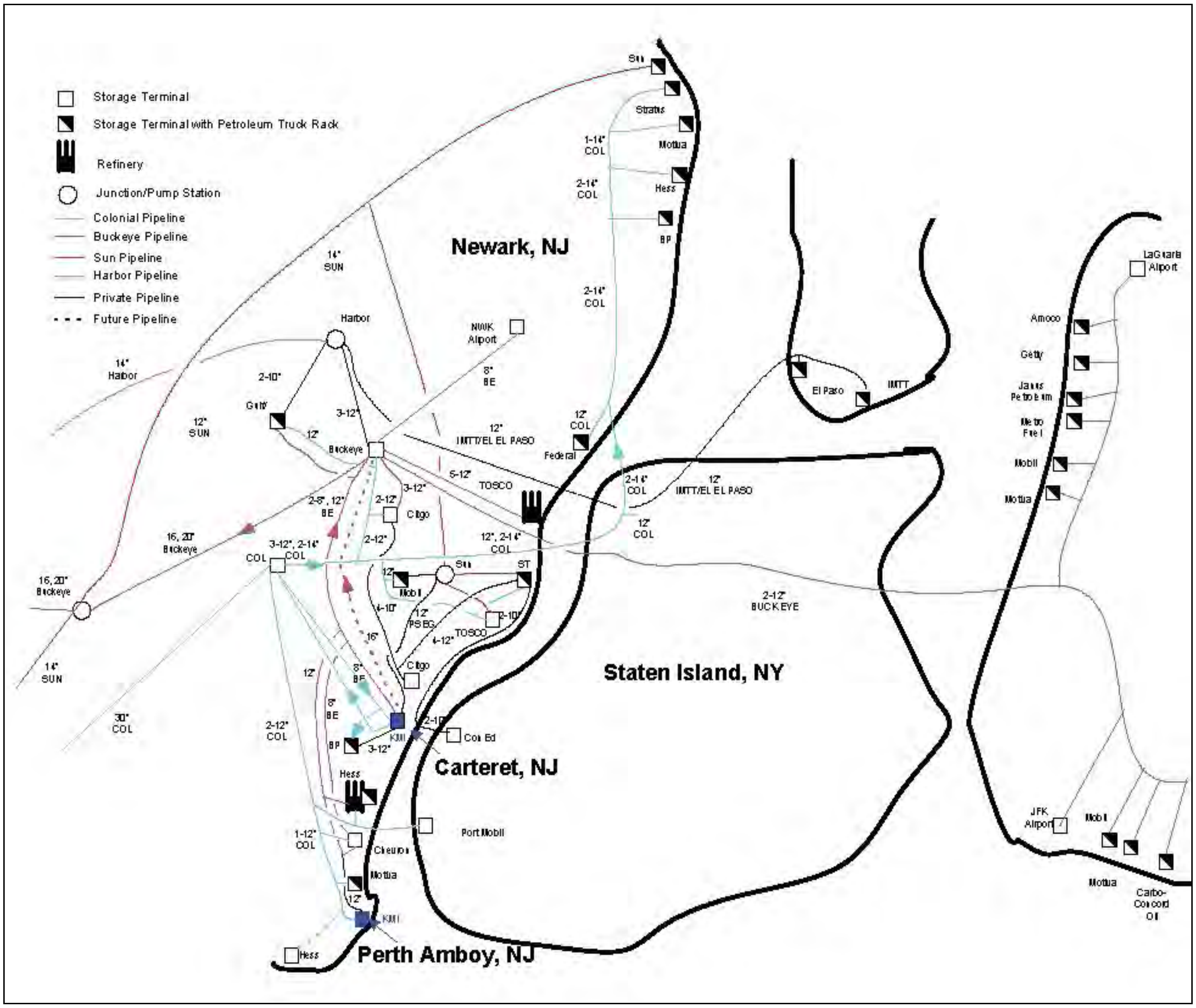
Source: http://www.colpipe.com/ab_faq.asp

Colonial Pipeline also has a network of smaller pipelines that branch out from the end of the mainline in Linden to a number of locations throughout the New York Harbor. This "Intra Harbor Transport Service" connects directly to terminals on the Hudson River owned by companies such as Motiva, Hess, and BP. More importantly, it also has direct connections to both the Buckeye and the Sunoco pipelines. Like Colonial, these pipelines serve many terminals in the greater New York Harbor area. Both Buckeye and Sunoco also have pipelines that leave the New York Harbor through New Jersey and Pennsylvania, but then turn north into New York where they serve cities such as Buffalo, Rochester, and Syracuse. Figure 2.8 is a detailed map of the local pipeline network in the New York Harbor area.

[37] http://www.colpipe.com/ab_faq.asp.

[38] http://www.colpipe.com/cs_faq.asp.

FIGURE 2.8
NEW YORK HARBOR PIPELINE SYSTEM WITH
COLONIAL CONNECTIONS TO BUCKEYE AND SUNOCO SYSTEMS

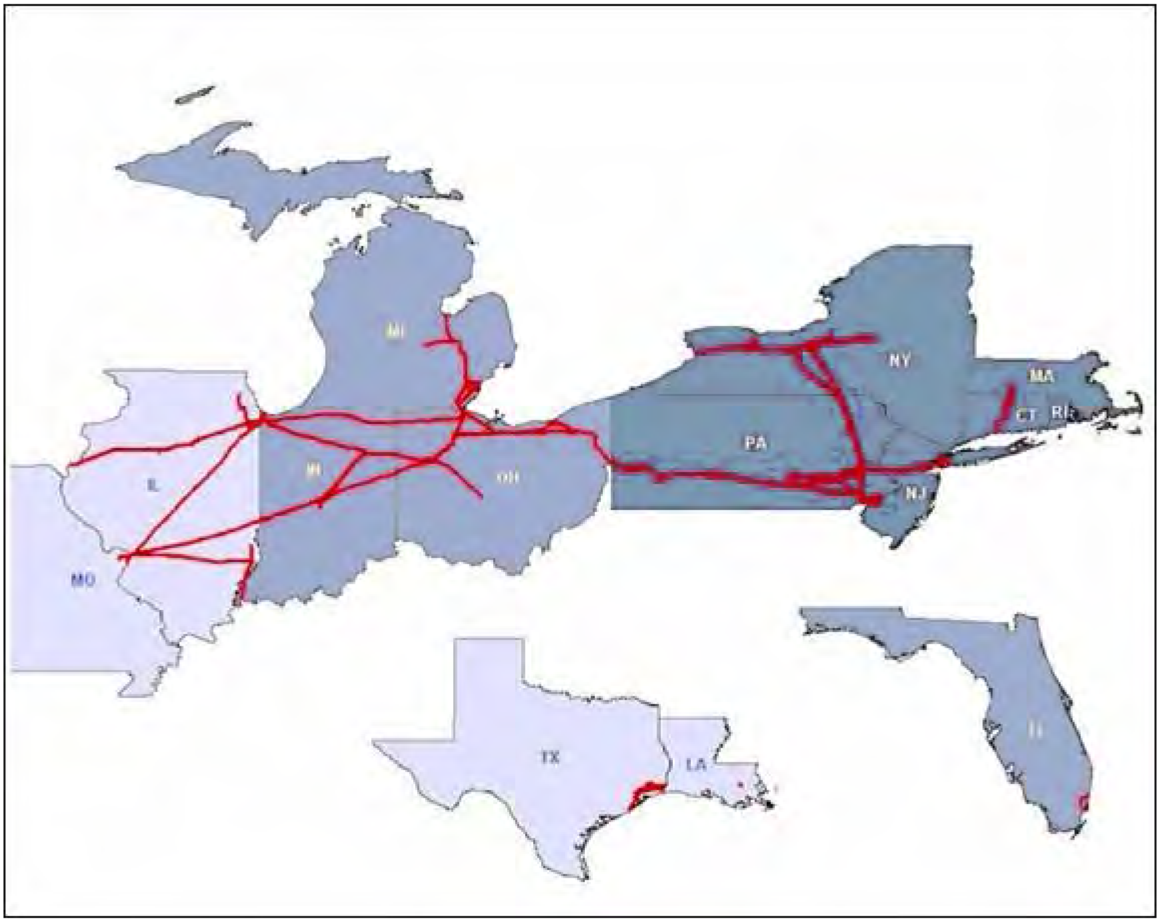


Source: www.unr.edu/coba/logis/executive_education/KinderMorgan.pdf

Buckeye Pipeline. Buckeye owns and operates approximately 5,350 miles of underground pipelines serving over 100 delivery locations within eighteen states. The company transports refined petroleum products including gasoline, jet fuel, diesel fuel, heating oil, and kerosene from major supply sources to industry-owned terminals and airports located within major end-use markets. Buckeye also transports other refined products such as propane and butane, refinery feedstocks, and blending components. Capacity utilization for Buckeye's pipelines typically range between 50% and 90%. In the States, utilization is usually higher in the winter because of increased consumption of heating oil.[39] Figure 2.9 is a map of Buckeye 's pipeline system.

[39] Interview with a representative of major pipeline company serving the Northeast.

FIGURE 2.9
BUCKEYE PIPELINE SYSTEM

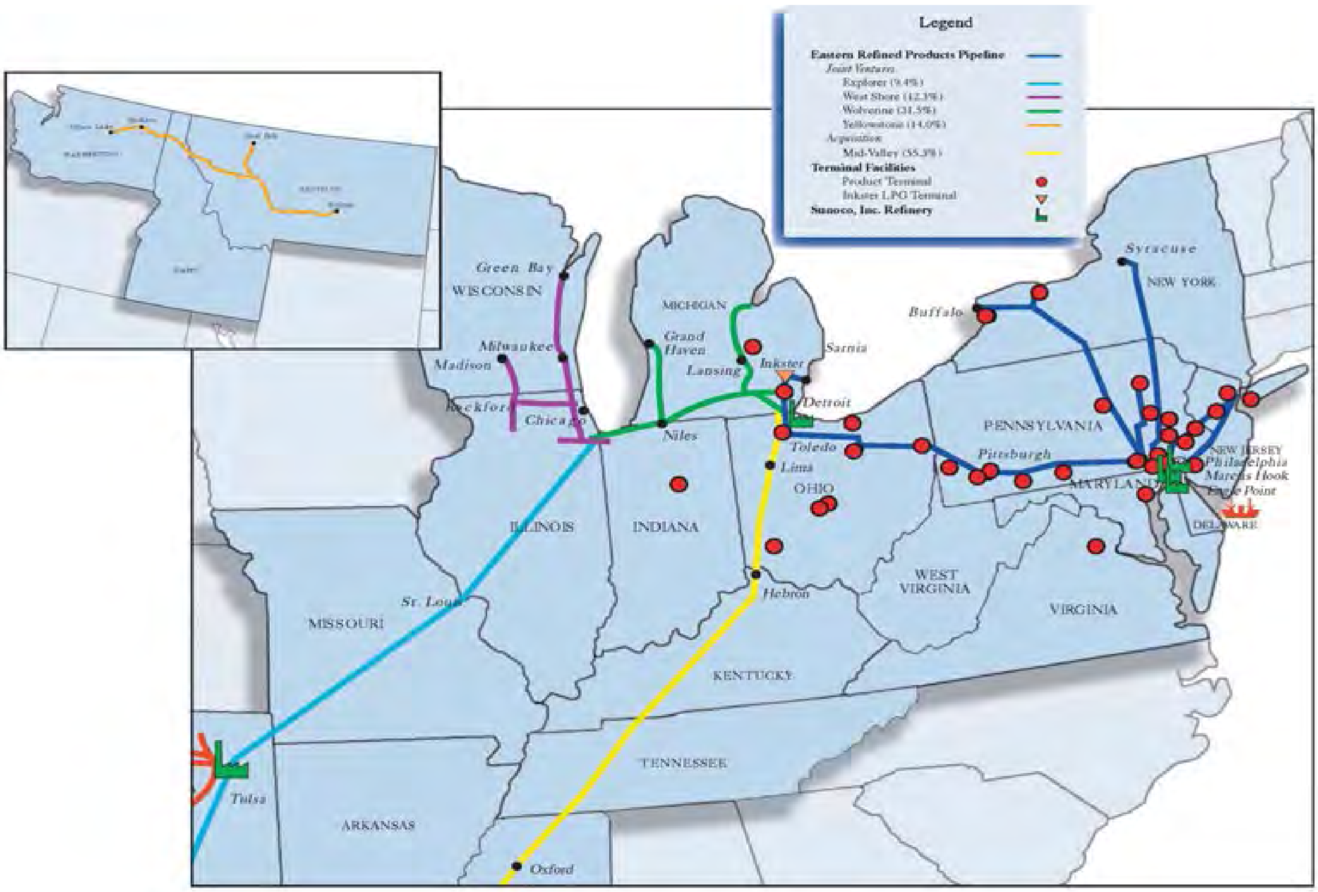


Source: http://www.buckeye.com/AboutUs/PipelineSystemMap/tabid/57/Default.aspx.

In the area of the States, Buckeye owns and operates a 14-inch pipeline that transports petroleum products north from Pennsylvania into south central New York. From there the pipeline proceeds north towards Auburn where it splits on an east/west axis proceeding east through Syracuse and terminating in Utica, and west (with a spur to Rochester) terminating in Buffalo. Buckeye also owns and operates a 12-inch pipeline that transports petroleum products north from the port of New Haven, through Hartford, and terminating in Springfield, Massachusetts as well as intra harbor pipelines that transport products between New Jersey to New York City.

Sunoco Logistics Pipeline. Sunoco has three lines consisting of its Western Pipeline System, Terminal Facilities, and Eastern Pipeline System, together comprising 1,740 miles of refined product pipelines. Sunoco's refined product pipelines transport refined products from Sunoco, Inc. (R&M)'s Philadelphia, PA, Marcus Hook, PA, Eagle Point, NJ, and Toledo, OH refineries, as well as from third parties to markets in New York, New Jersey, Pennsylvania, Ohio, and Michigan. The refined products transported in these pipelines include multiple grades of gasoline, middle distillates (such as heating oil, diesel, and jet fuel), LPGs (such as propane and butane), refining feedstocks, and other hydrocarbons. Sunoco's Northeast pipeline system is shown in Figure 2.10.

FIGURE 2.10
SUNOCO NORTHEAST PIPELINE SYSTEM

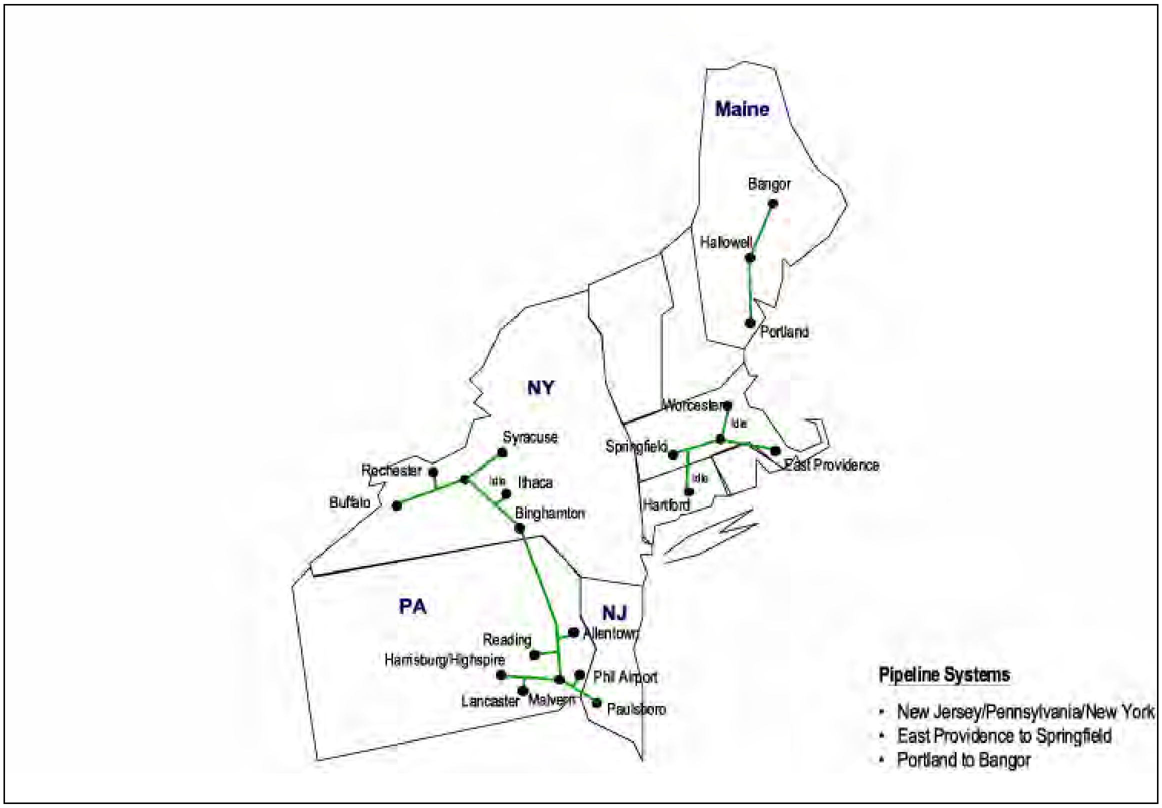


Source: http://www.sunocologistics.com/business_lines/business_lines_maps.asp#.

Sunoco's Eastern Pipeline System transports petroleum products into New York. An 8-inch pipeline and a separate 6-inch pipeline transport products north from Pennsylvania. The western 8-inch pipeline transports products to Rochester and Buffalo, while the eastern 6-inch pipeline transports products to Syracuse.

ExxonMobil: ExxonMobil has three pipeline systems in the Northeast region: Portland to Bangor, East Providence to Springfield, and the Paulsboro NJ/PA/NY system. The map of these three systems is given in Figure 2.11. The Portland to Bangor system consists of 124 miles of primarily 6-inch pipelines, originating in Portland and terminating in Bangor, with deliveries to ExxonMobil, Coldbrook Energies, and Weber Energy terminals. The East Providence to Springfield system consists of 84 miles of 6-inch pipeline, originating in East Providence, RI and terminating in Springfield. The Paulsboro NJ/PA/NY system consists of 472 miles of 6-inch and 8-inch pipeline serving ExxonMobil's Paulsboro, New Jersey, Pennsylvania, and New York terminals.

FIGURE 2.11
EXXONMOBIL NORTHEAST PIPELINE SYSTEM



Source: http://www.exxonmobilpipeline.com/Images/EMPCo/750xV_NEProd.jpg.

D. Canadian refineries

Since there are no refineries in the States, the States must receive their petroleum products from refineries in surrounding states or via imports from foreign countries. As shown above, much of the States' petroleum products are imported from Canada. Table 2.7 shows the location, processing capacity, and products of the six Canadian refineries located near the Northeast states. Most of these refineries produce gasoline and diesel fuel, and some produce other refined products such as heating oil, jet fuel, asphalt, and lubricating oils.

TABLE 2.7
CANADIAN REFINERIES

Name	Location	Processing Capacity (Barrels of Crude Oil Per Day)	Products
Irving	Saint John, New Brunswick	280,000\1	Gasoline, Diesel, Heating Oil, Jet Fuel, and Asphalt
Ultramar	Levis, Quebec	215,000\2	Gasoline, Diesel, Heating Oil, Lubricating Oils, Butane, Propane, Bunker Oil, Kerosene-type Aviation Turbine Fuel, and Asphalt
Shell	Montreal, Quebec	130,000\3	Gasoline, Diesel, Heavy Oil, Liquefied Petroleum Gas, Lubricating Oils, Marine Oils, and Bitumen
Imperial	Nanticoke, Ontario	118,000\4	Gasoline, Diesel, Jet Fuel, Heavy Fuel Oil, Asphalt, Propane, and Butane
Petro-Canada	Montreal, Quebec	94,880\5	Gasoline, Motor Oil, Fuel Oil, Liquefied Petroleum Gas, Asphalt, and Petrochemicals
Petro-Canada	Mississauga, Ontario	12,000\6	Lubricating Oils

Sources:
\1 http://www.irvingoil.com/dloads/HATGU.pdf
\2 http://www.ultramar.ca/Refinery/
\3 http://www.shell.ca/home/Framework?siteId=ca-en&FC2=/ca-en/html/iwgen/about_shell/what_we_do/oil_products/montreal/zzz_lhn.html&FC3=/ca-en/html/iwgen/about_shell/what_we_do/oil_products/montreal/montreal_profile.html
\4 http://www.imperialoil.ca/Canada-English/Thisis/Operations/TI_O_NanticokeRefinery.asp
\5 http://www.slv2000.qc.ca/bibliotheque/centre_docum/protection/006_a.pdf (Note: 1 m³ equals 6.2898 barrels, hence 15,085 m³ equals 94,881.8 barrels.)
\6 http://www.ene.gov.on.ca/programs/3354e62.pdf

Irving refinery is the largest refinery located near the Northeast region and is also the largest refinery in Canada. With a production capacity of up to 280,000 barrels of crude oil per day, it plays a significant role in providing petroleum products to Northeast states, supplying the States mostly via barge, but also, in very limited quantities, via train and truck. Irving exports approximately 175,000 barrels of petroleum products per day to the Northeast, including 100,000 barrels of reformulated gasoline (RFG), the equivalent of 42% of all Canadian exports and 45.5% of U.S. RFG imports.[40] In total, Irving accounts

[40] http://www.irvingoil.com/company/refinery.asp

for 64% of Canada's petroleum product exports to the U.S., 75% of Canada's gasoline exports to the U.S., and 19% of all U.S. gasoline imports.[41]

In October 2006, Irving announced that it was considering constructing a second refinery in Saint John, New Brunswick.[42] The refinery could supply up to 300,000 barrels of refined products per day to the U.S. Northeast. Given that the U.S. Northeast consumes 1.7 million barrels per day of transportation fuels, the proposed second Irving refinery would account for approximately 18% of 2006 consumption.[43]

E. Summary of the infrastructure for transporting petroleum products from refineries to terminals

Based on the above discussion, several general features of the infrastructure for transporting petroleum products from refineries to terminals in the States are apparent. Vermont, lacking pipeline or port facilities, has the least developed infrastructure for transporting petroleum products from refineries to terminals. Instead, Vermont relies primarily on truck transport from out of state terminals. This outcome is not surprising given the state's relatively small population and its far-northern and landlocked geographic location. New Hampshire imports refined petroleum products through port facilities, but it does not have an intrastate pipeline system to distribute product from the port to locations further within the state. Like Vermont, it relies on tanker trucks for within-state petroleum product distribution. Maine and Massachusetts import refined products through port facilities as well, but also have intrastate pipelines and terminalling facilities to facilitate distribution within the state. New York imports refined petroleum products through port facilities as well as via pipeline, and it has the most extensive infrastructure for importing petroleum products from refineries to terminals within the state, as evidenced by its extensive port operations (and neighboring port operations in New Jersey) and its connection to the Colonial pipeline system that transports petroleum products from Houston to New York harbor. Given its large inland geography, there are extensive intrastate pipelines within New York to transport petroleum products efficiently within the state.

Given the States' dependence on imports of refined petroleum products for their transportation fuel and home heating needs, state and local regulatory authorities may be interested in determining the extent to which the supply of petroleum products into their states can be substantially affected by the actions of individual firms. There are three primary levels of the distribution market: refinery production and shipment decisions, pipeline transportation, and terminalling facilities. Petroleum products enter the States

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[41] "Irving Oil's Saint John Refinery Reaches Two Billion Barrel Milestone," PR News US (March 1, 2006); "Irving Oil Looking at the Possibility of Second Refinery," October 5, 2006, http://www.irvingoil.com/community/news1.asp?newsid=144.

[42] "Irving Oil Looking at the Possibility of Second Refinery," October 5, 2006, http://www.irvingoil.com/community/news1.asp?newsid=144.

[43] "Irving Oil Looking at the Possibility of Second Refinery," October 5, 2006, http://www.irvingoil.com/community/news1.asp?newsid=144.

through pipelines and terminalling facilities that are owned by individual firms. First, the States depend for the most part on only one or two pipeline firms for their imports. However, prices and access to interstate pipelines are already regulated by the Federal Energy Regulatory Commission to ensure a smoothly functioning market. In addition, the States import refined petroleum products through ports. At these ports, refined products are offloaded from tankers and barges into storage terminals, which are then the gateways for petroleum product distribution into and within the States. Hence, terminals are the second level of distribution that can affect supply of refined products into and within the States. Unlike interstate pipelines, terminal facilities are not regulated, and the market structure of terminals in the States will be discussed in detail in the next section. Third, refineries produce products and decide quantities to ship to different markets, depending in part on relative prices across markets. Regulators may be interested in determining the extent to which supply of petroleum products to their state can be influenced by the action of any one refiner. For example, regulators may wish to estimate the ability of a refiner to exercise "market power," or the extent to which a disruption at a particular refinery may affect supply to and prices within their state.

Exercising market power would correspond to a voluntary reduction in supply with the goal of unilaterally increasing refiner profits by increasing the market price. In contrast, a supply disruption would be a non-voluntary or accidental reduction in supply that may result in temporarily higher prices. The extent to which any one refiner can affect the supply and market price in the States depends on the relative market share of the firm and the responsiveness of other refiners' supply to a temporary increase in price. For example, Maine receives 34.6% of its total consumption of petroleum products via waterway imports from Canada (see Table 2.6). Conservatively assuming that Irving's refinery in St. John accounts for all of those imports, Irving would have a one-third market share in Maine. Although this may seem like a relatively large market share, it does not necessarily imply that Irving can exercise market power in Maine by decreasing supply to profitably increase prices and profits. If other refiners can quickly and profitably respond to a reduction in supply from Irving to Maine, then despite its one-third market share, voluntary or accidental reductions in supply from Irving may have a minimal impact on petroleum prices in Maine. Thus, from an antitrust, market-power perspective, we care about demand and supply responses following a (hypothetical) permanent increase in price above the current level. Estimating these supply responses requires detailed firm-level data. This type of confidential data is typically only available to regulators in the context of a particular investigation.

III. Market Structure of Terminals

Terminals are the primary gateways for petroleum product distribution into and within the States. Thus, understanding the structure of the terminalling market in the States is important. This section characterizes the number and size distribution of terminal owners in the States and discusses conditions that affect the ability of firms to enter and exit the market. Data on terminal locations, capacities, and ownership, are presented. This section also discusses the geographic areas served by each of the terminal centers and the potential for economic overlap between them. Several maps are presented that illustrate the geographic areas economically served by alternative terminals, and measures of market shares and concentration are presented and discussed.

A. Terminal locations, capacities, and ownership

Detailed tables describing the characteristics of all petroleum terminals in the States for the years 2000 and 2006 are in Appendix II. The locations of the terminals are shown in Figure 3.1. There is no single complete source for data on terminal locations, capacities, and ownership. The information in Appendix II was compiled from the OPIS Terminal Encyclopedia and supplemented with the ILTA Terminal Member Directory (directories compiled from voluntary firm survey responses), data from the U.S. Army Corps of Engineers and company websites. Where possible, the data were checked for accuracy across the various sources.

Figure 3.2 shows the locations of Canadian terminals located near the States. Although we lack data on volume of petroleum products transported via ground transportation from these terminals to the States, we can place an upper bound on such imports. Recall that Irving Oil exports approximately 175,000 barrels of petroleum products per day to the Northeast, accounting for 64% of Canada's petroleum product exports to the U.S.[44] Given that these shipments are all via waterway, an upper bound on the volume of petroleum products transported from these terminals into the States via ground transportation is approximately 98,000 barrels per day.[45] Based on the States' total consumption of petroleum products in 2004 of approximately 1.6 million barrels per day (see Tables 2.1 to 2.5), this upper bound figure would account for approximately 6% of total consumption of petroleum products in the States.[46]

For many of the terminals, capacity data are presented separately for specific products, e.g., gasoline versus No. 2 high-sulfur heating oil. Terminal operators do have some ability to switch tanks between storing #2 distillate fuels (heating oil) and gasoline. Newer, stainless steel tanks can handle any petroleum product. To switch between

[44] "Irving Oil's Saint John Refinery Reaches Two Billion Barrel Milestone," PR News US (March 1, 2006).

[45] If Irving's exports constitute 64% of Canadian petroleum product exports to the U.S., then total Canadian petroleum product exports to the U.S. equal approximately 273,000 barrels per day. The difference between total Canadian exports and Irving's (waterway) exports equals 98,000 barrels per day.

[46] This figure likely substantially exceeds the true figure because it assumes that all 98,000 barrels are imported into the States (as opposed to other U.S. locations).

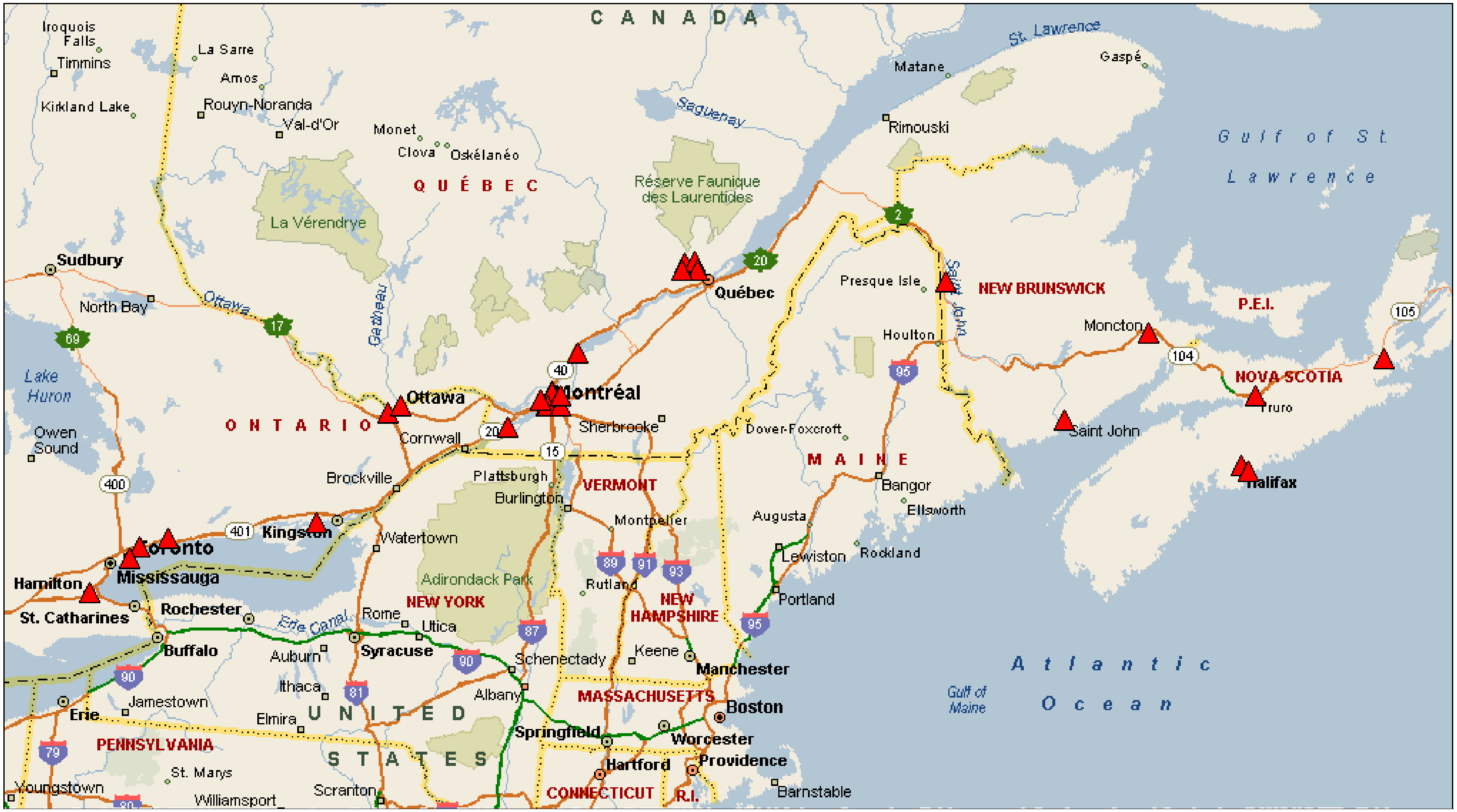
gasoline and heating oil, these tanks only need to be drained, dried, and cleaned. Older tanks have higher switching costs; they generally have a "heel" at the tank bottom where sludge from the petroleum product remains even after the tank has been drained. This requires an additional step to pump out all of the sludge before the tank is steam cleaned. A greater constraint involved in switching a tank between heating oil and gasoline is the vapor recovery system which is required for a gasoline tank but not for a heating oil tank. If a tank is switched from heating oil to gasoline, this recovery system would need to be installed on the tank.

Hence, even if the marginal profits from providing storage for gasoline exceeded those for home heating oil, for example, the costs associated with infrastructure and environmental permitting may be prohibitively expensive. For example, there may be a regulatory limit on emissions at the rack that prevents an operator from distributing more gasoline, so additional capacity would be useless without re-permitting for additional emissions. Similarly, the physical facilities for dispensing gasoline or heating oil at the rack may be fully utilized. Pipelines from the tanks to the racks may be running at full capacity or the intake from, say, a port to the tanks could have reached a capacity limit for one or more fuel types. In all of these cases, even if additional storage capacity could be added, the limitations of the infrastructure or the lack of regulatory permits may limit the ability to use that additional capacity. In the long run the operator could improve the infrastructure and apply for the appropriate permits, but in the short run such operational and regulatory constraints limit the ability of an operator to switch the products stored in a given tank.

FIGURE 3.1
LOCATIONS OF TERMINALS IN THE STATES

Source: OPIS Petroleum Terminal Encyclopedia (2006).

FIGURE 3.2
CANADIAN TERMINALS NEAR THE STATES



Source: OPIS Petroleum Terminal Encyclopedia (2006).

B. *Terminal owners' market shares and market concentration*

Using the information in Appendix II on terminal ownership and capacities, we can calculate firms' market shares. In order to calculate market shares we first need to define the size of the market. What determines the definition of a market in which firms compete? One reasonable definition of an economic market is a product and a geographic area within which prices tend to equality, net of transportation costs. The product and geographic dimensions of an economic market are determined by arbitrage conditions.[47] Within a given economic market, trades between buyers and sellers tend to eliminate profitable arbitrage opportunities. For example, based on the discussion above, terminals currently in use for home heating oil may or may not be part of the market for terminalling services for gasoline depending on how easily terminals used for home heating oil can be switched into use for gasoline in response to an arbitrage opportunity. Similarly, two terminals may or may not be in the same geographic market depending on how profitable it is for demanders to switch services between two terminals in response to a price difference across the two locations.

Because data on terminalling contracts, including prices, terms, volume of sales and permitting constraints, are not publicly available, we are limited in how precisely we can define the relevant market and thus measures of firm market shares and concentration. One approach is to use terminal capacities as an approximation of a firm's volume of sales, transportation costs for the demanders (trucking costs) to define the geographic scope of the market, and the totality of terminals regardless of current use as the relevant product market.

Market shares based on all terminals. Tables 3.1 through 3.10 show the identities of firms owning terminals in the States and market shares for these firms based on the market definitions described above. In addition, because information on terminal capacities and ownership is the only information available, we present measures of concentration based the Herfindahl-Hirschman Index ("HHI"). The HHI equals the sum of the squared market shares of suppliers, which are measured here as capacity shares given our geographic and product market definition.[48] The HHI is largest in a market with a monopoly (100% market share) and the HHI equals 10,000. In contrast, in a market with a large number of firms, the HHI tends toward zero. A useful way of interpreting the HHI is to recognize that the inverse of the number of equal-sized firms

[47] *See* Alfred Marshall, PRINCIPLES OF ECONOMICS (variorum ed., 1961), p. 325; *see also* Augustin Cournot (1838), RECHERCHES SUR LES PRINCIPES MATHEMATIQUES DA LA THEORIE DES RICHESS, Paris: Hachette. (English translation: Researches into the Mathematical Principles of the Theory of Wealth. New York: Macmillan, 1897. (Reprinted New York: Augustus M. Kelley, 1971)).

[48] The HHI represents the sum of each participant's squared market share. In a single-firm (monopoly) market, the firm's share is 100%, which results in an HHI value of 10,000. By contrast, a market served by many firms of small market share will display an HHI near zero.

equals the HHI, e.g., a market with two equal-sized firms has an HHI of 5,000 and a market with three equal-sized firms has an HHI of 3,333.[49]

It is important to emphasize that the HHI statistics in this report have been calculated using geographic markets delineated using information on the approximate cost per mile of transporting refined petroleum products and product markets delineated by approximate abilities of firms to switch between product services. Thus, for a specific terminal location, we have attempted to define a geographic market showing the area that can be economically served based on transportation cost estimates. The resulting HHI statistics are not the product of detailed market definition analyses whose purpose would be to delineate relevant markets for antitrust purposes using, for example, the market definition methodology in the *Horizontal Merger Guidelines* in the context of a particular merger analysis. They are instead useful descriptive statistics for further understanding market structure for terminalling services in the States.

Based on the available data, and on our described market definitions, Tables 3.1-3.10 report market shares and HHI statistics for two areas in Maine, three areas in Massachusetts, the state of New Hampshire, three areas in New York, and the state of Vermont, for a total of ten geographic areas. There is significant variation in the HHI measures of concentration across the ten regions. In general, economists refer to markets where the HHI is below 1,000 (i.e., the equivalent of ten equal-sized firms) as "unconcentrated"; markets where the HHI is above 1,000 but below 1,800 (i.e., the equivalent of approximately 5.5 equal-sized firms) as "moderately concentrated"; and markets where the HHI exceeds 1,800 as "highly concentrated." In Maine, the two areas analyzed are highly concentrated.[50] In Massachusetts, the three areas are moderately to highly concentrated. Both New Hampshire and Vermont have highly concentrated markets (having the equivalent of five equal-size sellers). Finally, in New York the New York City and Albany areas are moderately concentrated, with the remaining portion of the state (primarily Buffalo, Rochester, and Syracuse) being highly concentrated. Concentration across the ten regions is roughly correlated with overall market demand.

[49] Economic theory posits a relationship between the HHI and the amount by which firms' prices exceed their marginal costs. In particular, the price-cost margin equals $(p—mc) / p$ = HHI $(1 + v) / e$, where v is the conduct parameter indicating how competitive or collusive firms act and e is the elasticity of demand. Thus, the higher the HHI, the higher is the price-cost margin. *See, e.g.*, Luis Cabral (2000), INTRODUCTION TO INDUSTRIAL ORGANIZATION, Cambridge, MA: MIT Press, Chapter 9; *see also* Stephen Martin (2002), ADVANCED INDUSTRIAL ECONOMICS, 2nd Edition, Cambridge, MA: Blackwell Publishers, chapter 11.

[50] For some terminals, neither OPIS nor the U.S. Army Corps of Engineers have capacity data. If a terminal with missing data has a large capacity, this could have a substantial effect on the reported market shares.

TABLE 3.1
MAINE—SOUTH PORTLAND
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Portland Pipe Line Corp.	2,634,000	36.9	
Sprague Energy Corporation	1,638,377	23.0	
Irving Oil Corporation	831,100	11.6	
Gulf Oil, Limited Partnership	732,782	10.3	
Global Companies, LLC	659,377	9.2	
ExxonMobil Oil Corporation	639,600	9.0	
Total	7,135,236	100.0	
HHI			2,297

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE 3.2
MAINE—EXCLUDING SOUTH PORTLAND
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Sprague Energy Corporation	1,514,932	39.3	
Irving Oil Corporation	1,065,952	27.7	
Webber Tanks, Inc.	892,675	23.2	
Webber Energy Fuels	147,600	3.8	
Coldbrook Energy, Inc.	131,000	3.4	
ExxonMobil Oil Corporation	98,800	2.6	
Total	3,850,959	100.0	
HHI			2,884

Note: Terminals located in Bangor, Bucksport, Hampden, and Searsport.

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE 3.3
MASSACHUSETTS—BOSTON AREA
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Global Companies, LLC	2,771,300	31.3	
ExxonMobil Refining & Supply Co.	2,100,000	23.7	
Sprague Energy Corporation	1,644,000	18.5	
Gulf Oil, Limited Partnership	1,137,026	12.8	
CITGO Petroleum Corporation	1,129,868	12.7	
Irving Oil Terminals Inc.	80,000	0.9	
Callahan Company, Inc.	3,571	0.0	
ConocoPhillips	n/a	n/a	
Swissport Fueling, Inc	n/a	n/a	
Total	8,865,765	100.0	
HHI			2,210

Note: Terminals located in Braintree, Chelsea, East Boston, Everett, Quincy, Revere, and Waltham.

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE 3.4
MASSACHUSETTS—SOUTHEAST REGION
(INCLUDING NEARBY TERMINALS IN RHODE ISLAND)
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Motiva Enterprises LLC	1,410,000	23.8	
ExxonMobil Oil Corporation	930,600	15.7	
Capital Terminal Company	671,500	11.3	
Sprague Energy Corporation	622,000	10.5	
Inland Fuel Terminals Inc	564,000	9.5	
NRG Somerset Power, LLC	545,000	9.2	
PG&E Generating	500,000	8.4	
Global Companies, LLC	343,444	5.8	
Hudson Terminal Corp.	309,500	5.2	
Northeast Products Co.	40,000	0.7	
Total	5,936,044	100.0	
HHI			1,354

Note: Terminals located in Fall River (MA), New Bedford (MA), Sandwich (MA), Somerset (MA), East Providence (RI), Providence (RI), and Tiverton (RI).

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE 3.5
MASSACHUSETTS—SOUTHWEST REGION
(INCLUDING NEARBY TERMINALS IN CONNECTICUT)
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Magellan Midstream Partners, L.P.	3,900,000	33.1	
New Haven Terminal, Inc.	2,500,000	21.1	
Motiva Enterprises LLC	1,700,000	14.4	
NRG Middletown Operations	950,000	8.1	
Gateway Terminal	650,000	5.5	
PSEG Power Connecticut	650,000	5.5	
Gulf Oil, Limited Partnership	539,744	4.6	
Global Companies, LLC	338,000	2.9	
ExxonMobil Oil Corporation	280,500	2.4	
R&H Terminal, LLC	125,000	1.1	
Getty Terminals Corp.	82,688	0.7	
Triram Connecticut, LLC	70,000	0.6	
Albany Street Terminals LLC	n/a	n/a	
F L Roberts Inc	n/a	n/a	
L. E. Belcher, Inc.	n/a	n/a	
Springfield Terminals, Inc.	n/a	n/a	
Stellar Propane Service Corp.	n/a	n/a	
Total	11,785,932	100.0	
HHI			1,916

Note: Terminals located in Springfield (MA), New Haven (CT), Middletown (CT), Portland (CT), and Wethersfield (CT).

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE 3.6
NEW HAMPSHIRE
(INCLUDING NEARBY TERMINALS IN MASSACHUSETTS)
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Sprague Energy Corporation	3,839,726	31.5	
Global Companies, LLC	2,771,300	22.7	
ExxonMobil Refining & Supply Co.	2,100,000	17.2	
Gulf Oil, Limited Partnership	1,137,026	9.3	
CITGO Petroleum Corporation	1,129,868	9.3	
Irving Oil Terminals Inc.	632,000	5.2	
Sea-3, Inc.	587,000	4.8	
Callahan Company, Inc.	3,571	0.0	
ConocoPhillips	n/a	n/a	
Total	12,200,490	100.0	
HHI			2,025

Note: Terminals located in N. Walpole, Newington, Portsmouth, Braintree (MA), Chelsea (MA), East Boston (MA), Everett (MA), Quincy (MA), Revere (MA), Walpole (MA), and Waltham (MA).

Source: OPIS Petroleum Terminal Encyclopedia (2006) and ILTA Terminal Member Directory (2006).

TABLE 3.7
NEW YORK—ALBANY AREA
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Petroleum Fuel & Terminal	3,042,358	33.7	
CITGO Petroleum Corporation	1,221,000	13.5	
Sprague Energy Corporation	1,044,000	11.5	
ExxonMobil Oil Corporation	1,004,900	11.1	
Warex Terminals Corporation	894,085	9.9	
TransMontaigne Product Services Inc.	583,542	6.5	
Bray Terminals, Inc.	396,000	4.4	
International Petroleum Traders, LLC (IPT, LLC)	333,632	3.7	
Stratus Petroleum Corp.	210,000	2.3	
Getty Terminals Corp.	173,743	1.9	
Westway Terminal	108,000	1.2	
Sunoco Inc.	20,000	0.2	
TEPPCO	9,285	0.1	
Amerada Hess Corporation	n/a	n/a	
Cibro Petroleum Products	n/a	n/a	
Kingston Oil Supply	n/a	n/a	
Meenan Oil Co.	n/a	n/a	
Sunoco Logistics Partners L.P.	n/a	n/a	
Total	9,040,545	100.0	
HHI			1,755

Note: Terminals located in Albany, Catskill, Glenmont, Green Island, New Windsor, Newburgh, Oneonta, Port Ewen, Poughkeepsie, Rensselaer, and Selkirk.

Source: OPIS Petroleum Terminal Encyclopedia (2006) and ILTA Terminal Member Directory (2006).

TABLE 3.8
NEW YORK—NEW YORK CITY (INCLUDING NEARBY TERMINALS IN NJ AND CT)
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
IMTT	15,300,000	28.3	
Kinder Morgan	9,548,701	17.6	
Carbo Industries Inc.	5,900,000	10.9	
Motiva Enterprises LLC	5,730,418	10.6	
ST Linden Terminal, LLC	3,884,000	7.2	
CITGO Petroleum Corporation	3,699,250	6.8	
ExxonMobil Oil Corporation	2,599,100	4.8	
Amerada Hess Corporation	1,938,000	3.6	
Center Terminal Company – Newark	975,000	1.8	
Castle Oil Corporation	807,000	1.5	
Sunoco Logistics Partners L.P.	592,793	1.1	
Stuyvesant Fuel Service	571,428	1.1	
Gulf Oil, Limited Partnership	568,374	1.0	
BP Products North America, Inc.	553,000	1.0	
Sprague Energy Corporation	395,700	0.7	
Kaneb Pipe Line Partners	370,551	0.7	
Getty Terminals Corp.	291,396	0.5	
Metro Terminals Corporation	200,000	0.4	
Commander Terminals LLC	118,000	0.2	
Fred M. Schildwachter & Sons	105,350	0.2	
A. R. Fuels, Inc.	n/a	n/a	
Bayside Fuel Oil Depot Corp.	n/a	n/a	
Castle Astoria Terminals, Inc	n/a	n/a	
Chevron Products Company	n/a	n/a	
ConocoPhillips	n/a	n/a	
Ditmas Oil Associates, Inc.	n/a	n/a	
Lefferts Oil Terminal, Inc.	n/a	n/a	
Meenan Oil Co.	n/a	n/a	
Northville Industries Corporation	n/a	n/a	
Allied Aviation Service of New York	n/a	n/a	
BP Marine Americas	n/a	n/a	
Total	54,148,061	100.0	
HHI			1,486

Note: Terminals located in Bronx (NY), Brooklyn (NY), East Meadow (NY), East Setauket (NY), Flushing (NY), Glenwood Landing (NY), Harrison (NY), Holtsville (NY), Inwood (NY), Jamaica (NY), Lawrence (NY), Long Island City (NY), Mount Vernon (NY), Oceanside (NY), Oyster Bay (NY), Peekskill (NY), Plainview (NY), Riverhead (NY), Sleepy Hollow (NY), Staten Island (NY), Bayonne (NJ), Bogota (NJ), Carteret (NJ), Edgewater (NJ), Elizabeth (NJ), Linden (NJ), Newark (NJ), Perth Amboy (NJ), Piscataway (NJ), Port Reading (NJ), Sewaren (NJ), and Stamford (CT).

Source: OPIS Petroleum Terminal Encyclopedia (2006) and ILTA Terminal Member Directory (2006).

TABLE 3.9
NEW YORK—EXCLUDING ALBANY AREA AND NEW YORK CITY
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Buckeye Terminals, LLC	2,328,834	23.9	
NRG Energy, Inc.	1,548,000	15.9	
TEPPCO	1,200,000	12.3	
NOCO Energy Corporation	1,113,000	11.4	
ExxonMobil Oil Corporation	765,400	7.8	
United Refining Company	515,000	5.3	
Sprague Energy Corporation	514,994	5.3	
Kiantone Pipeline Corporation	500,000	5.1	
Sunoco Logistics Partners L.P.	487,334	5.0	
Petroleum Fuel & Terminal Co.	276,297	2.8	
Marathon Petroleum Company LLC	163,000	1.7	
CITGO Petroleum Corporation	123,276	1.3	
Stratus Petroleum Corp.	114,500	1.2	
Bray Terminals, Inc.	111,000	1.1	
Supreme Energy Inc LLC	n/a	n/a	
Amerada Hess Corporation	n/a	n/a	
Total	9,760,635	100.0	
HHI			1,285

Note: Terminals located in Baldwinsville, Brewerton, Buffalo, Marcy, Oswego, Rochester, Seneca, Tonawanda, Utica, Vestal, Warners, Waterloo, and Watkins Glen.

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE 3.10
VERMONT
(INCLUDING NEARBY TERMINALS IN NEW YORK)
MARKET SHARES OF FIRMS OWNING PETROLEUM TERMINALS

Company	Total Storage Capacity (Barrels)	Market Share (%)	HHI
Petroleum Fuel & Terminal Co.	3,042,358	37.4	
CITGO Petroleum Corporation	1,221,000	15.0	
Sprague Energy Corporation	1,055,100	13.0	
ExxonMobil Oil Corporation	986,800	12.1	
TransMontaigne Product Services Inc.	583,542	7.2	
Bray Terminals, Inc.	396,000	4.9	
International Petroleum Traders, LLC	333,632	4.1	
Stratus Petroleum Corp.	210,000	2.6	
Getty Terminals Corp.	173,743	2.1	
Westway Terminal	108,000	1.3	
Sunoco Logistics Partners L.P.	20,000	0.2	
TEPPCO	6,428	0.1	
Amerada Hess Corporation	n/a	n/a	
Cibro Petroleum Products	n/a	n/a	
Total	8,136,603	100.0	
HHI			2,044

Note: Terminals located in Burlington, Hartford, Middlebury, Albany (NY), Glenmont (NY), Green Island (NY), Plattsburgh (NY), Rensselaer (NY), and Selkirk (NY).

Source: OPIS Petroleum Terminal Encyclopedia (2006) and ILTA Terminal Member Directory (2006).

OPIS capacity information is often provided for an entire terminal, i.e., not broken down by tank for each of the various products at the terminal facility. Because the breakdown was not universally available, the HHIs in the above tables were calculated by treating all tanks at the terminals as being the same, regardless of which particular petroleum products they store. (Of course, tanks can be switched between products at some cost.) Since differentiating between tanks could reduce the number of firms that own tanks capable of storing a given petroleum product, treating all tanks at the terminals as being the same may result in HHIs that understate concentration for the storage of specific petroleum products.

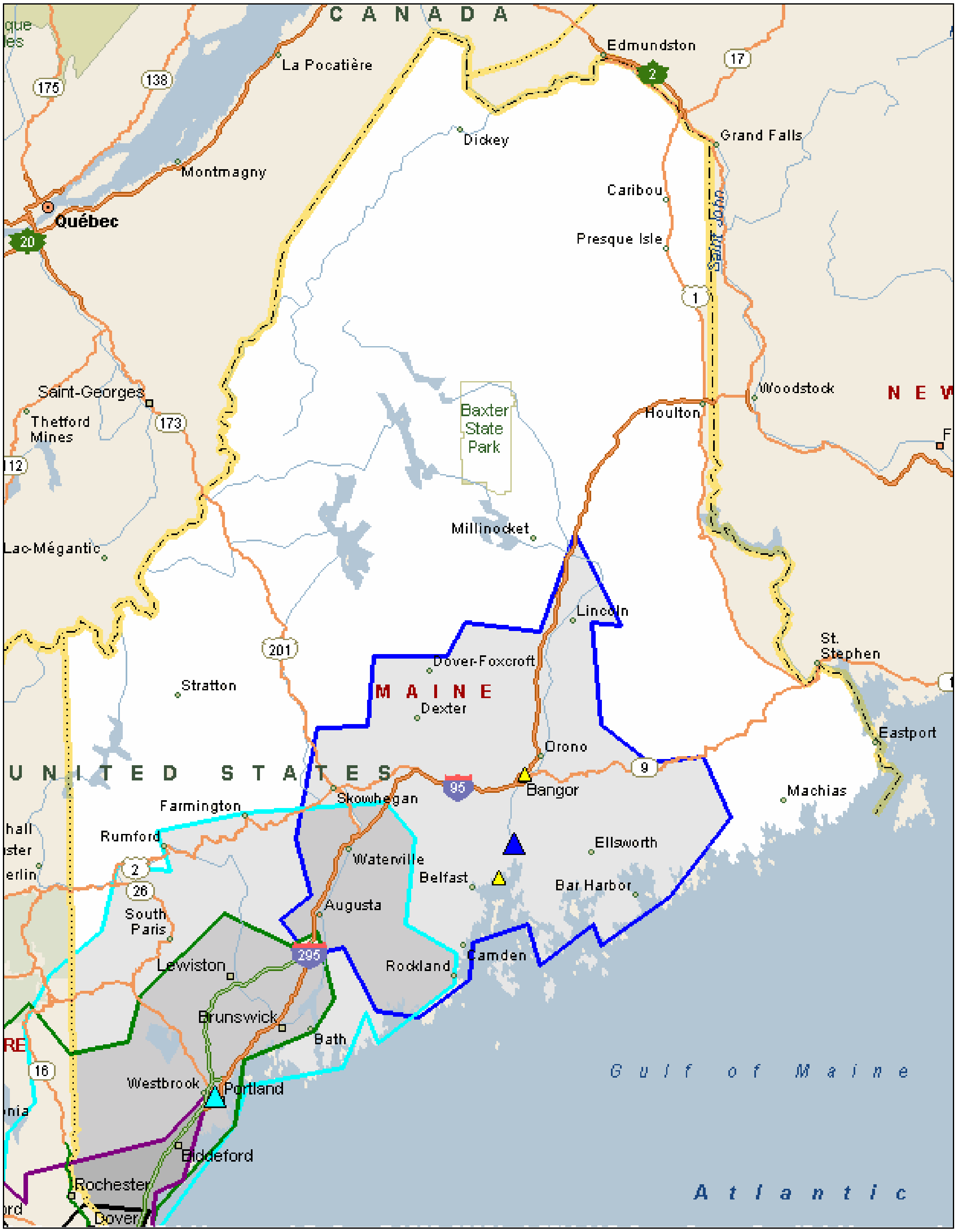
Similarly, the inclusion of terminals in any HHI calculation depends on the size of the relevant geographic market, which in turn depends on the costs of transporting products to the end user. As transportation costs fall, more terminals become competitors since consumers can be profitably served from further distances away. Similarly, as transportation costs rise, fewer terminals are competitors as it becomes increasingly important to be located near the consumer. Consequently, the cost of transportation and the geographic proximity of the terminals are important in understanding the infrastructure available to supply the States. This last point is considered more fully in the next section.

C. *Geographic areas economically served by terminals*

To further describe the potential geographic competition between terminalling facilities, the following maps indicate the primary areas in which distributors (jobbers or integrated distributors who are the demanders for terminal storage and access) would find it economic to transport refined products. In the maps (Figures 3.3 to 3.9), small, yellow triangles represent locations with one or two terminals, while the larger triangles (of several colors, as discussed below) represent clusters of at least three terminals. For example, there are five terminals located in the greater Rochester, New York area, and all five are represented by one large triangle. Around each of these clusters of terminals is a boundary approximating how far a gasoline tanker could drive in one hour and forty-five minutes.[51] The boundary has the same color as the triangle, so the boundary around Rochester includes Buffalo to the west and Syracuse to the east. The darker is the gray shading in a given area, the greater the number of terminals within one hour and forty-five minutes of that area. For example, Bar Harbor, Maine lies in an area that one cluster of terminals can reach within one hour and forty-five minutes; Augusta, Maine lies in an area that two clusters of terminals can reach within that time; and Biddeford, Maine lies in an area that three clusters of terminals can reach in that time. Localities not included in boundary areas surrounding clusters of terminals are served either by (1) trucks traveling from locations with three or more terminals and driving more than one hour and forty-five minutes or (2) trucks traveling from locations with one or two terminals (or in some cases by rail distribution).

[51] The hour and forty-five minute boundary was chosen as an approximation for how far a truck can travel while limiting its distribution costs to no more than ten cents per gallon. Also, interviews with representatives from a major pipeline in the Northeast indicated that gasoline trucks generally travel no more than 100 miles from a terminal.

FIGURE 3.3
MAINE—ECONOMIC PETROLEUM DISTRIBUTION AREAS

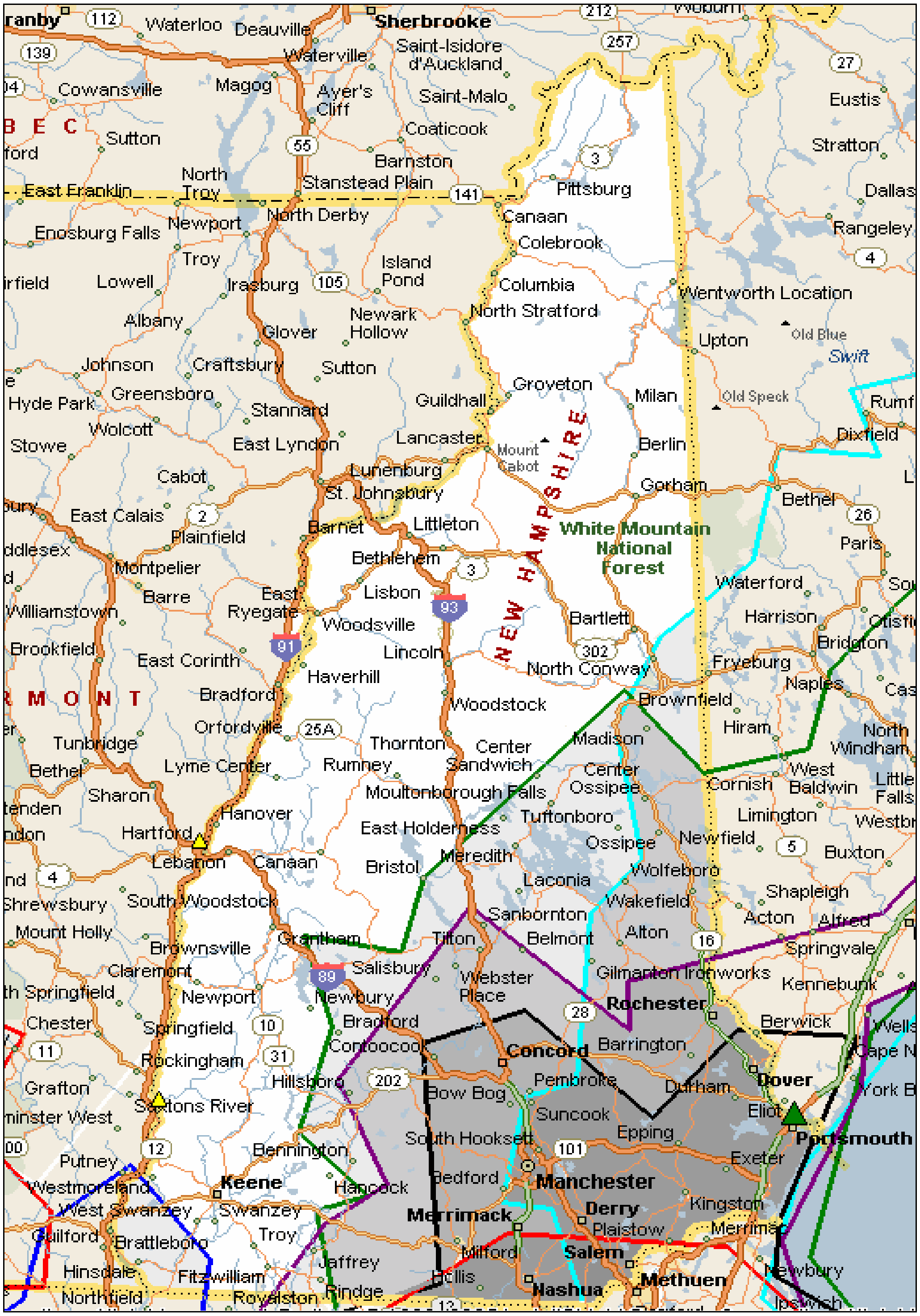


Source: OPIS Petroleum Terminal Encyclopedia (2006).

FIGURE 3.4
MASSACHUSETTS—ECONOMIC PETROLEUM DISTRIBUTION AREAS

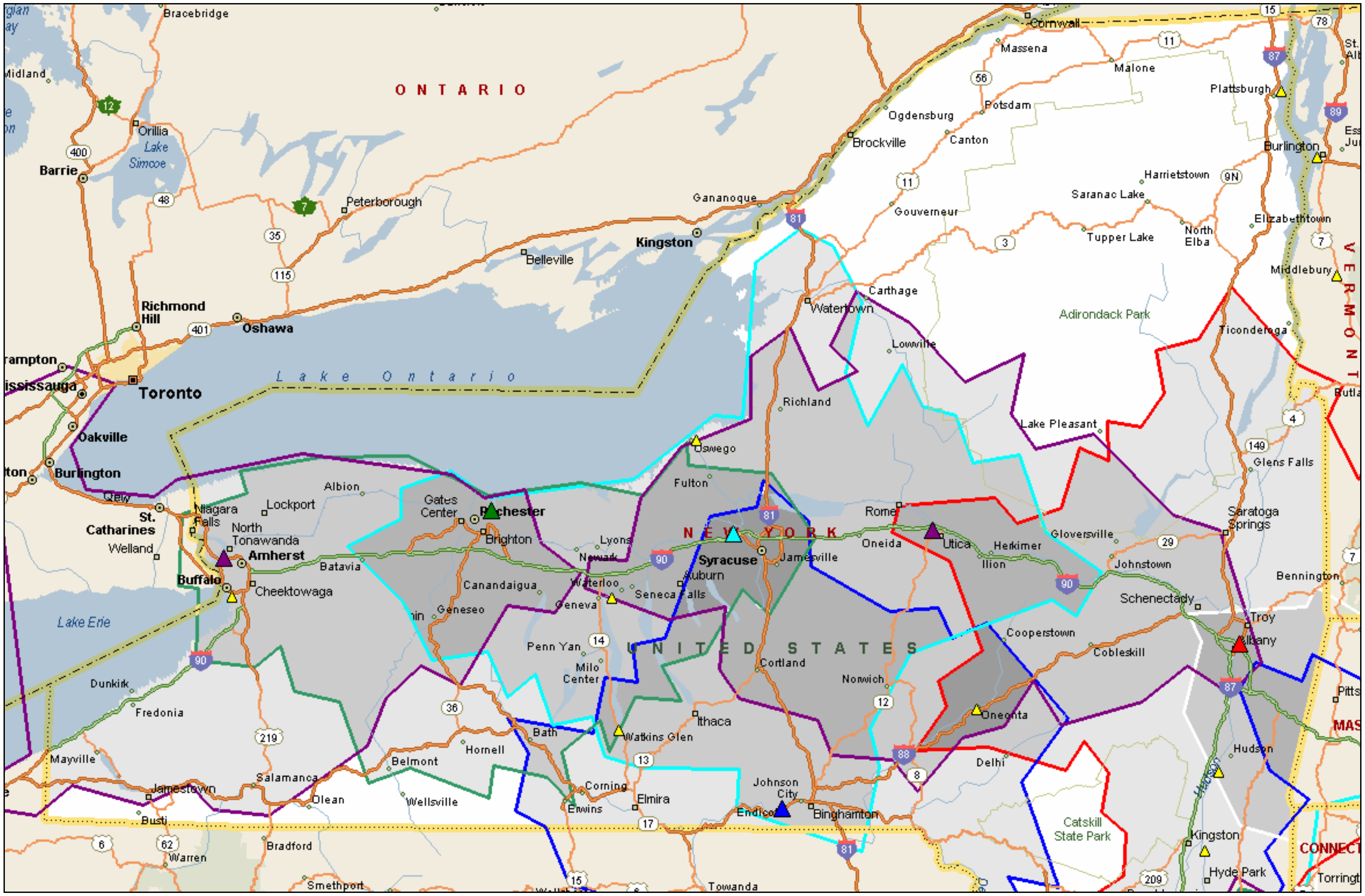
Source: OPIS Petroleum Terminal Encyclopedia (2006).

FIGURE 3.5
NEW HAMPSHIRE—ECONOMIC PETROLEUM DISTRIBUTION AREAS



Source: OPIS Petroleum Terminal Encyclopedia (2006).

FIGURE 3.6
NEW YORK, OUTSIDE NEW YORK CITY—ECONOMIC PETROLEUM DISTRIBUTION AREAS



Source: OPIS Petroleum Terminal Encyclopedia (2006).

FIGURE 3.7
NEW YORK CITY—ECONOMIC PETROLEUM DISTRIBUTION AREAS

Source: OPIS Petroleum Terminal Encyclopedia (2006).

FIGURE 3.8
VERMONT—ECONOMIC PETROLEUM DISTRIBUTION AREAS

Source: OPIS Petroleum Terminal Encyclopedia (2006).

The maps indicate areas with relatively extensive supply infrastructure as contrasted to areas with more limited supply infrastructure.[52] For example, jobbers serving gasoline stations in areas with lighter shades of grey may only find it economical to supply retail stations from one distribution rack. Alternative wholesale racks are far enough from these stations to cause significant increases in transportation costs. Thus, the firms owning terminalling services at these racks may face a more inelastic demand, allowing them to exert more influence over terminalling prices since there are no close alternative terminals through which wholesalers can readily supply local jobbers and retail gasoline stations.

The economic distribution area for home heating oil may be much smaller than the economic distribution area for gasoline. Unlike gasoline, which is transported by a large tanker that holds around 7,000 gallons and travels up to 100 miles from a terminal, home heating oil is transported by either a tanker or a smaller type of truck called a "bobtail" that serves homes directly. A tanker truck is typically used to transport heating oil between large terminals—which can have a total capacity measured in millions of gallons—and smaller bulk facilities that have a capacity of about 20,000 gallons. Bobtail trucks draw from both the central terminal and these bulk facilities. A gasoline station can have underground tanks as large as 4,000 gallons per pump and are filled by the large trucks.[53] In contrast, homes may have heating oil tanks as small as 250 gallons, making the large trucks unnecessary.[54] Thus, homes are supplied by bobtails that typically hold up to 3,000 gallons of heating oil. Moreover, the smaller size of the bobtail allows it to easily navigate through the narrow streets of the neighborhoods it serves. Bobtail trucks generally travel no more than 35 to 60 miles.[55]

[52] The maps should not be understood to imply predictions as to the intensity of price competition in different geographic areas, given that they do not evaluate terminal capacity or ownership.

[53] See e.g., http://albany.bizjournals.com/albany/stories/1997/10/13/story7.html

[54] See e.g., http://www.tevisoil.com/tanks/oil/

[55] Interview with a representative of a major pipeline company serving the Northeast.

IV. Wholesale and Retail Gasoline Markets

A. Wholesale and retail gasoline market structure

In the previous section, we discussed the market structure of wholesale gasoline supply at the terminal level for geographic regions within the five states including major metropolitan areas and points of entry. After arriving at the terminal, the next stage in the petroleum product supply chain is the distribution of wholesale gasoline to retail gasoline stations. In this section we discuss the procurement and distribution of wholesale gasoline to retailers, measures of retail market structure, and regulatory factors that affect retail prices in the States.

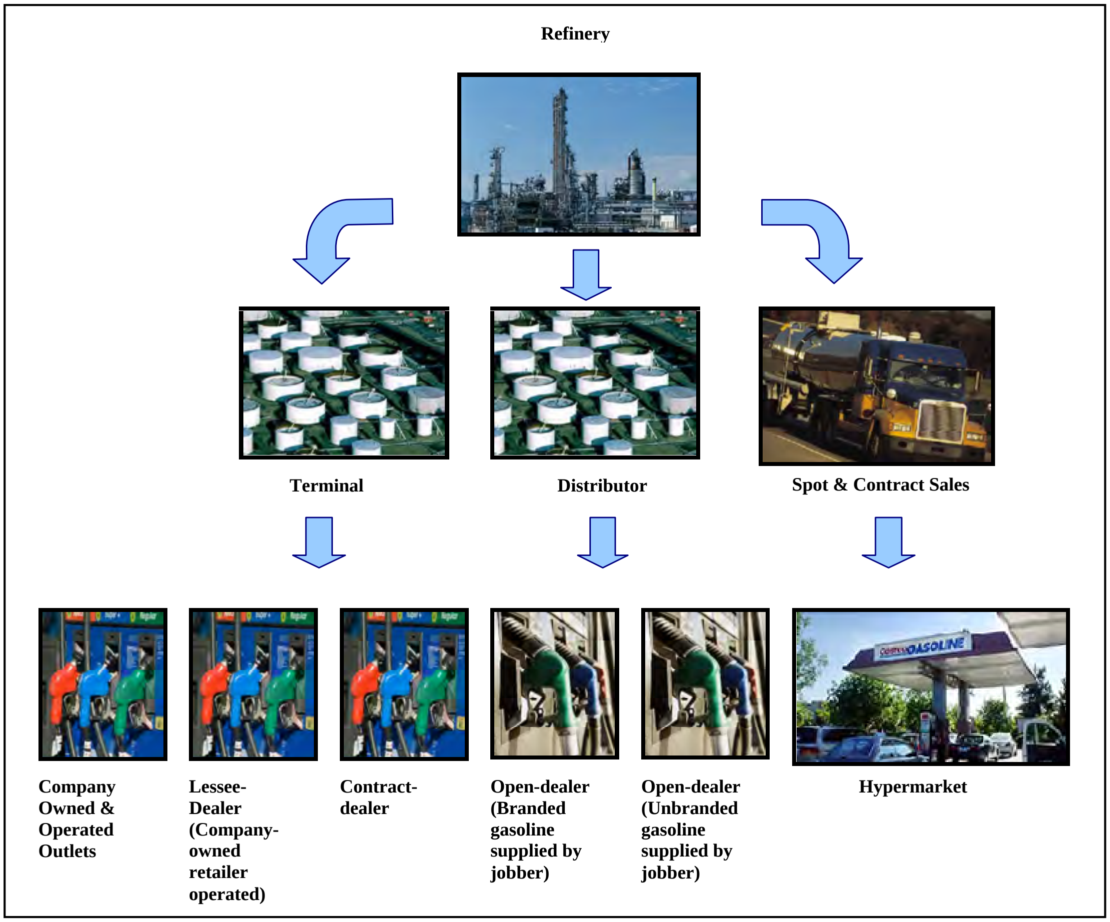
Refiners and wholesalers may sell wholesale gasoline to third parties directly at the distribution rack, or they may distribute gasoline from the rack directly to their retail stations. As noted in the previous section, terminalling facilities are concentrated in some metropolitan areas in the States. However, refiners are often able to sell gasoline at distribution racks and terminals that they do not own. Even if only one or two firms own terminalling facilities at a distribution rack, other refiners may still sell gasoline and/or supply their direct-delivery retail stations from that rack. This is accomplished through exchange agreements or leases with the refiner-marketers that own terminalling facilities at that rack. In an exchange, company A may agree to provide gasoline on behalf of company B in a location where company B does not have a presence and, in turn, company B agrees to provide gasoline on behalf of company A in a location where company A does not have a presence.

B. Distribution of wholesale gasoline from the terminal to the retail outlet

The method by which gasoline is distributed from distribution racks to retail outlets depends on the contractual relationship between the refiner and the retail outlet (see Figure 4.1). Retail stations can either be owned directly by the refiner-marketer or by an independent party. We referred to stations owned by an independent party as "dealers." If the station is owned by the refiner-marketer, the gasoline is distributed directly to the retail station by the refiner.[56] If the station is owned by a dealer, the gasoline may be distributed directly to the station by the refiner or by an intermediate distributor called a "jobber." The distribution and ownership relationship between the refiner and the retailer influences how wholesale and retail prices are set.

[56] The discussion in this section focuses on retail gasoline. There are, however, other outlets for gasoline products such as sales to fleets (rental cars, government, busses), agriculture, and marinas. The market shares in this section do not capture sales through these alternative outlets. These outlets are generally served by jobbers.

FIGURE 4.1
RETAIL GASOLINE DISTRIBUTION METHODS



Sources: Photos from Adobe stock photos and daviswiki.org.

Stations owned by a refiner. Integrated oil companies such as ExxonMobil, Shell, and Chevron-Texaco ("refiner-marketers") own retail gasoline brands that complement the production and distribution infrastructure they have from the refinery to the distribution terminal. Stations owned by an integrated refiner-marketer carry the refiner's gasoline brand. These stations can be operated directly by the refiner-marketer. If this is the case, the refiner sells gasoline directly at the retail station; supplying gasoline to the station and setting the retail price and hours of operation. Store managers are typically employed directly by the refiner-marketer and are compensated by salary.[57] However, not all stations that are owned by refiner-marketers are also operated by them. Some stations are operated through a franchise arrangement or lease ("lessee-dealer"). Here an individual operator leases the station from the refiner-marketer. In this case, the lessee acts as a "residual claimant," leasing the retail gasoline business from the refiner and keeping residual profits after covering operating and leasing costs. The refiner delivers gasoline directly to the lessee-dealer, and the lessee-dealer is typically obligated by contract to purchase the gasoline from the refiner at the price the refiner sets for stations in its price zone each day. This station or zone-specific wholesale price is often referred to as a "direct-delivery price" or a "dealer-tankwagon price" ("DTW price"). There may be significant differences in the DTW prices across stations or price-zones for the same brand of gasoline, and a price zone may include only one station. Refiners-marketers can use the DTW price in order to price discriminate, for example by charging higher prices in less competitive markets and lower prices in more competitive markets.

Stations owned by a dealer. When a station is owned by a dealer it can still market a refiner's brand, but if it does, it must carry the brand of gasoline that it markets from the respective upstream refiner-marketer. Branded dealer-owned stations can either be supplied directly by the refiner, or they can be supplied by an intermediate distributor called a "jobber." If the station is supplied by the refiner, the refiner may set the wholesale price charged to the station, much like it does for a lessee-dealer. If the station is supplied by a jobber, the jobber generally purchases gasoline from the refiner at the posted "rack price" and delivers it to the station for a delivery charge. The rack price is the price of wholesale gasoline posted by the refiner for branded or unbranded gasoline at the distribution rack. The rack price is a posted price; it is the same for any agent purchasing wholesale gasoline at the rack (no price discrimination). Jobbers typically operate fleets of trucks that deliver gasoline from the terminal to individual stations. Jobbers may supply many stations of various brands as well as unbranded stations. They may also own retail stations themselves. They also can often purchase wholesale gasoline for their retail clients from different distribution racks, arbitraging across racks any price differences that may occur.

Dealer-owned unbranded stations can typically purchase gasoline from any refiner selling gasoline at the distribution rack, either branded or unbranded. Jobbers supplying these stations may arbitrage not only across racks, but also across suppliers at a given rack.

[57] An integrated refiner-marketer refers to a firm that refines gasoline and markets it at the retail level through a brand name. For example, Chevron, ExxonMobil, and Shell gasoline brands are all owned by refiners and are marketed as distinctive brands of gasoline.

Large unbranded stations may also purchase unbranded wholesale gasoline through spot market or contract sales. Often these contracts will stipulate that the wholesale price equals the lowest posted price in the region for that day. Because unbranded stations can credibly and easily switch purchases between refiners and wholesalers in response to small price decreases, refiners and wholesalers must compete intensely on price for their business.

C. Ownership structure, wholesale and retail gasoline prices

Table 4.1 gives a summary of the ownership structures of retail gasoline stations and the relationships between retailers and wholesale suppliers, highlighting the relationships between ownership, delivery, wholesale and retail prices.

TABLE 4.1
SUMMARY OF DISTRIBUTION FOR DIFFERENT TYPES OF STATIONS:
IMPLICATIONS FOR WHOLESALE AND RETAIL PRICES

	Station Type	Station Ownership	Wholesale Price	Retail Price
Branded				
	Company-owned and operated	Station owned by refiner-marketer	Branded gasoline supplied directly to retail - no wholesale transactions price	Refiner directly sets the retail price
	Lessee-dealer (Company-owned retailer operated)	Station owned by refiner-marketer[58]	Branded gasoline supplied by the refiner. Wholesale price is the DTW price, which can vary across stations or price zones each day.	Lessee dealer sets the retail price and hours of operation subject to stipulations in lease agreement
	Contract-dealer	Station owned by a dealer	Branded gasoline supplied by the refiner. Wholesale price is typically a DTW price, which is set by the refiner for each station or price zone on each day.	Dealer sets the retail price
	Open-dealer	Station owned by a dealer	Branded gasoline supplied by a jobber. Wholesale price is the rack price for that brand of gasoline plus delivery costs.	Dealer sets the retail price
Unbranded				
	Open-dealer	Station owned by dealer	Unbranded gasoline is supplied by a jobber. Wholesale price can be the lowest wholesale rack price that the station can procure plus delivery costs.	Dealer sets the retail price
	Hypermart Chain	Station owned by Hypermart chain	Unbranded gasoline supplied by a distributor or the hypermart's fleet. Wholesale price can be the lowest rack or spot price the hypermart can procure plus delivery costs.	Hypermart sets the retail price

[58] In some cases lessee-dealers may also make investments in the land or buildings on the retail gasoline station site. Lessee-dealer contracts suffer from inefficiencies in investment incentives due to asset-specific investment risk. See, e.g., A. Blass and D. Carlton, "The Choice of Organizational Form in Gasoline Retailing and the Cost of Laws That Limit That Choice" *Journal of Law and Economics*, October 2001.

The different ownership structures imply varying levels of relative control over retail prices by the refiner or wholesaler and the retail operator. With company owned-and-operated stations, the refiner-marketer effectively sells gasoline directly to the end user, setting prices for gasoline and convenience store products as well as the hours of operation. A salaried employee is hired to serve customers during business hours. Centralized ownership gives the refiner efficient and direct control over pricing and operations, but this may come at some cost. Centralized ownership can remove some of the incentive for the operator to run the store as efficiently and profitably as possible. Lessee-dealers are residual claimants, leasing the business from the refiner and keeping residual profits after covering the lease and operating costs. The lessee sets the retail price and prices within the store, subject to overall business operations guidelines stipulated in the lease agreement. Because the lessee keeps residual profits and benefits from the leased business, he or she has more incentive to operate a high-effort, high-quality operation. On the other hand, lessee agreements may suffer from inefficiencies in asset-specific investments (e.g. infrastructure improvements) since neither party is sure they can capture the benefits from those investments.[59] In addition, the refiner relinquishes some control over the station's retail prices. The lessee dealer may set price to maximize his or her own profit instead of the refiner-marketer's profit.[60] However, the refiner-marketer may still exert substantial influence over the lessee-dealer's price through the DTW price and volume stipulations in the lease agreement.

Refiner-marketers have lower control over retail prices at dealer-owned, jobber-supplied stations. Jobbers purchase gasoline at the rack price. For unbranded gasoline, the jobber can typically purchase from the cheapest supplier on any given day. Competition bounds the price of unbranded gasoline, a homogeneous good. For branded gasoline, jobbers must purchase from the appropriate refiner-marketer in the short run, however, dealer-owned, jobber-supplied stations can switch brands in the long run if the branded rack price is consistently high enough to make it profitable to do so. After purchasing the gasoline at the rack, the dealer-owned, jobber-supplied station determines its profit-maximizing retail price.

A relatively new type of retail gasoline outlet is the "hypermarket." These are high-volume stations coupled with a major retail or grocery outlet such as BJ's Wholesale Club or Sam's Club. Hypermarkets often price their gasoline lower than other stations in the area. This may be because they can use gasoline as a "loss-leader" that attracts customers to the store. That is, the hypermarket might find it profitable to lower prices on

[59] See A. Blass and D. Carlton, "The Choice of Organizational Form in Gasoline Retailing and the Cost of Laws That Limit That Choice" *Journal of Law and Economics*, October 2001; M. Slade, "Multitask Agency and Contract Choice: An Empirical Exploration" *International Economic Review*, May 1996; M. Slade, "Strategic Motives for Vertical Separation: Evidence from Retail Gasoline Markets" *Journal of Law, Economics, and Organization*, Spring 1998.

[60] The retailer's optimal price may in theory be higher or lower than the refiner's optimal price for the station. It depends on the amount of market power the lessee dealer has (this tends to make the dealer's optimal price higher than the refiner's) and the overlap in competition (cross-price elasticity) between the lessee's station and the refiner's other local stations (this tends to make the dealer's price lower than the refiners optimal price).

gasoline if this leads to increased customer traffic and increased in-store revenues. Hypermarkets may also often require membership to the store (e.g. Costco, BJ's and Sam's Club) in order to purchase gasoline, or they may require in-store purchases in order to get the discounted gasoline price (this often occurs with grocery store chains). These requirements may hinder the extent to which they compete directly with local traditional retail gasoline stations if consumers do not have membership or view in-store purchase requirements as an inconvenience. Nevertheless, retail trade groups and organizations, typically representing gasoline dealers, often lobby for laws preventing hypermarkets from charging very low prices. While such laws may benefit small gasoline dealers, it is not clear that they benefit consumers in the short run or in the long run. We will return to this issue when we discuss regulation of gasoline markets later in this section.

Retail market structure in the States.

We use survey data on retail gasoline sales from gasoline stations in major metropolitan areas in the states to examine how prevalent ownership and delivery contracts are for the major gasoline brands in each of the States.[61] Tables 4.2 through 4.6 show the share of gasoline sold in each of the five states, broken down by the primary ownership structure.

In the States, dealer-owned jobber supplied stations have the highest share of retail gasoline sold. Combining the shares of jobbers selling branded and unbranded gasoline, jobbers have the highest total share of any type: In all states except New York, branded and unbranded jobber gasoline sales are more than half of all sales. Of dealer-owned jobber-supplied stations, most are affiliated with a major brand. Massachusetts and New York have the highest proportion of unbranded jobber-supplied stations in the States, with almost 40% of their jobber-supplied stations being unbranded. Of stations that are owned by refiner-marketers, lessee-dealers are more common than company-operated stations in Maine, Massachusetts, and New York. The opposite is true in Vermont and New Hampshire. Hypermarkets do not have a strong presence in the States. For example, BJ's sells an estimated 4.5% of the gasoline in Maine and 1.1% in New Hampshire, but less than 0.5% in Massachusetts, New York, and Vermont. Sam's Club only has a presence in Maine and New Hampshire, with 1.6% and 0.6% of the statewide sales volumes, respectively. Costco only sells gas in New York, with a statewide share of 0.1%. Despite the relatively low presence of hypermarkets in the States, some states have proposed and even recently passed regulations aimed at preventing these retailers from selling at low prices. We will discuss this type of regulation in the next section of the report.

[61] The survey data comes from MPSI (2006). The volume measure is the stated volume of gasoline sales provided by a retail station representative.

TABLE 4.2
MAINE
GASOLINE SALES VOLUMES BY OWNERSHIP TYPE

Operation	Volume (in thousands of gallons per month)	Share
Company Owned		
Company-operated	1,147	11.5%
Lessee-dealer	1,151	11.6%
Dealer Owned		
Contract Dealer	995	10.0%
Jobber – branded	5,161	52.0%
Jobber – unbranded	1,478	14.9%
Total	9,932	100.0%

Source: MPSI (2006).

TABLE 4.3
MASSACHUSETTS
GASOLINE SALES VOLUMES BY OWNERSHIP TYPE

Operation	Volume (in thousands of gallons per month)	Share
Company Owned		
Company-operated	21,729	12.2%
Lessee-dealer	49,513	27.8%
Dealer Owned		
Contract Dealer	16,581	9.3%
Jobber – branded	54,447	30.5%
Jobber – unbranded	36,024	20.2%
Total	178,294	100.0%

Source: MPSI (2006).

TABLE 4.4
NEW HAMPSHIRE
GASOLINE SALES VOLUMES BY OWNERSHIP TYPE

Operation	Volume (in thousands of gallons per month)	Share
Company Owned		
Company-operated	9,459	15.1%
Lessee-dealer	5,795	9.3%
Dealer Owned		
Contract Dealer	3,812	6.1%
Jobber – branded	35,134	56.1%
Jobber – unbranded	8,438	13.5%
Total	62,638	100.0%

Source: MPSI (2006).

TABLE 4.5
NEW YORK
GASOLINE SALES VOLUMES BY OWNERSHIP TYPE

Operation	Volume (in thousands of gallons per month)	Share
Company Owned		
Company-operated	74,211	19.0%
Lessee-dealer	94,426	24.2%
Dealer Owned		
Contract Dealer	62,636	16.1%
Jobber – branded	97,247	24.9%
Jobber – unbranded	61,639	15.8%
Total	390,159	100.0%

Source: MPSI (2006).

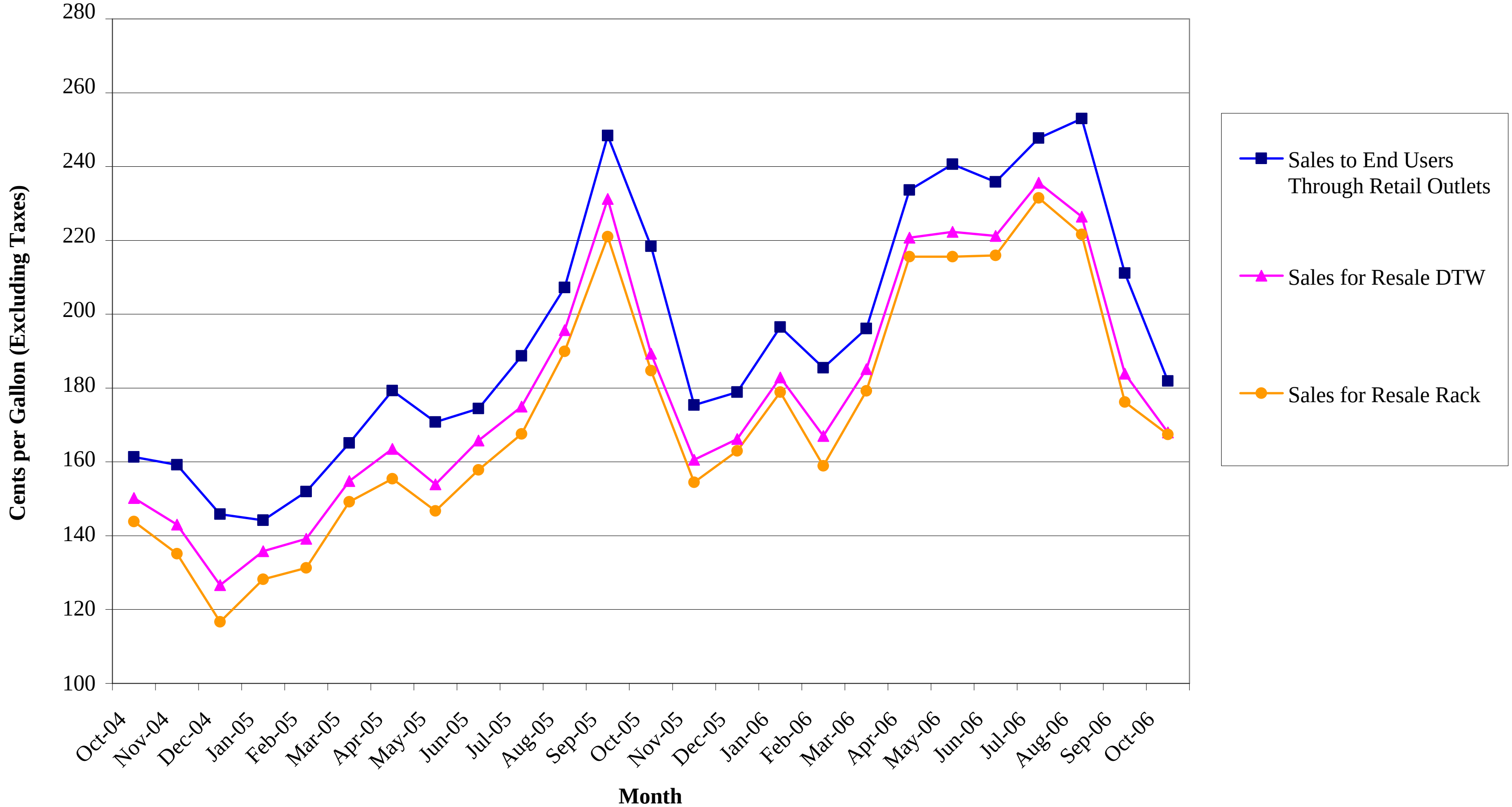
TABLE 4.6
VERMONT
GASOLINE SALES VOLUMES BY OWNERSHIP TYPE

Operation	Volume (in thousands of gallons per month)	Share
Company Owned		
Company-operated	697	2.4%
Lessee-dealer	--	--
Dealer Owned		
Contract Dealer	267	0.9%
Jobber – branded	23,749	82.9%
Jobber – unbranded	3,935	13.7%
Total	28,648	100.0%

Source: MPSI (2006).

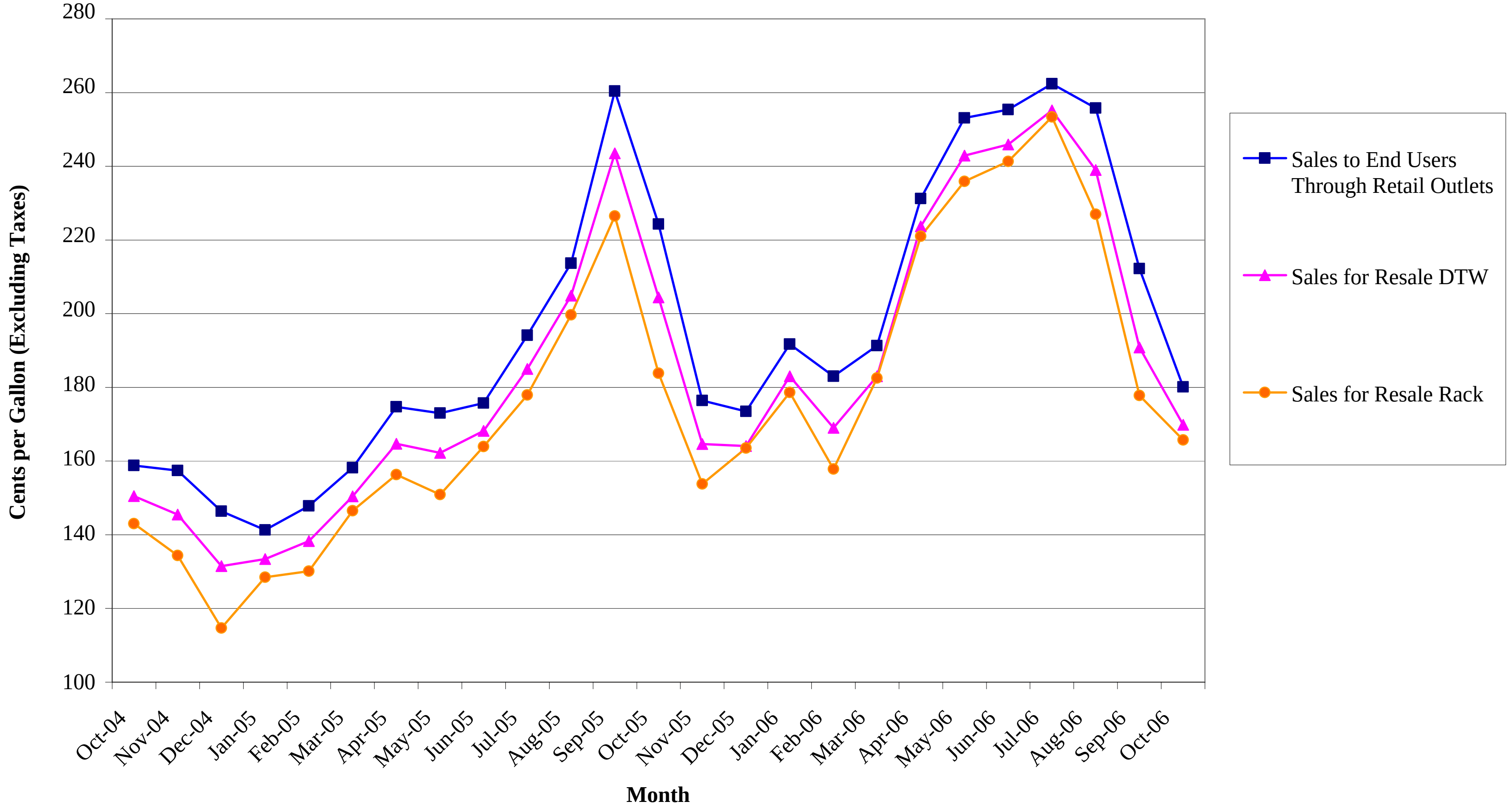
As described earlier, these different retail ownership and operation structures imply different ways in which retail and wholesale prices are set, with various degrees of control between the upstream refiner-marketer and the local retailer. There is limited publicly available data on retail gasoline prices by delivery type. The Energy Information Administration ("EIA") publishes state-level prices by delivery type collected from surveys of firms supplying wholesale and/or retail gasoline. These data are shown for each of the States in Figures 4.2 through 4.6. In each graph, "Sales to End Users Through Retail Outlets" represents prices for direct sales to retail stations owned and operated by the refiner, or sales to fleets and government agencies (also end users). These sales exclude retail taxes. "Sales for Resale DTW" shows the prices that result when a refiner makes sales through direct delivery. "Sales for Resale Rack" shows the prices for sales at the rack, in the case that the survey respondent sells gasoline at the distribution rack. These prices can include both branded and unbranded sales, as these sales are not separately distinguished in the data.

FIGURE 4.2
MAINE MOTOR GASOLINE PRICES BY SALES TYPE
OCTOBER 2004—OCTOBER 2006



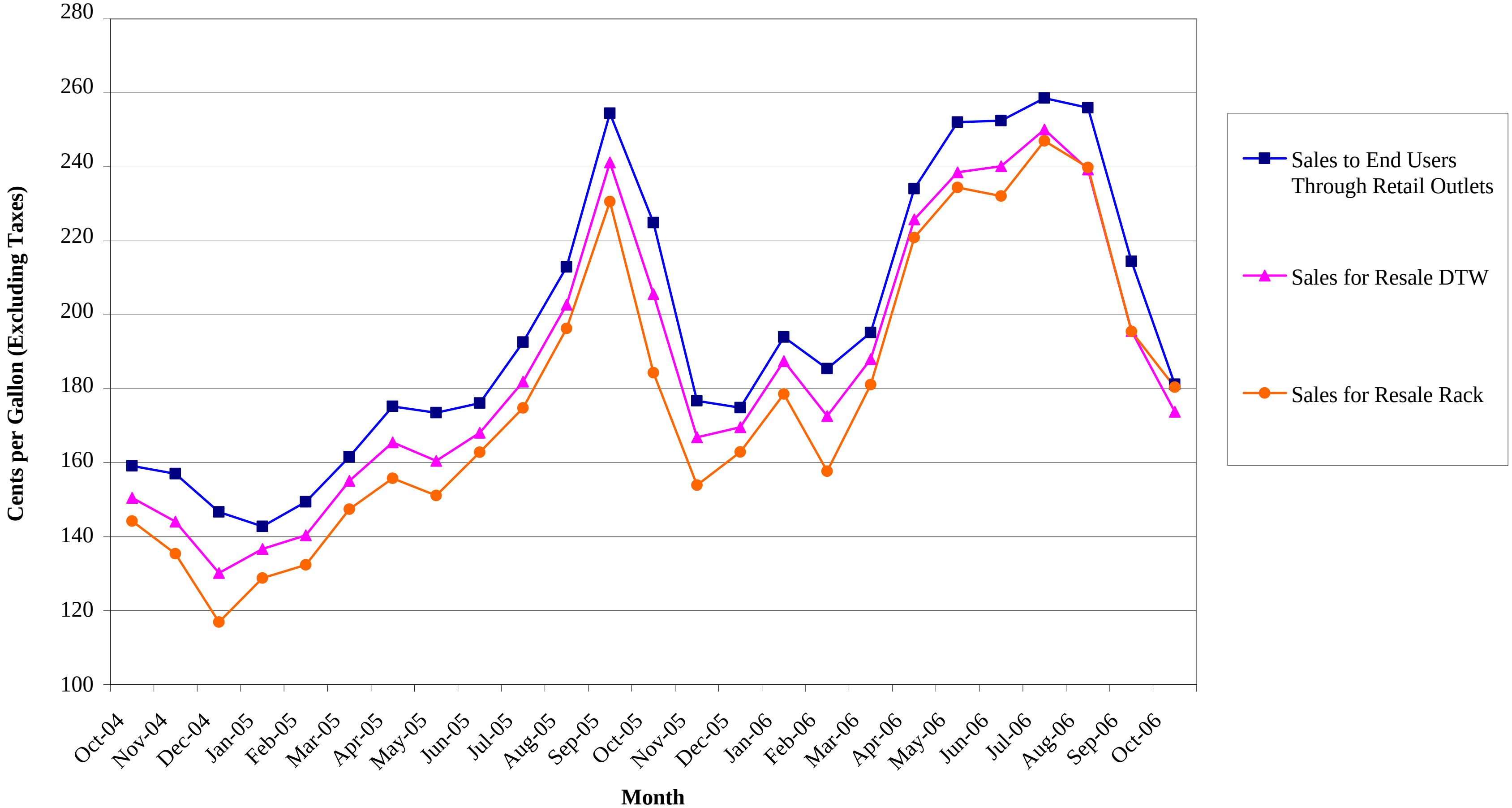
Source: Energy Information Administration, 2006.

FIGURE 4.3
MASSACHUSETTS MOTOR GASOLINE PRICES BY SALES TYPE
OCTOBER 2004—OCTOBER 2006



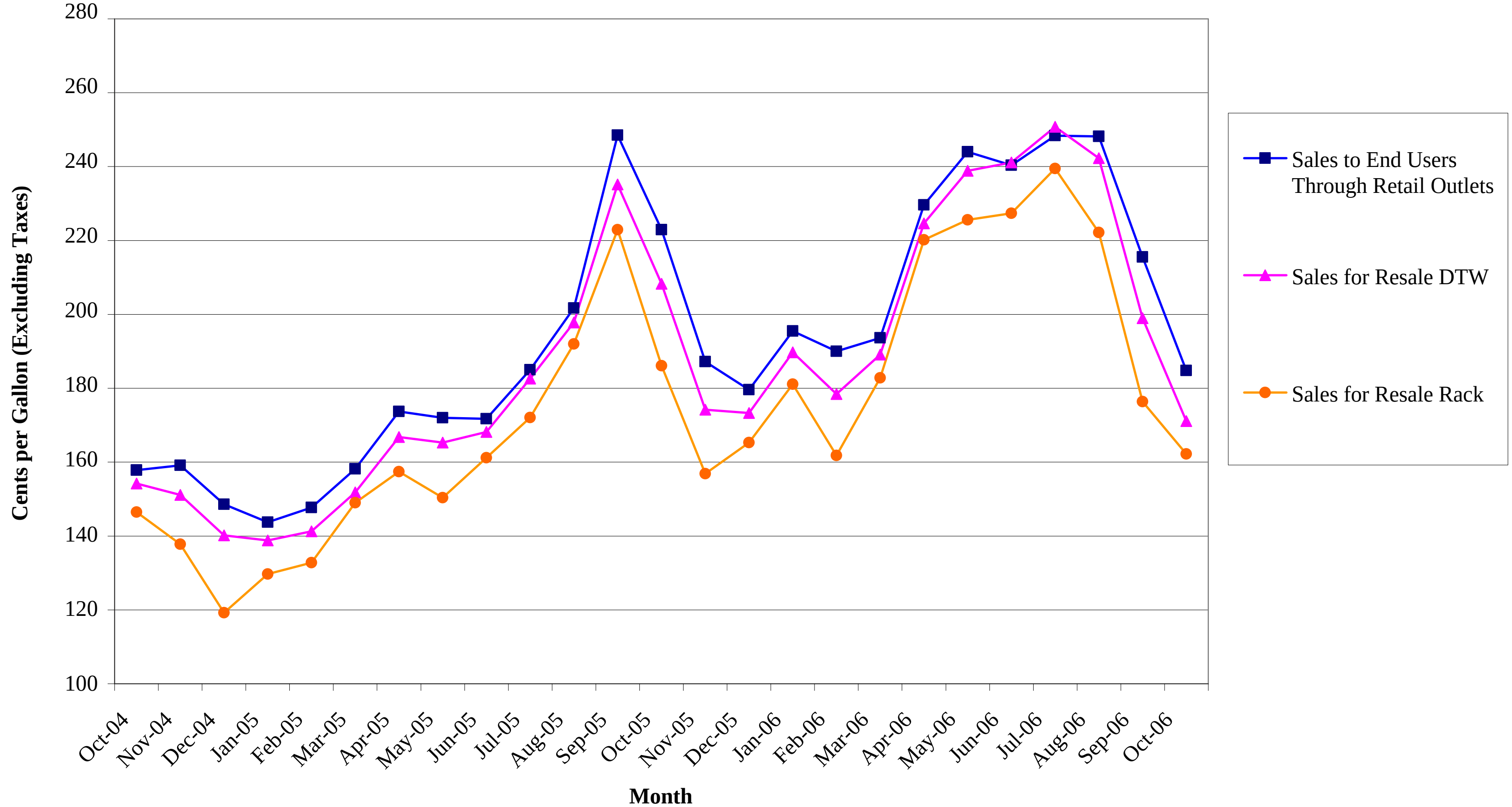
Source: Energy Information Administration, 2006.

FIGURE 4.4
NEW HAMPSHIRE MOTOR GASOLINE PRICE BY SALES TYPE
OCTOBER 2004—OCTOBER 2006



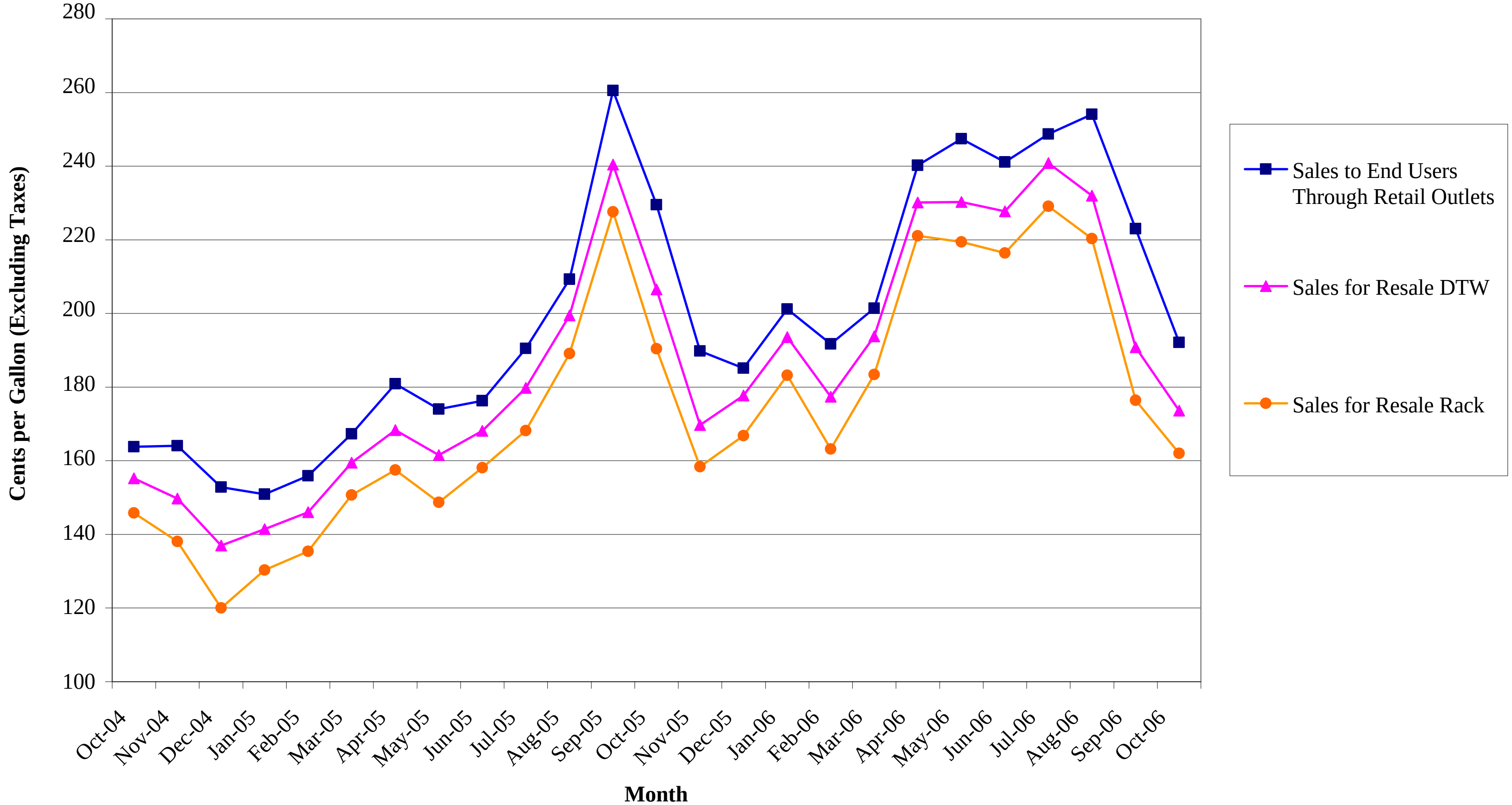
Source: Energy Information Administration, 2006.

FIGURE 4.5
NEW YORK MOTOR GASOLINE PRICES BY SALES TYPE
OCTOBER 2004—OCTOBER 2006



Source: Energy Information Administration, 2006.

FIGURE 4.6
VERMONT MOTOR GASOLINE PRICES BY SALES TYPE
OCTOBER 2004—OCTOBER 2006



Source: Energy Information Administration, 2006

There are a two main items that make interpreting differences in these price series difficult. First, the number and composition of survey respondents may vary over time. Data on respondents are not publicly available. In addition, the types of contract and ownership structures vary across each of the major brands that market gasoline in the States. Hence, the respondents in each series in the graph above may market very different brands. Some brands have a strong brand presence, allowing retail and wholesale prices that are consistently higher than others. If delivery type varies across brands, then differences attributable to brand value can generate differences in average prices by delivery type. In addition, if jobber-supplied stations are located in different areas than company-owned-and-operated stations, then price averages by delivery type may also vary because of geography instead of by delivery type.

Table 4.7 shows ownership structure of retail stations for major branded refiners operating in the States.

TABLE 4.7
OWNERSHIP TYPES FOR BRANDED STATIONS

	Company Operated	Lessee-dealer	Contract-dealer	Jobber - branded	Jobber - unbranded	Grand Total	Overall Brand Share
AMOCO	12.1%	2.9%	83.3%	1.7%	0.0%	100.0%	1.2%
BP	45.2%	10.7%	41.5%	2.7%	0.0%	100.0%	4.4%
CITGO	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%	9.5%
COASTAL	0.0%	0.0%	14.8%	85.2%	0.0%	100.0%	0.7%
EXXON	0.9%	10.3%	8.8%	80.1%	0.0%	100.0%	6.7%
GETTY	0.0%	53.4%	23.5%	23.1%	0.0%	100.0%	5.4%
GULF	7.7%	8.7%	16.2%	67.4%	0.0%	100.0%	5.5%
HESS	96.7%	2.4%	0.0%	0.9%	0.0%	100.0%	7.5%
IRVING	78.5%	6.5%	10.8%	4.2%	0.0%	100.0%	1.3%
MOBIL	12.9%	48.2%	12.9%	26.0%	0.0%	100.0%	23.2%
SHELL	8.5%	51.6%	8.3%	31.5%	0.0%	100.0%	6.0%
SUNOCO	15.2%	30.3%	29.7%	24.7%	0.0%	100.0%	10.0%
TEXACO	9.2%	27.6%	18.9%	44.3%	0.0%	100.0%	1.5%
VALERO	0.0%	0.0%	2.7%	97.3%	0.0%	100.0%	0.6%
All Others	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%	16.7%
Ownership Type Share of Market	16.0%	22.5%	12.6%	32.3%	16.6%	100.0%	100.0%

Source: MPSI (2006).

According to the statistics in Table 4.7, there does not seem to be a clear relationship between market share and the type of ownership and contract. For example Amoco, Getty and Valero all have relatively small overall market shares, however Amoco has majority of stations in a contract-dealer relationship, Getty in lessee-dealer, and Valero in jobber-branded. While the two largest dealers, Mobil and Sunoco, use similar proportions of company operated and jobber-branded outlets, Mobil has a much higher percentage of lessee-dealer stations and Sunoco has a higher percentage of contract-dealers. Across all of the States, Citgo and Valero supply branded gasoline almost exclusively through jobbers. Coastal, Exxon (recall that the Exxon brand is marketed in the States by ConocoPhilips), and Gulf sell more than 50% of their gasoline in the five states through jobbers. All of the *integrated* companies sell at least 23% of their gasoline through jobbers except for Amoco, BP, Hess, and Irving, which all sell less than 5% through jobbers. Companies that sell a large share of their gasoline through company owned-and-operated retail stations include Hess (97%), Irving (78%), and BP (45%). For the other companies, 15% or less of their gasoline was sold in company owned-and-operated stations. Dealer-owned stations were used most by BP (41%), Sunoco (30%), and Getty (23%). Finally, companies that sold a high percentage of their gasoline through a lessee station include Getty (53%), Shell (52%), and Mobil (48%).[62]

Tables 4.8 through 4.12 show the share of retail gasoline sales of each branded company for the five states. The category "All Others" combines all of the unbranded stations with less than 2.5% of sales. As the tables show, the largest gasoline brand in each of the five states was Mobil with a share ranging from 21% to 31%. Other companies with high sales shares include Citgo, Sunoco, and Shell. Unbranded stations combined have shares ranging from 13.5% to 20.2%.

[62] The "All Others" category contains the unbranded gasoline stations. This is all jobber-supplied, but it is left in the table as a reference that unbranded totals 16.6% of the retail market in the five states.

TABLE 4.8
MAINE
GASOLINE SALES VOLUMES BY COMPANY

Company	Volume (in thousands of gallons per month)	Share
MOBIL	2,855	28.7%
CITGO	1,785	18.0%
IRVING	1,229	12.4%
GULF	1,071	10.8%
EXXON	863	8.7%
All Others	778	7.8%
BJS	450	4.5%
TEXACO	385	3.9%
STOP & SHOPP	250	2.5%
GETTY	201	2.0%
SHELL	65	0.7%
Total	9,932	100.0%

Source: MPSI (2006).

TABLE 4.9
MASSACHUSETTS
GASOLINE SALES VOLUMES BY COMPANY

Company	Volume (in thousands of gallons per month)	Share
MOBIL	41,772	23.4%
All Others	36,024	20.2%
SUNOCO	17,744	10.0%
SHELL	16,837	9.4%
CITGO	15,189	8.5%
EXXON	12,397	7.0%
GULF	11,490	6.4%
HESS	9,704	5.4%
GETTY	9,102	5.1%
TEXACO	7,454	4.2%
COASTAL	318	0.2%
VALERO	157	0.1%
IRVING	106	0.1%
Total	178,294	100.0%
Source: MPSI (2006).		

TABLE 4.10
NEW HAMPSHIRE
GASOLINE SALES VOLUMES BY COMPANY

Company	Volume (in thousands of gallons per month)	Share
MOBIL	13,127	21.0%
CITGO	9,427	15.0%
All Others	8,438	13.5%
IRVING	6,394	10.2%
SHELL	6,301	10.1%
GULF	5,056	8.1%
SUNOCO	4,924	7.9%
EXXON	4,022	6.4%
GETTY	2,687	4.3%
HESS	1,217	1.9%
TEXACO	509	0.8%
COASTAL	383	0.6%
VALERO	153	0.2%
Total	62,638	100.0%
Source: MPSI (2006).		

TABLE 4.11
NEW YORK
GASOLINE SALES VOLUMES BY COMPANY

Company	Volume (in thousands of gallons per month)	Share
MOBIL	88,415	22.7%
All Others	61,639	15.8%
SUNOCO	42,951	11.0%
HESS	39,370	10.1%
CITGO	32,364	8.3%
BP	29,272	7.5%
EXXON	25,075	6.4%
GETTY	23,947	6.1%
GULF	16,337	4.2%
SHELL	13,740	3.5%
AMOCO	8,238	2.1%
COASTAL	3,779	1.0%
VALERO	3,568	0.9%
TEXACO	1,464	0.4%
Total	390,159	100.0%
Source: MPSI (2006).		

TABLE 4.12
VERMONT
GASOLINE SALES VOLUMES BY COMPANY

Company	Volume (in thousands of gallons per month)	Share
MOBIL	8,981	31.3%
CITGO	4,593	16.0%
All Others	3,935	13.7%
SHELL	3,357	11.7%
GULF	2,765	9.7%
EXXON	2,200	7.7%
SUNOCO	1,523	5.3%
IRVING	784	2.7%
VALERO	187	0.7%
TEXACO	174	0.6%
GETTY	127	0.4%
COASTAL	22	0.1%
Total	28,648	100.0%
Source: MPSI (2006).		

Measures of Retail Gasoline Market Concentration:

It is difficult to broadly characterize concentration in retail gasoline markets since geographic market definition may be localized and vary in size across regions depending on congestion, density and traffic patterns, among other things. For example, in New York City or Boston, where traveling small distances can be very difficult, stations that are a mile apart may not compete with each other for customers. However, in suburban areas where consumers drive over broader distances, retail stations may compete over a much wider geography. Without detailed data on station-level retail prices and sales volumes, it is difficult to measure the degree of competition, the *cross-price elasticity*, between different retail stations in order to define relevant geographic markets for calculating accurate measures of retail market shares and market concentration. In order to present market shares given the available data at a more detailed level than the state level, Appendix III contains tables showing the shares of retail gasoline sales by brand in all counties in the States for which data are available.[63] Interestingly, Maine's Office of the Attorney General uses counties as the appropriate geographic market definition for retail gasoline markets, pursuant to that state's *Petroleum Market Share Act*.[64] In addition, the Maine Office of the Attorney General characterizes counties with an HHI below 500 as "unconcentrated," between 500 and 1,000 as "moderately concentrated;" between 1,000 and 1,800 as "highly concentrated," and over 1,800 as "extremely concentrated." These characterizations of the degree of market concentration are more stringent than those in the *Horizontal Merger Guidelines*. In addition, the geographic market definition is not based on a formal test such as those defined by the *Horizontal Merger Guidelines.*[65] Hence the resulting county-level HHI statistics are not the product of detailed market definition analyses whose purpose would be to delineate relevant markets for antitrust purposes using, for example, the market definition methodology in the *Horizontal Merger Guidelines.* Nonetheless these tables present summary statistics of brand market share and brand-level concentration at a finer geographic level than do the state-level tables.

[66]Using the traditional characterizations of market concentration based on HHI statistics, the retail gasoline market in Maine's Cumberland county is moderately concentrated and the market in Penobscot county is highly concentrated based on brand-level market shares. Using the characterizations used by Maine's office of the Attorney General, retail gasoline markets in these two counties would be classified as highly and extremely concentrated respectively. Mobil and Citgo had the largest market shares for both counties. There are a significant number of retail gasoline companies with less than 5% of market share in Cumberland county, as these companies together have 22.5% market share.[67]

In Massachusetts, five counties are moderately concentrated, two are highly concentrated, and four are unconcentrated. Barnstable and Berkshire counties have the most concentrated markets. Mobil has the largest market share in all the counties except for Berkshire and Hampden. There are many companies with less than 5% market share in

[63] MPSI collects data from retail gasoline stations in some, but not all, of the counties in the States.

[64] State of Maine, Office of the Attorney General (March 27, 2006), *Annual Report of the Attorney General to the Maine Legislator Pursuant to 10 M.R.S.A. § 1677.*

[65] In defining a geographic market, the Department of Justice's *Horizontal Merger Guidelines* consider the actions of a "hypothetical monopolist," i.e., an imaginary firm that currently controls and will continue to control all of the geographic area that is being proposed as a market. If such a hypothetical monopolist would be able to use its monopoly power to raise prices by a small but significant and non-transitory amount within that geographic area, then the area would be considered its own geographic market.

[66] Because refiner-marketers set wholesale prices that determine in part retail prices, we measure concentration at the brand level and treat unbranded stations as individual firms.

[67] Companies in the "Others" category include those with less than 5% market share as well as those with less than three stations in the county. The reported HHIs are still calculated from the market shares of the individual firms in the "Others" category. For unbranded stations, we calculate a firm's market share based on the station name since we do not know the names of individual proprietors at each retail operation.

Massachusetts; the companies in the "others" category had at least 20% market share in six of the ten counties that we analyzed in Massachusetts.

In New Hampshire, out of the eleven counties where we analyzed market concentration, four counties—Belknap, Cheshire, Monadnock, and Sullivan—were highly concentrated. Rockingham, with an HHI of 921, is unconcentrated, and the remaining six counties are moderately concentrated. Mobil and Citgo have the largest market shares in four counties each.

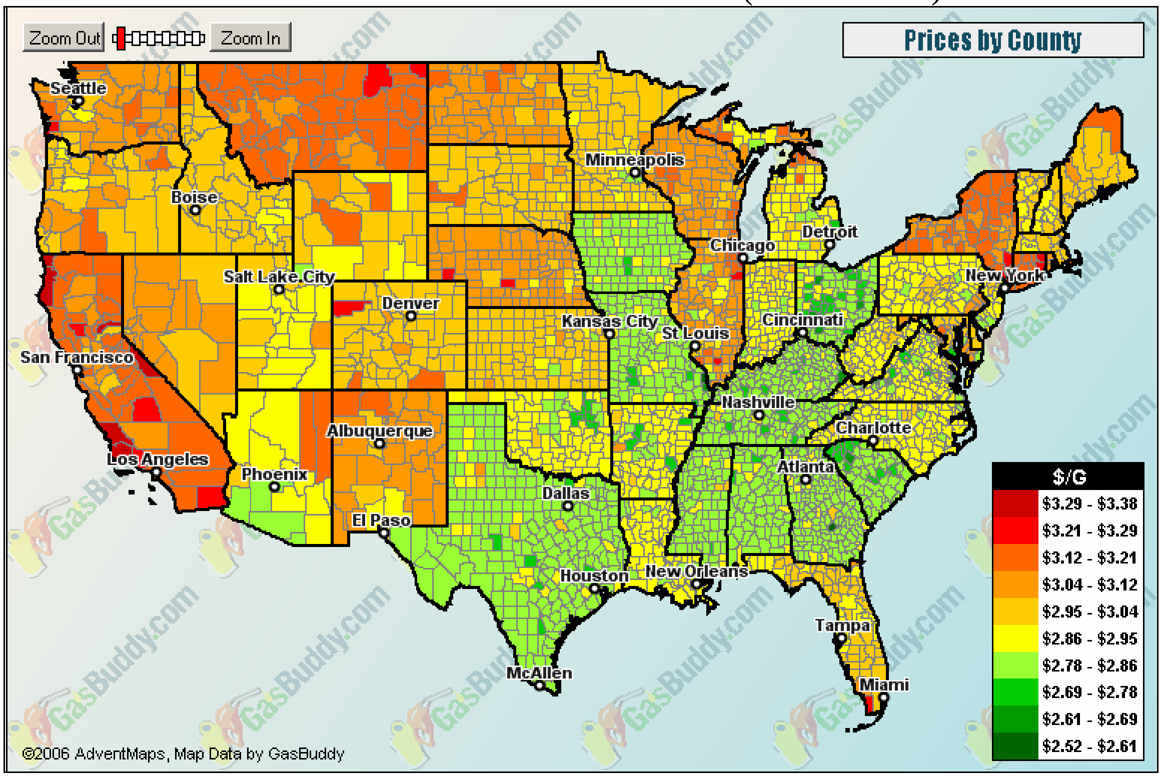
In New York, sixteen counties are highly concentrated, fifteen counties are moderately concentrated, and three are unconcentrated. Mobil has the largest market shares in twenty-one different counties, and Sunoco has the largest market shares in five different counties.

In Vermont, seven counties are highly concentrated and seven counties are moderately concentrated. Mobil has the largest market share in twelve of the fourteen counties. Grand Isle, which has an HHI of 3,752, is the most concentrated market, and Bennington is the least concentrated market with an HHI of 1,304.

D. Wholesale and retail gasoline prices, state and federal taxes

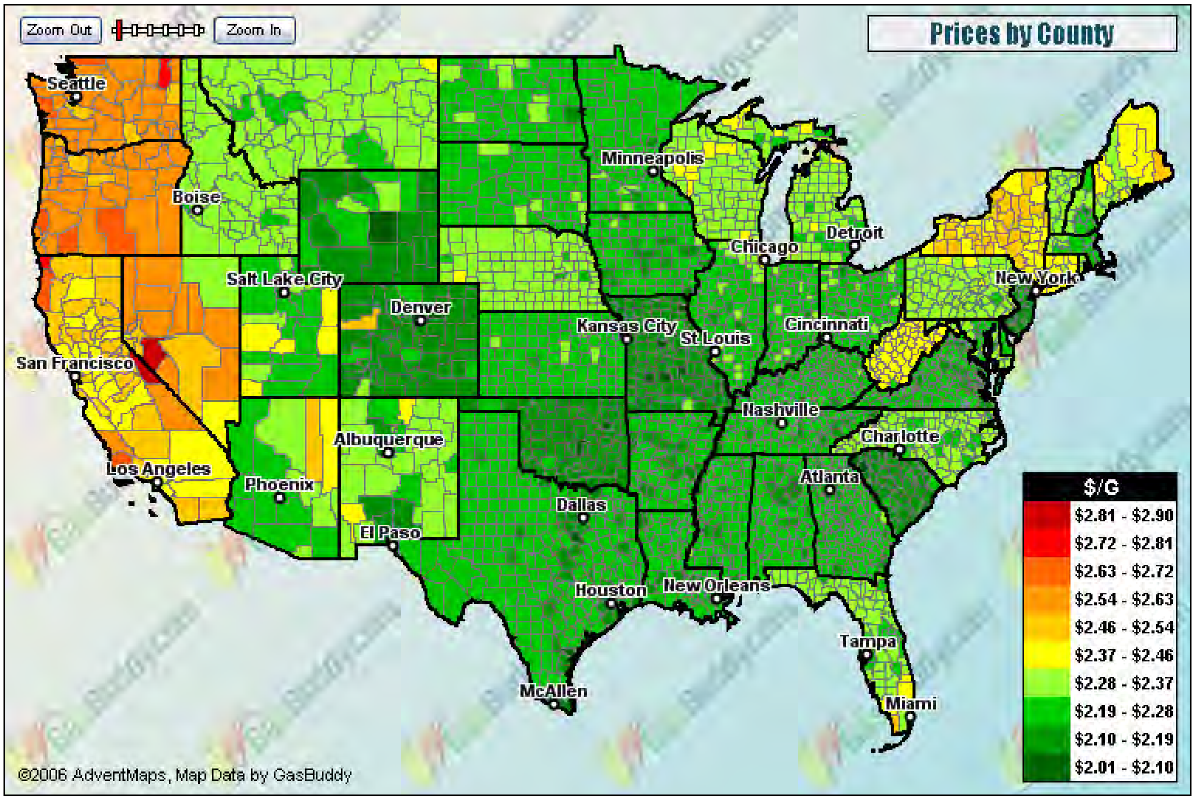
Gas prices can vary dramatically around the country, with prices in the most expensive state sometimes more than 25% higher than the cheapest state. Figures 4.7a and 4.7b display a snapshot of gasoline prices across the country as of August and December 2006. For the most part, consumers on the West Coast and in the Northeast pay more for gasoline than consumers in Southern states. Variation in gasoline prices can be caused by regional differences in demand and supply conditions, market structure, and government regulation.

FIGURE 4.7A
AVERAGE GASOLINE PRICES BY COUNTY (AUGUST 2006)



Source: http://www.gasbuddy.com/gb_gastemperaturemap.aspx

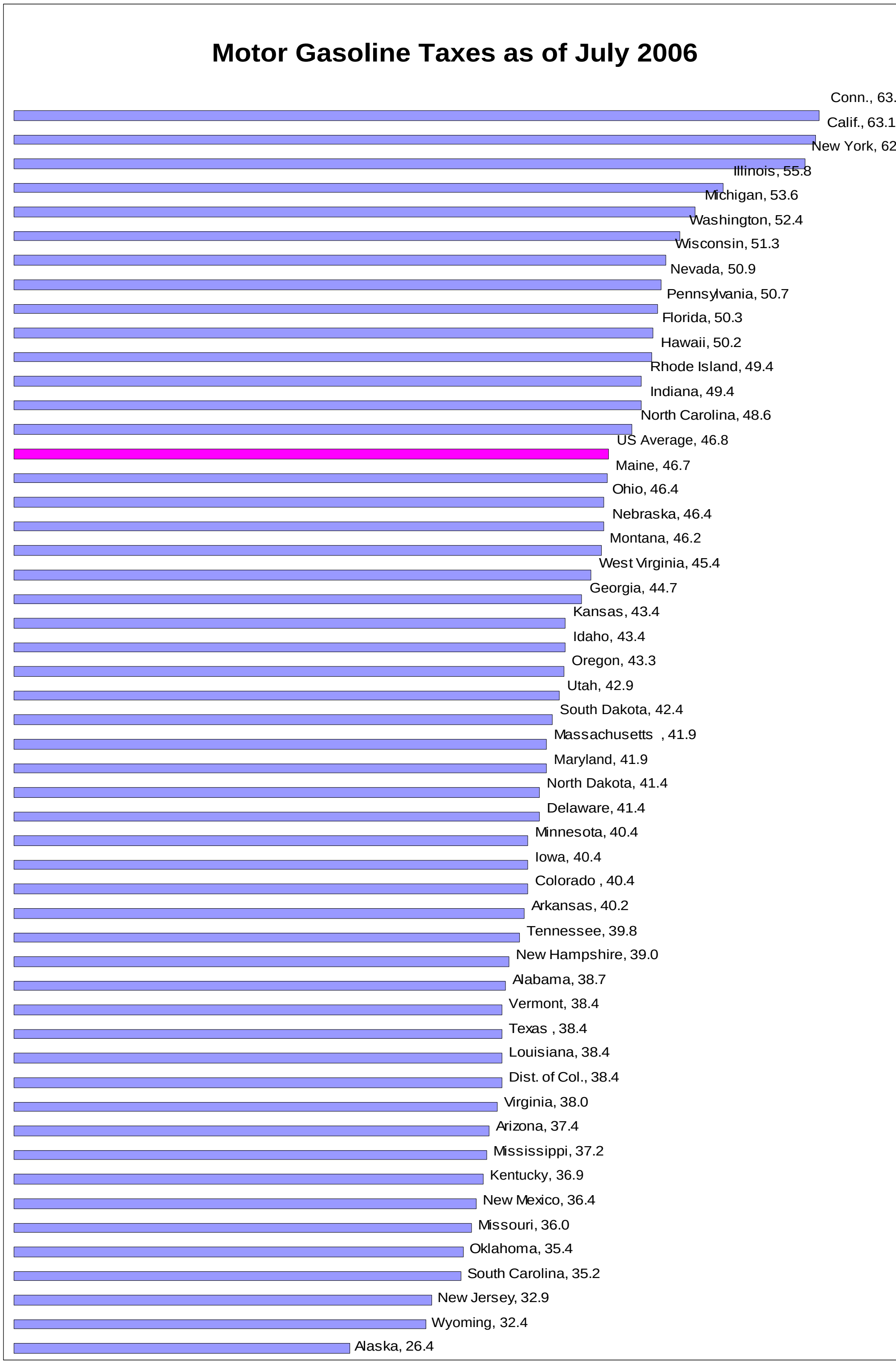
FIGURE 4.7B
AVERAGE GASOLINE PRICES BY COUNTY (DECEMBER 2006)



Source: http://www.gasbuddy.com/gb_gastemperaturemap.aspx

One significant component of cross-state variation in gasoline prices is differences in state and local taxes. Figure 4.8 lists the average tax per gallon of gasoline for all states. Illinois and Wisconsin, for example, have higher taxes than neighboring states—taxes in Illinois are 6 cents more than Indiana, 15 cents more than Iowa, and 20 cents more than Missouri. This is one reason for higher gasoline prices in Illinois than neighboring states (see Figure 4.7). In the Northeast, the two most expensive states are Connecticut and New York, and these states also have the highest gas taxes in the country, 63.4 and 62.3 cents respectively —more than 15 cents above the national average.

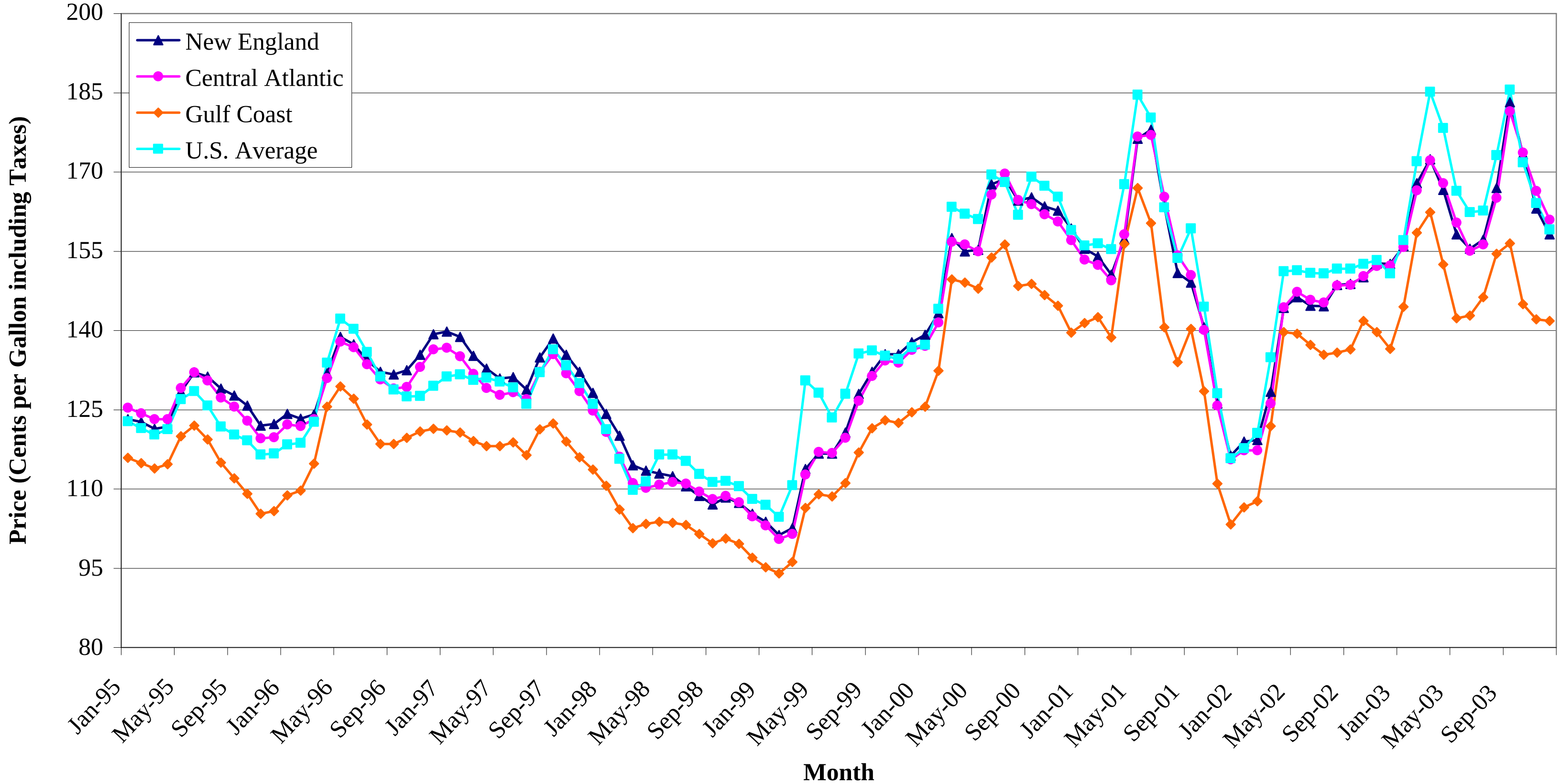
FIGURE 4.8
AVERAGE MOTOR GASOLINE TAXES AS OF JULY 2006



Source: American Petroleum Institute.

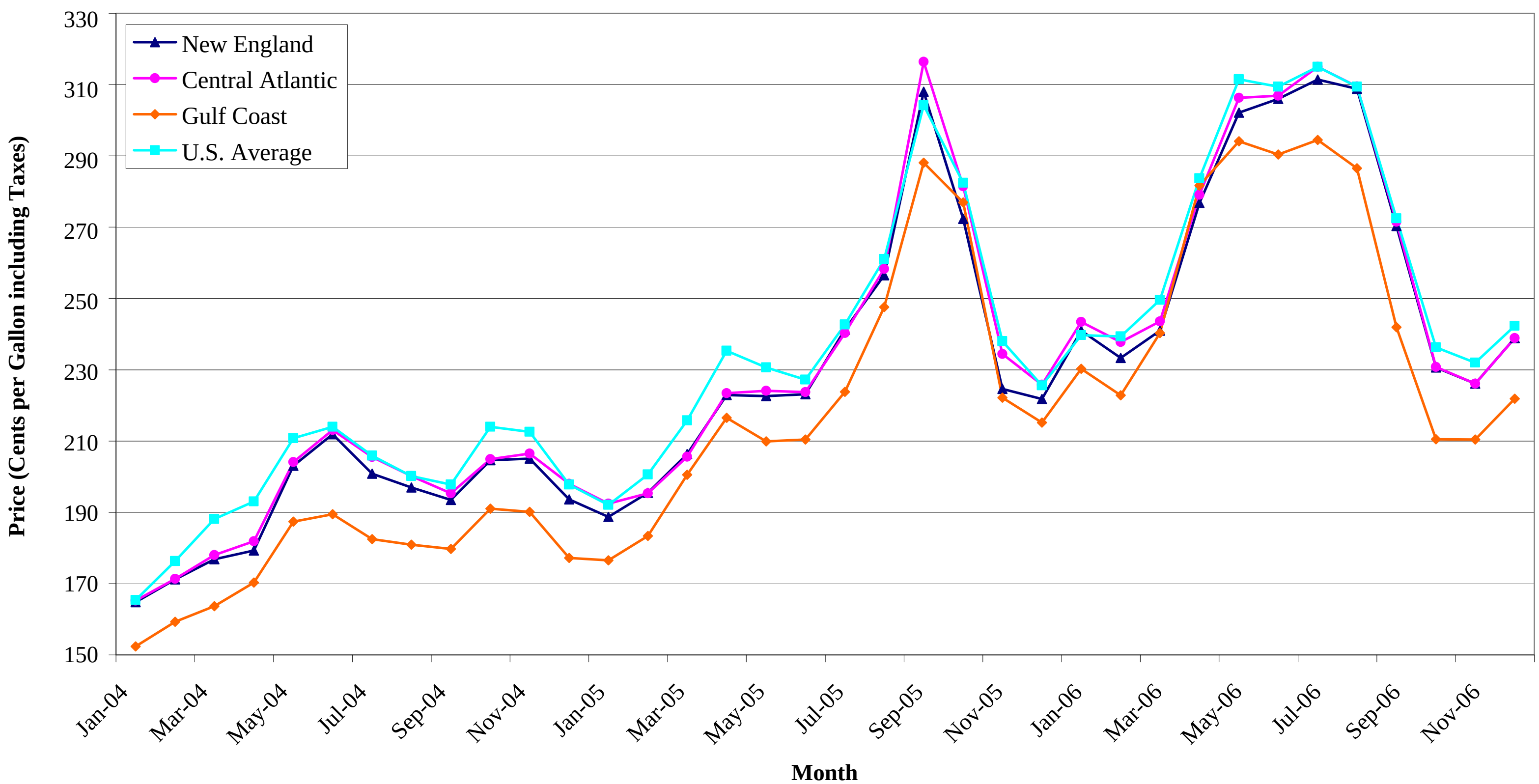
Even after removing taxes from the price of gasoline, there is still consistent regional variation in the price of gasoline. Figures 4.9 through 4.12 graph the average retail price of gasoline excluding taxes for the Gulf Coast, mid-Atlantic, New England, and the U.S. as a whole. Figure 4.9 graphs the price of reformulated gasoline from 1995 through 2003, while Figure 4.10 shows the price data from 2004 to May 2006. Similarly, Figure 4.11 graphs the price of conventional gasoline from 1995 through 2003 and Figure 4.12 from 2004 to May 2006.

FIGURE 4.9
MONTHLY ALL GRADES REFORMULATED RETAIL GASOLINE PRICES
1995—2003
(CENTS PER GALLON)



Source: Energy Information Administration, 2006

FIGURE 4.10
MONTHLY ALL GRADES REFORMULATED RETAIL GASOLINE PRICES
2004—2006
(CENTS PER GALLON)

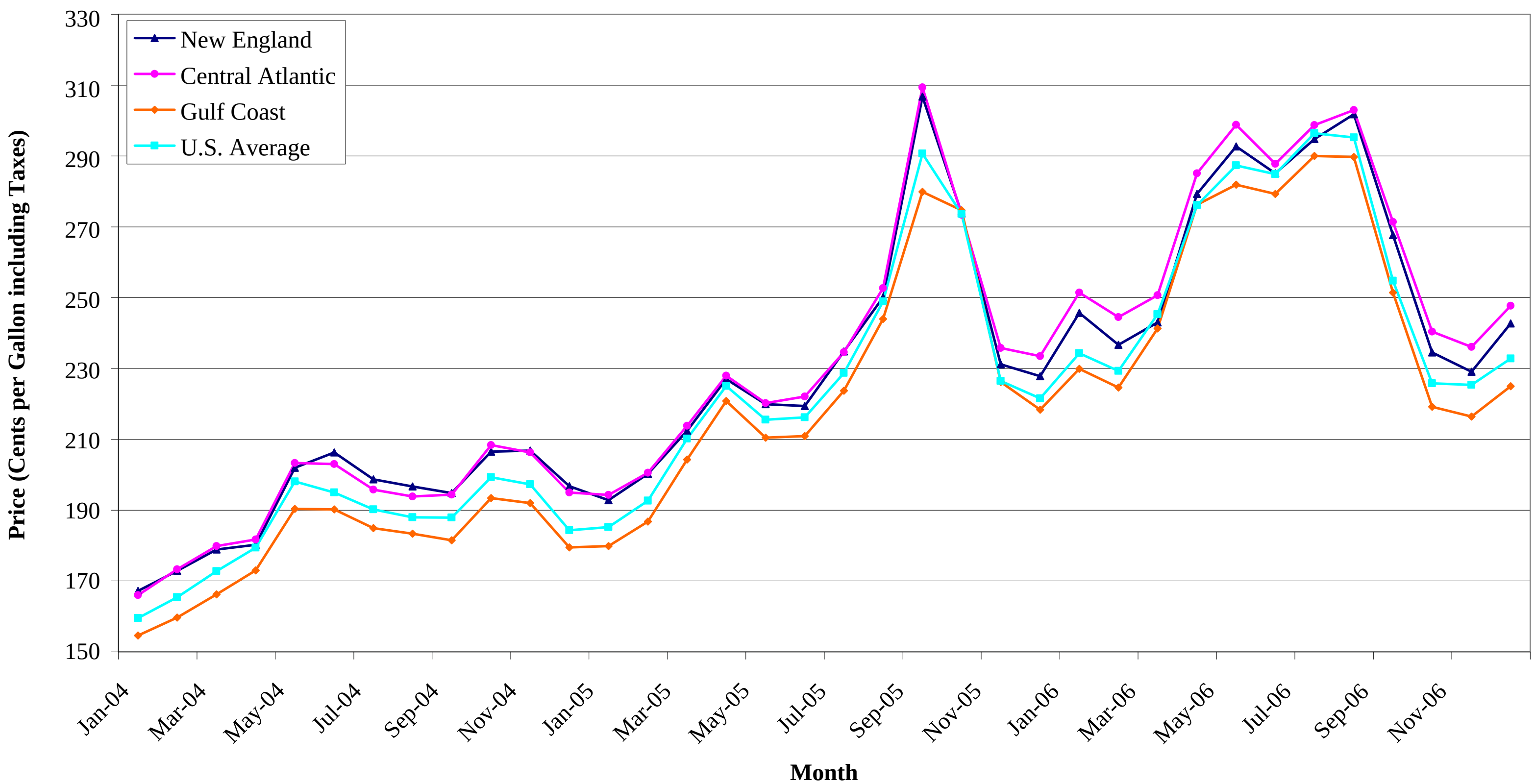


Source: Energy Information Administration, 2006

FIGURE 4.11
MONTHLY ALL GRADES CONVENTIONAL RETAIL GASOLINE PRICES
1995—2003
(CENTS PER GALLON)

Source: Energy Information Administration, 2006

FIGURE 4.12
MONTHLY ALL GRADES CONVENTIONAL RETAIL GASOLINE PRICES
2004—2006
(CENTS PER GALLON)

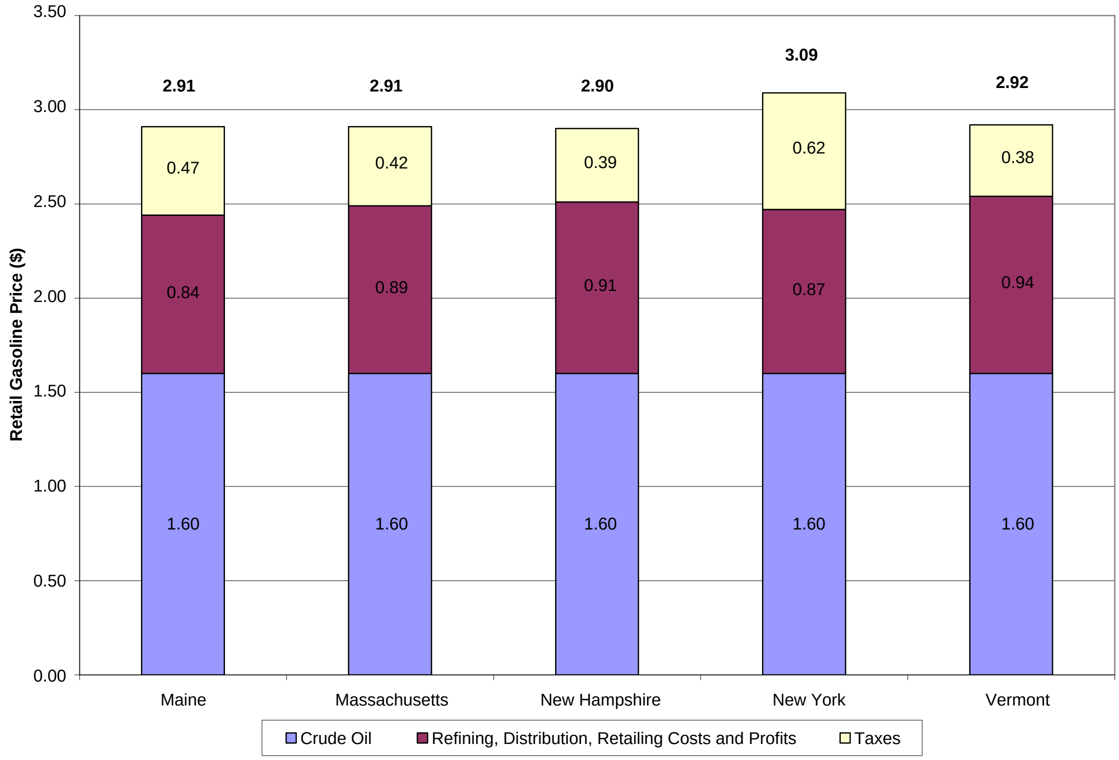


Source: Energy Information Administration, 2006

There are three important patterns to highlight in Figures 4.9 through 4.12. First, the regional retail prices move together over time, despite persistent differences in their levels. This is because crude oil prices are the largest variable input cost in the production of gasoline. According to data from the Energy Information Administration, crude oil currently accounts for approximately 55% of the price of retail gasoline.[68] Federal and state gasoline taxes are on average 15% percent of the price of retail gasoline in the States. The retail averages in the Northeast in the Figure 4.13 shows how the retail price of a gallon of gasoline can be divided into (1) the cost of crude oil, (2) refining, distribution, and retailing costs and profits, and (3) state and federal taxes. Given these retail gasoline prices, crude oil would account for approximately $1.60 of the retail price, which we hold constant among the States. Since market structure, regulation, and taxes are all relatively more stable than oil prices, variation in retail gasoline prices over time results primarily from changes in crude oil prices.

[68] http://www.eia.doe.gov/bookshelf/brochures/gasolinepricesprimer/eia1_2005primerM.html.

FIGURE 4.13
RETAIL GASOLINE PRICES AND THEIR COMPONENTS



Sources: www.gasbuddy.com and American Petroleum Institute.

A second important pattern in Figures 4.9 through 4.12 is the persistent differences in average retail prices excluding taxes across regions in the United States. Northeast and Mid-Atlantic average retail prices are consistently higher than those in the Gulf Coast. Some of the persistent difference may be due to differences in transportation costs. The Gulf Coast is a major refining center, providing gasoline via pipeline to the entire East Coast. Hence, the cost of transporting gasoline from the Gulf Coast to the Northeast would generate a constant, per-gallon difference in retail prices between the two regions.

The price of gasoline in some markets is more closely related to the price of crude oil than in other markets. Table 4.13 shows for each state the fraction of variation in retail gasoline prices explained by variation in crude oil prices; that is, it shows how closely gasoline and crude oil prices move together over time. A correlation of one would mean that changes in gasoline prices are entirely explained by changes in crude oil prices, while a correlation of zero would mean that the two prices are completely independent of each other. This table demonstrates that gasoline prices in all the states are highly correlated. Among the states, changes in oil prices explain the smallest percentage of changes in gasoline prices over this time period in Oregon, with changes in oil prices explaining 68% of the variation in monthly average retail gasoline prices. The table also shows that these correlations can vary significantly from state to state. Among the states, changes in oil prices explain the largest percentage of changes in gasoline prices in South Dakota, with changes in oil prices explaining 87% of the variation in monthly average retail gasoline prices. Thus, while changes in retail gasoline prices are predominantly determined by changes in the world price of oil, there remain non-trivial differences among the states in the extent to which changes in oil prices explain changes in retail gasoline prices. This may be due to regional differences in such things as gasoline regulations, market structure, consumer behavior, or labor and capital costs.

TABLE 4.13
FRACTION OF VARIATION IN AVERAGE RETAIL GASOLINE PRICES ATTRIBUTABLE TO VARIATION IN AVERAGE CRUDE OIL PRICE

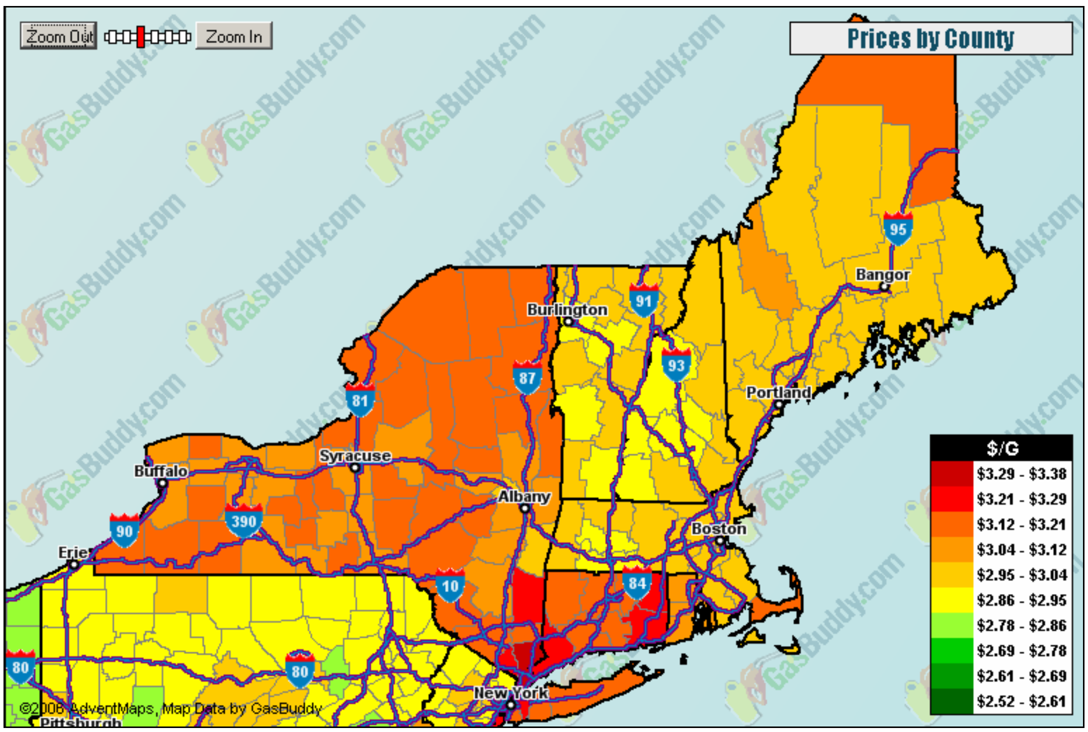
State	Correlation	State	Correlation
Alabama	0.8450	Montana	0.7761
Alaska	0.8363	Nebraska	0.8618
Arizona	0.7413	Nevada	0.7084
Arkansas	0.8294	New Hampshire	0.8037
California	0.7260	New Jersey	0.7492
Colorado	0.7900	New Mexico	0.8626
Connecticut	0.8071	New York	0.8286
Delaware	0.8000	North Carolina	0.8087
District of Columbia	0.8513	North Dakota	0.8332
Florida	0.8434	Ohio	0.8301
Georgia	0.8210	Oklahoma	0.8594
Hawaii	0.8664	Oregon	0.6792
Idaho	0.7523	Pennsylvania	0.8455
Illinois	0.8268	Rhode Island	0.7790
Indiana	0.8349	South Carolina	0.7921
Iowa	0.8488	South Dakota	0.8682
Kansas	0.8398	Tennessee	0.8222
Kentucky	0.8521	Texas	0.8409
Louisiana	0.8651	Utah	0.7078
Maine	0.8343	Vermont	0.8301
Maryland	0.8252	Virginia	0.8151
Massachusetts	0.7794	Washington	0.7045
Michigan	0.8475	West Virginia	0.8526
Minnesota	0.8428	Wisconsin	0.8548
Missouri	0.8350	Wyoming	0.7947

Source: www.eia.doe.gov. The retail data are EIA's monthly average retail prices, excluding taxes, for each state from January 2004 to May 2006. The crude oil price is averaged from Daily WTI spot prices for crude oil posted to the EIA's website.

Although variation in gasoline prices between states can be significant, there is as much variation in gasoline prices within much smaller geographic areas such as counties and metropolitan areas. Figures 4.14a and 4.14b show county-level differences in gasoline prices in the States. Intrastate differences in gasoline prices may be driven by several factors. Differences in distribution costs are an important component of intrastate variation in gasoline prices, just as they are in interstate gasoline price variation. Note in

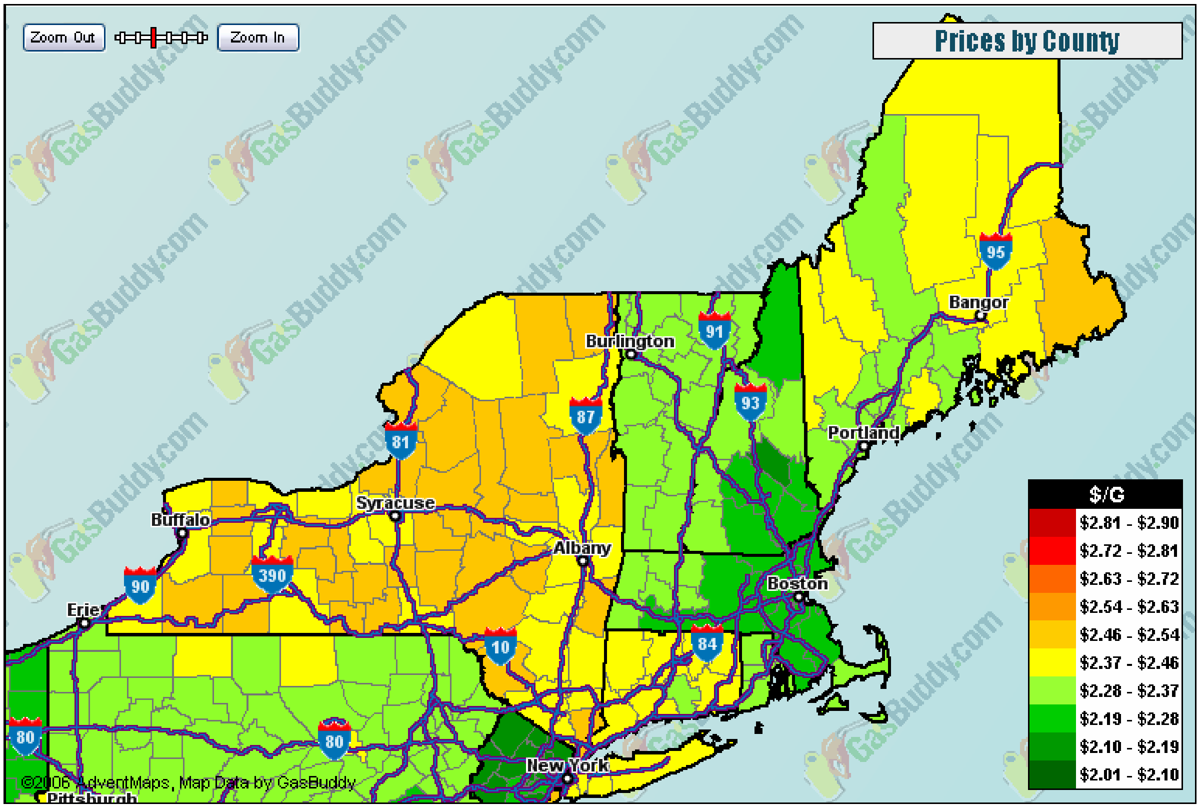
Figure 4.14 that lower prices tend to be proximate to gasoline distribution racks and major highways. In addition, factors such as local wholesale and retail market structure, including the concentration of wholesale suppliers, the demand elasticity the wholesale suppliers face, the density of distribution racks, and the geographic density and ownership concentration of gasoline stations may contribute to differences in intrastate retail prices. Differences in retail geographic density can result from differences in land values, entry, and exit costs. In addition, demand can play an important role. If consumers in certain areas are very inelastic—not willing to shop for cheaper gasoline prices across stations—retail prices will be higher than in regions where consumers are more price sensitive.

FIGURE 4.14A
AVERAGE GASOLINE PRICE IN THE NORTHEAST
(AUGUST 2006)



Source: www.gasbuddy.com.

FIGURE 4.14B
AVERAGE GASOLINE PRICE IN THE NORTHEAST
(DECEMBER 2006)



Source: http://www.gasbuddy.com/gb_gastemperaturemap.aspx

E. How regulations affect retail gasoline prices

In addition to gasoline taxes, there are several state and federal regulations that may contribute either directly or indirectly to variation in wholesale and retail gasoline prices across geographic areas. In this section we discuss the primary regulations that affect gasoline markets in the States, as well as regulations that have been proposed and/or passed by state legislatures and regulators in recent years.

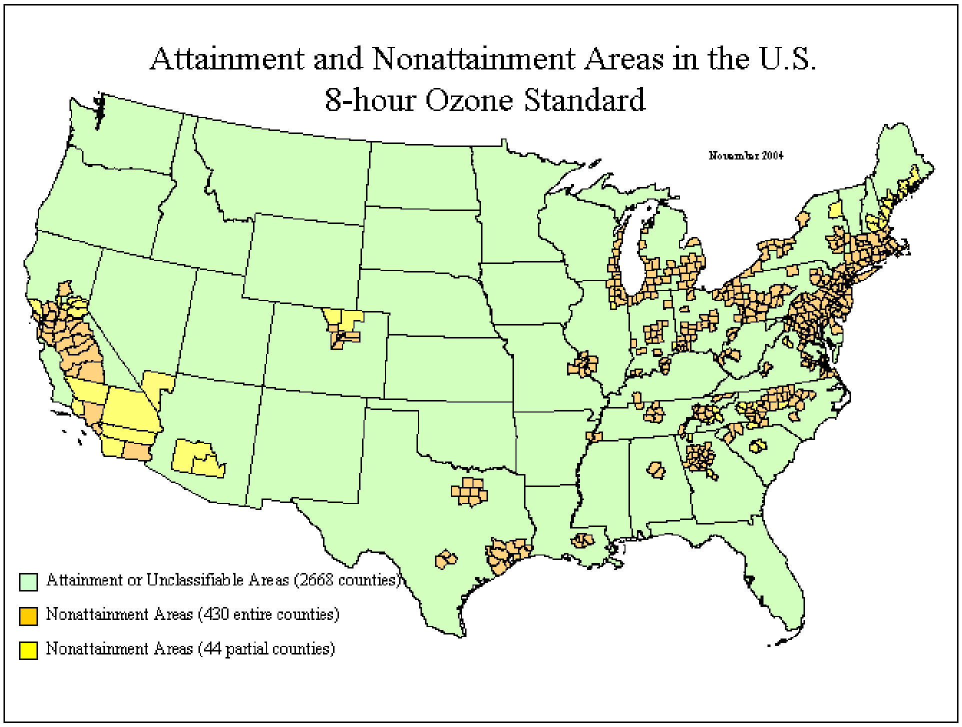
a. Gasoline Content Regulation

The regulation with the broadest geographic scope is the regulation of gasoline content under the federal Clean Air Act Amendments of 1990 ("CAAA"). The CAAA is administered through EPA and regulates air emissions from stationary and mobile sources. The original Clean Air Act (of 1970) set air quality targets for every state. The 1990 amendments address issues such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxins. Recognizing the role of fuel-related emissions, the Act targets gasoline content (among other things) to reduce overall air pollution.

Regulations in the CAAA limit Reid Vapor Pressure ("RVP"), mandate minimum oxygen content, and prescribe specific requirements relating to reformulated gasoline, among other things. Application of the regulations is not uniform; some content requirements are national, while others pertain only to non-attainment regions identified by the EPA (see Figure 4.15). States and regions not required to participate may still opt-in to the programs. Three main regional programs aim to reduce fuel-related air pollution: the Oxygenated Gasoline Program, the RVP Program, and the Federal Reformulated Gasoline ("RFG") Program.[69] Minimum standards are mandated by the EPA, and the program allows regional regulators to impose more stringent requirements through State Implementation Plans ("SIPs"). The standards apply to all gasoline sold for use in the regulated region, but do not apply to fuel being transported for sale outside of the jurisdiction.

[69] For a survey of gasoline content regulations and adoption timing across US counties and metropolitan areas, see, e.g., Eric Muehlegger, "The Role of Content Regulation in Pricing and Market Power in Regional Retail and Wholesale Gasoline Markets," CEEPR Working Paper WP-2002-008 (2002). Also, J. Brown, J. Hastings, E. Mansur, and S. Billas-Boas. "Reformulating Competition? Gasoline Content Regulation and Wholesale Gasoline Prices." University of California CUDARE Working Paper No. 1010, January 8, 2007.

FIGURE 4.15



Source: http://www.epa.gov/oar/oaqps/greenbk/naa8hrgreen.html

RVP measures a fuel's propensity to evaporate. Lowering RVP decreases at-the-pump pollutants such as volatile organic compounds ("VOC"). To reduce RVP, refiners eliminate the lightest components of the fuel, either by decreasing the volume of normal butane blended into gasoline, or by increasing the volume of normal butane rejected from motor gasoline. RVP regulations stipulate explicit content criteria. Since ground-level ozone pollution is exacerbated by high temperatures and sunlight, most RVP regulations are effective only in summer months.

The Oxygenated Gasoline Program provides explicit content criteria to reduce carbon monoxide ("CO") emissions, a pollutant with particularly severe health effects for people with cardiovascular or respiratory diseases. The oxygenation process increases oxygen content which enables gasoline to burn more completely. To produce oxygenated gasoline, either ethanol or Methyl Tertiary-Butyl Ether ("MTBE") is added to the product after refining.[70] Generally, refiners and distributors sell oxygenated gasoline during winter months, when CO emissions from mobile sources are highest. Also, since ethanol increases the RVP, oxygenation can be detrimental to reducing ozone pollution during summer months.

[70] MTBE is derived from natural gas and is used primarily in the Northeast, while ethanol is derived from renewable feed-stocks and is used mostly in the Midwestern states and California. MTBE has the same RVP as gasoline, requiring no change formulation of the gasoline it is blended into. Ethanol, on the other hand, has a much higher RVP than gasoline. This implies that the gasoline to which it is added must have a lower RVP level in order to meet the overall RVP requirement for conventional gasoline.

The RFG Program shares its targets with the other two programs. Like the RVP program, the RFG program aims to reduce ground-level ozone-forming pollutants and, similar to the oxygenate regulations, the RFG requirements combat CO emissions. RFG regulations stipulate both content criteria (such as benzene content limits) and emissions-based performance standards for refiners.[71] While the required content changes must be done at the refinery level, refiners can meet these standards in the least-cost manner. The RFG program is in effect throughout the year and has winter (non-VOC Control Period) and summer (VOC Control Period) components. The Reformulated Gasoline Program is a major gasoline regulation: RFG gasoline constitutes one third of all gasoline sold in the U.S., and the EPA attributes a 17% reduction in emissions of VOC and other toxics to this program.

Both the RFG and RVP regulations have been phased in over time, with increasingly stringent standards required in each successive phase. Phase I of the RVP program began in the summer of 1989, reducing regional RVP limits. The second phase introduced a national RVP cap in the summer of 1992. In addition, Phase II set stricter standards in ozone non-attainment areas. The RFG program's first phase began in January 1, 1995, forcing refiners to reduce VOC and nitrogen oxides emissions, and comply with content regulations for benzene and oxygenates. Phase II began January 1, 2000, and required even greater emissions reductions and content restrictions. RFG compliance was required initially in the nine worst ozone non-attainment (metropolitan) areas in the U.S.: Baltimore, Chicago, Hartford, Houston, Los Angeles, Milwaukee, New York City (including CT and NJ "suburbs"), Philadelphia, and San Diego.[72] Two types of RFG programs are in place: RFG North and "stricter" RFG South, where the geographic definition is given by the Mason-Dixon Line. RFG South has stricter requirements for RVP levels due to the higher average temperatures and evaporation rates in that region.

Currently, in the Northeast, the RFG intended for northern states is used in the entire states of Delaware, New Jersey, Connecticut, Rhode Island, and Massachusetts, and parts of Pennsylvania, New York, and New Hampshire. Southern Maine has a separate type of lower-pollution gasoline which has 7.8 RVP in the summer months, but has no oxygenate requirement. Vermont uses conventional gasoline throughout the state. Elsewhere around the country, Maryland, St Louis, Houston, Dallas-Ft. Worth, and others use an RFG South. Other locations have varying RVP requirements, or different rules on the type of oxygenate, depending on the regulations required by the CAAA for their region and their individual state implementation plans.[73] Tables 4.14 through 4.17 provides a list of areas

[71] Between 1995 and 2000, both ethanol and MTBE were used in the RFG program; ethanol was used in 100% of RFG in Chicago and Milwaukee.

[72] Parts of Louisiana and Georgia were classified as non-attainment zones in 2003 and 2004, respectively. However, litigation has stayed implementation of the RFG program.

[73] In the past, the most common oxygenate was MTBE. While it served the purpose of the Clean Air Act Amendments, it was shown to be harmful to the water supply. There is limited information about the direct effects of MTBE on human health. But, it is known that very small amounts of MTBE can make water undrinkable. Many states, including the states in the Northeast using RFG, have moved away from using MTBE as an oxygenate and now use ethanol. As it is primarily made from corn, some of the push toward ethanol has also been motivated by encouraging the use of renewable fuels and supporting corn growers.

in the country that have content regulation for gasoline by regulation type (RFG, RVP, or Oxygenate program) and notes when the program began in that region.

TABLE 4.14
MANDATED RFG PROGRAM AREAS

State	County	Start Date
California	El Dorado (partial), Placer (partial), Sacramento, Solano (partial), Sutter (partial), Yolo	June 1, 1996
California	Fresno, Kent (partial), Kings, Madera, Merced, San Joaquin	December 10, 2002
California	Los Angeles, Orange, Riverside (partial), San Diego, Stanislaus, Tulare, Ventura	January 1, 1995
Connecticut	Fairfield, Hartford (partial), Litchfield (partial), Middlesex (partial), New Heaven (partial), New London (partial), Tolland (partial)	January 1, 1995
Delaware	New Castle, Kent	January 1, 1995
District of Columbia	Entire District of Columbia	January 1, 1995
Georgia	Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, Rockdale	January 1, 2004
Illinois	Cook, Du Page, Grundy (partial), Kane, Kendall, Lake, McHenry, Will	January 1, 1995
Indiana	Lake, Porter	January 1, 1995
Louisiana	Ascension, East Baton Rouge, Iberville, Livingston, West Baton Rouge	January 1, 2003
Maryland	Anne Arundel, Baltimore, Calvert, Carroll, Charles, Cecil, Frederick, Harford, Howard, Montgomery, Prince George's, The City of Baltimore	January 1, 1995
New Jersey	Bergen, Burlington, Camden, Cumberland, Essex, Gloucester, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Salem, Somerset, Sussex, Union	January 1, 1995
New York	Bronx, Kings, Nassau, New York, Orange, Putnam, Queens, Richmond, Rockland, Suffolk, Westchester	January 1, 1995
Pennsylvania	Bucks, Chester, Delaware, Montgomery, Philadelphia	January 1, 1995
Texas	Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller	January 1, 1995
Virginia	Alexandria, Arlington, Fairfax, Fairfax County, Falls Church, Loudoun, Manassas, Manassas Park, Prince William, Stafford	January 1, 1995
Wisconsin	Kenosha, Milwaukee, Ozaukee, Racine, Washington, Waukesha	January 1, 1995
Sources: epa.gov/otaq/rfg/whereyoulive.htm;eia.doe.gov/emeu/steo/pub/special/rfg2.html		

TABLE 4.15
RFG PROGRAM "OPT-IN" (VOLUNTARY) AREAS

State	County	Start Date
Connecticut (Entire State)	Litchfield (partial), Hartford (partial), Middlesex (partial), New London (partial), Tolland (partial), Windham, New Haven (partial)	January 1, 1995
Delaware (Entire State)	Sussex nonattainment area, Sussex	January 1, 1995
Kentucky	Boone, Bullitt (partial), Campbell, Jefferson, Kenton, Oldham (partial)	January 1, 1995
Maryland	Kent, Queen Anne's	January 1, 1995
Massachusetts	Barnstable, Berkshire, Bristol, Dukes, Essex, Franklin, Hampden, Hampshire, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, Worcester	January 1, 1995
Missouri	St. Louis, St. Louis city, Franklin, Jefferson, St. Charles	June 1, 1999
New Hampshire	Hillsborough, Rockingham, Merrimack, Strafford	January 1, 1995
New Jersey	Atlantic, Cape May, Warren	January 1, 1995
New York	Dutchess, Essex (partial)	January 1, 1995
Rhode Island	Bristol, Kent, Newport, Providence, Washington	January 1, 1995
Texas	Collin, Dallas, Denton, Tarrant	January 1, 1995
Virginia	Charles City, Chesapeake, Chesterfield, Colonial Heights, Hampton, Hanover, Henrico, Hopewell, James City, Newport News, Norfolk, Poquoson, Portsmouth, Richmond, Suffolk, Virginia Beach, Williamsburg, York	January 1, 1995
Sources: http://www.epa.gov/otaq/rfg/whereyoulive.htm; http://www.eia.doe.gov/emeu/steo/pub/special/rfg2.html		

TABLE 4.16
RFG PROGRAM "OPT-OUT" AREAS

State	County	Start Date
Arizona	Phoenix, AZ nonattainment area, Maricopa (partial)	June 10, 1998
Maine	Hancock, Waldo	August 7, 1996
Maine	Androscoggin, Cumberland, Kennebec, Knox, Lincoln, Sagadahoc, York	Mar 10, 1999
Pennsylvania	Adams, Allegheny, Armstrong, Beaver, Berks, Blair, Butler, Cambria, Carbon, Columbia, Cumberland, dauphin, Erie, Fayette, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Mercer, Monroe, Northampton, Perry, Somerset, Washington, Westmoreland, Wyoming, York	August 7, 1996
New York	Albany, Erie, Greene, Jefferson, Montgomery, Niagara, Rensselear, Saratoga, Schenectady	August 7, 1996
Sources: http://www.epa.gov/otaq/rfg/whereyoulive.htm; http://www.eia.doe.gov/emeu/steo/pub/special/rfg2.html		

TABLE 4.17
RVP REQUIREMENTS

Areas	Program Start Date	Program End Date	Requirements
Jefferson (Birmingham), AL	December 1, 2000		RVP 7.0 June-Sept 15 (SIP)
Shelby, AL	December 1, 2000		RVP 7.0 June-Sept 15 (SIP)
Maricopa (partial), AZ	August 11, 1997		RVP 7.0 June-Sept 30 (SIP)
Adams (partial), CO	1992		RVP 7.8 June-Sept 15 (Federal) proposal for 2003 to 9.0
Arapahoe (partial), CO	1992		RVP 7.8 June-Sept 15 (Federal) proposal for 2003 to 9.0
Boulder (partial), CO	1992		RVP 7.8 June-Sept 15 (Federal) proposal for 2003 to 9.0
Denver, CO	1992		RVP 7.8 June-Sept 15 (Federal) proposal for 2003 to 9.0
Douglas, CO	1992		RVP 7.8 June-Sept 15 (Federal) proposal for 2003 to 9.0
Jefferson, CO	1992		RVP 7.8 June-Sept 15 (Federal) proposal for 2003 to 9.0
Broward, FL	1992		RVP 7.8 June-Sept 15 (Federal)
Dade, FL	1992		RVP 7.8 June-Sept 15 (Federal)
Duval, FL	1992		RVP 7.8 June-Sept 15 (Federal)
Hillsborough, FL	1992		RVP 7.8 June-Sept 15 (Federal)
Palm Beach, FL	1992		RVP 7.8 June-Sept 15 (Federal)
Pinellas, FL	1992		RVP 7.8 June-Sept 15 (Federal)
Atlanta, GA—(45 counties)	July 18, 2001		RVP 7.0 June-Sept 15 (SIP)
Madison, IL	May 22, 1995		RVP 7.2 June-Sept 15 (SIP)
Monroe, IL	May 22, 1995		RVP 7.2 June-Sept 15 (SIP)
St. Clair, IL	May 22, 1995		RVP 7.2 June-Sept 15 (SIP)
Clark, IN	April 9, 1996		RVP 7.8 June-Sept 15 (SIP)
Floyd, IN	April 9, 1996		RVP 7.8 June-Sept 15 (SIP)
Johnson, KS	March 15, 2002		RVP 7.0 June-Sept 15 (SIP)
	May 2, 1997	March 15, 2002	RVP 7.2 June-Sept 15 (SIP)
Wyandotte, KS	March 15, 2002		RVP 7.0 June-Sept 15 (SIP)
	May 2, 1997	March 15, 2002	RVP 7.2 June-Sept 15 (SIP)
Source: http://www.epa.gov/OTAQ/regs/fuels/420b05012.pdf			

TABLE 4.17
RVP REQUIREMENTS—CONTINUED

Areas	Program Start Date	Program End Date	Requirements
Beauregard, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Calcasieu, LA	1992		RVP 7.8 June-Sept 15 (Federal)
E Baton Rouge, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Grant, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Iberville, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Jefferson, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Lafayette, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Lafourche, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Livingston, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Orleans, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Point Coupee, LA	1992		RVP 7.8 June-Sept 15 (Federal)
St. Bernard, LA	1992		RVP 7.8 June-Sept 15 (Federal)
St. Charles, LA	1992		RVP 7.8 June-Sept 15 (Federal)
St. James, LA	1992		RVP 7.8 June-Sept 15 (Federal)
St. Mary, LA	1992		RVP 7.8 June-Sept 15 (Federal)
W Baton Rouge, LA	1992		RVP 7.8 June-Sept 15 (Federal)
Androscoggin, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
Cumberland, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
Kennebec, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
Knox, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
Source: http://www.epa.gov/OTAQ/regs/fuels/420b05012.pdf			

TABLE 4.17
RVP REQUIREMENTS—CONTINUED

Areas	Program Start Date	Program End Date	Requirements
Lincoln, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
Sagadahoc, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
York, ME	April 5, 2002		RVP 7.8 May-Sept 15 (SIP)
Livingston, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
Macomb, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
Monroe, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
Oakland, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
St. Clair, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
Washtenaw, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
Wayne, MI	May 5, 1997 (interim July 1, 1996)		RVP 7.8 June-Sept 15 (SIP)
Clay, MO	March 15, 2002		RVP 7.0 June-Sept 15 (SIP)
	May 26, 1998	March 15, 2002	RVP 7.2 June-Sept 15 (SIP)
Jackson, MO	March 15, 2002		RVP 7.0 June-Sept 15 (SIP)
	May 26, 1998	March 15, 2002	RVP 7.2 June-Sept 15 (SIP)
Platte, MO	March 15, 2002		RVP 7.0 June-Sept 15 (SIP)
	May 26, 1998	March 15, 2002	RVP 7.2 June-Sept 15 (SIP)
Davidson, NC	1992		RVP 7.8 June-Sept 15 (Federal)
Davie (partial), NC	1992		RVP 7.8 June-Sept 15 (Federal)
Durham, NC	1992		RVP 7.8 June-Sept 15 (Federal)
Forsyth, NC	1992		RVP 7.8 June-Sept 15 (Federal)

Source: http://www.epa.gov/OTAQ/regs/fuels/420b05012.pdf

TABLE 4.17
RVP REQUIREMENTS—CONTINUED

Areas	Program Start Date	Program End Date	Requirements
Gaston, NC	1992		RVP 7.8 June-Sept 15 (Federal)
Granville (partial), NC	1992		RVP 7.8 June-Sept 15 (Federal)
Guilford, NC	1992		RVP 7.8 June-Sept 15 (Federal)
Mecklenburg, NC	1992		RVP 7.8 June-Sept 15 (Federal)
Wake, NC	1992		RVP 7.8 June-Sept 15 (Federal)
Washoe, NV	1992		RVP 7.8 June-Sept 15 (Federal)
Clackamas, OR	1992		RVP 7.8 June-Sept 15 (Federal)
Multnomah, OR	1992		RVP 7.8 June-Sept 15 (Federal)
Washington, OR	1992		RVP 7.8 June-Sept 15 (Federal)
Marion (partial), OR	1992		RVP 7.8 June-Sept 15 (Federal)
Polk (partial), OR	1992		RVP 7.8 June-Sept 15 (Federal)
Allegheny, PA	June 18, 2001 (SIP on July 23, 1998)		RVP 7.8 June-Sept 15 (SIP)
Armstrong, PA	July 23, 1998		RVP 7.8 June-Sept 15 (SIP)
Beaver, PA	July 23, 1998		RVP 7.8 June-Sept 15 (SIP)
Butler, PA	July 23, 1998		RVP 7.8 June-Sept 15 (SIP)
Fayette, PA	July 23, 1998		RVP 7.8 June-Sept 15 (SIP)
Washington, PA	July 23, 1998		RVP 7.8 June-Sept 15 (SIP)
Westmoreland, PA	July 23, 1998		RVP 7.8 June-Sept 15 (SIP)
Davidson, TN	1992		RVP 7.8 June-Sept 15 (Federal)

Source: http://www.epa.gov/OTAQ/regs/fuels/420b05012.pdf

TABLE 4.17
RVP REQUIREMENTS—CONTINUED

Areas	Program Start Date	Program End Date	Requirements
Rutherford, TN	1992		RVP 7.8 June-Sept 15 (Federal)
Shelby, TN	1992		RVP 7.8 June-Sept 15 (Federal)
Williamson, TN	1992		RVP 7.8 June-Sept 15 (Federal)
Wilson, TN	1992		RVP 7.8 June-Sept 15 (Federal)
Eastern Texas, TX—95 counties	May 29, 2001		RVP 7.8 May-Oct 1 (SIP)
El Paso, TX	May 1, 1996		RVP 7.0 June-Sept 15 (Federal)
Hardin, TX	1992		RVP 7.8 June-Sept 15 (Federal)
Jefferson, TX	1992		RVP 7.8 June-Sept 15 (Federal)
Orange, TX	1992		RVP 7.8 June-Sept 15 (Federal)
David, UT	1992		RVP 7.8 June-Sept 15 (Federal)
Salt Lake, UT	1992		RVP 7.8 June-Sept 15 (Federal)
Source: http://www.epa.gov/OTAQ/regs/fuels/420b05012.pdf			

In February of 2006, the EPA amended its regulations on RFG. Prior EPA regulations required that oxygen constitute at least 2% of the weight of RFG. The new regulation removed this 2% oxygen content requirement nationwide. The EPA stated that this change in regulation will provide oil refiners with greater flexibility in producing clean-burning gasoline. The new regulation also revised their rules on combining volatile organic compound (VOC)-controlled RFG blended with ethanol with VOC-controlled RFG blended with other oxygenates and prohibits combining VOC-controlled RFG blended with ethanol with non-oxygenated VOC-controlled RFG, except in limited circumstances authorized by the Energy Policy Act of 2005.

Because of their lower quantities and specialized blends, such gasoline types are known as "boutique fuels." Figure 4.16 is a map of all the different types of gasoline used throughout the United States.

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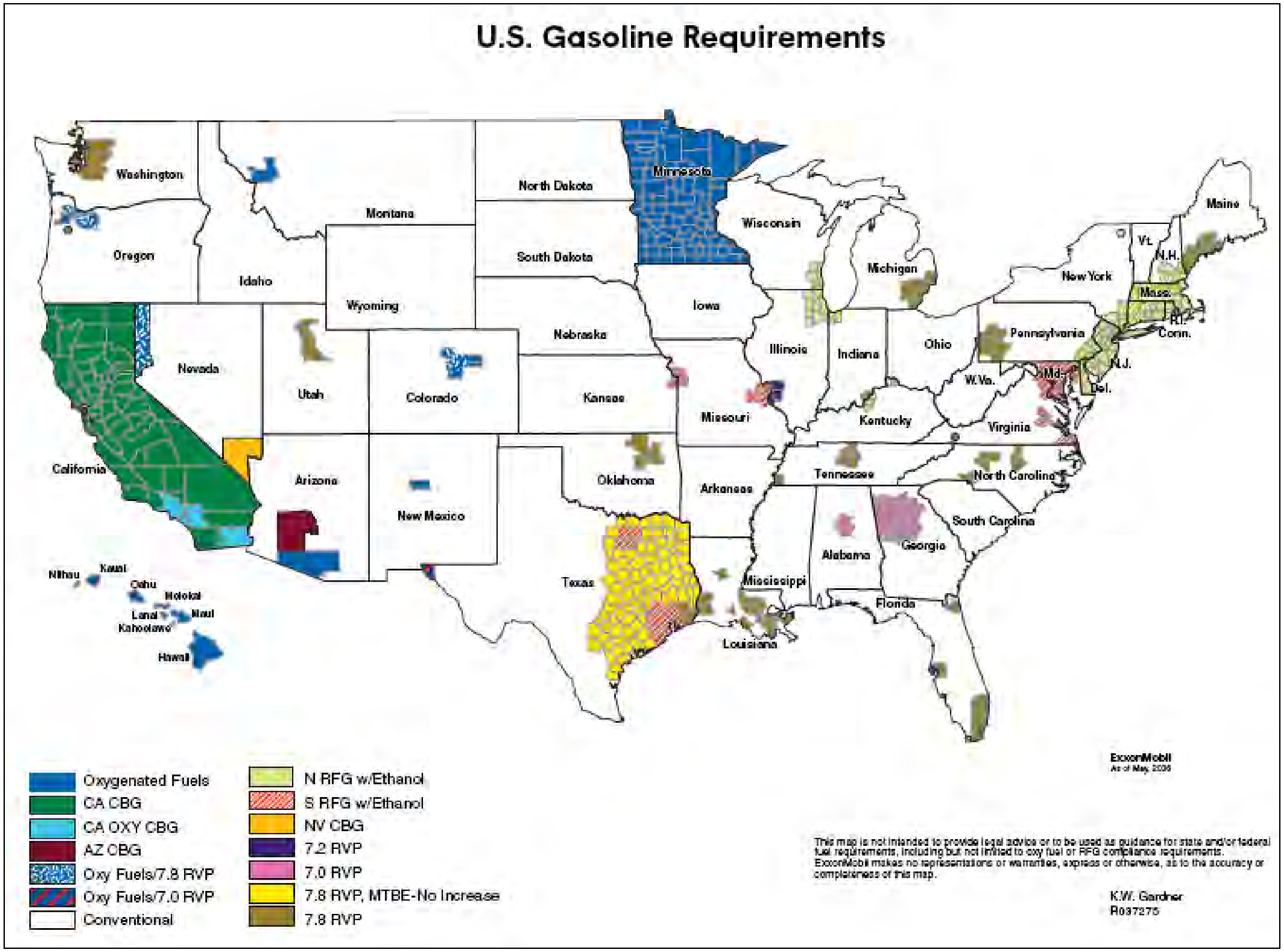
FIGURE 4.16



Source: www.npra.org/issues/fuels/state_bb/us_fuels_map.pdf

One concern with the proliferation of boutique fuels is that it makes areas using these fuels susceptible to price spikes due to a supply disruption. When a particular type of gasoline is produced in smaller quantities, there are presumably fewer refineries, pipelines, and barges that provide the fuel. If the production of one of these refineries or pipelines is disrupted, it could result in a strong spike in the price of a boutique gasoline since there are few options for quickly replacing the lost supply of gasoline. On the other hand, if it is not a boutique fuel and there are many refineries producing that type of gasoline, then a disruption to one refinery or pipeline would have a limited effect on gasoline prices as there are multiple options to replace supply. Additionally, because of the fewer number of participants along the supply chain, there could be a higher chance that suppliers would be able to exercise market power in locations with boutique fuels. The validity of these concerns, however, is not clear. In a report from June 2006, an EPA task force reported that under normal circumstances, boutique fuels do not present a problem for the distribution of gasoline, but that they can be more susceptible to disruptions in supply.[74] Other research has shown that boutique fuels raise prices both because of the increased cost of producing the fuel and the increased market power of those firms supplying it. It is difficult to estimate the equilibrium impact of more uniform gasoline content requirements. The resulting impact on prices depends not only on the increased fungibility of fuels across markets, but also on secondary market structure impacts of broadening the scope of regulation.[75] Boutique fuels also make it more difficult to transport gasoline from the refinery to the end-user. For example, since boutique fuels are used in smaller quantities, it is more difficult to transport them in pipelines where small batch sizes may be inefficient and there may be problems with boutique fuels mixing with other fuels.

Three types of gasoline are used in States: conventional, reformulated, and 7.8 RVP. Conventional gasoline is not a boutique fuel. RFG is a blend used throughout the east coast from Delaware to Massachusetts. Both the volume of RFG and the contiguous geographic area of its use serve as a buffer to any potential supply disruption and thus

[74] EPA, Report to the President, Task Force on Boutique Fuels, June 2006.

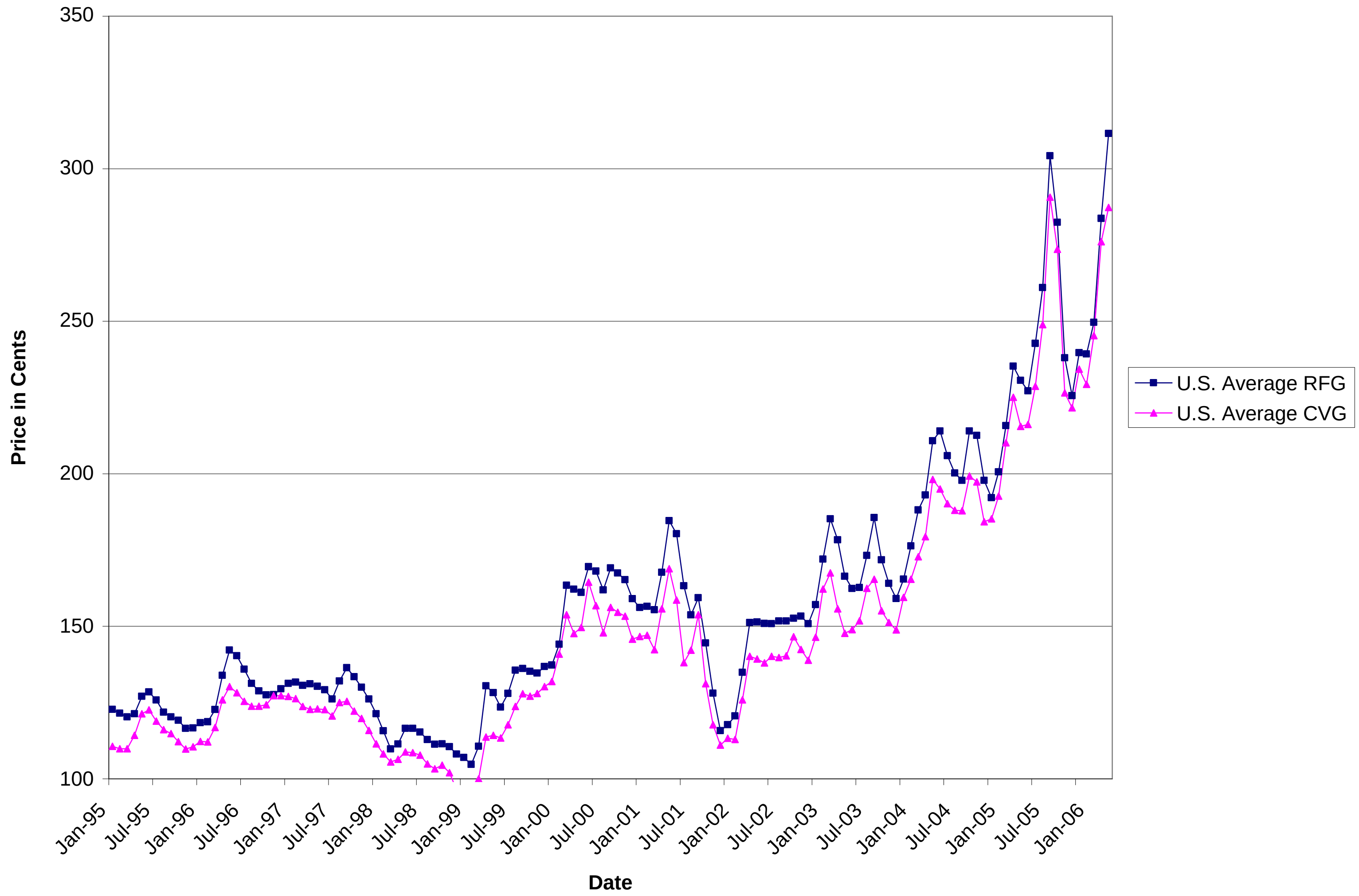
[75] Without data on firm-level entry, production, and distribution decisions, the secondary market impact of changes in gasoline content regulations are very difficult to estimate. These data are typically not publicly available. One study that was able to examine firm quantity responses was the FTC's report on the sharp increase in gasoline prices in the Midwest in the spring and summer of 2000. Using confidential firm data, the FTC found that "at least one firm increased its summer-grade RFG production substantially and, as a result, had excess supplies of RFG available and had additional capacity to produce even more RFG at the time of the price spike. It thus found itself with considerable market power in the short term. This firm did sell off some inventoried RFG, but acknowledged that it limited the magnitude of its response because it recognized that increasing supply to the market would push down prices and thereby reduce the profitability of its overall RFG sales." FTC, *Midwest Gasoline Price Investigation*, March 29, 2001. For other studies of the effect of content regulation on regional market structure and prices, see U. Chakravorty and C. Nauges. "Boutique Fuels and Market Power," Emory Economics 0511, Department of Economics, Emery University (Atlanta), 2005; E. Muehlegger. "The Role of Content Regulation in Pricing and Market Power in Regional Retail and Wholesale Gasoline Markets." CEEPR Working Paper WP-2002-008; J. Brown, J. Hastings, E. Mansur, and S. Billas-Boas. "Reformulating Competition? Gasoline Content Regulation and Wholesale Gasoline Prices." University of California CUDARE Working Paper No. 1010, January 8, 2007.

lower the risks associated with boutique fuels. Maine is the only New England state using 7.8 RVP gasoline, suggesting that it has a higher risk of suffering from supply disruptions. However, this risk is attenuated by the fact that 7.8 RVP is used in major cities across the country and that Maine's gasoline is supplied primarily by barge and trucks, both of which are easier to adapt to supply changes than pipelines.

Recently, the government has taken steps to reduce the number of boutique fuels and limit any potential problems they create. The Energy Policy Act of 2005 placed a cap on the number of allowed fuel blends nationwide. The EPA and Department of Energy are engaged in a "Fuel System Requirements Harmonization Study" that looks at both the economic and environmental effects of boutique fuels as well as the possibility of setting national or regional fuel types. Finally, the EPA may waive the fuel requirements in extraordinary circumstances, as it did in the aftermath of hurricanes Katrina and Rita.

Prices of reformulated and conventional gasoline. Figure 4.17 plots the average price of conventional and reformulated gasoline for the United States. From January 1995, when the EPA first mandated reformulated gasoline, to May 2006, the last month in these data, the price of reformulated gasoline was always above that of conventional gasoline. On average, the price of reformulated gasoline was about 10 cents per gallon above that of conventional gasoline. However, because the price of gasoline varies geographically and reformulated gasoline is required in a relatively few number of urban areas, it is premature to conclude that reformulated gasoline always adds 10 cents per gallon. In other words, reformulated gasoline, rather than being inherently more expensive than conventional, could simply be used in locations where gasoline would be more expensive regardless of type.

FIGURE 4.17
PRICE OF CONVENTIONAL AND REFORMULATED GASOLINE IN THE U.S.
JANUARY 1996 TO MAY 2006



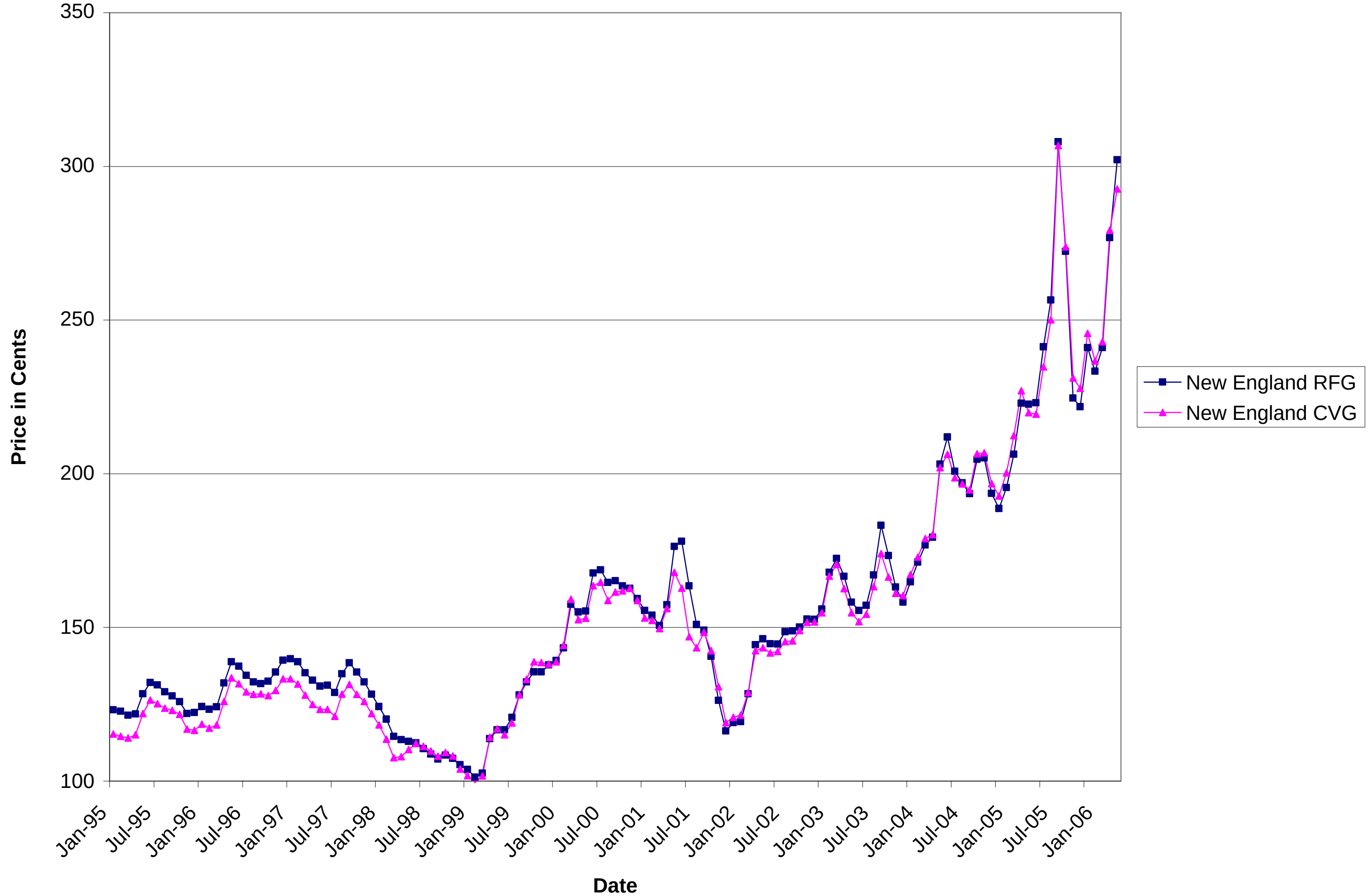
Source: Energy Information Administration, 2006.

When reformulated gasoline was first introduced, the EPA used an analysis of the costs of producing it to estimate that prices for reformulated gasoline would be three to five cents higher than conventional.[76] In 1997, a Lundberg survey concluded that the price of reformulated gasoline was three cents higher than conventional. A more stringent reformulated gasoline was introduced in 2000, and the EPA estimated that it would raise the cost of reformulated gasoline one to two cents above the previous version of reformulated gasoline.

Figure 4.18 shows the average price of reformulated and conventional gasoline for New England from January 1995 to May 2006. Here, the price difference between the two gasoline types is much smaller than it was for the nation as a whole. In fact, about 30% of the time, conventional gasoline was more expensive than reformulated gasoline. Across the entire time period, reformulated gasoline was on average 2.5 cents more expensive than conventional. The fact that this price difference is so much smaller than it is for the United States as a whole does suggest that geography differences were driving much of the ten cent average price difference between gasoline types for the U.S. But again, the same issues regarding regional variations in gasoline prices exist within New England; the observed price difference between conventional and reformulated gasoline could be decreased by the fact that conventional gasoline is used in rural areas of New England where the costs of distribution are higher, for example.

[76] It is not clear if this estimate was for average (including fixed costs) or marginal costs.

FIGURE 4.18
PRICE OF CONVENTIONAL AND REFORMULATED GASOLINE IN NEW ENGLAND
JANUARY 1996 TO MAY 2006



Source: Energy Information Administration, 2006.

b. Regulation of retail gasoline markets

i. Minimum mark-up and sales-below-costs laws

One type of local regulation that affects retail gasoline markets in the states is Minimum Mark-up Laws. Minimum mark-up laws and sales-below-cost laws are often passed in retail industries in an effort to prevent predatory pricing. They often affect gasoline retailers and stipulate that retailers must charge a minimum mark-up over their variable costs or face a fine. Predatory pricing occurs when a large firm sells a product at a loss either to drive smaller competitors out of the market or to create a barrier to entry that keeps potential competitors from entering the market. If a firm is successful in driving a competitor out of the market, then it can potentially raise prices above what they would have otherwise been. But, the ability to raise prices after driving a competitor out of the market is constrained not only by the competitors remaining in the market, but also by the ease with which potential competitors can enter the market. Ultimately, a predatory strategy is only profitable if the market power gained in the long run by driving out the competitor enables the firm to raise prices to a level sufficiently high that it can recoup the short-term losses incurred from the predatory prices.[77]

The practice of predatory pricing is deemed anti-competitive and is illegal under federal antitrust laws. Most economists agree that predatory pricing is rarely practiced. To be successful, a predatory firm must take on an enormous amount of risk. While the firm knows that it will lose money in the short-run, it does not know beforehand just how much it will be able to charge once it has driven any competitors out of business. In other words, the short-term losses are known but the long term gains are speculative. Also, it may take a long time for a competitor to go out of business and when it does, another company may simply buy it out, resulting in no gain in market power for the predatory firm.

In addition, it is difficult to determine when predatory pricing is being practiced. The short-term effect is lower prices, but there could be a number of reasons for a firm to reduce prices. Perhaps the firm is lowering prices in response to increased competition or perhaps it is operating more efficiently and has lowered its costs. Both of these reasons, while not favorable for the firm's competitors, are favorable to consumers. Deciding whether the lower prices are due to legitimate competition or to predation is difficult for a regulator, who typically has only limited information about the competitive structure of the market and each firm's cost. A liberal enforcement of laws prohibiting predatory pricing is therefore likely to interfere at times with a truly competitive market, thus harming consumers for whom the laws were intended to protect.

At the state level, many legislatures have passed laws that purport to avert predatory pricing by banning firms from pricing products below cost. Such statutes are known as "sales-below-cost" (SBC) laws. Many SBC laws are generic in nature while others are

[77] The Federal Trade Commission recently prepared a detailed discussion of the purpose and usefulness of predatory pricing in the retail gasoline market. See: http://www.ftc.gov/be/V020011.htm

designed specifically to address pricing concerns of certain industries, such as gasoline. Currently, twenty-four states have general SBC laws[78] and twelve have SBC laws pertaining specifically to fuel retailers.[79]

One problem with SBC laws is that the retailer's costs are difficult to determine or unknown entirely. Without knowing a firm's production cost, a regulator cannot judge whether the firm is engaging in below-cost pricing. As a result, many gasoline-specific SBC laws explicitly state how the cost to the retailer is to be estimated. Alabama and Massachusetts, for example, conduct surveys to find the average cost for the grade and quality of the gasoline in the region while Maryland uses the cost estimates from the Oil Price Information Service ("OPIS"). Other states use invoice costs, replacement costs, or published list prices. The states with gasoline-specific SBC laws and the date the laws were enacted are listed in Table 4.18.

[78] States with general SBC laws are Arkansas, California, Colorado, Hawaii, Idaho, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Montana, Nebraska, North Carolina, North Dakota, Oklahoma, Rhode Island, South Carolina, Tennessee, Utah, Washington, West Virginia, Wisconsin, and Wyoming.

[79] States with SBC laws pertaining specifically to motor fuel retailers are Alabama, Florida, Maryland, Massachusetts, Minnesota, Missouri, New Jersey, New York, and North Carolina. Tennessee has an SBC law that pertains to motor fuel wholesalers, but not retailers.

TABLE 4.18
STATES WITH GASOLINE-SPECIFIC SBC LAWS[80]

State	Act Name	Date of Enactment	Amendments
Alabama	Motor Fuel Marketing Act	May 8, 1984	
Florida	Motor Fuels Marketing Practices Act	60 days after May 31, 1985	1987, 1989, 1991
Maryland	Sale of motor fuel below cost prohibited	October 1, 2001	
Massachusetts	Motor Fuels Sales Act	1950	
Minnesota	Unlawful gasoline sales	August 2001	
Missouri	Missouri Motor Fuel Marketing Act	August 28, 1993	
New Jersey	Unfair Motor Fuels Practices Act	July 1, 1954	
New York	Motor Fuels Marketing Practices Act	May 5, 2003	November 7, 2004
North Carolina	Motor Fuel Marketing Act	September 1, 1986	
South Carolina	Unfair Trade Practices Act	60 days after June 15, 1993	
Utah	Motor Fuel Marketing Act	March 16, 1987	
Wisconsin	Unfair Sales Act	June 3, 1939	1973, 1987, 1992, 1998

Minnesota and Wisconsin are the only states with laws containing "minimum markup" provisions, which stipulate that companies set retail prices a certain percentage above wholesale prices. Minnesota requires that all retailers maintain margins of at least 6% while Wisconsin's minimum markup is 9.18% for most retailers.[81] The Wisconsin law recently received some press attention when, on August 8, 2006, Governor James Doyle announced that he would not enforce the minimum markup law for retailers selling gasoline blended with ethanol. The announcement was in response to news that the state Department of Agriculture, Trade and Consumer Protection was investigating complaints that an ethanol-based gasoline retailer was underselling its product. The Wisconsin minimum markup applies to "motor vehicle fuel," which includes ethanol-based motor fuel.

[80] The sources used to compile the enactment dates include various news sources as well as M. Skidmore, J. Peltier, and J. Alm, "Do State Motor Fuel Sales-Below-Cost Laws Raise Prices?," *Journal of Urban Economics*, January 2005. Information as to the names and specifics of the Acts was gathered from the state statutes themselves.

[81] As outlined in Wisconsin's Unfair Sales Act, a retailer who is also a wholesaler must mark up 9.18%, a retailer who is not a wholesaler must mark up 6%, and a retailer who is not a wholesaler and who is not selling gas from a "retail station" must mark up 3%.

Other states have had gasoline-specific SBC laws that were later repealed. Arkansas enacted a law in 1993, but it was ruled unconstitutional and repealed less than three years later. Georgia also had an SBC law for a brief period in the 1980s. Montana repealed its Retail Motor Fuel Marketing Act in 1999. Maryland may soon follow suit as there are currently bills in both the House and the Senate to repeal its gasoline-specific SBC law. Yet, if Maryland were to repeal its law, predatory pricing would still be illegal under the Sales Below Cost Act, the state's general SBC law.

Summary of SBC laws in the States:

Maine: While Maine does not have a gasoline-specific SBC law, the Unfair Sales Act outlaws predatory pricing for all industries. The Maine law, however, is rarely enforced. The Attorney General has typically taken the position that below-cost pricing does not necessarily correspond to predatory pricing and that aggressive enforcement of the Act could hurt competition and raise prices to consumers.[82]

Massachusetts: Massachusetts has a gasoline-specific law that was enacted in 1950, making the state second only to Wisconsin in the number of years a gasoline-specific SBC law has been in place. The law, known as the Motor Fuel Sales Act, bans pricing retail motor fuel at below-cost levels with the intent to lessen competition. The Act contains no minimum markup provision. Instead, the cost to the retailer is estimated in a survey conducted by an independent agency. Exceptions are made for clearance sales and when the "motor fuel is sold in good faith to meet the price of a competitor." Massachusetts also has a general SBC law that forbids retailers from selling any retail item below cost with the "intent to injure competitors or destroy competition."

New Hampshire: New Hampshire does not have any SBC laws.

New York: New York does not have any general SBC laws but the state recently enacted a gasoline-specific law. The New York Motor Fuel Marketing Practices Act went into effect in 2003 and was amended in 2004. The Act originally stipulated that gasoline retailers price their motor fuel at a level greater than or equal to 98% of the cost. The amendment changed this figure to 95%.[83]

Vermont: Vermont does not have any SBC laws.

Empirical findings on the effects of SBC laws. If SBC laws were effectively preventing predatory pricing practices, one would expect, in the long run, prices to be lower and the market to be less concentrated. A recent study conducted by Mark Skidmore, James Petier, and James Alm found that after an initial jump in price of about 0.6 cents, five years after they are enacted, SBC laws lowered the average price of retail gasoline by

[82] The Unfair Pricing Act is outlined in Chapter 30 of the Maine's Consumer Law Guide. http://www.maine.gov/ag/?r=clg&s=chap30

[83] New York's Motor Fuel Marketing Practices Act and corresponding Amendment can be found at http://www.nymfmpa.gov.

about 1 cent. The study also found that there were 4.7% more retail outlets.[84] Most empirical studies, however, have not found beneficial effects of SBC laws. For example, using information on the number of retail outlets from the Census Bureau, another study found that SBC laws did not increase the number of retailers, and in particular, did not keep the number of small retailers from declining. The study argues that SBC laws mostly protect inefficient businesses.[85] Studies by Anderson et al.[86] and Clarke et al.[87] report similar findings.

ii. Divorcement laws

As discussed above, in addition to selling their gasoline through dealers and jobbers, some integrated oil companies such as ExxonMobil, Sunoco, and BP own and operate retail gasoline stations. When it owns and operates the retail outlet, the refiner directly sets the retail price. In contrast, when the refiner sells the same gasoline through a lessee-dealer, the lessee dealer is responsible for determining the retail price. Divorcement laws prohibit refiner-marketers from owning and operating retail stations, forcing them instead to lease the stations they own to lessee-dealers. Legislative divorcement proposals are often put forward based on concerns that refiner participation in the retail market may exert upward pressure on retail prices. There are two primary arguments that have been used to support this claim. First, when setting the price at each station, the refiner incorporates the effect one station's price has on its other station's prices. In other words, if a refiner lowers a price at station A, that can hurt its own profits at station B. Since the refiner maximizes the *joint* profits at all of its stations, it will choose a higher price than it would if it maximized the *independent* profits of all of its stations. The lessee dealer, leasing on only one station maximizes the *independent* profit for her station. She does not take into account the loss of sales at the refiner's other stations when setting her price. In markets with moderate retail concentration (where any individual refiner likely has stations that compete with each other) the difference between the price that maximizes *joint* profits and the one that maximizes *individual* profits may be significant. By forcing refiners to relinquish price-setting control to individual lessee-dealers, average prices might then fall. However, if refiners can exert significant influence over lessee-dealers' prices using DTW's that can vary by station and volume stipulations in lease agreements, then this proposed benefit of divorcement may be non-existent.

84 M. Skidmore, J. Peltier, and J. Alm. "Do State Motor Fuel Sales-Below-Cost Laws Raise Prices?" *Journal of Urban Economics*, January 2005.

85 R. Johnson. "The Impact Of Sales-Below-Cost Laws On The U.S. Retail Gasoline Market." Report Prepared for Industry Canada, Competition Bureau, February 1999.

86 R. Anderson and R. Johnson. "Antitrust and Sales-Below-Cost Laws: The Case of Retail Gasoline." *Review of Industrial Organization,* 1999.

87 D. Clarke and S. Crane. "The Effects of Sales-Below-Cost and Minimum Markup Laws on Retail Gasoline Prices and Retail Gasoline Price Margins." Research Report prepared for the Coalition for Lower Gs Prices, 2003.

A second reason for divorcement legislation arises from the concern that integrated refiners could discriminate in the wholesale gasoline prices charged to dealer-owned stations and lessee dealers relative to the (implicit) price charged to company owned-and-operated stores. If this were the case, then the refiner could possibly disadvantage dealers' retail stations in favor of its wholly owned stations. This could adversely affect the level of competition in the market for retail gasoline and possibly lead to higher prices to the consumer. This concern may not be well founded. At a theoretical level, it is difficult to see why a refiner would want to harm a dealer-owned station that sells its gasoline. The company earns profits on the gasoline the dealer-owned station sells, and the dealer-owned station could switch refiner-suppliers in most cases. Moreover, company-operated stores in many markets are constrained as much by the surrounding competition from various brands as they are constrained by a jobber selling their branded gasoline. A refiner might find it more profitable to own a store rather than selling gasoline to a dealer-owned station only if it can run the store more efficiently than the dealer could. But if this were the case, the company-operated store could threaten the dealer's business with or without discriminatory pricing, and because of the competitiveness of the market as a whole, efficiencies at the company owned store would tend to be passed down to consumers. Across all retail sectors of the economy, company-operated stores sit next to franchised or third-party owned stores without much concern of discriminatory and predatory pricing on the part of the company.[88]

Nevertheless, due to concerns that company-operated stations lead to higher retail prices, six states and the District of Columbia have enacted "divorcement laws." The six states are Connecticut, Delaware, Hawaii, Maryland, Nevada, and Virginia. Most other states have considered such laws. Though the details of these laws can vary from state to state, the primary purpose is to limit the number of retail gasoline stations that can be owned and operated by the integrated refiners. At an empirical level, studies of the effect of these laws on the retail gasoline market suggest that they harm the retail markets more then help them, with divorcement laws actually raising the price of gasoline. One study found that state divorcement laws tend to increase retail gasoline prices by an average of 2.6 cents per gallon.[89] A study of Maryland's divorcement law found that it raised prices between 1.4 and 1.7 cents per gallon for self-serve, and 5 to 7 cents per gallon for full-serve.[90] The annual cost of divorcement laws, if enacted nationwide, could exceed $1 billion according to one study and $2.5 billion to another.[91] One possible explanation for

[88] For example, "outlet malls" are mostly company-owned stores, and those companies generally sell their products as well in stores they do not own, e.g., Levi's has its own outlet stores and also sells through department stores. Many retail outlets, including fast food restaurants and car dealerships, use a mix of franchise and company-owned stores.

[89] Michael G. Vita, "Regulatory Restrictions on Vertical Integration and Control: The Competitive Impact of Gasoline Divorcement Policies," *Journal of Regulatory Economics*, Vol. 18, pp. 217-233 (2000).

[90] John M. Barron and John R. Umbeck, "The Effect of Different Contractual Arrangements: The Case of Retail Gasoline Markets," *Journal of Law and Economics,* Vol. 27, pp. 313-328 (1984).

[91] Asher A. Blass and Dennis W. Carlton, "The Choice of Organizational Form in Gasoline Retailing and the Cost of Laws that Limit that Choice," *Journal of Law and Economics*, Vol. 44, p. 511-524 (2001).

the increase in retail gasoline prices after divorcement is "double marginalization." If a refiner owns retail stations and holds market power, separating the refiner from the retail station could create a situation where the refiner retains market power in the wholesale gasoline market, and the new owners of the retail stations still have market power in the retail market. After divorcement, gasoline passes through two companies with market power on its way to the end user instead of just the one company pre-divorcement. This can lead to higher prices. Empirically, it seems divorcement laws harm consumers overall.[92]

iii. Zone pricing, wholesale price discrimination and the Robinson-Patman Act

As described earlier, many stations pay a station-specific wholesale price for gasoline. This DTW price can vary from station to station, allowing refiners to price discriminate between retail stations. Often, retail gasoline stations are placed in geographic zones, which can vary in size and in the limit contain only one station. The refiner then sets the DTW price by zone for each day. This is referred to as "zone pricing," and is a form of price discrimination practiced by gasoline refiners. A price zone is often defined for a set of gas stations of the same brand in the same geographic region that face the similar competitive factors. Because the price differentiation reflects competitive factors, and not just transportation costs, many contend that the practice is anticompetitive. However, price discrimination occurs in many markets, and it is not clear it harms consumers. For example, movie theaters, national parks, Amtrak, and many other locations offer discounts to seniors. This is price discrimination based on age. But were such discrimination to be prohibited, discounts would not be available to seniors and the average price paid by consumers could increase.

There have been several occasions where, because of zone pricing, gasoline refiners have been accused of violating the Robinson-Patman Act.[93] For a transaction to be in violation of the Robinson-Patman Act, the following conditions must be met:

- there must be sales to two or more buyers from a single seller;
- the buyers must be paying different prices;
- the sales must involve "commodities;"
- the commodities must be of like grade and quantity; and
- the effect of the price discrimination must injure competition.

[92] There may be other, non-economic reasons to support divorcement laws. As the former Attorney General of Hawaii said, "If the better policy favors the protection of independent dealers from competition even at the cost of higher prices to the public and perhaps inefficiency in the market, divorcement is appropriate. If the better policy is to promote competition, efficiency in marketing, and lower consumer prices, divorcement should be rejected." (Quoted at http://www.hawaii.gov/lrb/rpts95/petro/pet15.html.) Hawaii later enacted a divorcement law.

[93] Act of June 19, 1936, 15 U.S.C. §§ 13-13b, 21a (2000).

Under the Act, not only can the seller face penalties, but the buyer who was given the reduced price may also be held accountable, as it is illegal for any person "knowingly to induce or receive a discrimination in price."[94] The Act also makes an effort to ensure that wholesalers do not circumvent the law by offering discounts or services to one retailer and not another. Price discrimination may not necessarily be due to differences in the direct selling price, but can also occur indirectly via commission, brokerage, or other allowances.

Those accused of violating Robinson-Patman Act frequently mount the following defenses: (1) the difference in prices reflects a difference in costs; (2) one price was lowered to match the price of a competitor; or (3) no injury to competition resulted from the difference in prices. The Act does make an exception for prices that have been lowered in "good faith to meet an equally low price of a competitor."[95] In practice, however, the third defense is often the make or break point as it is frequently difficult to prove that the price discrimination negatively affected competition.

A prominent Supreme Court case that considered a Robinson-Patman Act claim in the context of the retail gasoline industry is *Texaco Inc. v. Hasbrouck et al.* In that case, several small retailers sued Texaco for violating the Robinson-Patman Act.[96] The plaintiffs alleged that two retailers, Gull and Dumpier, were offered lower prices and more favorable discounts than the plaintiffs. Texaco argued its case on a number of fronts, the most notable being that (1) the price differences reflected differences in functions between the retailers and (2) the price differences did not injure competition. The Supreme Court rejected Texaco's arguments and ruled in favor of the plaintiffs. The Court found that Gull and Dumpier performed no marketing or promotional functions that justified the lower price. In addition, because Gull and Dumpier did not perform additional functions, and because the prices did not reflect a difference in costs, the Court found that the price discrimination did in fact injure competition. As a result of the ruling Texaco was ordered to adjust its pricing scheme and pay damages.

Some states have proposed "branded open supply" laws to prevent the practice of zone pricing. Such laws typically prohibit refiners from restricting where lessee retailers purchase gasoline. While open supply laws do not directly prohibit zone pricing, they render the practice not-profitable by creating an arbitrage situation for retailers. Under zone pricing, the lessee retailer has a contract with the refiner to only purchase the gasoline of that refiner. In the absence of this restriction, the retailer in a high-price zone could choose instead to purchase gasoline through a jobber at the (lower) rack price. However, retailers are still constrained to purchase gasoline solely from their respective branded upstream refiner. Thus, while prices in high-priced zones might fall, there will likely be a corresponding increase in prices in low-price zones, leading to ambiguous

[94] Clayton Act, § 2(f).

[95] Clayton Act, § 2(a).

[96] 110 S. Ct. 2535, *Texaco Inc. v. Hasbrouck et al.* (1990).

overall effects on wholesale and retail prices.[97] New York is the only state out of the States to have enacted some form of uniform wholesale pricing law. The law indicates that at each level of the distribution chain and within the same geographic market, a seller cannot price its fuel at less than 95% of the price that it charges any other customer at that time. Similarly, any rebates, subsidies, or concessions that a seller offers a buyer must be available to all buyers under proportionately equal terms.[98]

[97] Michael C. Keeley and Kenneth G. Elzinga (2003), "Uniform Gasoline Price Regulation: Consequences for Consumer Welfare," *International Journal of the Economics of Business*, vol. 10, pp. 157-168.

[98] New York State Motor Fuel Marketing Practices Act, November 7, 2004.

V. Retail Home Heating Oil Markets

A. *Retail home heating oil market structure*

Heating oil dealers. For most home heating options, such as natural gas or electricity, homeowners typically have very few suppliers to choose from, and often only one. In contrast, consumers buying heating oil can generally choose between many possible suppliers. Table 5.1 shows the number of businesses in each of the five states that sell heating oil to end-users.

Table 5.1
Heating Oil Dealers, Direct Selling

State	Establishments	Sales ($1,000)	Sales % of U.S.	Annual Payroll ($1,000)	Paid Employees
Maine	260	774,307	5.43	82,694	2,956
Massachusetts	527	1,189,735	8.34	199,599	5,175
New Hampshire	122	444,910	3.12	65,384	1,837
New York	788	2,693,803	18.89	375,123	9,666
Vermont	79	263,622	1.85	33,850	1,010
Five State Total	**1,776**	**5,366,377**	**37.63**	**756,650**	**20,644**
United States	**4,672**	**14,259,058**	**100.00**	**1,708,778**	**50,109**

Source: U.S. Census Bureau, County Business Patterns, 2002

As suggested by this table, heating oil dealers are on average relatively small. In the five states, there are about ten employees for every dealer. Simple Internet searches confirm that consumers can choose between many heating oil dealers. For example, a yellow-pages search for dealers in Cambridge, Massachusetts found 16 dealers. The same search for Portland, Maine found 22 dealers. In Westchester County, New York, a government survey lists 40 dealers who provide heating oil somewhere in the county. Rural areas would of course have fewer options.

That heating oil dealers tend to be small is confirmed in Tables 5.2 through 5.7. For each of the five states, these tables show the number of dealers in each county broken out by the number of employees. For example, in Somerset County, Maine, there are a total of 11 heating oil dealers. One of these dealers has between one and four employees; seven have between five and nine, and three have between ten and 19.[99] In all of Maine, there are 96 dealers that have between one and four employees, which imply that there are between 96 and 384 (4 * 96) employees working for dealers of this size. Similarly, there are between 400 and 720 employees working for dealers that have between five and nine employees; between 480 and 912 for dealers that have between 10 and 19; between 900 and 2,205 for dealers that have between 20 and 49; and between 250 and 495 for dealers

[99] The Census Bureau only reports the number of companies for the ranges shown in the table.

that have between 50 and 99. Thus, while 64% of the heating oil dealers have less than ten employees, only 28% to 35% of employees work for employers that have less than ten employees. The tables for the other states are interpreted in the same way, and they show similar distributions of size.

As a point of reference, Table 5.7 shows the size distribution of heating oil dealers each state. The table suggests that for the most part, a majority of the heating oil dealers in each state have less than ten employees.

TABLE 5.2
NUMBER OF HEATING OIL DEALERS IN MAINE, BY COUNTY

County	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class						
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499
Androscoggin	100-249	0	0	18	5	5	4	4	0	0	0
Aroostook	230	1,527	5,820	16	2	3	7	4	0	0	0
Cumberland	647	5,576	21,886	43	17	8	7	9	2	0	0
Franklin	95	586	2,254	10	4	4	0	2	0	0	0
Hancock	156	1,214	5,069	18	9	4	2	3	0	0	0
Kennebec	250-499	0	0	23	8	5	4	6	0	0	0
Knox	75	605	2,227	11	7	2	1	1	0	0	0
Lincoln	78	472	2,241	6	2	3	0	0	1	0	0
Oxford	20-99	0	0	10	1	5	3	1	0	0	0
Penobscot	250-499	0	0	34	13	14	4	1	2	0	0
Piscataquis	100-249	0	0	10	3	4	1	2	0	0	0
Sagadahoc	20-99	0	0	4	1	3	0	0	0	0	0
Somerset	85	581	2,256	11	1	7	3	0	0	0	0
Waldo	89	696	2,502	14	8	3	3	0	0	0	0
Washington	100-249	0	0	12	4	3	1	4	0	0	0
York	424	3,523	14,091	34	11	7	8	8	0	0	0
Total Maine	**3,158**	**24,761**	**97,835**	**274**	**96**	**80**	**48**	**45**	**5**	**0**	**0**

Source: U.S. Census Bureau, County Business Patterns, 2004. Values for "Number of Employees" that are ranges or Payroll values of zero indicate the Census Bureau withheld information to protect companies' anonymity.

TABLE 5.3
NUMBER OF HEATING OIL DEALERS IN MASSACHUSETTS, BY COUNTY

County	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class						
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499
Barnstable	224	2,308	8,587	20	3	7	6	4	0	0	0
Berkshire	175	1,668	6,681	19	6	5	7	1	0	0	0
Bristol	325	3,232	12,350	43	19	15	5	3	1	0	0
Essex	429	4,219	16,781	56	26	16	10	3	1	0	0
Franklin	20-99	0	0	5	1	0	1	3	0	0	0
Hampden	373	3,705	13,657	37	14	10	7	5	1	0	0
Hampshire	100-249	0	0	10	1	3	5	1	0	0	0
Middlesex	1,000-2,499	0	0	108	43	34	20	7	4	0	0
Norfolk	822	10,448	42,413	63	23	14	17	7	1	1	0
Plymouth	268	2,887	11,150	39	16	12	10	1	0	0	0
Suffolk	500-999	0	0	32	13	6	5	4	2	2	0
Worcester	723	7,400	28,931	64	17	18	19	10	0	0	0
Total Massachusetts	**5,276**	**59,382**	**229,456**	**496**	**182**	**140**	**112**	**49**	**10**	**3**	**0**

Source: U.S. Census Bureau, County Business Patterns, 2004. Values for “Number of Employees” that are ranges or “Payroll” values of zero indicate the Census Bureau withheld information to protect companies’ anonymity.

TABLE 5.4
NUMBER OF HEATING OIL DEALERS IN NEW HAMPSHIRE, BY COUNTY

County	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class						
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499
Belknap	100-249	0	0	4	0	2	1	0	1	0	0
Carroll	56	548	2,372	5	1	1	3	0	0	0	0
Cheshire	100-249	0	0	9	0	4	2	3	0	0	0
Coos	100-249	0	0	8	1	1	5	1	0	0	0
Grafton	181	1,855	7,560	11	4	2	1	3	1	0	0
Hillsborough	557	6,332	21,493	18	3	3	2	8	0	2	0
Merrimack	204	1,828	7,856	15	3	3	8	0	1	0	0
Rockingham	270	2,404	10,344	27	11	4	8	4	0	0	0
Strafford	100-249	0	0	11	2	4	3	2	0	0	0
Sullivan	20-99	0	0	8	2	2	3	1	0	0	0
Total New Hampshire	**1,883**	**18,610**	**74,194**	**116**	**27**	**26**	**36**	**22**	**3**	**2**	**0**

Source: U.S. Census Bureau, County Business Patterns, 2004. Values for "Number of Employees" that are ranges or "Payroll" values of zero indicate the Census Bureau withheld information to protect companies' anonymity.

TABLE 5.5
NUMBER OF HEATING OIL DEALERS IN NEW YORK, BY COUNTY

County	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class							
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999
Albany	182	1,547	6,246	10	3	4	1	0	2	0	0	0
Allegany	20-99	0	0	2	1	0	0	1	0	0	0	0
Bronx	100-249	0	0	29	13	7	4	5	0	0	0	0
Broome	61	436	1,668	3	0	1	1	1	0	0	0	0
Cattaraugus	20-99	0	0	2	0	0	0	2	0	0	0	0
Cayuga	37	263	962	5	3	0	1	1	0	0	0	0
Chautauqua	20-99	0	0	3	1	0	2	0	0	0	0	0
Chemung	0-19	0	0	1	0	1	0	0	0	0	0	0
Chenango	79	555	2,195	7	3	2	1	1	0	0	0	0
Clinton	20-99	0	0	4	2	0	2	0	0	0	0	0
Columbia	134	1,054	4,007	13	2	7	3	1	0	0	0	0
Cortland	20-99	0	0	3	0	2	1	0	0	0	0	0
Delaware	71	480	2,015	11	6	3	1	1	0	0	0	0
Dutchess	417	4,581	15,836	23	12	5	3	1	1	1	0	0
Erie	22	143	608	3	1	1	1	0	0	0	0	0
Essex	20-99	0	0	10	3	4	3	0	0	0	0	0
Franklin	110	760	3,096	12	6	2	3	1	0	0	0	0
Fulton	34	289	1,066	6	4	1	0	1	0	0	0	0
Genesee	20-99	0	0	2	0	1	0	1	0	0	0	0
Greene	20-99	0	0	8	5	1	1	0	1	0	0	0
Hamilton	0-19	0	0	1	1	0	0	0	0	0	0	0
Herkimer	20-99	0	0	4	2	1	1	0	0	0	0	0
Jefferson	20-99	0	0	5	1	1	2	1	0	0	0	0

TABLE 5.5
NUMBER OF HEATING OIL DEALERS IN NEW YORK, BY COUNTY—CONTINUED

County	Number of Employees	Payroll ($1,000) 1st Quarter	Payroll ($1,000) Annual	Total Dealers	1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999
Kings	500-999	0	0	61	35	9	7	5	5	0	0	0
Lewis	20-99	0	0	3	0	1	2	0	0	0	0	0
Livingston	20-99	0	0	3	2	0	0	1	0	0	0	0
Madison	20-99	0	0	4	2	1	1	0	0	0	0	0
Monroe	0-19	0	0	3	2	1	0	0	0	0	0	0
Montgomery	0-19	0	0	3	1	1	1	0	0	0	0	0
Nassau	1,929	25,765	93,671	70	31	13	12	6	3	4	0	1
New York	64	735	3,144	7	4	0	2	1	0	0	0	0
Niagara	70	475	1,967	4	1	0	1	2	0	0	0	0
Oneida	20-99	0	0	13	10	1	2	0	0	0	0	0
Onondaga	20-99	0	0	6	2	3	1	0	0	0	0	0
Orange	243	2,489	9,775	21	8	7	3	1	2	0	0	0
Orleans	20-99	0	0	2	0	1	1	0	0	0	0	0
Oswego	20-99	0	0	3	1	1	1	0	0	0	0	0
Otsego	60	551	2,113	7	2	2	3	0	0	0	0	0
Putnam	91	948	3,623	14	8	2	3	1	0	0	0	0
Queens	530	7,935	26,684	29	12	3	9	2	2	1	0	0
Rensselaer	100-249	0	0	13	3	4	3	3	0	0	0	0
Richmond	20-99	0	0	9	5	0	2	2	0	0	0	0
St. Lawrence	131	725	2,822	10	4	2	2	1	1	0	0	0
Saratoga	100-249	0	0	11	6	1	3	1	0	0	0	0
Schenectady	63	538	2,271	10	7	2	0	1	0	0	0	0
Schoharie	31	299	1,144	5	1	3	1	0	0	0	0	0
Schuyler	20-99	0	0	2	0	1	1	0	0	0	0	0

TABLE 5.5
NUMBER OF HEATING OIL DEALERS IN NEW YORK, BY COUNTY—CONTINUED

County	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class							
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999
Seneca	0-19	0	0	1	0	0	1	0	0	0	0	0
Steuben	0-19	0	0	2	1	0	1	0	0	0	0	0
Suffolk	1,488	15,972	58,565	159	82	33	23	17	3	1	0	0
Sullivan	100-249	0	0	9	2	2	3	2	0	0	0	0
Tioga	20-99	0	0	3	1	0	1	1	0	0	0	0
Tompkins	0-19	0	0	3	2	1	0	0	0	0	0	0
Ulster	329	3,094	10,653	21	8	7	3	1	1	1	0	0
Warren	20-99	0	0	5	1	2	0	2	0	0	0	0
Washington	20-99	0	0	17	8	7	2	0	0	0	0	0
Wayne	20-99	0	0	5	2	1	0	2	0	0	0	0
Westchester	767	10,915	37,525	65	38	14	6	5	0	2	0	0
Wyoming	0-19	0	0	1	0	0	1	0	0	0	0	0
Yates	0-19	0	0	1	1	0	0	0	0	0	0	0
Total New York	**9,413**	**107,481**	**395,980**	**772**	**362**	**170**	**133**	**75**	**21**	**10**	**0**	1

Source: U.S. Census Bureau, County Business Patterns, 2004. Values for "Number of Employees" that are ranges or "Payroll" values of zero indicate the Census Bureau withheld information to protect companies' anonymity.

TABLE 5.6
NUMBER OF HEATING OIL DEALERS IN VERMONT, BY COUNTY

County	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class						
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499
Addison	20-99	0	0	4	1	2	1	0	0	0	0
Bennington	94	857	3,673	8	4	0	2	2	0	0	0
Caledonia	20-99	0	0	6	0	5	0	1	0	0	0
Chittenden	83	844	3,391	14	7	3	4	0	0	0	0
Franklin	20-99	0	0	3	0	2	0	1	0	0	0
Grand Isle	0-19	0	0	1	1	0	0	0	0	0	0
Lamoille	130	910	3,367	5	0	1	1	2	1	0	0
Orange	20-99	0	0	2	0	0	1	0	1	0	0
Orleans	20-99	0	0	3	1	1	1	0	0	0	0
Rutland	124	1,110	4,682	13	2	6	4	1	0	0	0
Washington	83	720	3,176	7	1	1	5	0	0	0	0
Windham	83	740	3,153	5	0	3	1	0	1	0	0
Windsor	125	1,225	4,569	8	3	1	2	2	0	0	0
Total Vermont	**977**	**8,393**	**33,849**	**79**	**20**	**25**	**22**	**9**	**3**	**0**	**0**

Source: U.S. Census Bureau, County Business Patterns, 2004. Values for "Number of Employees" that are ranges or "Payroll" values of zero indicate the Census Bureau withheld information to protect companies' anonymity.

Table 5.7
Number of Heating Oil Dealers in the United States, by State

State	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class							
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999
Alabama	274	1,579	6,291	13	3	2	2	5	1	0	0	0
Alaska	525	4,360	19,606	54	22	14	11	6	1	0	0	0
Arizona	33	126	608	3	1	1	0	1	0	0	0	0
Arkansas	100-249	0	0	5	2	0	0	3	0	0	0	0
California	283	2,457	11,136	34	13	10	9	2	0	0	0	0
Colorado	74	555	2,143	10	3	4	3	0	0	0	0	0
Connecticut	4,425	50,748	194,150	336	121	97	69	31	13	5	0	0
Delaware	250-499	0	0	26	13	7	2	3	1	0	0	0
District of Columbia	0-19	0	0	2	1	1	0	0	0	0	0	0
Florida	100-249	0	0	27	18	3	3	3	0	0	0	0
Georgia	20-99	0	0	11	3	5	3	0	0	0	0	0
Hawaii	20-99	0	0	2	1	0	0	1	0	0	0	0
Idaho	100-249	0	0	34	19	9	6	0	0	0	0	0
Illinois	250-499	0	0	37	14	13	7	2	1	0	0	0
Indiana	250-499	0	0	43	26	6	6	3	2	0	0	0
Iowa	100-249	0	0	33	18	5	6	4	0	0	0	0
Kansas	100-249	0	0	18	10	5	0	2	1	0	0	0
Kentucky	20-99	0	0	15	11	2	0	2	0	0	0	0
Louisiana	20-99	0	0	8	4	3	0	1	0	0	0	0
Maine	3,158	24,761	97,835	274	96	80	48	45	5	0	0	0
Maryland	1,992	17,511	67,460	94	25	24	19	17	6	2	1	0
Massachusetts	5,276	59,382	229,456	496	182	140	112	49	10	3	0	0

TABLE 5.7
NUMBER OF HEATING OIL DEALERS IN THE UNITED STATES, BY STATE—CONTINUED

State	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class							
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999
Michigan	756	4,367	19,893	83	44	17	12	9	0	1	0	0
Minnesota	500-999	0	0	74	38	13	13	7	3	0	0	0
Mississippi	100-249	0	0	8	2	5	0	0	1	0	0	0
Missouri	182	1,022	4,248	27	15	7	3	2	0	0	0	0
Montana	20-99	0	0	7	3	3	1	0	0	0	0	0
Nebraska	339	1,898	7,532	16	7	1	1	6	0	1	0	0
Nevada	100-249	0	0	8	3	1	1	3	0	0	0	0
New Hampshire	1,883	18,610	74,194	116	27	26	36	22	3	2	0	0
New Jersey	3,477	37,728	145,907	285	117	80	47	27	8	6	0	0
New Mexico	20-99	0	0	12	5	7	0	0	0	0	0	0
New York	9,413	107,481	395,980	772	362	170	133	75	21	10	0	1
North Carolina	1,324	7,731	31,404	176	85	52	28	8	3	0	0	0
North Dakota	100-249	0	0	38	23	8	4	3	0	0	0	0
Ohio	500-999	0	0	100	42	33	19	5	1	0	0	0
Oklahoma	129	566	1,742	12	4	5	1	1	1	0	0	0
Oregon	250-499	0	0	28	14	7	2	4	0	1	0	0
Pennsylvania	5,968	50,793	197,102	537	234	140	88	54	16	5	0	0
Rhode Island	1,106	10,816	40,126	98	46	28	13	8	2	0	1	0
South Carolina	190	1,097	5,066	39	24	11	2	2	0	0	0	0
South Dakota	100-249	0	0	23	7	8	6	2	0	0	0	0
Tennessee	98	554	2,612	10	3	4	1	2	0	0	0	0
Texas	291	2,523	10,472	34	17	8	6	2	1	0	0	0
Utah	0-19	0	0	1	1	0	0	0	0	0	0	0
Vermont	977	8,393	33,849	79	20	25	22	9	3	0	0	0

TABLE 5.7
NUMBER OF HEATING OIL DEALERS IN THE UNITED STATES, BY STATE—CONTINUED

State	Number of Employees	Payroll ($1,000)		Total Dealers	Number of Dealers by Employment Size Class							
		1st Quarter	Annual		1 to 4	5 to 9	10 to 19	20 to 49	50 to 99	100 to 249	250 to 499	500 to 999
Virginia	2,039	16,312	64,920	170	64	53	32	14	5	2	0	0
Washington	807	7,518	29,732	55	22	9	14	6	4	0	0	0
West Virginia	196	1,480	5,870	16	5	4	4	3	0	0	0	0
Wisconsin	250-499	0	0	82	53	11	12	6	0	0	0	0
Wyoming	20-99	0	0	7	2	2	2	1	0	0	0	0

Source: U.S. Census Bureau, County Business Patterns, 2004. Values for "Number of Employees" that are ranges or "Payroll" values of zero indicate the Census Bureau withheld information to protect companies' anonymity.

In the analysis of retail gasoline markets, we saw that the structure of ownership included dealer-owned stations, company-owned franchises, and company-owned-company-operated stations. By contrast, the structure of retail heating oil markets is much simpler. There are occasionally heating oil dealers who could be considered "company-owned" in the sense that the owner of the terminal is also the company that supplies the end-user. For the most part, however, heating oil dealers are analogous to jobbers in the retail gasoline industry. They can purchase from different distributors; they are not attached to any integrated oil company brand; and they own their own delivery equipment. This simplicity in market structure makes less relevant some of the concerns raised in the retail gasoline market such as predatory pricing by company-owned stores or zone pricing.

Consumers' Options for Purchasing Heating Oil. With each dealer selling the same basic product, one way dealers attract customers is to offer several types of contracts that each appeal to different types of consumers. The basic purchasing option is simply to purchase heating oil as needed and pay the market price at the time of purchase. Here, there is no contract between the consumer and any dealer; the consumer is responsible for filling the tank when needed and can purchase from any dealer. When heating oil is bought in this way, it is called purchasing by "specific request."

In contrast to the specific requests made as needed, there are two common winter or season-long contract types available to consumers. The first type is the "fixed-price" contract. With this contract, the consumer and heating oil dealer agree to fix the price of heating oil that the customer will pay for the length of that contract. That is, regardless of any fluctuations—up or down—in the market price of heating oil, the consumer pays the price agreed to in the contract. With a fixed-price contract, the consumer does not need to request a delivery from the dealer. Instead, the dealer estimates and monitors the use of heating oil and regularly supplies the consumer accordingly. This is called "automatic delivery." In many cases, if the consumer uses more heating oil in a given time period than she secured in her fixed-price contract, the consumer needs to make a specific request and purchase at the market rate.

The second common alternative to purchasing at the market price is a "capped-price" contract. With this contract, the consumer and dealer agree on a price above which the consumer will never pay—the price cap—regardless of how high the market price might rise. But, if the market price falls below the cap, the consumer gets to pay the lower price. Like the fixed-price contract, a capped-price contract is served with automatic delivery, and should the consumer's use exceed the quantity of heating oil specified in the contract, she must purchase additional heating oil at the market rate. A capped-price plan usually requires a fee to buy the contract or is tied to other products such as cleaning and servicing.

With both fixed and capped-price contracts, consumers need to agree to a particular payment plan. One option is "pre-pay," where consumers pay a lump sum at the time the contract is signed for a quantity of oil which is intended to cover all of the heating oil for the coming winter. Another option, "budget pay," sets up equal monthly payments spread across 10 or 12 months. By stretching the payment period beyond just the winter months, the monthly payments are smaller, even if the amount spent annually stays the same. A budget pay plan can be useful for any consumer that prefers consistency in monthly expenses, for example, fixed-income consumers who might have difficulty paying a high bill in any one month even though they have sufficient annual income to pay their total heating costs for the winter. With both pre-pay and budget pay, if the consumer uses more heating oil than has been paid for, she must purchase additional heating oil as a specific request at the market price. Additionally, if a consumer on a budget pay plan uses more heating oil up to a given date than she has paid for, she must purchase additional oil at the market price to cover her needs until she has made the next payment on her plan.

The above description outlines the major types of contracts available. Table 5.8 shows a survey from July 2006 of heating oil dealers in Westchester County, New York. This sample demonstrates the diversity of service plan costs and pricing options available. Indeed, the listed prices charged from company to company can vary dramatically, with the highest price about 25% above the lowest price. This suggests that checking prices with multiple heating oil dealers can produce a significant savings in heating oil costs.[100]

[100] The survey is usually conducted monthly, but at the time of the survey, it only requests information on price. Other information on this table is only updated once per year (or as information is volunteered by heating oil dealers) and is not intended by the county to be a reference for consumers. Thus, it is not surprising to see to see so few explicit options for fixed-price contracts.

TABLE 5.8
JULY PRICES IN WESTCHESTER COUNTY, NEW YORK

City	Price Per Gallon	Lock-In Price	Service Plan Cost	Specials
Peekskill	$2.16			Quote is for a minimum 200 gallon delivery.
Carmel	$2.19		Varies With Level of Service	Cash Price. Volume Discounts, Automatic Delivery, Senior Citizen Discounts
Mahopac	$2.20		$250.00 annually	HEAP, 24 hour service, volume/senior/disabled vet. Discounts
Verplank	$2.26			Cash on Delivery, Senior Discounts, HEAP, Automatic Delivery, Volume Discount
Cortlandt Manor	$2.28		$145.00 Annually	COD Only (No Budget Plans). HEAP Accepted (Current Customers Only). Automatic Deliveries. 24 HR. Emergency Service.
Ossining	$2.28		No Services	Cash on Delivery
Pelham	$2.29		Free Service Contract	24 Hour Emergency Service.
Pelham	$2.29		Free Service Contract	24 Hour Emergency Service.
Mt. Vernon	$2.29			Senior Discounts, Budget Plans, 24 Hour Service
Mt. Vernon	$2.29		Varies	Cash on Delivery Only
Ossining	$2.29	Call	Call	HEAP Accepted. Discount for Return Customers. COD and Automatic Delivery, Volume Discounts, Senior Discounts.
Mahopac Falls	$2.30		Varies	HEAP, 24 Hour Service, Budget Plan, Volume Discount, Senior Discount, Automatic Delivery, Service Contract
Hartsdale	$2.35	Available	Free premium contract, others to $256.	24 hour emergency service; PREMIUM GRADE OIL; automatic delivery ONLY; discounted oil tank replacement; oil leak insurance; payment terms (call for details). Westchester, Putnam, NYC, CT.
Ossining	$2.35		$200/year	Price quoted is COD.
Somers	$2.35		Available	Budget Plans, 24 Hour Service
Ossining	$2.36			Price based on 200 Gallon delivery. Volume discounts, automatic order reminders
Peekskill	$2.38		$215/year Includes Cleaning	Senior Discount, Volume Discount. Tank Closure & Installations.
New Rochelle	$2.40			Cash on Delivery Only
Cortlandt Manor	$2.43		Varies	Servicing Putnam County and Limited Areas in Upper Westchester County. Senior Discount, Cash Discount, 24 Hour Service

TABLE 5.8
JULY PRICES IN WESTCHESTER COUNTY, NEW YORK—CONTINUED

City	Price Per Gallon	Lock-In Price	Service Plan Cost	Specials
White Plains	$2.43		Price varies.	Budget Plans, 24 Hour Service
Millwood	$2.44		$155.00 plus tax, Annually	24 Hour Service
New Rochelle	$2.44		Available	Senior Discount, Budget Plan, 24 Hour Service
New Rochelle	$2.45		Varies	Budget Plans,24 Hour Service
Scarsdale	$2.46		$149.00 Annually	Budget Plans, Cash Discount, Senior Discount, 24 Hour Service
Mt. Vernon	$2.49		Available	Quoted price is without contract. 150 gallon minimum. Budget plan available.
White Plains	$2.49			24 Hour Service
Mamaroneck	$2.50		$195.00 Annually	Budget Plans, 24 Hour Service
Croton Falls	$2.50		Basic: $169.95 Annually	Price quoted is with Prompt Payment Discount, Senior Discount Available, 24 Hour Service
White Plains	$2.50		$139 plus tax	
New Rochelle	$2.50			24 Hour Service
Irvington	$2.56		$175.00 Annually	Senior Discount, Budget Plan, 24 Hour Service
Ossining	$2.59		$159.00 Annually	Quote is COD. Senior Discount, Budget Plan, 24 Hour Service.
Ossining	$2.60		$155.00 Annually	Senior Discount, 24 Hour Service
Katonah	$2.60	Available	Free premium contract, others to $256.	24 hour emergency service; PREMIUM GRADE OIL; automatic delivery ONLY; discounted oil tank replacement; oil leak insurance; payment terms. Westchester, Putnam, NYC, CT.
Mamaroneck	$2.61			Budget Plan, 24 Hour Service
Mt. Vernon	$2.65		Free	LOWEST PRICE--Some Heat USA Suppliers charge MORE
Buchanan	$2.66		$175.00 Annually	Service Contracts; Budget Plan
White Plains	$2.66		Free	HIGHEST PRICE--Some Heat USA Suppliers charge LESS
New Rochelle	$2.69	CAPPED	$189	Plumbing, HVAC, Oil Tank. Call for COD, 24/7 Service. Lower Westchester/Fairfield
Larchmont	$2.70			Senior Discounts

Source: Westchester County Government. Company names and phone numbers have been removed.

The benefits of each contract type. For the consumer, the three different purchasing methods have their own benefits and risks. There are two primary benefits to purchasing by specific request at the market price. First, *on average*, she can expect to spend less for her heating than she would with a fixed or capped-price plan. Second, as the other contract types often require fixed payment plans, she does not pay for heating oil before she uses it. However, the risks associated with purchasing at the market price mirror the benefits: The variability of heating oil prices means that while she could pay unexpectedly low prices, she could also be forced to pay very high prices should demand spike. Similarly, if demand increases dramatically, there is no guarantee that a specific request customer would be able to purchase heating oil at all. Although rising prices should normally ensure that anyone who wants to buy heating oil can buy it, automatic delivery contracts mean that dealers may have already committed all their available heating oil to customers purchasing on automatic request.

For the heating oil dealer, a benefit of a specific request customer is that she will always represent a profit opportunity. Regardless of the price of heating oil, the dealer can always charge a markup to ensure he does not lose money on that customer. But the tradeoff for knowing that he will not lose money on any given transaction is that he does not know how much heating oil he will be able to sell that season. In other words, the dealer puts the risk of high prices on the customer, but accepts the risk of selling smaller quantities of heating oil. Moreover, the specific request customer is free to check prices with multiple heating oil dealers, thus putting pressure on dealers' margins since they must compete for the business.

The major benefit to a consumer from a fixed-price contract is that it removes the uncertainty of how much she will pay for heating oil. Buying by specific request forces the consumer to bear the risks of a volatile heating oil market; buying by fixed-price contracts pushes the risk back to the dealer. The downside, however, is that for this surety in price, the consumer can expect to pay more *on average* than she would have paid buying by specific request. In this way it is very similar to insurance: the consumer pays a premium to eliminate the possibility of very high heating bills.

The downside of fixed-price contracts to consumers is also the benefit to the heating oil dealer. If a dealer accepts a fixed-price customer, he runs the risk that heating oil prices rise and he loses money on that contract. To accept this risk, the dealer must be paid a premium above the expected market price for heating oil—the same premium that the consumer is willing to pay to avoid this risk. Because of this premium, the dealer can expect to make *on average* more than he would from a specific request customer. On the other hand, fixed-price contracts reduce the dealer's uncertainty of how much oil he will be able to sell each year, which can be important in a volatile market. Fixed-price contracts are usually sold in April or May. By selling at that time, heating oil dealers may secure some of their supplies during the summer months when prices are usually lower, knowing they can at least sell this oil to their fixed-price customers.

In theory, such contracts should remove entirely any uncertainty about how much the consumer will pay. In practice, there are still pitfalls. A consumer may not understand the entire contract and could miss hidden fees or allowable price changes. There are occasionally unscrupulous heating oil dealers who enter into such contracts, but then do not secure sufficient supplies to ensure they can fulfill their deliveries. They may simply raise the rate above what the contract specifies, and hope the consumer does not protest. There also can be dealers who enter into these contracts in good faith, but unexpected events make them unable to deliver the oil. In all of these cases, though there are certainly laws in place to protect the consumer, at the time the consumer may have little immediate recourse except to purchase oil at the market price, which could prove a burden to some customers.[101]

The benefit to a capped-price contract is similar to a fixed price: it limits how much a consumer will pay for heating. However, a capped-price contract has the additional benefit that consumers can pay lower amounts for their heating oil if the market price falls below their capped-price. These contracts are usually associated with an upfront fee that the consumer must pay. While a capped-price contract may seem the best of both worlds, they can in practice be difficult for the consumer to know if they are receiving the price they should. The price paid by the consumer is usually not based on some "market price," but rather is based on a markup from the dealer's specific costs. These costs are not observable to the consumer, so she may not know when she should expect a lower price. Also, like the fixed-price contracts, a capped-price does still carry the risk that the dealer will renege on his end of the bargain.

Fundamentally, the difference between a fixed- or capped-price contract and a specific request at the market price is who accepts the risk of a volatile heating oil market. The willingness of dealers or consumers to accept risk is ultimately a matter of their preferences. For any given level of risk in the market, different people are willing to pay differing amounts to remove that risk. Conversely, for any given level of risk, different dealers will require differing premiums to accept that risk. These differences create a market for fixed-price contracts much like any other market. Consumers demand fixed-price contracts; dealers supply them; supply and demand meet to determine a price premium for fixed contracts, given an expected level of risk.

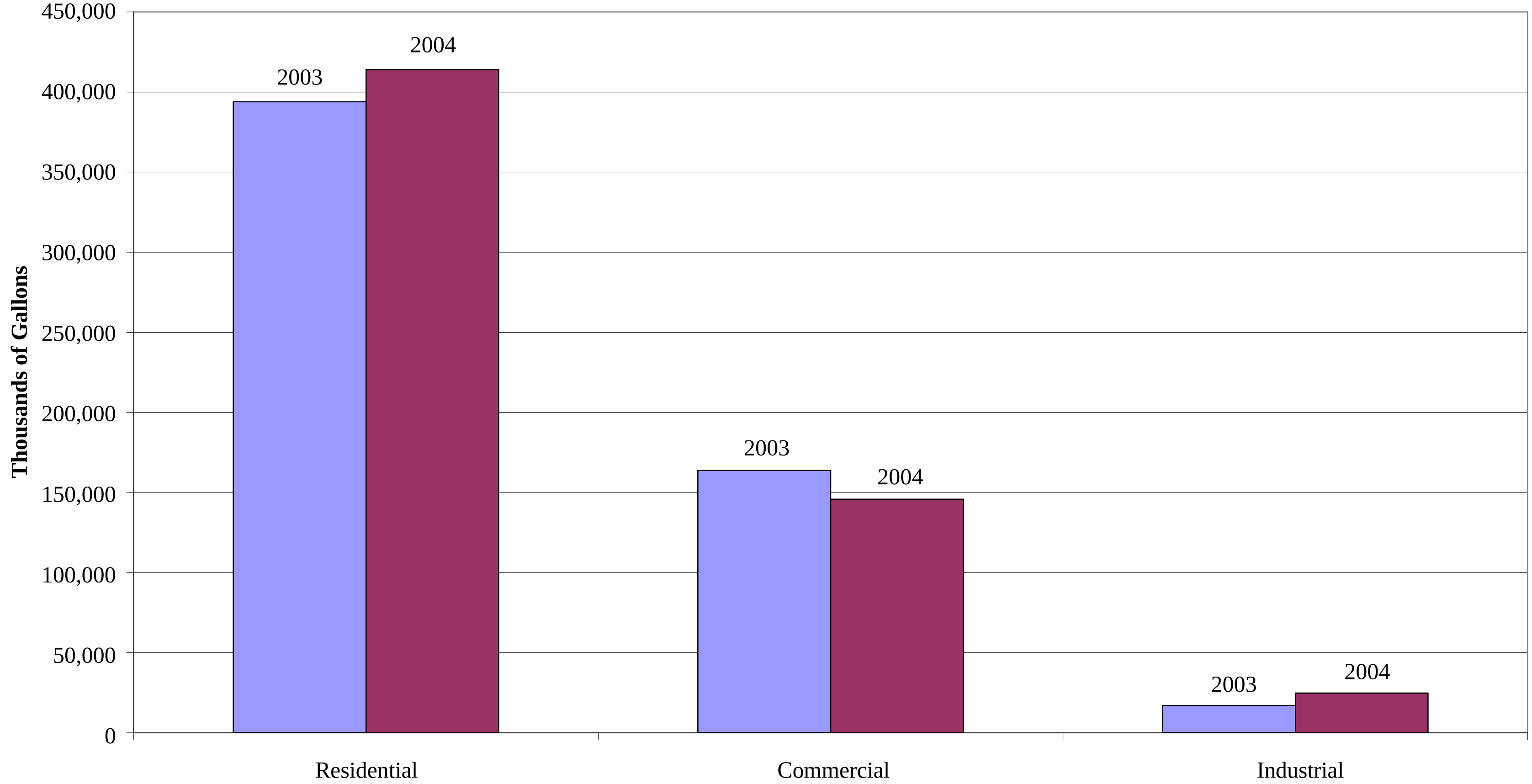
Although the willingness to accept risk is a matter of preference, one generalization is that people with higher incomes are less willing to pay to remove a given level of risk than are people with lower incomes. For example, one might suppose that a wealthy person need not worry about possibility of heating oil reach $3.50 since she can pay regardless. In this case, she may well take her chances with specific requests at the market rate, since specific requests are cheaper, on average. On the other hand, someone with lower income might worry considerably, since she may not have sufficient income to pay for heat if it reached that price. She may then be willing to pay a bit extra to be sure this unacceptable outcome will not happen.

[101] States do have education campaigns to help consumers understand these contracts and to choose a reputable dealer. They also have agencies that consider complaints if consumers feel their contracts are not being honored. See for example: http://www.ago.state.ma.us/sp.cfm?pageid=1732.

Regardless of income, as the volatility of the heating oil market increases, all consumers' willingness to pay a premium to avoid the price volatility increases as well. But heating oil dealers also demand higher premiums in more volatile markets. As volatility increases, the premium for these contracts will become more expensive. That is, the actual fixed-price specified in the contract will rise even further above the expected price. Although the rise in premiums can drive consumers of all income levels away from fixed-price contracts, we would expect that lower income consumers would be more likely to be "priced out" of the market and return to purchasing by specific request at the market price.

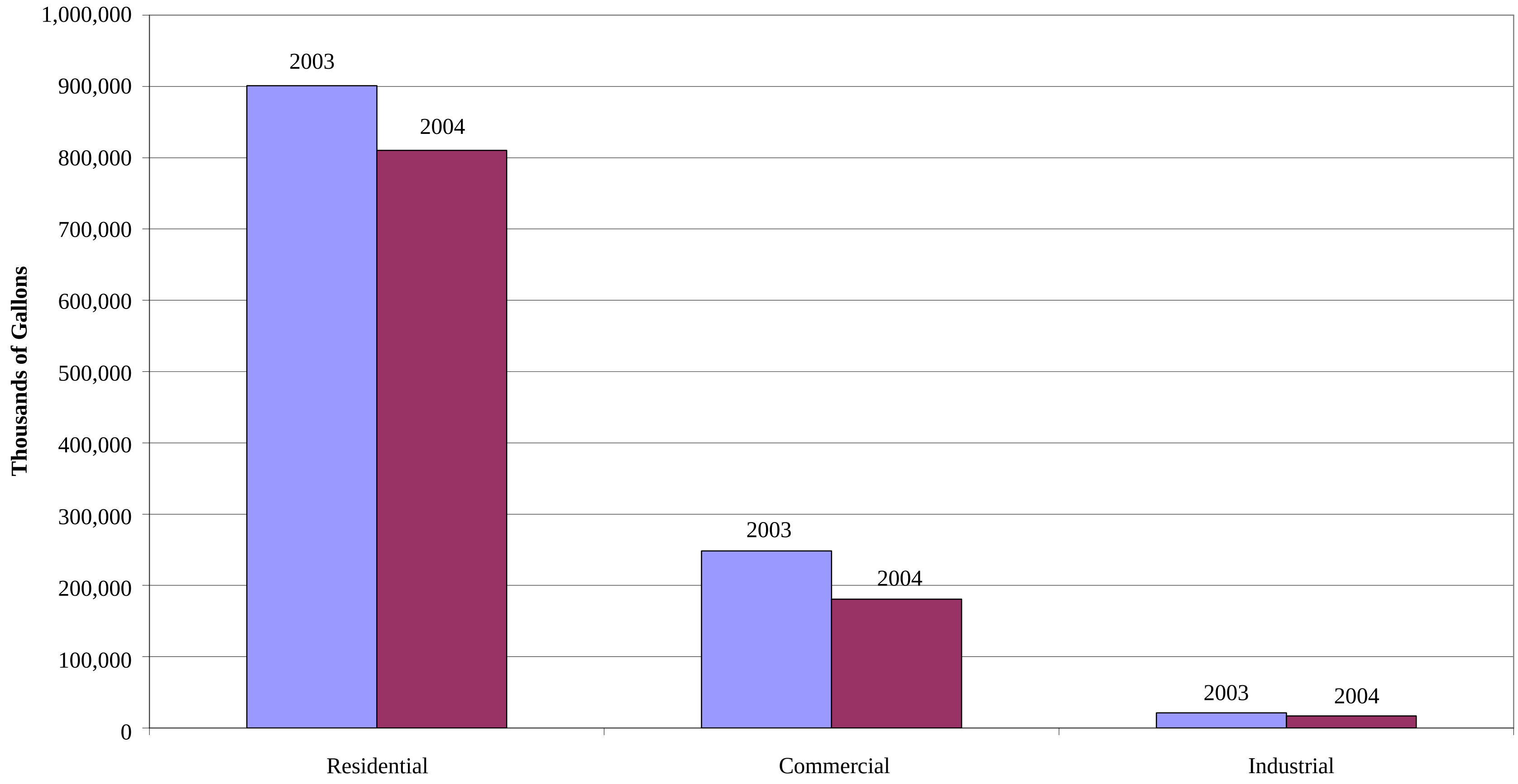
Heating oil use in the States. In all five states, a majority of the heating oil used in the state is used by residential customers. Commercial customers use less than half the amount used by residential customers. Industrial uses comprised the lowest percentage of heating oil use in each state with Vermont having the highest at about 6%. Figures 5.1 through 5.5 show the amount of heating oil used in each of the three main sectors for the years 2003 and 2004. In Massachusetts and New York, both residential and commercial consumption fell from the year 2003 to 2004. In Maine and New Hampshire, residential consumption increased from 2003 to 2004, but commercial consumption fell. Only Vermont saw an increase in residential, commercial, and industrial heating oil use.

FIGURE 5.1
MAINE SALES OF HEATING OIL BY ENERGY USE
2003—2004



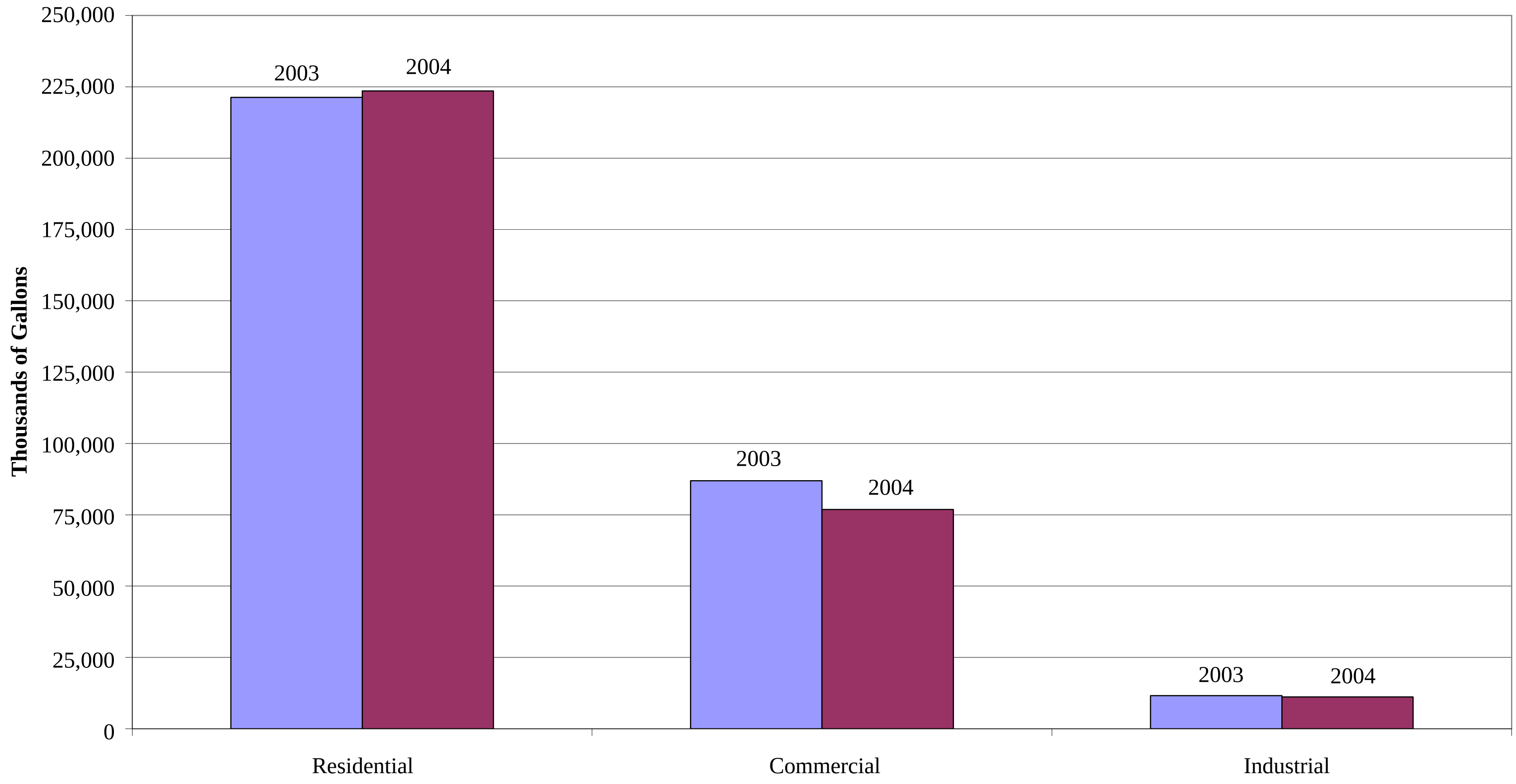
Source: Energy Information Administration, 2006.

FIGURE 5.2
MASSACHUSETTS SALES OF HEATING OIL BY ENERGY USE
2003—2004



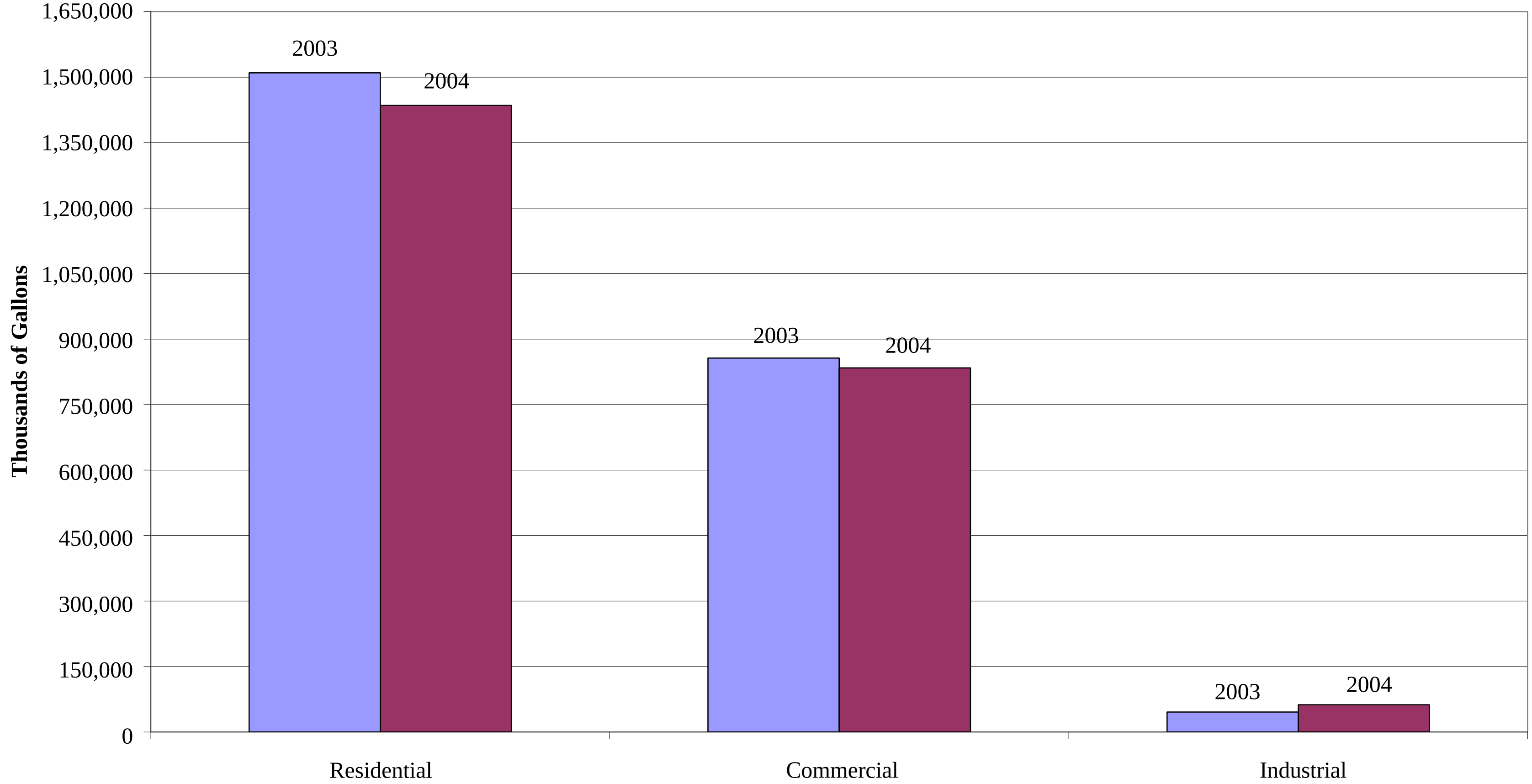
Source: Energy Information Administration, 2006.

FIGURE 5.3
NEW HAMPSHIRE SALES OF HEATING OIL BY ENERGY USE
2003—2004



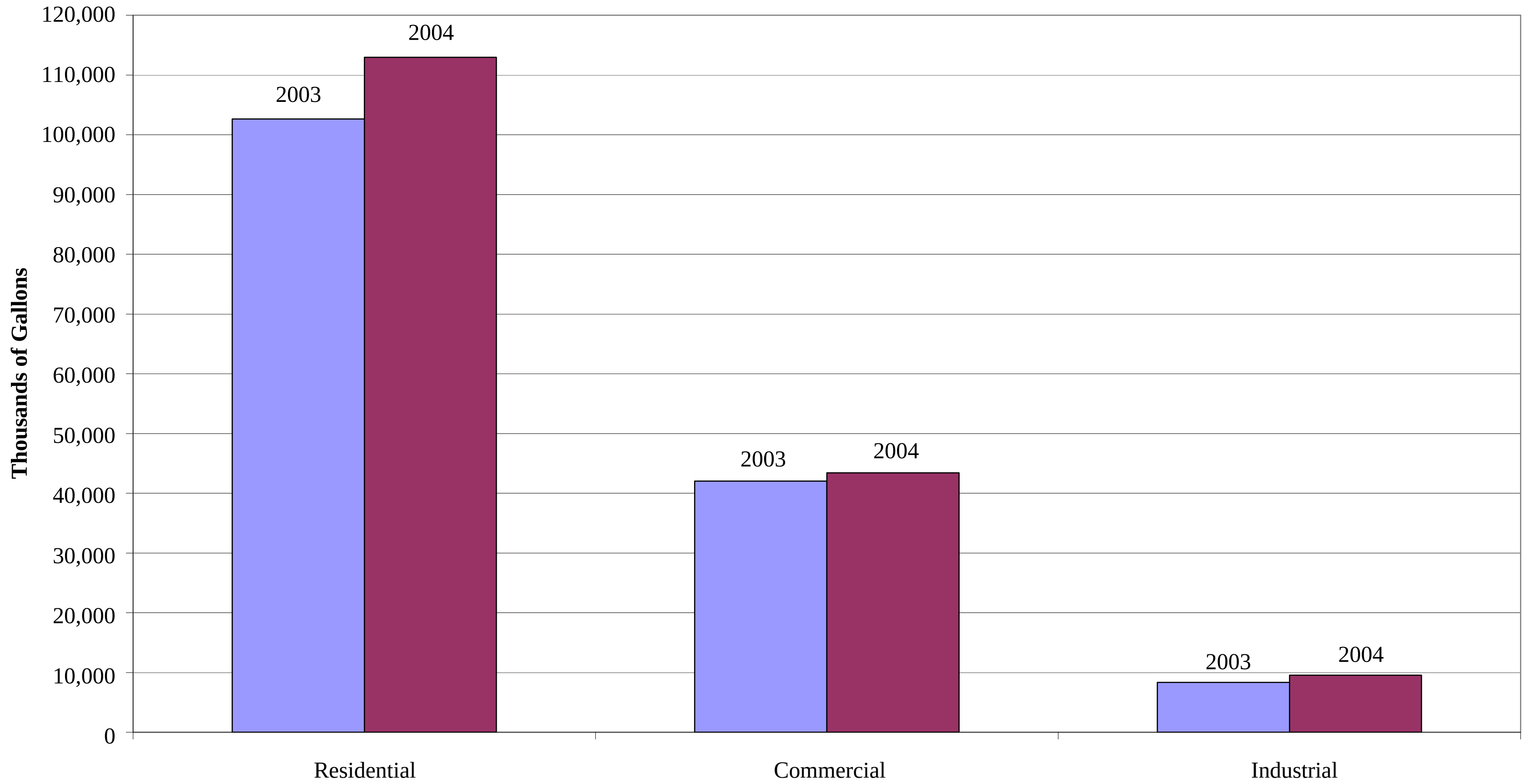
Source: Energy Information Administration, 2006.

FIGURE 5.4
NEW YORK SALES OF HEATING OIL BY ENERGY USE
2003—2004



Source: Energy Information Administration, 2006.

FIGURE 5.5
VERMONT SALES OF HEATING OIL BY ENERGY USE
2003—2004



Source: Energy Information Administration, 2006.

As suggested by the list of prices for Westchester County in the previous section, home heating oil prices can vary dramatically even within local geographic regions. Appendix IV has tables for various regions within Maine, New Hampshire, and Massachusetts that show the different prices in those areas.[102] On average, the highest price in each region is 6% more than the average price for that region. Similarly, the lowest price in each region is about 6% lower than the average price for that region. Thus, prices do vary from dealer to dealer, and vary sufficiently that shopping for lower prices can yield significant savings on heating bills.

The immediate question is this: Why do prices vary so much within a region? Since dealers are selling the same product—heating oil—one might expect prices to be the same. If people knew which dealer had the lowest price, they would only buy from that dealer; any dealer with a higher price would not sell any heating oil until they lowered their price to match the lowest price. Part of the variance in prices can be explained by differences in the complete package of services being sold to consumers. One dealer might charge a lower price for heating oil, but then require purchasing a service contract that is more expensive. Another dealer might charge a very low price for a service contract, but then require purchasing heating oil at an increased price.

Another important reason for price differences is known as "search costs." To illustrate the effects of such costs, suppose that the only way to check the price of heating oil was to drive to the dealer's place of business and ask. In addition to the monetary costs of gasoline or parking, it is a time-consuming process to drive to each dealer and the time spent is itself a cost. A consumer drives to the first dealer and gets a price-quote, and he must then decide whether he should spend the time and money to drive across town to get a second price quote. He would only do this if she expects to find a price low enough to justify the time and money required to check the second dealer. If he does not expect to find a sufficiently low price, then he would accept the price offered by the first dealer. On the dealer's side, she may know that the dealer across town offers a lower price, but she also knows that some of the people who walk in his door will find it too costly check across town. To these people, she can charge a higher price.[103]

Because there is a cost to searching for low prices, the dealer can charge prices a bit higher than other dealers and still have a profitable business. But as the cost of searching falls, so does the ability of the dealer to charge a higher price. Now suppose that instead of driving to every dealer, consumers need only call to get a price quote. This lowers the cost of checking prices, so when the consumer calls the first dealer, he is more likely to call the dealer across town to check for a lower price. This means the first dealer cannot

[102] Appendix IV has the results of data collected by newenglandoil.com and it does not survey every dealer in each region (perhaps because the dealer is unwilling to participate). However, the Appendix is used to illustrate the *spread* between the highest and lowest prices. If dealers missing from the survey were included, the true spread would be at least what is seen in the tables.

[103] An alternative strategy is to charge a lower price than the competitor, in the hope of keeping all the customers who enter the store, plus pulling the additional customers who are coming from the high-priced store across town.

charge a price as high as she did when consumers had to drive to his store because more customers would determine the other store had lower prices, and so would buy from that store unless she lowers her price. In other words, as search costs fall, she needs to lower her price toward her competitor or risk losing more and more customers.

The general point is that lower average search costs drive down average prices, as well as reduce the level of price dispersion, as companies are forced to compete more intensely with each other. If there are ways of reducing the cost of searching for low heating oil prices, this could help reduce average prices. To this end, websites such as the one that was the source for the tables in Appendix IV (NewEnglandOil.com) serve an important purpose in lowering search costs. If states were able to survey their dealers regularly, and post the results of their surveys on websites or have a telephone recording listing the lowest prices, this could further reduce the cost of consumers' searches.

An alternative side to this is that the cost of searching for the lowest price does not change with the quantity of oil being purchased—the consumer has to call the dealer for one gallon or a hundred gallons. However, with larger quantities of heating oil, the benefits of finding a lower price are greater. If the price difference is 20 cents per gallon, a consumer purchasing one gallon would only save 20 cents by searching for the low price, but a consumer purchasing 100 gallons would save $20. The higher quantity makes it more likely that consumers will search for low prices, and thus makes it more likely that the average price for larger quantities is lower. (This is one explanation of "quantity discounts.")

An extension of search costs is "switching costs," that is, a consumer is purchasing from one dealer but finds it costly to switch to another. One reason for this is search costs, as explained above. But with heating oil, there can be other switching costs. Heating oil customers can enter into a long-term contract, usually one year, and once signed, it can be very costly to get out of the contract and switch to a different dealer with lower prices. Customers may not be in a binding contract, but they might be set up for automatic delivery with their current dealer. This could again raise the cost of switching to a lower-priced dealer. Whatever the source of the switching cost, the effect is similar to search costs. A dealer may be able to raise prices knowing that some of his customers are tied to him, so long as he does not raise prices too high.

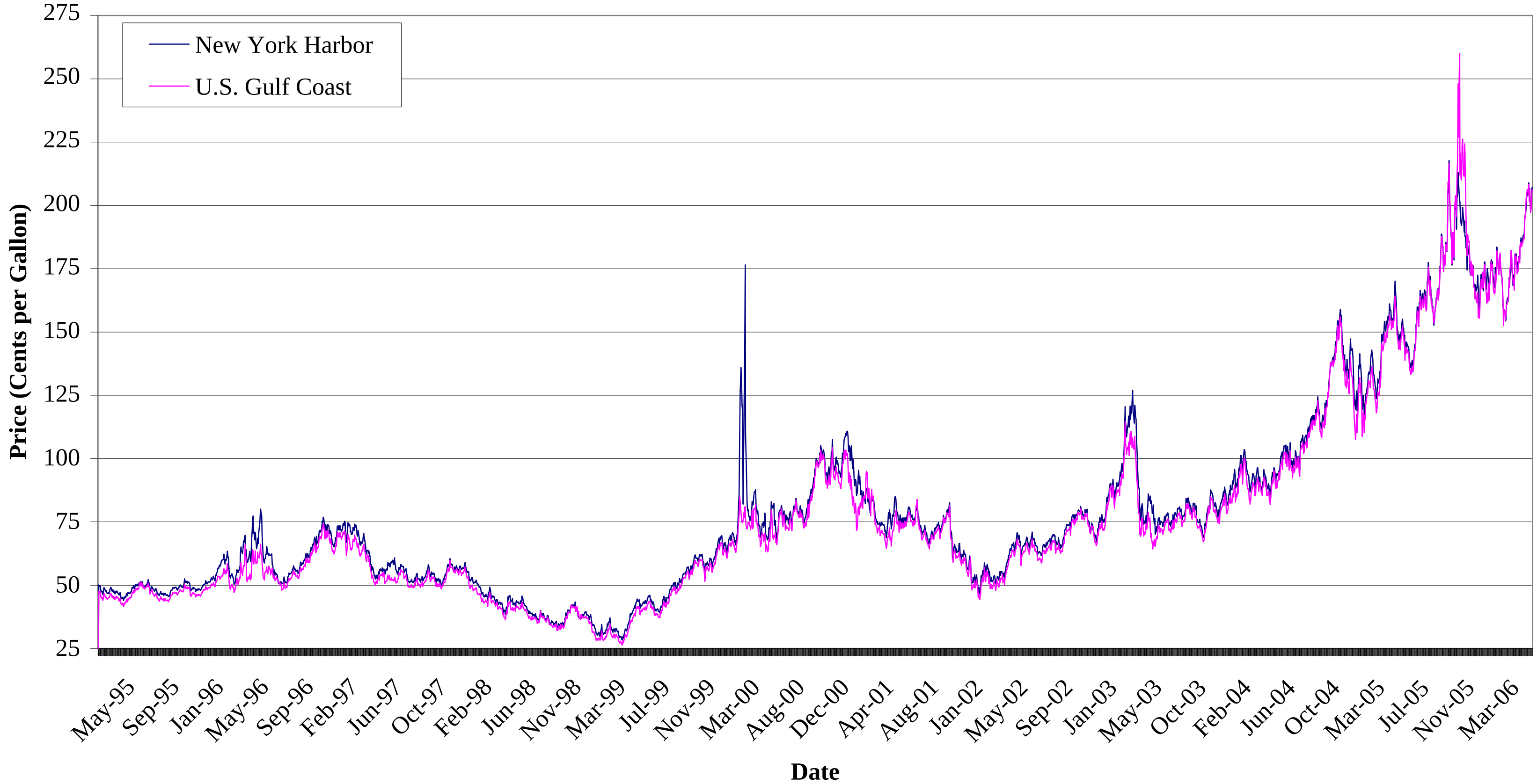
Companies only compete to the extent that their customers have the ability to choose between them and their competitors. Search and switching costs can reduce the ability to choose between competitors, and thus enable companies to raise prices. Any policy to reduce these costs encourages companies to compete more intensely, which can then lead to lower prices.

B. Heating oil prices from 1995 to 2006

As we found for gasoline prices, heating oil prices have risen dramatically in the past ten years. Between May 1995 and March 1999, spot prices ranged between 25 and 75 cents per gallon. From March 1999 to December 2000, prices trended upward to over $1 per gallon. There was a very high spike in prices—up to $1.75—in January 2000, which is discussed in a later section of this report.[104] Prices generally fell throughout 2001, at which point they have risen to about $2.00 per gallon at the end of the heating season this year. Over this time span, there were two other major price spikes. The first, in early 2003, was driven by the war in Iraq, and it temporarily raised prices 50 cents per gallon. The other was driven by hurricanes Katrina and Rita in early Fall 2005, and raised prices from about $1.75 to a peak of over $2.50 per gallon. Figure 5.6 below graphs the heating oil spot prices at both the Gulf Coast and at New York Harbor from May 1995 to May 2006.

[104] This price spike was only for spot prices in the New York Harbor, not the Gulf Coast. This is reflective of the fact that this price spike, as I will discuss later, was driven by increased demand localized to the Northeast due to a period of unusually cold and unexpected weather.

FIGURE 5.6
DAILY HEATING OIL SPOT PRICES
JANUARY 1995—MAY 2006



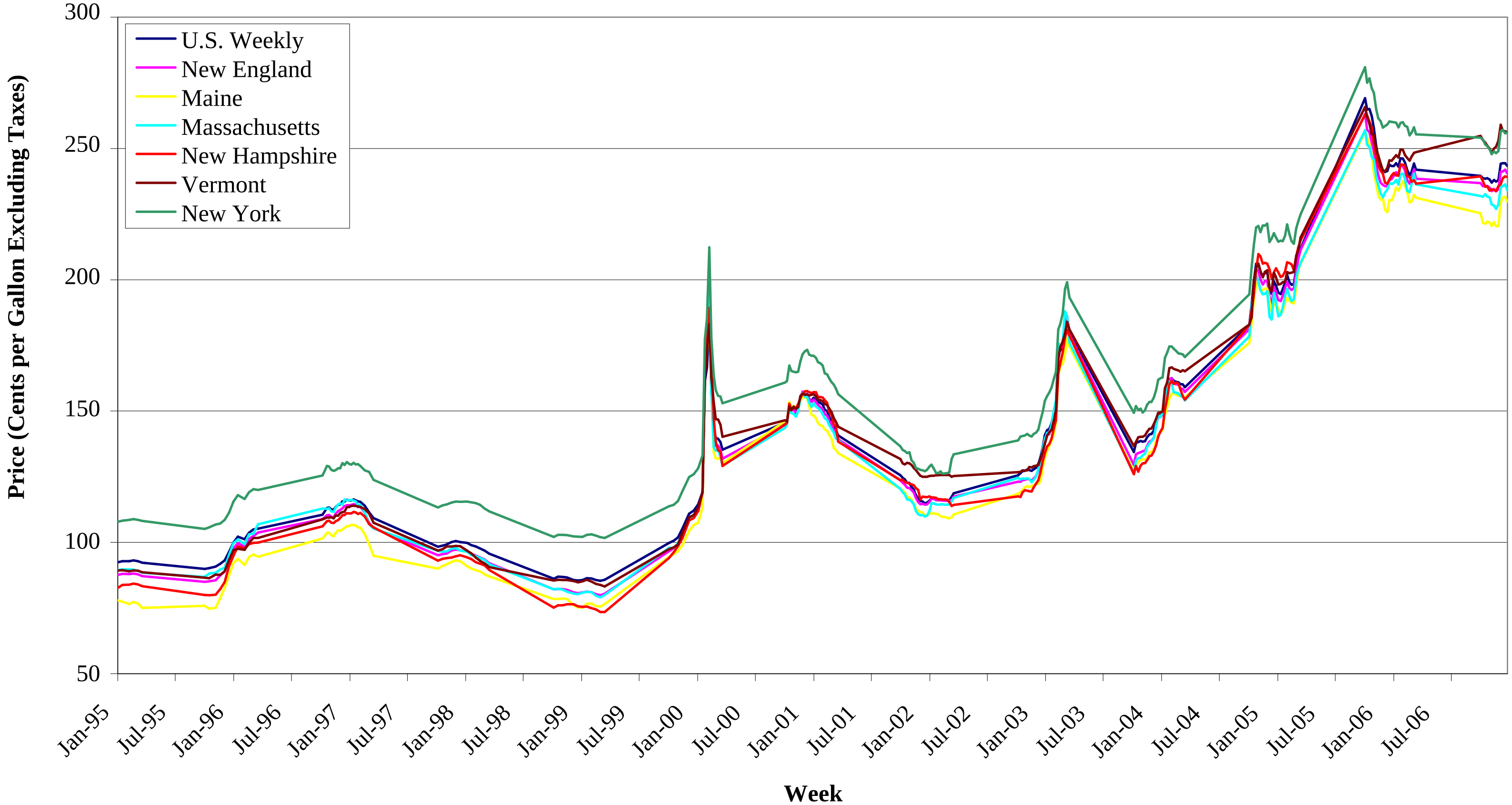
Source: Energy Information Administration, 2006.

Figure 5.7 shows the average weekly *residential* heating oil price for each of the five states in addition to U.S. and New England averages from January 1995 to March 2006. The prices follow the same trends as seen in Figure 5.6, but some of the apparent volatility is smoothed in part because these are weekly, not daily, average prices and also because heating oil is purchased relatively infrequently or is purchased with fixed-price contracts. This graph also demonstrates that for this time period, heating oil was more expensive in New York than in the other four states.

Figure 5.8 covers the same time period as Figure 5.7, but contains average residential monthly prices for the New England, Central Atlantic, and Lower Atlantic regions. The prices here follow the same basic pattern as the previous figure. For most of this period, the Central Atlantic was the most expensive of these East Coast regions. The Lower Atlantic is generally less expensive than New England, although there are a few short time periods when New England has the lowest residential heating oil prices.

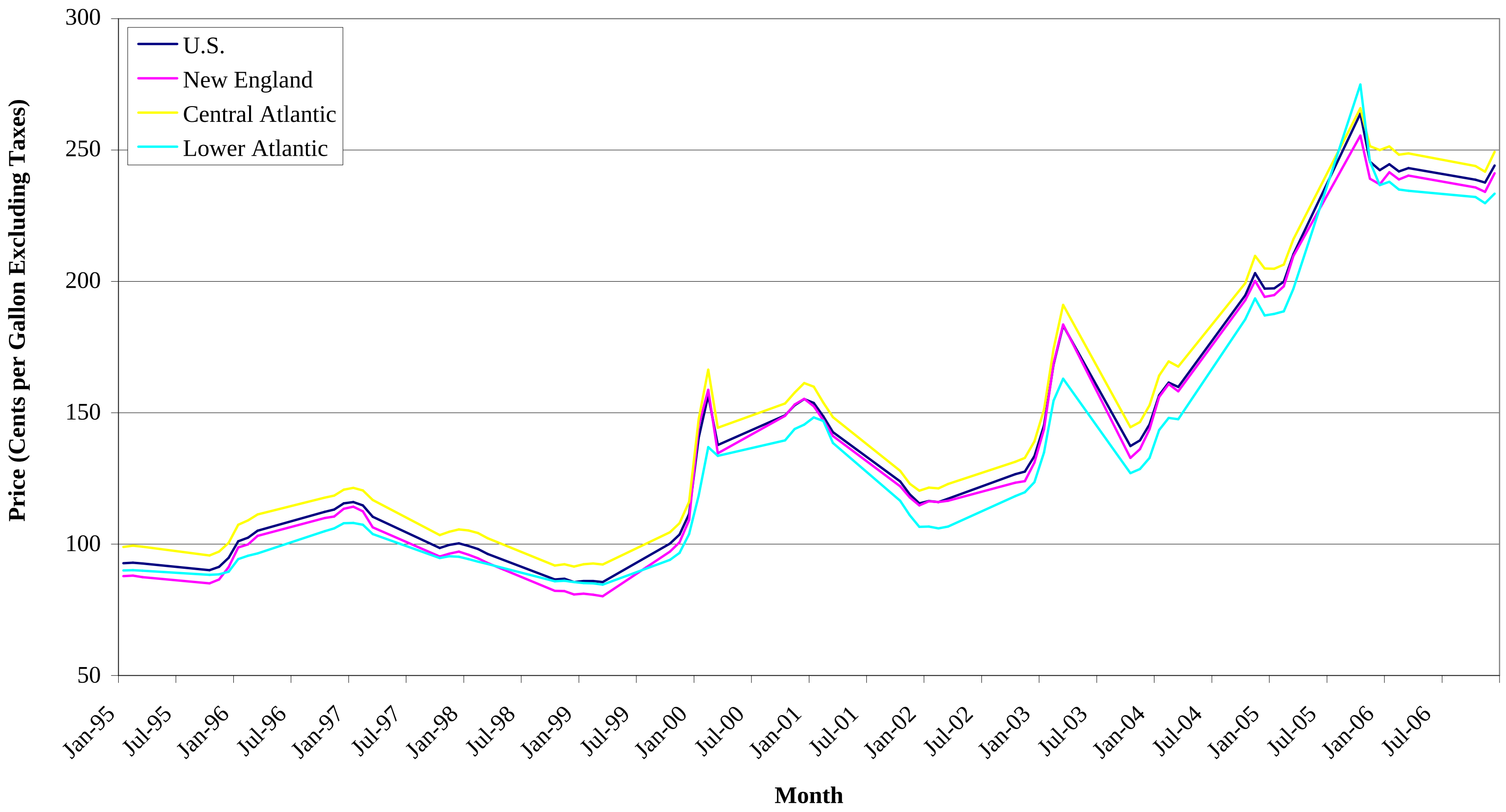
Figure 5.9 shows the average residential heating oil price in each of the five states only for the 2005-06 winter. Prices began high, with New York paying $2.80 per gallon and the other four states paying between $2.55 and about $2.65. However, at this time prices were still elevated due to the events surrounding hurricanes Katrina and Rita, and in all five states, prices steadily declined into December. The lowest prices of the winter occurred in the first week of December. Prices in each of the five states fell by more than 20 cents per gallon between the first week of October and the first week of December. From December through March, prices remained relatively stable. Vermont ended the period with prices about eight cents above their low in December and Maine about five cents above their low. The other three states ended with prices very near or below the price in the beginning of December.

FIGURE 5.7
WEEKLY RESIDENTIAL HEATING OIL PRICES
1995—2006



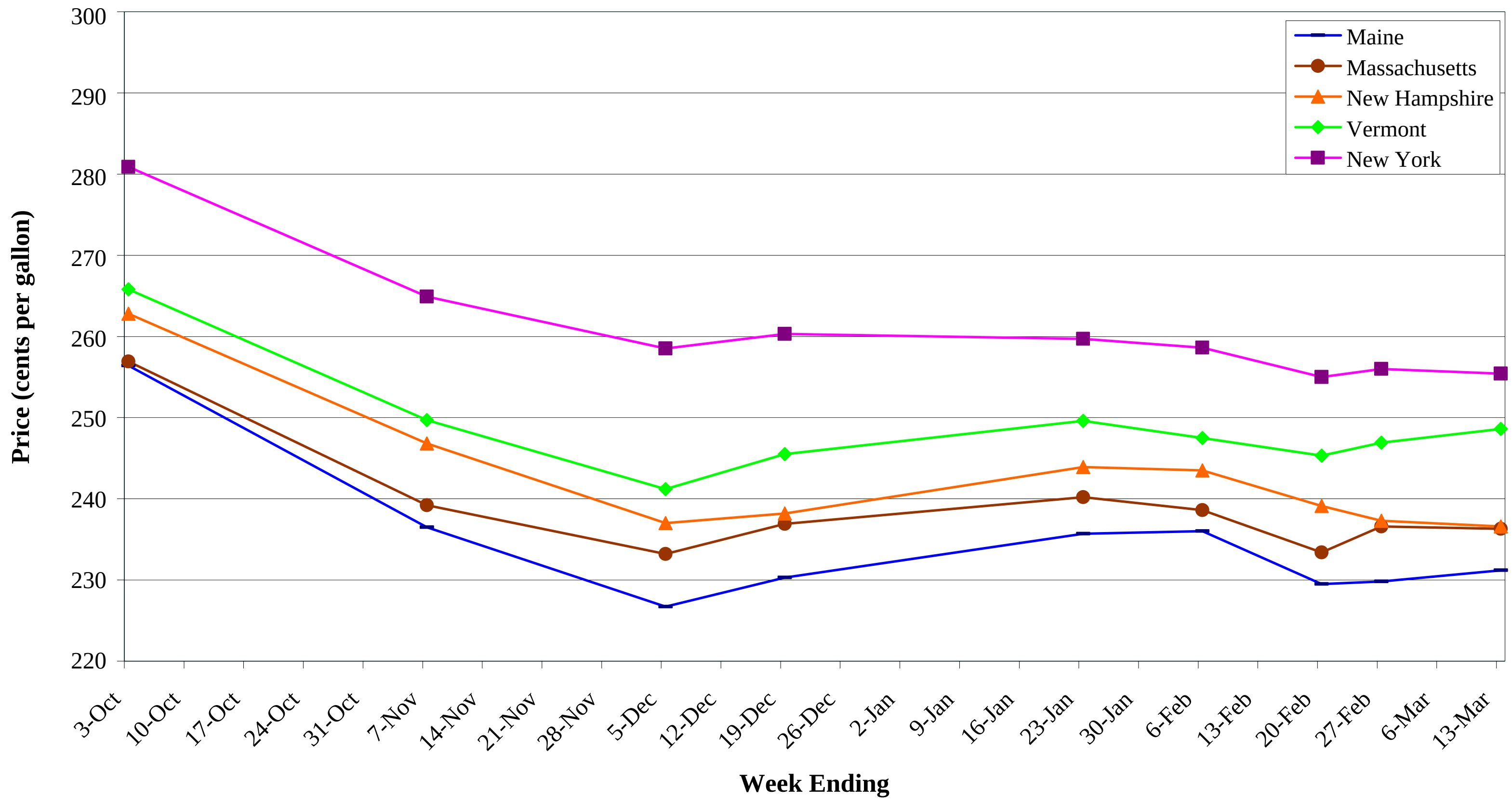
Source: Energy Information Administration, 2006.

FIGURE 5.8
MONTHLY RESIDENTIAL HEATING OIL PRICES
1995—2006



Source: Energy Information Administration, 2006.

FIGURE 5.9
RESIDENTIAL HEATING OIL PRICES
OCTOBER 3, 2005—MARCH 13, 2006



Source: Energy Information Administration, 2006.

C. *Natural gas as a substitute for heating oil*

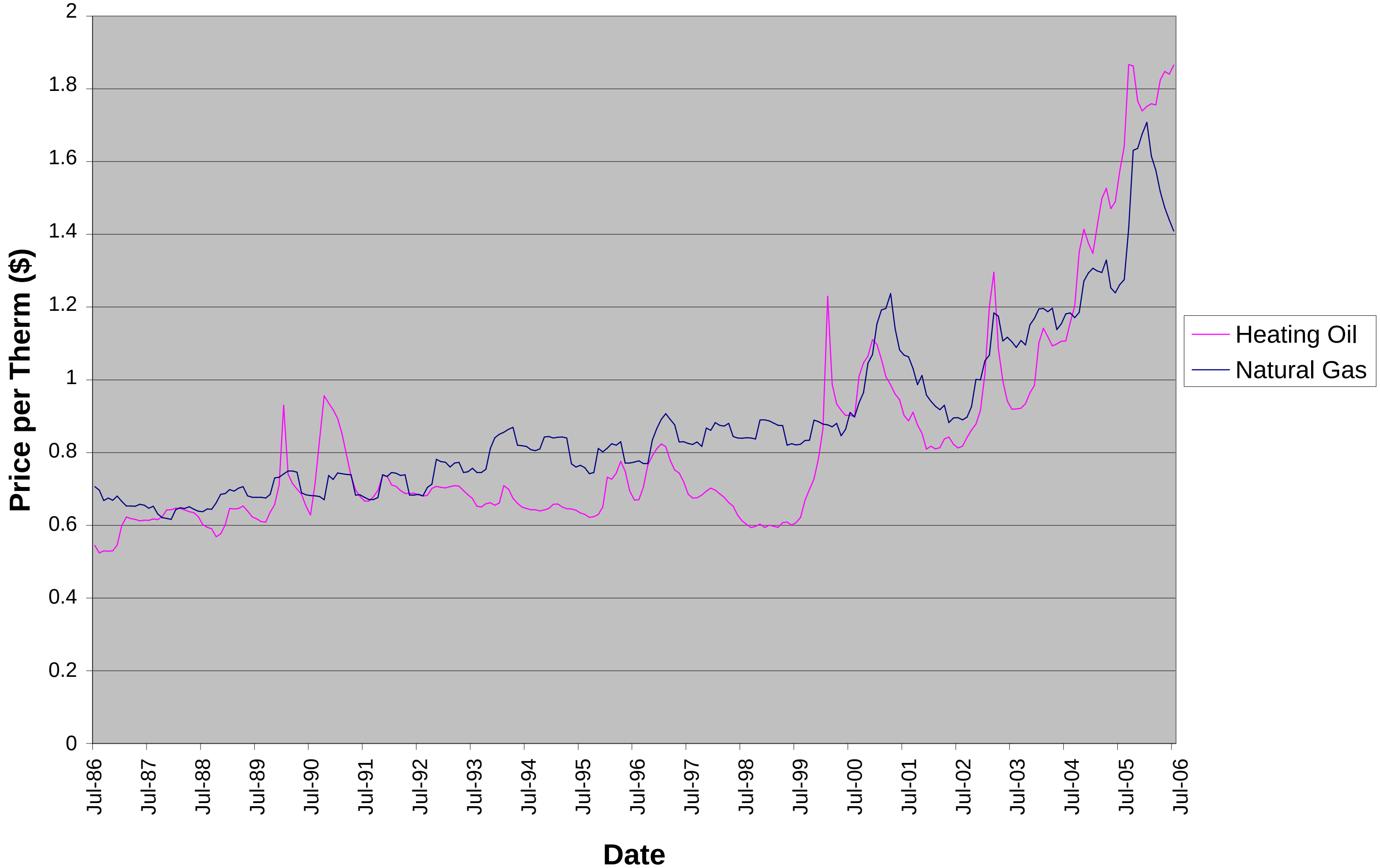
While natural gas is the predominant fuel used to heat homes across the United States, home heating oil is the predominant fuel used in the Northeast. Over the past several years, the price of heating oil has been very volatile—most notably in January 2000 when a dramatic temperature drop caused demand to increase, supplies to diminish, and prices to increase substantially. Price spikes and supply shortages have prompted many heating oil users to consider switching to natural gas. As described earlier in this report, heating oil dealers have responded by offering fixed- and capped-price contracts to help customers reduce their risk of paying unexpectedly high heating costs. The federal government has also helped reduce this risk by establishing the Northeast Home Heating Oil Reserve.[105] Because of the volatility in the price of heating oil, many consumers are considering the costs and benefits of switching to natural gas.

In addition to the volatility of heating oil prices, another motivation for converting from oil to gas would be the long-term rise in the price of heating oil. Over the past two years, the average national price per therm of heating oil has risen above that of natural gas. The differences are relatively small and long-term trends still suggest prices are about the same. Average prices in the Northeast, however, can differ from the national averages. In New England and the Mid-Atlantic, prices of the two fuels have been very close, with home heating oil the cheaper alternative for most of the past 20 years. Figures 5.10 and 5.11 show the average retail prices of home heating oil and natural gas since July 1986 for the U.S. as a whole and for the Northeast.[106]

[105] Established in 2001, the Northeast Home Heating Oil Reserve consists of 2 million barrels of oil set aside off the coast of Connecticut, Rhode Island, and New Jersey to be used only in the event of a sudden supply shortage. The Reserve is discussed more fully later in this report.

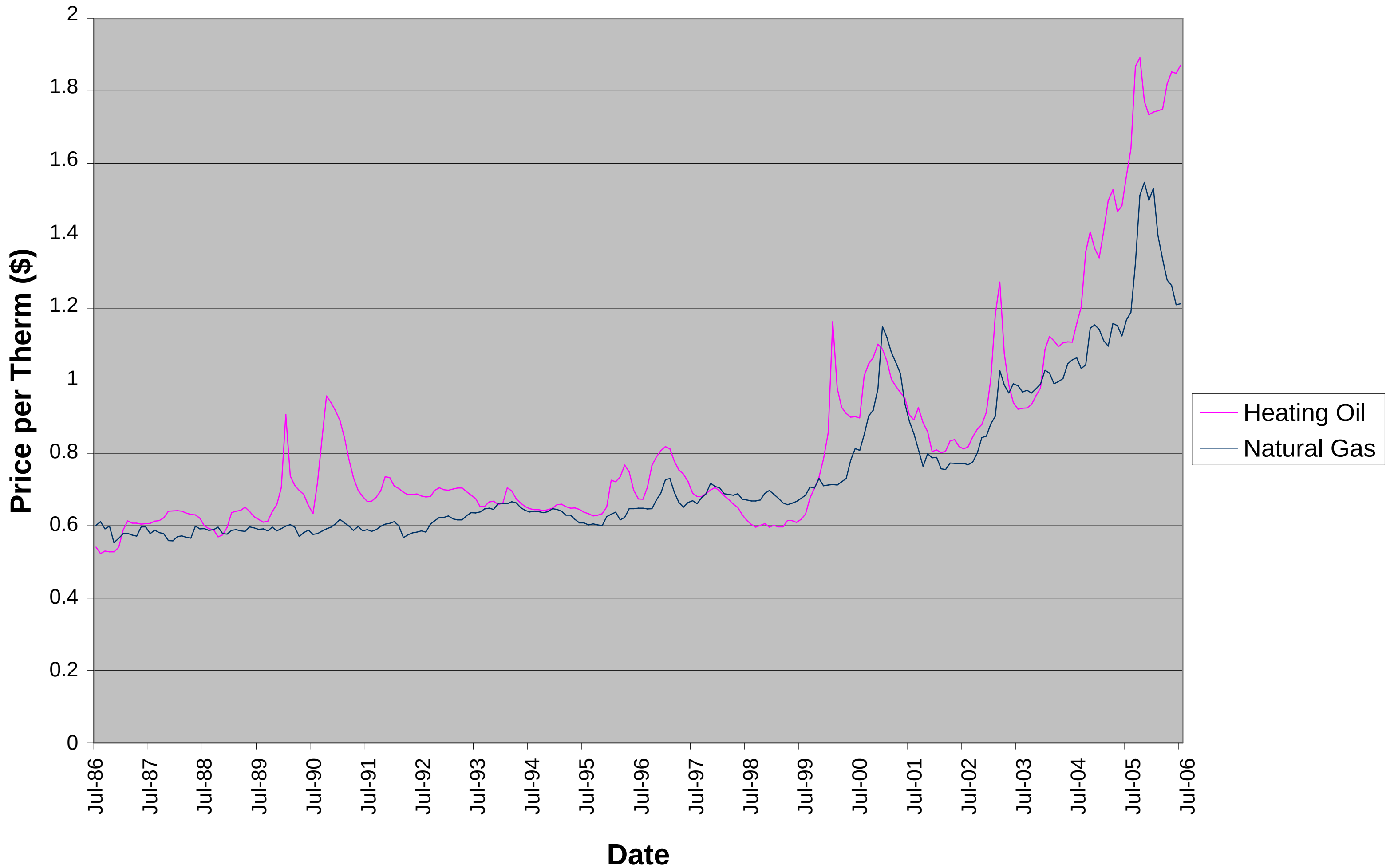
[106] Heating oil is priced per gallon while natural gas is priced per British Thermal Unit (BTU). In Figures 5.10 and 5.11, the natural gas prices have been converted to reflect approximately equal heat-content with a gallon of heating oil. Although some end-users seem to prefer oil heat to gas heat or vice-versa, generally speaking, burning a gallon of oil typically generates about 140,000 BTUs of heat.

FIGURE 5.10
HEATING OIL AND NATURAL GAS PRICES
NORTHEAST URBAN AVERAGES



Source: Consumer Price Index

FIGURE 5.11
HEATING OIL AND NATURAL GAS PRICES
U.S. URBAN AVERAGES



Source: CPI Average Price Data

The ease with which consumers can switch between these fuels is important because it determines the extent to which heating oil and natural gas should be considered substitute products competing in the same market. If, for example, it were costless to switch between heating fuels, then their prices would tend to equality. Conversely, if it were impossible to switch between these fuels, then their prices would diverge and they would not be substitutes from the perspective of consumers.

In reality, switching between fuels only seems to make economic sense for homeowners in limited circumstances.[107] Even if heating oil prices in the Northeast were to rise above gas prices in the future, unless the prices diverged substantially, the incentives for homeowners to switch fuels are not strong. A 2001 study by the Consumer Energy Council of America (CECA) found that switching from oil heat to gas is a bad investment at current prices and suggests that other home energy investments, such as conservation, equipment and appliance upgrades, and enhanced insulation are more cost-effective ways to save money on heating bills.[108]

There are two ways in which a user of home heating oil can switch to natural gas. One option is to replace an existing oil burner in a furnace or boiler with a gas burner. The other option is to replace the entire furnace or boiler with gas equipment.

Replacing an oil burner with a gas burner is generally not cost-effective. The costs of conversion are high, and there will likely be a loss of efficiency in the system.[109] In addition, other changes to the heating system, such as modifying the vent system flue or relining the chimney, may be necessary and any such changes will add additional costs. However, if a consumer needs to replace the entire furnace or boiler anyway, perhaps because it is damaged or old, then switching fuels may well be a viable option at that time. The expected lifetime of a furnace or boiler is more than 20 years, so every year, approximately 5% of consumers need to replace the entire system.

New gas furnaces and boilers have comparable efficiencies and costs to their heating oil counterparts. The following are current cost estimates for new heating equipment:[110]

[107] There may be non-economic reasons to prefer switching from heating oil to natural gas, namely, heating oil produces more particulate air pollution greenhouse gasses than natural gas.

[108] *Oil, Gas, or…? An Evaluation of the Economics of Fuel Switching Versus Home Energy Conservation.* Consumer Energy Council of America. March 2001.

[109] In 2001, the CECA estimated the costs of conversion to be $1600 and the loss of efficiency to be around 3%.

[110] The prices for furnaces and boilers are based on 2001 CECA estimates and then adjusted for inflation using the Consumer Price Index.

Equipment	Cost
80% efficient furnace	$2,130
90% efficient furnace	$3,080
80% efficient boiler	$3,800
90% efficient boiler	$4,880

But the actual furnace or boiler is only a part of the entire heating system. Switching from a heating oil to a natural gas system will likely require additional costs of conversion elsewhere in the heating system. Some of the products and services that may be required include:

- Installation of gas piping – Natural gas is brought to residences via pipelines connecting the heater to a central pipe known as a "gas main." Home heating oil, on the other hand, is transported via trucks and pumped into oil tanks located on the residence's premises. When switching to natural gas, the installation of a gas pipeline can be a substantial expense depending on the location of the gas main.

- Gas meter, regulator, and valves – Gas companies will sometimes subsidize the cost of this equipment to help attract new customers, but a consumer may have to pay some, if not all, of these expenses.

- Exhaust vent pipe replacement – There are differences between the types of exhaust pipes used by heating oil and natural gas systems. Heating oil equipment requires the use of an "atmospheric damper" while gas equipment uses a "draft diverter."

- Condensate pumps and drains – The condensation of water and gas vapors in the chimney and flue is a common safety problem with gas systems. This condensation can lead to flue blockages and debris build-up, both of which can result in carbon monoxide leaks and fires. Condensate pumps and drains minimize such safety hazards and are often needed with new gas systems.

- Chimney upgrades – State and local jurisdictions often mandate that chimneys be cleaned and sometimes relined when a system is converted from oil to gas. This is to minimize the safety hazards associated with condensation. In addition, gas systems often operate most efficiently when the chimney is a specific size. Chimneys used for oil heaters are often too large to work efficiently with gas heaters. After converting to gas, consumers may have to choose between either replacing the chimney or having the gas system operate at a sub-optimal level of efficiency. Both of these options impose additional costs upon the consumer.

- Disposal of the oil tank and remaining oil – Heating oil systems include fuel tanks that are typically located in the basement of the residence near the furnace or boiler. After converting to natural gas, the oil tank is no longer needed and depending on environmental regulations, the tank along with any remaining oil may need to be removed.

- Draft inducers or power vents – The pressure of the exhaust from new heaters is often lower than that of old systems. As a result, ventilation systems may be needed to help prevent build-up and corrosion.

- Sound vibration dampers and sound insulation – Additional equipment is sometimes needed to minimize the noise produced by high efficiency "pulse combustion" gas systems.

The cost of these products and services varies widely across residences. In some instances, the additional expenses associated with switching from heating oil to natural gas beyond the cost of the furnace or boiler itself can be upwards of $5,000. Conservative estimates, however, put the cost of conversion between $500 and $1,000.[111] With positive conversion costs and no appreciable benefits, as long as home heating oil and natural gas prices remain comparable on a (per therm) heating basis, there is little financial incentive to switch systems.

There is, however, another sector of the economy which is an important link between the natural gas and heating oil markets. Many large industrial complexes such as factories or electricity generation plants are "dual-fuel," which means they can switch between natural gas and heating oil as needed. For all Northeastern states, including New Jersey and Pennsylvania, these dual-fuel facilities can use an estimated 133,000 barrels of heating oil per day during the winter if they were converted entirely to oil. In the short-term, this does not happen regularly. While the differential in spot price between natural gas and heating oil can fluctuate throughout the year, there are still some costs associated with switching; with no expectation of a continuing price differential, a dual-fuel facility may simply continue to use its current fuel. In the long-term, however, if there are continuing price differentials, then dual-fuel facilities may decide to switch. This process helps to keep prices between natural gas and heating oil from diverging significantly.

A more subtle issue with dual-fuel facilities is "interruptible natural gas service." Natural gas companies can offer lower gas rates to dual-fuel facilities on the condition that the gas supply to the facility can be cut off if demand is too high to serve all the gas company's customers. That is, when the natural gas company has reached the limits of its distribution system in the midst of a cold front, it can stop supplying its dual-fuel customers. This means the dual-fuel customers will switch to heating oil. Thus, during a winter storm when the use of both natural gas and heating oil are rising, dual-fuel facilities may suddenly be forced to start buying in the heating oil market, driving up demand in heating oil even higher still. While interruptible service can help control demand spikes in the natural gas market, they can aggravate demand spikes in the heating oil market. The EIA studied the heating oil and natural gas markets in the Northeast during a particularly cold period (January 2000) and estimated that demand for heating

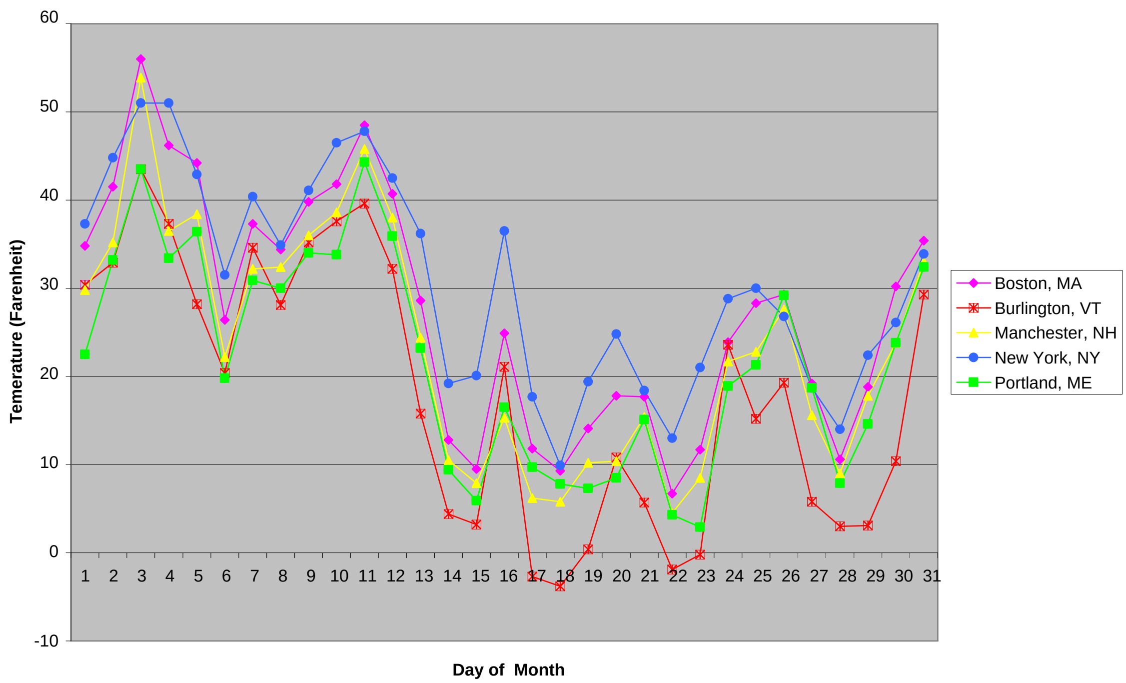
[111] The cost estimates are based on 2001 figures from the CECA.

oil increased by 78,000 to 84,000 barrels per day due to interruptible service contracts, or approximately 10% of the average daily consumption in January.[112]

D. The Northeast Home Heating Oil Reserve

In mid-January 2000, an extreme cold front hit the Northeast. Within one week, temperatures in Boston dropped almost 40 degrees Fahrenheit. New York City saw a similar drop in temperature while some areas of northern New England were faced with even larger temperature declines. As a result of this quick drop in temperatures, household heating requirements increased dramatically. Figure 5.12 below shows the average daily temperatures in one major city from each of the five states.

FIGURE 5.12
AVERAGE DAILY TEMPERATURES
JANUARY 2000



Source: National Climate Data Center, U.S. Department of Commerce

Prior to the January cold front, regional wholesalers had scaled back their inventories in anticipation of a decline in prices. Consequently, they were not prepared to meet such demand pressures. As a result, heating oil supplies in the Northeast were quickly depleted and prices rose sharply. Because most regional suppliers received their fuel from distant

[112] This is actually the estimate of the amount of heating oil that would have been needed to replace all of the interrupted gas supply. However, there were occasions where an interrupted customer found an alternative gas supplier or simply closed down temporarily. See "Impact of Interruptible Natural Gas Service on Northeast Heating Oil Demand", January 2001, Energy Information Administration.

sources (as described in Section III), it would take many days to replenish inventories. Exacerbating the problem, the cold weather and icy roads caused delivery problems at the retail level, even preventing the heating oil from reaching end-users.

By mid-February 2000, heating oil stocks were replenished and temperatures had returned to normal. The effects of the shortage, however, were not forgotten and there was an effort to ensure the crisis would not happen again. On November 9, 2000, Congress passed the Energy Act, which authorized the Department of Energy (DOE)"to establish, maintain, and operate in the Northeast a Northeast Home Heating Oil Reserve." The Reserve would hold 2 million barrels of heating oil, which is approximately 1.4% of the total heating oil used in the Northeast in 2004. As outlined in the Act, in the event of another heating oil shortage, the DOE is authorized to sell the heating oil contained in the Reserve. The Northeast Home Heating Oil Reserve was formally established on March 6, 2001.

The Reserve consists of two million barrels of oil off the coasts of Connecticut, Rhode Island, and New Jersey. The Department of Energy maintains contracts with three companies to store this oil: Motiva Enterprises, Morgan Stanley Capital Group, and Amerada Hess Corp. The DOE has one-year contracts with each of these three companies with a four-year option for renewal. The renewal option is set to expire on September 30, 2007. Table 5.9 lists information for each of the four Reserve terminals.

TABLE 5.9
THE NORTHEAST HOME HEATING OIL RESERVE TERMINALS

Company	Terminal Name	Terminal Location	Barrels of Oil
Motiva Enterprises, LLC	Motiva	New Haven, CT	250,000
Motiva Enterprises, LLC	Motiva	Providence, RI	250,000
Morgan Stanley Capital Group	Magellan Midstream Partners, LP	New Haven, CT	500,000
Amerada Hess Corp	Hess First Reserve	Woodbridge, NJ	1,000,000
Total			2,000,000

Source: U.S. Department of Energy

For the Reserve to be accessed, the President of the United States must find that the there has been a "severe energy supply interruption" as defined by the Energy Policy and Conservation Act: the price difference between residential heating oil in the Northeast and crude oil must be more than 60% greater than its 5-year rolling average differential for that month. This differential must continue for two consecutive Mondays, and the price differential of the second Monday must be higher than the first Monday. By comparison, in the 2003-2004 winter, the differential between heating oil and crude oil was never more than 15% higher than the 5-year average differential. In the 2004-2005 winter, the differential was never more than 45% higher than the average differential, and it was never above 40% for two consecutive Mondays.

If the President authorizes the release of oil in the Reserve, the DOE notifies the storage terminals of the potential release. The terminals respond by providing the DOE information on inventories, activity, and distribution capabilities. The DOE, in consultation with the terminals, issues a Reserve Capability Statement identifying available terminals and inventories for sale. The day after the DOE issues the sale notice, heating oil becomes available for purchase via an online auction. Eligible bidders submit bids over a specified time period (typically 2-3 hours) via the internet. After the bidding closes, the DOE evaluates the bids and sends a notification listing the purchasers who have been awarded the heating oil. The entire sales process should be completed within 48 hours of the original notice. The bidder must then wire the DOE the money for the oil within 48 hours of receiving notice he was a winning bidder. Retailers make their requests to terminals and schedule delivery on a first-come, first-serve basis. All delivery must be completed within ten days. Thus, the entire process from supply disruption to delivery to the consumer takes place in a compressed time frame in accordance with the Reserve's goal of handling only short-term supply problems.

One potential concern raised by the Heating Oil Reserve is that it could lead terminal operators to decrease their stocks of heating oil, thus helping to create the disruptions the Reserve intends to eliminate. If releasing stocks from the Reserve is done regularly whenever prices are deemed too high, terminal operators discount the possibility that they will be able to sell their heating oil at high prices. This effectively lowers the price that terminal operators can expect to receive for heating oil, and thus lowers their incentive to keep adequate stocks on hand. But if releasing heating oil from the Reserve is a relatively rare event, as it seems to be thus far, then terminal operators could be expected to keep their heating oil stocks roughly where they would be even without the Reserve.

VI. Futures Markets for Petroleum Products

A. *Introduction to futures markets*

As we saw in the previous section on home heating oil, some consumers may be interested in purchasing a fixed-price contract to avoid the risks of volatile prices. Like consumers, businesses may also face risks that they would prefer to avoid. An American corporation selling goods in Mexico may not want its profits to fluctuate according to a Dollar-Peso exchange rate that it cannot control. A farmer might fear that the price for which he can sell his crop will fall. Or, like the farmer, an oil producer may fear the price of oil will fall, thus not only hurting its revenue but also disrupting its ability to make sound production and investment decisions.

In each of these cases, a "futures contract" is one way in which businesses can avoid these risks. A futures contract is an agreement to exchange a specific good at a particular time and location for an agreed price—perhaps 100,000 barrels of light sweet crude oil delivered to New York Harbor on December 15 at a price of $69.32 per barrel. The price in the contract is the "futures price." The date is the "delivery date" or "maturity date." Specifically, one party to a futures contract agrees to sell a given quantity of a good on the delivery date at the futures price while the other party to the contract agrees to buy that quantity of the good on the delivery date.[113] The holder of a futures contract has both the *right* and the *obligation* to buy or sell the good at that time and is thus required to exercise the contract on the delivery date.

For example, when a farmer is deciding how much wheat to plant in the spring, she can at that time enter into a futures contract and secure the ability to sell her wheat in the summer at the agreed futures price. She can then make all of her production decisions, from planting to harvesting, knowing how much she will receive for her wheat, and so know how much profit she will make per harvested bushel. Although she will not benefit if the market price (or "spot price") of wheat rises above her futures price when summer comes, she will not lose if the spot price falls below her futures price.

The opposite side from the farmer in a wheat futures contract could be a baker. Whereas the farmer fears a fall in the price of wheat, a baker fears a rise in price that would raise his cost of making bread and adversely affect his profits. But the baker can similarly fix how much he will pay for wheat if he enters into a wheat futures contract with the farmer. The baker agrees to purchase the farmer's wheat at the agreed futures price on the delivery date, and the farmer agrees to sell at the futures price at the same time. If the

[113] As will be discussed below, futures markets typically take place on exchanges where there is no simple one-on-one match-up between buyers and sellers as described in this section. Explication of the basics of futures, however, is easier when considering the idealized perfect match between a buyer and a seller. This simplified, bilateral contract is a "forward contract." These contracts are also very common, but they are not traded on an exchange. See, e.g., Svi Bodie, Alex Kane, Alan K. Marcus (2005), *Investments*, McGraw-Hill/Irwin; New York Mercantile Exchange web site, nymex.com; and "The Role of Market Speculation in Rising Oil and Gas Prices: A Need to Put the Cop Back on the Beat," U.S. Senate Permanent Subcommittee on Investigations (June 17, 2006).

spot price ends up higher than their agreed futures price, the farmer would have made more money without the futures contract; if the spot price ends up lower than the futures price, the baker would have made more money without the futures contract. The two sides of the futures contract compete in a "zero-sum" game: The amount of money that the farmer gained (or lost) by entering into the futures contract is equal to the amount that the baker lost (or gained). No profits are directly generated by the futures contract, but both the farmer and the baker have benefited from the reduced risk that a futures contract provides.

The farmer may end up producing more or less wheat than she agreed to deliver in the contract, but she is nevertheless required to deliver exactly the amount specified in her contract. If she produces more wheat, she can sell the remainder in the open market at the "spot price," where delivery takes place immediately, as in a normal market. But if she produces less wheat, she must purchase wheat in the spot market to deliver to the baker per their contract. Thus, the farmer has not entirely removed all of her risk by using a futures contract. The same principle applies to the baker—he either purchases additional wheat in the spot market if he ultimately needs more than he agreed to purchase, or he sells wheat he contracted to buy from the farmer if he needs less than he agreed to purchase.

Now suppose that the only potential buyer of wheat is the baker and that if the price of wheat rises, the baker has no trouble raising the price of bread to compensate for his increased costs. A fluctuating price of wheat is not a risk to his business. In this case, the baker has little need to purchase a futures contract for wheat since the price of wheat does not affect his profit overall. Without a counterpart that balances the farmer's need to reduce risk, the farmer would not be able to enter into a futures contract. The farmer would remain exposed to the volatility of the market price of wheat. However, someone other than the baker may be willing to enter into a futures contract with the farmer, purchase the wheat from her on the delivery date, and then sell to the baker at the spot price in the market. In this case, the farmer is again able to eliminate the risk of volatility in price and pass it on to this third party. Because this third person is neither a producer nor a consumer of wheat, he is a "speculator."

The speculator primarily makes money in two ways. First, market price fluctuations could put him on the "winning side" of the futures contract, where the futures price that he must pay the farmer is lower that the price for which he can sell the wheat in the market. He then makes money on the price difference. Second, as the farmer wants to reduce her risk, she may be willing to accept a futures price below what the market price is expected to be; and as the speculator is taking on risk, he may similarly *require* a futures price below the expected spot price to compensate him for the increased risk. Transferring the risk in this way makes it more likely that the speculator will end up on the winning side of the futures contract. Even though the speculator is neither a producer nor consumer of wheat, he does provide a very useful service to the farmer; namely, he takes on the farmer's risk.[114]

[114] This is not dissimilar to how insurance companies work. Car owners, for example, transfer much of the risk of losing the value of their car from an accident to a third party unrelated to the actual accident, the

B. *Futures markets for crude oil, gasoline, and heating oil*

The simple example with the farmer, the baker, and the speculator was used to illustrate why the different entities may wish to enter into a futures contract. In fact, these types of bilateral contracts are very common. Homeowners enter into fixed-price contracts directly with heating oil dealers for oil delivered months later. Corn growers call their local processing plant in the spring and arrange to sell their product in the summer to ensure the processor can accommodate their corn. But commodities futures markets, including the petroleum based commodities, are historically traded on a formal exchange which simplifies the process in many ways, but complicates it in others.

For petroleum products, the primary exchange is the New York Mercantile Exchange (NYMEX). Whereas the simple example had the farmer and the baker choosing exactly how much wheat to exchange and where it should be delivered, NYMEX organizes a very small number of futures contracts. All trading takes place among these limited contracts. For light sweet crude oil, NYMEX only has contracts denominated in either 500 or 1,000 barrels. All crude oil is arranged for delivery in Cushing, Oklahoma. NYMEX coordinates futures for delivery within a specific month, for up to 72 months into the future. Trading of each contract stops approximately 10 days before the delivery month.[115] For example, one could sell four, 1,000 barrel contracts to deliver oil to Oklahoma in February, 2007. If one has not sold these contracts prior to late January, then the delivery must take place. It is not possible to purchase a 2,200 barrel contract, and it is not possible to specify that delivery be made to anywhere other than Oklahoma. Gasoline, heating oil, and diesel all have similar types of futures contracts, although the quantities and delivery points are different. Gasoline, heating oil, and diesel are all delivered to New York Harbor in 42,000 gallon quantities, although diesel and heating oil are combined and traded on the futures market as heating oil, or rather fuel oil no 2.[116]

Table 6.1 gives information on petroleum product futures traded on NYMEX as well as futures prices as of September 6, 2006 for the following six months. For example, heating oil is traded in 1,000 barrel increments and delivered to New York Harbor. Trading takes place for contracts from anywhere between 1 and 18 months into the future. On

insurance company. For the benefit of reducing their risk, consumers are willing to pay more on average in insurance premiums than they will save in the event of an accident, and for the cost of increasing their risk, insurance companies require premiums that will on average total more than their disbursements to car owners.

[115] The closing date rule is: "Trading terminates at the close of business on the third business day prior to the 25th calendar day of the month preceding the delivery month. If the 25th calendar day of the month is a non-business day, trading shall cease on the third business day prior to the business day preceding the 25th calendar day." See http://www.nymex.com/CL_spec.aspx for complete specifications of the light sweet crude contracts, and elsewhere on the same website for many other commodities.

[116] Heating oil and diesel is not exactly the same product—primarily differing in sulfur content. However, the two products trade at very stable price differences with each other. So for the purposes of hedging risk, it is not necessary to have contracts for both heating oil and diesel.

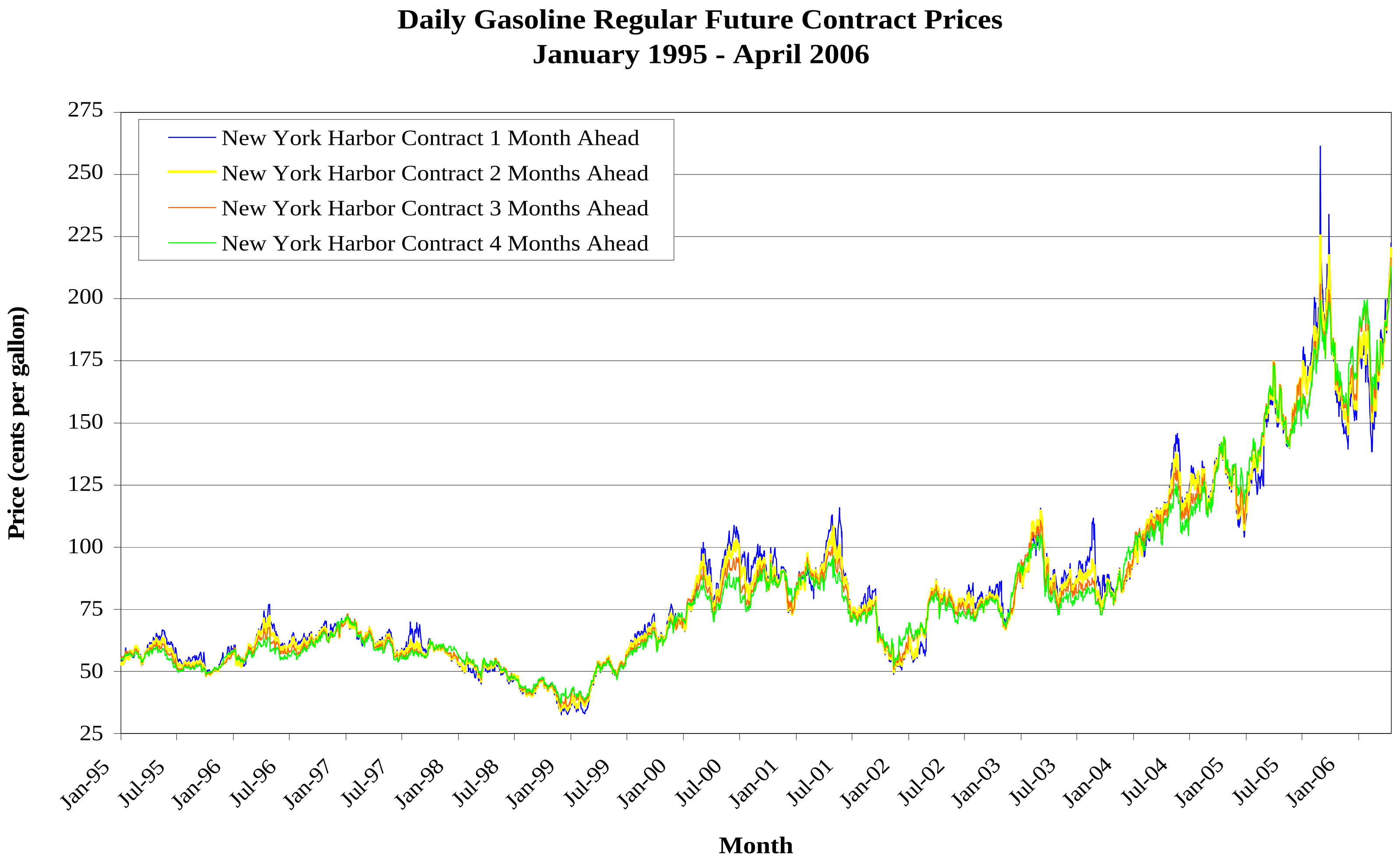
September 6, 2006, the spot price was $1.84 per gallon, heating oil delivered in October was $1.84 per gallon, $1.91 per gallon in November, $1.96 in December, $2.00 in January, $2.03 in February, and $2.03 in March. The general increase in the futures price extending out to March indicates that market participants expect that heating oil will be more expensive in the late winter. Figures 6.1 and 6.2 plot the one, two, three, and four months ahead futures prices for gasoline and heating oil, respectively.

Table 6.1
NYMEX Petroleum Product Contracts and Futures Prices
(Prices as of 09/08/2006)

Product	Denomination	Delivery Location	Availability into Future (months)	Spot Price	Future Oct. '06	Future Nov. '06	Future Dec. '06	Future Jan. '07	Future Feb. '07	Future Mar. '07
Light Sweet Crude Oil	Standard (1,000 bbls)	Cushing, Oklahoma	60-72	67.75	66.25	67.38	68.33	69.13	69.80	70.36
Light Sweet Crude Oil	miNy (500 bbls)	Cushing, Oklahoma	60-72	67.75	66.25	67.38	68.33	69.13	69.80	70.36
Natural Gas	Standard (10,000 mmBtu)	Sabine Pipe Line Co., Henry Hub, Louisiana	72	5.73	5.68	7.61	9.52	10.19	10.23	10.04
Natural Gas	miNy (2,500 mmBtu)	Sabine Pipe Line Co., Henry Hub, Louisiana	72	5.73	5.68	7.61	9.52	10.19	10.23	10.04
Heating Oil	Standard (1,000 bbls)	New York Harbor	18	1.84	1.84	1.91	1.96	2.00	2.03	2.03
Heating Oil	miNy (500 bbls)	New York Harbor	18	1.84	1.84	1.91	1.96	2.00	2.03	2.03
Gasoline	Standard (1,000 bbls)	New York Harbor	12	1.66	1.61	1.65	1.68	1.69	n/a	n/a
Gasoline	miNy (500 bbls)	New York Harbor	12	1.66	1.61	1.65	1.68	1.69	n/a	n/a
RBOB Gasoline	Standard (1,000 bbls)	New York Harbor	12	1.67	1.64	1.70	1.73	1.76	1.79	1.82
RBOB Gasoline	miNy (500 bbls)	New York Harbor	12	1.67	1.64	1.70	1.73	1.76	1.79	1.82

Source: www.nymex.com. Crude oil prices are dollars per barrel. Heating oil, gasoline, and RBOB gasoline prices are per gallon. Natural gas prices are dollars per mmBTU.

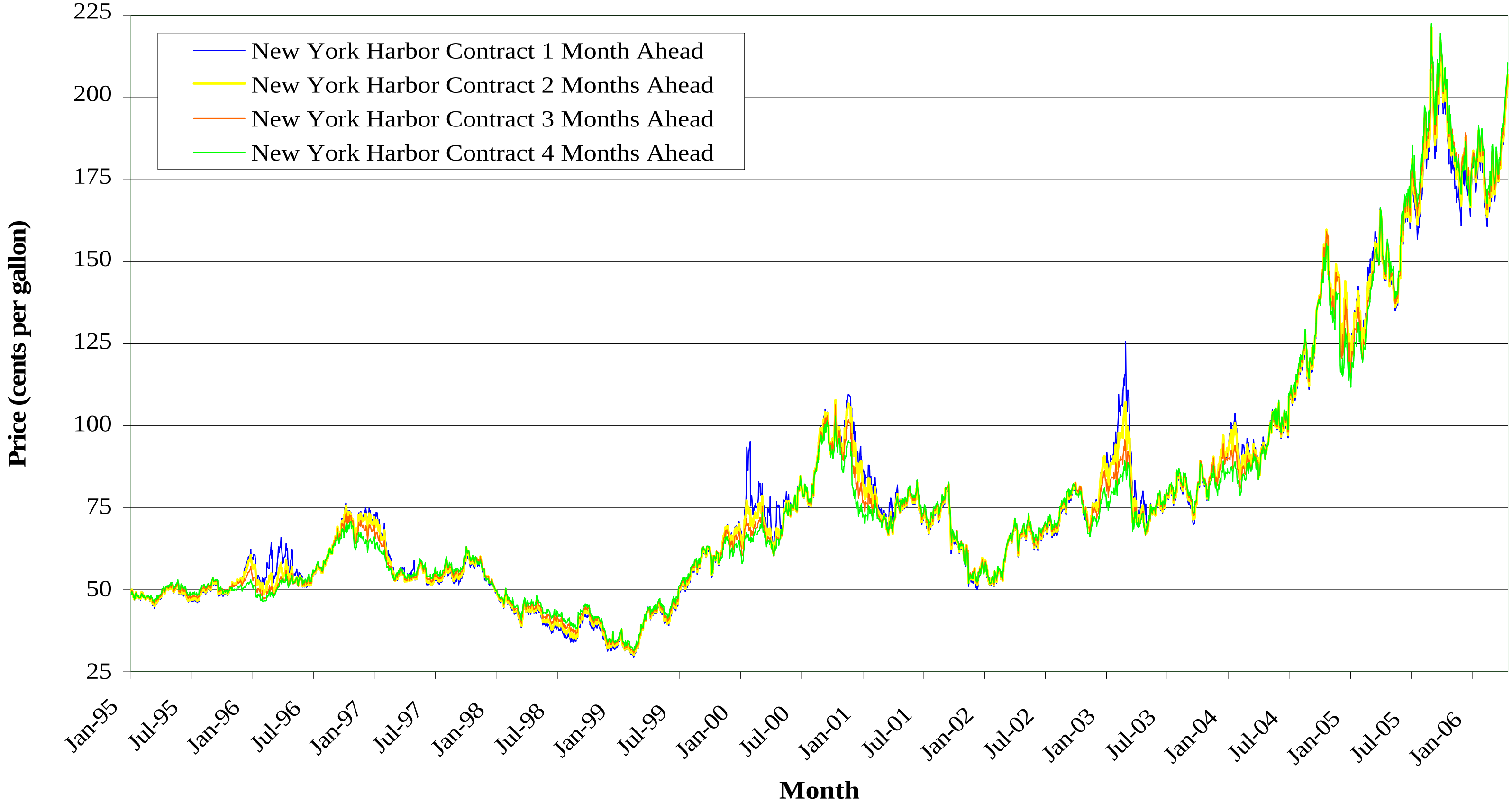
FIGURE 6.1



Source: Energy Information Administration, 2006.

FIGURE 6.2

Daily Heating Oil Regular Future Contract Prices
January 1995 - April 2006



Source: Energy Information Administration, 2006.

The few available contracts in quantity, time, and place, may at first appear to severely limit the usefulness of futures contracts. An oil producer in Alaska is probably not interested in sending crude oil to Oklahoma: It would perhaps need to transport the oil down the Alaskan pipeline, onto a tanker going down the west coast, through the Panama Canal to the Gulf Coast, and then up by pipeline to Oklahoma. This oil could then be purchased by a refinery in California, thus requiring that the oil reverse its course of travel as far as Martinez, California. This is inefficient both in transportation costs and in transaction costs between the parties shipping the oil. Similarly, a gasoline terminal in Vermont does not want its gasoline in New York Harbor, only then to arrange shipping to Vermont. It would prefer to purchase gasoline that would be delivered directly to the terminal. Because of inefficiencies like these, only a small proportion of futures contracts are executed, with products being delivered to the appropriate locations. However, one can use futures contracts to reduce risk without actually executing the contract. That is, the oil producer in Alaska can use a futures contract to reduce its risk without ever delivering oil to Oklahoma, as can a terminal operator without purchasing gasoline in the New York Harbor. This is accomplished by selling the futures contract prior to the delivery date.

To again take a stylized example that directly links a buyer and seller, suppose that in January, when the spot price for crude oil is $68 per barrel, the Alaskan oil producer purchased a contract to sell crude oil in Oklahoma in June at $72 per barrel. There would be a corresponding buyer who agreed to buy the crude oil for $72 per barrel. As time passes toward the delivery date, the futures price for delivery in June will fluctuate based on the market's expectation of what prices will be in June. Suppose that in March, the futures price for June delivery rises to $74 per barrel; that is, if the buyer and seller returned to the futures market in March for an additional contract, the price would be $74 per barrel. The producer of oil has implicitly *lost* money as of March, since he has committed to sell for $72 per barrel in June, but if he were making the commitment in March, he would be able to get $74. Likewise, the buyer has implicitly *earned* money since she has the right to buy oil in June for $72, but in March, she could sell that right for $2 per barrel.[117] Both the buyer and the seller can "close out" their futures position in the following way: The oil producer can, in March, return to the futures market and purchase a contract to *buy* crude oil at $74 per barrel. He thus holds one contract to sell at $72 and another to buy at $74. These are "offsetting" contracts—on net, the oil producer is neither buying nor selling oil, but he does need to pay the $2 difference between the futures prices. Similarly, the buyer can, in March, purchase a contract to *sell* crude oil at $74 per barrel. Again, on net, the buyer need not receive or deliver oil to Oklahoma, but can keep the $2 per barrel earned as of March.

[117] It might seem strange to speak of buyers and sellers winning and losing in the futures market when the main reason they purchased a futures contract in the first place was to fix the price they pay or receive for oil. In this instance, "winning" and "losing" is thought of in terms of opportunity cost. The oil producer may have a contract to sell oil at $72 and he can always keep that contract and execute it in June. However, if the spot price in June for crude oil is $74, he has implicitly lost $2 per barrel, since he is forced to sell at $72. Or, if the spot price has drop to $69, he has implicitly earned $3 per barrel, since he gets to sell at $72 whereas if he had to sell in the spot market, he would only get $69.

This has eliminated some of the risk for both the buyer and the seller in the sense that buyer can secure a certain $2 per barrel premium, thus cushioning any fluctuations in the spot price by June. Likewise, the seller can accept a $2 loss, avoid the possibility of losing still more, and take his chances on the spot market. Both the buyer and the seller can eliminate virtually all of their risk if they do not close out their contracts until the end of May. There is far less uncertainty in May about the spot price of oil in June. Consequently, the futures price for June delivery will continue to approach the spot price, and the possibility of spot price fluctuations continues to fall. If the buyer and the seller do not close out their positions until May, then they are nearly certain of how much money they have either earned or lost.

The ability to close out positions with offsetting transactions enables both buyers and sellers to reduce their risk without literally trading oil, regardless of where the contract specifies the crude oil is supposed to be delivered. Closing out positions is also the reason that speculators can enter the futures market. Speculators neither produce nor use the product; they only trade the product. But, by closing out their positions, speculators can participate in the futures market in much the same way as the oil companies.

When trading is taking place, NYMEX never matches buyers and sellers together directly in the way I have described. In fact, NYMEX, as a clearinghouse, is the implicit purchaser of all contracts, and NYMEX adjusts the futures price to balance those in the market wishing to purchase oil and those wishing to sell. At the end of each day, the clearinghouse closes out the positions of all traders in the market, and those traders who are "in the money" receive a credit in their account for money they earned, and those who are "out of the money" must make payment into the account to cover their losses. Closing out positions daily is called "marking to market." NYMEX also serves as a guarantor that anyone who is owed oil (or money) is paid, and anyone who must deliver oil (or money) will deliver. Finally, after trading for the particular futures contract has ended, NYMEX matchers up those buyers and sellers who are executing their contracts in as efficient manner as possible and the product is traded in the designated location at some point during the month of the futures date.

C. Regulation and the over-the-counter market

Commodities futures markets, including NYMEX where petroleum futures are traded, are regulated by the Commodity Futures Trading Commission (CFTC). The CFTC is responsible for monitoring exchanges for price manipulation or "excessive" speculation. Specifically, the Commodity Exchange Act directs the CFTC to take appropriate steps to control "Excessive speculation in any commodity under contracts of sale of such commodity for future delivery...causing sudden or unreasonable fluctuations or unwarranted changes in the price of such commodity, is an undue and unnecessary burden on interstate commerce in such a commodity."[118] To this end, the CFTC has in

[118] Commodities Exchange Act, as quoted in "The Role of Market Speculation in Rising Oil and Gas Prices: A Need to Put the Cop Back on the Beat," U.S. Senate Permanent Subcommittee on Investigations (June 17, 2006).

place reporting rules that aid in its oversight of the market. All NYMEX traders are required to keep a complete record of all trades. Large trades must be reported directly to the CFTC. Using this information, in conjunction with price and volume information for the exchange, the CFTC can monitor trading for what it deems to be price manipulation or excessive speculation.

Complicating the CFTC's oversight, however, has been the recent significant growth of "over-the-counter" (OTC) trades which do not take place in a formal exchange and are not subject to CFTC regulations. Originally, OTC trades were between two parties that agreed on price, quantity, and delivery location, similar to the example I used above with the farmer and the baker. Negotiations took place on the phone or in person over all aspects of the contract. These contracts were uniquely written for the needs of the buyer and seller, and consequently, they were for the most part executed at the delivery date; they were rarely sold or traded to anyone else. The CFTC considered these bilateral contracts, and so they were not subject to governmental oversight. Unlike traders on NYMEX, OTC traders are not required to keep records of their trades, nor are they required to report large trades to the CFTC. There is no limit on the number of contracts a trader can hold and there is no reporting on the number of outstanding contracts at the end of each day. Much of the lack of regulation is the result of a provision that was added to the Commodity Futures Modernization Act of 2000. The provision, which was lobbied for by large energy traders, including Enron, exempted OTC trading from CFTC oversight. It is frequently referred to as the "Enron loophole."[119]

With the rise of electronic trading, OTC contracts became easier to trade, and contracts traded in the OTC market became more standardized. These contracts came to look more and like the NYMEX futures, so much so that they are often dubbed "futures-look-alikes." The standardization of contracts enables traders to easily purchase a contract and then, if needed, cash out with an offsetting contract. Contracts need not be literally bilateral anymore since contracts increasingly are not expected to be executed at the delivery date. At this point, speculators can participate in the market, which means that speculators are influencing the futures markets without the CFTC knowing what they are doing. Yet, because of the clear interactions between NYMEX and look-alike trades on the OTC, actions in the OTC affect actions in the NYMEX.

The lack of regulation of OTC trades leaves the market vulnerable to manipulation by large petroleum companies. The British oil giant, BP, is currently being investigated for allegedly manipulating the energy market via OTC trades in 2003 and 2004. BP controls many of the storage tanks in Cushing, Oklahoma, the delivery location for light, sweet crude oil traded on NYMEX. While the details of the investigation have not been disclosed, the ability to control storage facilities in Cushing places BP in a position where

[119] U.S. Senate Permanent Subcommittee on Investigations (June 17, 2006), "The Role of Market Speculation in Rising Oil and Gas Prices: A Need to Put the Cop Back on the Beat."

it could potentially manipulate storage capacity and impede the delivery of oil traded in a futures contract.[120]

As a hypothetical example of how the owner of storage terminals in Cushing could potentially manipulate the market, suppose the terminal enters into futures contracts to sell crude oil. Then, the terminal overstates its inventory, and indicates it will not have space available for any oil futures contracts being delivered in the next month. An oil producer with a futures contract who intends to deliver product to that terminal would then be faced with additional costs if it wants to deliver the oil to Cushing since it must arrange a new terminal for storage. Rather than face the additional costs of delivery, the producer may instead opt to sell the contract. This would cause the price of oil to drop in both the NYMEX and OTC markets. The terminal still holds its futures contract, which gains value as traders sell their futures on the (false) impression that there is no space for delivery. In other words, the terminal owner can manipulate a drop in the futures price by strategically lying about its spare capacity. The CFTC has a decreased ability to watch for this kind of manipulation since it can take place on the unregulated OTC markets. Without information on who is trading what, the CFTC cannot investigate whether a large refiner, terminal, producer, or speculator is manipulating the market. The CFTC's job is even more difficult in that, unlike stock trading, it is not necessarily illegal for a trader of petroleum futures to use inside information (such as storage capacity) to profit; it is, however, illegal to use inside information to deliberately influence prices.

Adding to regulatory problems is the recent rise of U.S. gas and oil futures trading on the Intercontinental Exchange (ICE). The ICE is a London-based exchange which is regulated by the United Kingdom Futures Authority. In 1999, the ICE, with permission from the CFTC, opened trade sites in the U.S. to facilitate trading of European energy commodities on the ICE. In January 2006 the ICE began trading a futures contract for crude oil that is produced and delivered in the U.S. This contract can be traded not only in Europe, but also at the trading sites in the U.S. Despite the fact that the trades are of U.S. products being conducted at U.S. trading sites, the CFTC does not monitor the transactions. As is the case with OTC trades, large ICE trades are not reported.[121]

D. Speculators, futures markets, spot prices, and fundamentals

Futures prices should reflect the expected spot prices in the delivery month. But there is also the possibility changes in the futures price can affect the current spot prices. For example, suppose that energy traders expect the price of crude oil to be $72 next month, but the spot price is only $68 today. This could encourage oil producers to withhold crude oil from today's market, since they expect to be able to sell it for more next month, so long as the cost of storing the oil is not too high. This could in turn raise today's spot price of oil as companies withheld supply to sell next month, and lower the futures price

[120] John Wilke, Ann Davis, Chip Cummings (August 29, 2006), "BP Woes Deepen with New Probe," *The Wall Street Journal*.

[121] U.S. Senate Permanent Subcommittee on Investigations (2006).

as energy traders expect additional amounts to be sold on spot markets next month. This is appropriate if traders in both the spot and futures markets are acting on beliefs about the "fundamentals of supply and demand."[122] However, some worry that speculators can drive up the price of futures for reasons other than fundamental supply and demand, which can in turn drive up the spot price. This could be similar to a commodity like gold where the price reflects not only the actions of those who produce and use gold, but also by investors (i.e., speculators) who use gold as an investment tool.

Some analysts contend that speculators have contributed to rising oil and gas prices. Tim Evans, a senior analyst at IFR Energy Services in New York, believes that over-speculation in the markets has played a large role in the increase in oil prices.

> What you have on the financial side is a bunch of money being thrown at the energy futures market. It's just pulling in more and more cash. That's the side of the market where we have runaway demand, not on the physical side.[123]

While there is strong evidence that investment in U.S. energy markets has increased by mutual, pension, and hedge funds, the unreported trading on OTC and ICE markets make it difficult to quantify the increase. The lack of empirical evidence makes it difficult to either substantiate or refute the hypothesis that speculation has significantly impacted the price of petroleum products. Without empirical data, assessing the effect of speculators in the futures market on current spot prices is very difficult and subject to much uncertainty.

If there is over-speculation in the market for futures, the increased demand for oil futures would have the same effect as an increased demand for the physical product. Both factors would drive up the price of oil. In practice, however, the correlation between speculation and prices is easier to establish than is the causality. It is difficult to distinguish between rising prices fueled by over-speculation and rising prices brought about by the fundamentals of supply and demand. Further, it could be that the entrance of speculators induces increasing prices; or, increasing prices could be inducing more speculators to enter the market because they see opportunities to profit. Empirically, these two situations look very similar.[124]
A recent Senate investigation looked at the role speculators have had on the petroleum product markets. While recognizing that a difficult problem is made worse due to the lack of available data, the report referenced a number of reports from industry analysts.

[122] The language of "fundamentals of supply and demand" is often used when considering whether something is a bubble, but there is no definition of the concept. It is a concept used loosely to describe the actions taken by those who actually produce or consume the good, and not any intermediaries like speculators. What constitutes a divergence from the fundamentals is rarely known with certainty beforehand. The presence of speculators is not sufficient to conclude there is a divergence since they may be providing a genuine service to the producers and consumers, and as such, are part of the "fundamentals" of the market.

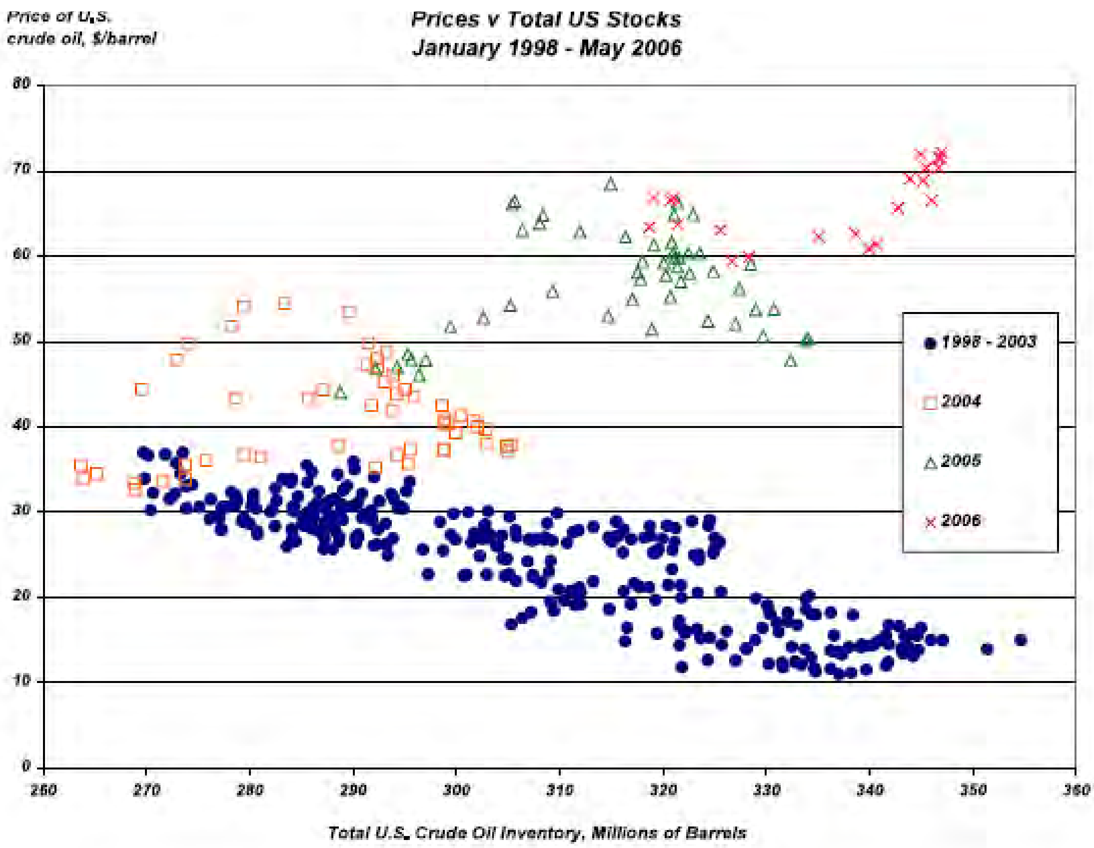
[123] June Kim and Patricia O'Connell (April 27, 2005), "Oil: A Bubble, Not a Spike?" *BusinessWeek*.

[124] U.S. Senate Permanent Subcommittee on Investigations (2006)

Former Federal Reserve Chairman Alan Greenspan testified that the investment community had driven up prices sooner than they would have otherwise. Citigroup found an increase in speculative positions across a broad range of commodities, especially natural gas and crude oil, and concluded this had contributed to the surge in commodity prices. A Goldman Sachs report in late 2004 estimated that speculators had pushed the price of crude oil up about $7 per barrel. An analysis by Philip Verleger for *The Petroleum Economics Monthly* notes that the number of very long-term, unexecuted contracts in crude oil increased more than 600% from July 2001 to July 2005, and he suggests that the increased demand in the very long term has had a ripple effect that increased demand in earlier time periods. However, as described above, this ripple effect is driven by producers withholding crude oil from the market. At some point, producers will release this oil onto the spot market, and Verleger believed that would usher in a period of very low prices.

There is perhaps some evidence to think that Verleger could be correct in thinking that increased speculative investing is causing producers to withhold their inventory instead of releasing it on the spot markets. As shown in Figure 6.3, from 1998 to 2003, the price of crude oil has been lower when the total US stocks has been higher. This is only correlation, not causation: the figure does not show whether low prices caused higher inventories, or high inventories caused lower prices. But a change does seem to have taken place in 2004 to 2006. In this time frame, higher prices are correlated with high inventories. While neither of these relations, by themselves, is evidence that speculators have affected the spot price of oil, the *change* in correlation coinciding with a change in the degree of market participation by speculators could be seen as evidence that speculators were driving up spot prices through activity on the futures markets. However, causality is still difficult to determine. The producers and consumers may feel that the crude oil market is to become increasingly risky, and they are thus offering a risk premium to investors willing to accept the burden of this risk.

FIGURE 6.3

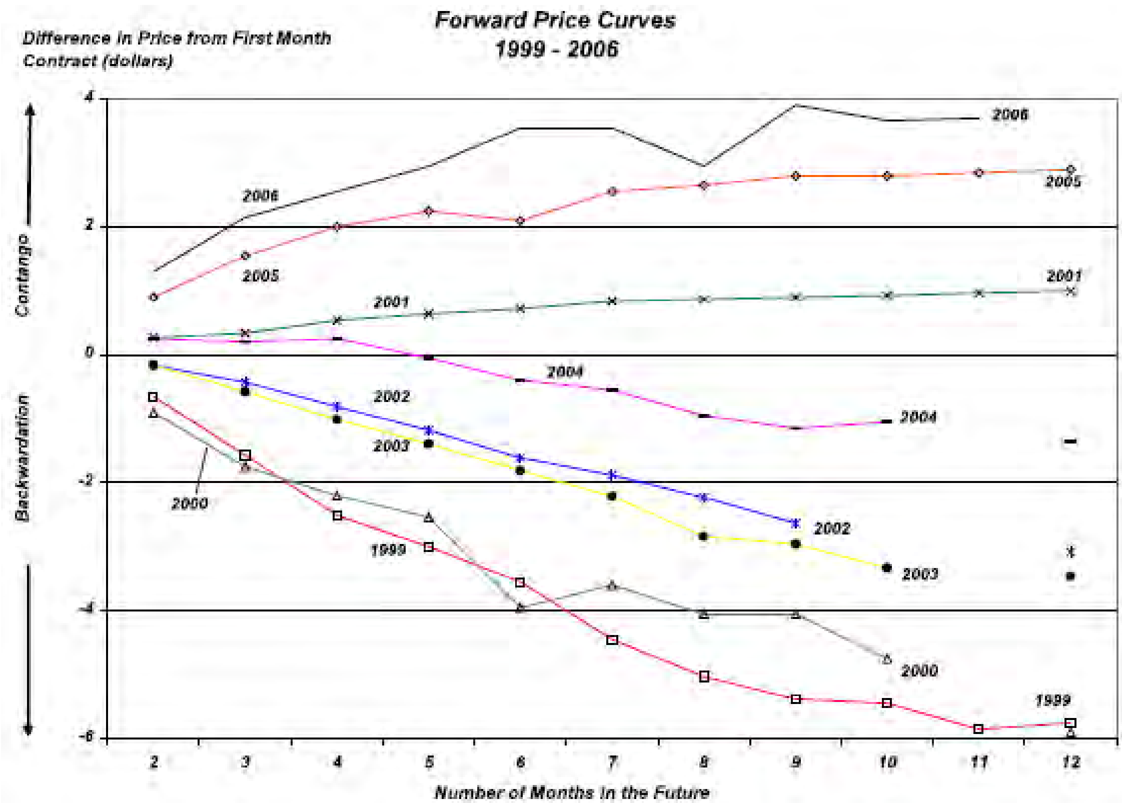


Source: Data from EIA, via "The Role of Market Speculation in Rising Oil and Gas Prices: A Need to Put the Cop Back on the Beat," U.S. Senate Permanent Subcommittee on Investigations (June 17, 2006).

On the other hand, the CFTC did its own analysis and determined that there was no relationship between speculative activity and prices. Indeed, CFTC found that additional participation from investors, all else equal, was correlated with lower crude oil prices. Speculators generally did what commercial traders did, and even traded less frequently. NYMEX, in a 2004 study, also did not find a relationship between speculative activity and the volatility of prices.

Figure 6.4 plots the "Forward Price Curves" for each year from 1999 to 2006. Each curve is taken as a snapshot in December and it shows the difference between the futures price for the following month (January) and the futures prices for February through December. For example, the 1999 curve shows that the February 2000 futures price was about 50 cents lower than the January 2000 futures price, as of December 1999. Likewise, the December 2000 futures price was nearly $6 lower than the January 2000 futures price. The years 1999, 2000, 2002, and 2003 all exhibit strong "backwardation," that is, the futures price declines as one moves further into the future. Years 2001 and 2004 show fairly stable curves, with the December futures price being within about $1 of the January price. Both 2005 and 2006, however, have a twelve-months-ahead futures price that is *above* the one-month-ahead futures price.[125] Prior to 2005, traders expected the price of oil to either decline dramatically, or at least stay relatively constant, while in recent months, traders have come to expect that crude oil prices will rise.

FIGURE 6.4



Source: Data from NYMEX, via "The Role of Market Speculation in Rising Oil and Gas Prices: A Need to Put the Cop Back on the Beat," U.S. Senate Permanent Subcommittee on Investigations (June 17, 2006).

There are two opposing views on the role of speculators in the futures market. On one hand, speculators accept risk from other market participants and so provide those participants with the means both to hedge their risk and to liquidate their holdings if and when it is necessary. On the other hand, speculators may invest beyond what is required by market participants to hedge their risk, thus turning the commodity into an independent investment and affecting the price outside of the fundamental supply and demand issues. Because of the increasing use of OTC and ICE markets that are not subject to oversight by the CFTC, the data do not exist to determine even the amount of speculative investment in crude oil, gasoline, or heating oil futures, let alone whether it is "over-speculation." Indeed, even if the data exist, it is not defined in precise terms what constitutes over-speculation; the concept remains subject to interpretation.

[125] The 2006 curve is a snapshot from April 1, 2006. The interpretation is the same as the other years.

However, it is clear that speculators provide a necessary function in the futures markets, including petroleum product futures, in that they provide market participants with the ability to hedge their risk and readily liquidate their positions. Without any speculators, market participants would be forced to bear this risk themselves, exposing them to price volatility they want to avoid. Any limitations on speculators acting within the futures market will risk limiting their needed services, and so risk leaving oil producers, refiners, and terminal owners exposed to price fluctuations.

VII. Concluding Remarks

The purpose of this report is to provide readers with an understanding of current economic conditions affecting the supply of petroleum products, mainly gasoline and home heating oil, in the States. The report focuses on the recent history of significant industry participants, product distribution networks, and market structure, each of which plays an important role in supplying petroleum products to the States. Section I provides background information useful for understanding the detailed discussions in the later sections. Section II focuses on how petroleum products are distributed to the states, particularly on the pipelines and waterways that transport these products to (and within) the States. Section III turns to the locations of terminals within the states and the market shares held by owners within certain geographic areas. Section IV examines several aspects of the gasoline market, including the ownership structures at both the retail and wholesale levels and factors such as regulations and taxes that could affect the availability and price of gasoline. The structure of the heating oil market and factors relating to the retail price of heating oil are covered in Section V. Finally, Section VI reviews the futures markets for petroleum products, focusing on why they exist, how they work, and what overall effect they might have on prices.

Our analyses led to the following findings and conclusions:

- Approximately 90% of the total consumption of petroleum products in the States is supplied by ships or barges. Waterway shipments from U.S. ports, Canada, and other foreign countries account for approximately 31%, 15%, and 43%, respectively, of total consumption in the States. Refineries in the Mid-Atlantic, Midwestern, and Gulf Coast regions of the U.S. provide a substantial portion of the refined petroleum products shipped by pipeline into New York.

- According to recent data, there are 161 petroleum products distribution terminals in the states: 14 in Maine, 30 in Massachusetts, 7 in New Hampshire, 107 in New York, and 3 in Vermont. The ownership and market structure of terminalling facilities is an important component of understanding wholesale gasoline markets since having access to facilities is necessary for any wholesaler wishing to import petroleum products in a particular geographic area. Although terminalling services should not be considered formal markets for antitrust purposes, measures of concentration of terminal ownership in several geographic areas within the States showed that about half of these markets were moderately concentrated and about half were highly concentrated.

- The price of crude oil is the single largest variable cost in the production of gasoline, accounting for approximately 55% of the retail price of gasoline. For the States, over 80% of observed variation in average retail gasoline prices over recent years is explained by variation in the average price of crude oil.

- Retail gasoline stations have different kinds of ownership structures, including stations owned and operated directly by the refiner; franchisees that operate a station leased from a refiner; and individual proprietors that purchase wholesale gasoline from refiners and are often supplied by jobbers that maintain relationships with multiple distribution racks. Jobber-supplied retail gasoline stations are the most prevalent. These stations' share of retail volume ranges from just over 40% in New York to 97% in Vermont.

- "Hypermarkets" such as BJ's, Costco, and Sam's Club have begun selling gasoline (typically, unbranded gasoline) with a focus on high volume and low margins, but such outlets currently have only nominal market shares in the States. Of branded gasoline, Mobil had the largest market shares in all five of the States. Citgo, Exxon, Sunoco, and Shell also had relatively large market shares.

- One significant component of cross-state variation in retail prices is the wide disparity in state and local taxes. Another component is differences in regulations between states, particularly on the blend of gasoline required. Within the States, three types of gasoline are predominantly used: conventional, reformulated (Eastern), and fuel characterized by a Reid Vapor Pressure of 7.8 pounds per square inch. Recent changes to EPA regulations have allowed refiners greater flexibility in creating fuels that meet emissions and pollution goals. This flexibility, however, has resulted in an increase in the number of "boutique" fuels; nationwide, at least 14 are currently available.

- In each of the States, a majority of the demand for heating oil comes from residential use rather than commercial customers. Across all of the States, 39% of residents use heating oil. It is the most common residential heating source in each of the States except New York, where natural gas is the largest fuel source for home heating.

- Retail home heating oil dealers tend to be small companies, usually with less than 10 employees. These dealers are typically not affiliated with an oil company. Retail home heating oil markets are characterized by relatively easy entry and many small firms.

- On average, the highest price of heating oil in each region observed by this report is 6% greater than the average price for that region; and the lowest price observed is about 6% lower then the average price. Because of the many available heating oil dealers and the relative difficulty in checking prices (compared to gasoline, where visible road signs with prices are standard practice), consumers may have trouble finding the best price for their heating oil needs. In addition, oil prices in contracts that bundle heating oil with associated services cannot be directly compared to prices for oil sold without any accompanying services. Differences in services bundled with the oil may lead to persistent price differences across suppliers.

- Futures contracts serve to protect both buyers and sellers from any potential adverse swings in the price of petroleum products. Trading of futures contracts for petroleum products typically takes place on the New York Mercantile Exchange and is subject to regulation by the Commodities Futures Trading Commission. However, in recent years, the over-the-counter market for petroleum futures has grown quickly, and these contracts are largely unregulated.

- Petroleum futures markets have also seen a dramatic increase in participation by speculators—people who buy and sell petroleum futures but do not themselves use any petroleum products or have any to sell. Some analysts contend that speculators, which can include mutual funds, pension funds, and hedge funds, have contributed to rising oil and gas prices as well as increased volatility in these prices. The effect of speculators and unregulated, over-the-counter trades is difficult to ascertain. The lack of available data prevents this report from either substantiating or refuting the hypotheses that speculative trading activity has significantly affected the price of petroleum products in the States.

APPENDIX I: GLOSSARY OF PETROLEUM TERMS[126]

Arbitrage: The practice of purchasing a good in one market where the price is low and selling it in a separate market where it is low. More generally, it is the ability of a buyer to switch readily from a high priced supplier to a low priced supplier, or for a supplier to switch from a low-paying customer to a high-paying customer. The result is that prices tend to equalize across markets and suppliers, a result of increasing the degree of competition between them.

Bbl: Barrel

Barrel: A volumetric unit of measurement for crude oil and petroleum products equivalent to 42 U.S. gallons. Abbreviated to "bbl".

Barrels per day: A unit of measurement used in the industry for the production rates of oil fields, pipelines, and transportation. Abbreviated to "bpd", "b/d" or "bbl/d".

British Thermal Unit (BTU): The measure used to gauge the heating quality of various fuels. It is the amount of heat needed to increase the temperature of one pound of water one degree Fahrenheit from 58.5 to 59.5 degrees under standard pressure of 30 inches of mercury at or near its point of maximum density. General conversion factors are: 1 Btu = 252 calories, 1,055 joules, or 0.293 watt hours.

Conventional Gasoline: Finished motor gasoline not included in the oxygenated or reformulated gasoline categories.

Note: This category excludes reformulated gasoline blendstock for oxygenate blending (RBOB) as well as other blendstock.

Crude Oil: A mixture of hydrocarbons that existed in liquid phase in underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Includes lease condensate and drip gas, as well as liquid hydrocarbons produced from tar sands, gilsonite, and oil shale. Excludes topped crude oil, residual oil, other unfinished oils, and liquids produced at natural gas processing plants and mixed with crude oil, where identifiable. Crude oil is considered as either domestic or imported according to the following:

1. **Domestic Crude Oil:** Crude oil produced in the United States or from its "outer continental shelf" as defined in 43 U.S.C. 1331.

[126] Glossary adapted primarily from EIA at http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/petroleum_marketing_annual/historical/2000/pdf/glossary.pdf, and supplemented with information from Amalgamated Exploration at http://www.findoil.com/glossary.html and OPIS at http://www.opisnet.com/market/glossary.asp.

2. **Imported Crude Oil:** Crude oil produced outside the United States and brought into the United States.

Dealer Tank Wagon (DTW) Sales: Wholesale sales of gasoline priced on a delivered basis to a retail outlet.

Distillate Fuel Oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation.

1. **No. 1 Distillate:** A light petroleum distillate that can be used as either a diesel fuel (see *No. 1 Diesel Fuel*) or a fuel oil (See *No. 1 Fuel Oil*).

    a. **No. 1 Diesel Fuel:** A light distillate fuel oil that has distillation temperatures of 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 975. It is used in high-speed diesel engines generally operated under frequent speed and load changes, such as those in city buses and similar vehicles. See *No. 1 Distillate*.

    b. **No. 1 Fuel Oil:** A light distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 396. It is used primarily as fuel for portable outdoor stoves and portable outdoor heaters. See *No. 1 Distillate*.

2. **No. 2 Distillate:** A petroleum distillate that can be used as either a diesel fuel (see *No. 2 Diesel Fuel*) or a fuel oil. See *No. 2 Fuel Oil*.

    a. **No. 2 Diesel Fuel:** A fuel that has distillation temperatures of 500 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 975. It is used in high speed diesel engines that are generally operated under uniform speed and load conditions, such as those in railroad locomotives, trucks, and automobiles. See *No. 2 Distillate*.

        i. **Low Sulfur No. 2 Diesel Fuel:** No. 2 diesel fuel that has a sulfur level no higher than 0.05 percent by weight. It is used primarily in motor vehicle diesel engines for on-highway use.

        ii. **High Sulfur No. 2 Diesel Fuel:** No. 2 diesel fuel that has a sulfur level above 0.05 percent by weight.

   b. **No. 2 Fuel Oil (Heating Oil):** A distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 396. It is used in atomizing type burners for domestic heating or for moderate capacity commercial/industrial burner units. See *No.2 Distillate*.

3. **No. 4 Fuel:** A distillate fuel oil made by blending distillate fuel oil and residual fuel oil stocks. It conforms with ASTM Specification D 396 or Federal Specification VV-F-815C and is used extensively in industrial plants and in commercial burner installations that are not equipped with preheating facilities. It also includes No. 4 diesel fuel used for low-and medium- speed diesel engines and conforms to ASTM Specification D 975.

Distillation: The first stage in the refining process in which crude oil is heated and unfinished petroleum products are initially separated.

Downstream: The oil industry term used to refer to all petroleum activities from the processing of refining crude oil into petroleum products to the distribution, marketing, and shipping of the products. The opposite of downstream is upstream.

EIA (Energy Information Administration): A division of the Department of Energy that compiles data on petroleum supply and demand on a weekly and monthly basis. These figures are not as timely as API statistics, but are considered more accurate.

Ethanol: An alcohol which is most often derived from corn. Ethanol is designed to be blended with gasoline to produce a cleaner burning fuel, and is an accepted oxygenate component for the oxygenated seasons mandated by the EPA.

Futures: A standardized contract for the future purchase or sale of a commodity on a formalized exchange.

Gallon: Measurement of volume in oil industry (42 gallons=1barrel).

Gasoline: A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in spark-ignition engines. Motor gasoline, as defined in ASTM Specification D-4814 or Federal Specification VV-G-1690B, is characterized as having a boiling range of 122 to 158 degrees Fahrenheit at the 10 percent recovery point to 365 to 374 degrees Fahrenheit at the 90 percent recovery point.

1. **Conventional Gasoline:** Motor gasoline not included in the oxygenated or reformulated gasoline categories. Excludes reformulated gasoline blendstock for oxygenate blending (RBOB).

2. **Oxygenated Gasoline:** Finished motor gasoline, other than reformulated gasoline, having an oxygen content of 2.7 percent or higher by weight and required by the U.S. Environmental Protection Agency (EPA) to be sold in areas designated by EPA as carbon monoxide (CO) nonattainment areas.

   Note: Oxygenated gasoline excludes oxygenated fuels program reformulated gasoline (OPRG) and reformulated gasoline blendstock for oxygenate blending (RBOB). Data on gasohol that has at least 2.7 percent oxygen, by weight, and is intended for sale inside CO nonattainment areas, are included in data on oxygenated gasoline. Other data on gasohol are included in data on conventional gasoline.

3. **Reformulated Gasoline:** Finished motor gasoline formulated for use in motor vehicles, the composition and properties of which meet the requirements of the reformulated gasoline regulations promulgated by the U.S. Environmental Protection Agency under Section 211(k) of the Clean Air Act.

   Note: This category includes oxygenated fuels program reformulated gasoline (OPRG) but excludes reformulated gasoline blendstock for oxygenate blending (RBOB).

Gasoline Grades: The classification of gasoline by octane ratings. Each type of gasoline (conventional, oxygenated, and reformulated) is classified by three grades - Regular, Midgrade, and Premium.

Note: Gasoline sales are reported by grade in accordance with their classification at the time of sale. In general, automotive octane requirements are lower at high altitudes. Therefore, in some areas of the United States, such as the Rocky Mountain States, the octane ratings for the gasoline grades may be 2 or more octane points lower.

1. **Regular Gasoline:** Gasoline having an antiknock index, i.e., octane rating, greater than or equal to 85 and less than 88.

   Note: Octane requirements may vary by altitude. See *Gasoline Grades*.

2. **Midgrade Gasoline:** Gasoline having an antiknock index, i.e., octane rating, greater than or equal to 88 and less than or equal to 90.

   Note: Octane requirements may vary by altitude. See *Gasoline Grades*.

3. **Premium Gasoline:** Gasoline having an antiknock index, i.e., octane rating, greater than 90.

   Note: Octane requirements may vary by altitude. *Gasoline Grades*.

Heating Oil: A distillate used for home or commercial heating. Widely used as a synonym for No. 2 fuel oil or diesel.

Hydrocarbons: Compounds containing only the hydrogen and carbon atoms. May be in solid, liquid or gaseous form.

Jobber: Someone who purchases refined products at the wholesale level and then transfers or resells the product at the retail level. The retail level sale/transfer can occur at facilities owned by the jobber, independent dealers, or commercial accounts.

Kerosene: A light petroleum distillate that is used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10-percent recovery point, a final boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. Included are No. 1-K and No. 2-K, the two grades of kerosene called range or stove oil, which have properties similar to those of No. 1 fuel oil.

MTBE (methyl tertiary butyl ether): An ether eligible for gasoline blending, blends up to 15.0 percent by volume MTBE which must meet the ASTM D4814 Specifications. Blenders must take precautions that the blends are not used as base gasolines for other oxygenated blends.

Natural gas: Petroleum in gaseous form consisting of light hydrocarbons often found in association with oil. Methane is the most dominant component.

NYMEX (New York Mercantile Exchange): Exchange where a number of commodities, including WTI crude, heating oil and unleaded gasoline are traded on a future basis.

OPEC: Organization of Petroleum Exporting Countries, oil-producing and exporting countries that have organized for the purpose of negotiating with oil companies on matters of oil production, prices, and future concession rights. Current members are Algeria, Gabon, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and Venezuela. Prior to January 1, 1993, Ecuador was a member of OPEC.

Operator: Term used to describe a company appointed by venture stake holders to take primary responsibility for day-to-day operations for a specific plant or activity.

Oxygenated Gasoline: See *Gasoline*.

Oxygenates: Substances which, when added to gasoline, increase the amount of oxygen in that gasoline blend. Ethanol, Methyl Tertiary Butyl Ether (MTBE), Ethyl Tertiary Butyl Ether (ETBE), and methanol are common oxygenates.

Petrochemicals: Chemicals such as ethylene, propylene and benzene that are derived from petroleum.

Petroleum Administration for Defense District (PADD): Five geographic areas into which the United States was divided by the Petroleum Administration for Defense for purposes of administration during federal price controls or oil allocation. They are:
PADD I (East Coast):

- PADD IA (New England): Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

- PADD IB (Central Atlantic): Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania.

- PADD IC (Lower Atlantic): Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia.

PADD II (Midwest): Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and Wisconsin.

PADD III (Gulf Coast): Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas.

PADD IV (Rocky Mountain): Colorado, Idaho, Montana, Utah, and Wyoming.

PADD V (West Coast): Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington.

Petroleum Products: Petroleum products are obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds. Petroleum products include unfinished oils, liquefied petroleum gases, pentanes, plus aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, petrochemical feedstocks, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Pipelines: A network that allows crude oil, refined products and gas liquids to move across the country, usually from either refiners to terminals or from coastal (import) locations to terminals and refineries further inland.

Rack Market: Petroleum products sold at the wholesale level from primary storage. Refers to loading racks where tanker trucks fill up.

RBOB (Reformulated Gasoline Blendstock for Oxygenate Blending): A motor gasoline blending component which, when blended with a specified type and percentage of oxygenate, meets the definition of reformulated gasoline.

Refiner: A firm or the part of a firm that refines products or blends and substantially changes products, or refines liquid hydrocarbons from oil and gas field gases, or recovers liquefied petroleum gases incident to petroleum refining and sells those products to resellers, retailers, resellers/retailers, or ultimate consumers. "Refiner" includes any owner of products which contracts to have those products refined and then sells the refined products to resellers, retailers, or ultimate consumers.

Refinery: An installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons and oxygenates.

Refining: The process of converting crude oil into usable fuel products.

Reformulated Gasoline: See *Gasoline*.

Reserves: An economically recoverable quantity of crude oil or gas.

Residual Fuel Oil: A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils, that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations. It conforms to ASTM Specification D396 and D975 and Federal Specification VV-F-815C. No. 5, a residual fuel oil of medium viscosity, is also known as Navy Special and is defined in Military Specification MIL-F-859E, including Amendment 2 (NATO Symbol F-77). It is used in steam-powered vessels in government service and inshore powerplants. No. 6 fuel oil includes Bunker C fuel oil and is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes.

Retail Outlet: Any company-owned outlet (e.g., service station) selling gasoline, on-highway low sulfur diesel fuel, or propane for on-highway vehicle use which is under the direct control of the firm filing the EIA-782 by virtue of the ability to set the retail product price and directly collect all or part of the retail margin. This category includes retail outlets: (1) being operated by salaried employees of the company and/or its subsidiaries and affiliates, and/or (2) involving personnel services contracted by the firm.

Retailer: A firm (other than a refiner, reseller, or reseller/ retailer) that carries on the trade or business of purchasing refined petroleum products and reselling them to ultimate consumers.

RVP (Reid Vapor Pressure): The volatility or tendency of a petroleum product to evaporate. The lower the number, the more stable the product. RVP is used to measure pressure in terms of pounds per square inch (psi). In terms of gasoline, RVP is used as an ozone control mechanism.

Sour crude oil: Crude oil with a high sulfur content.

Spot: A deal for supply wherein the price is negotiated between the buyer and the seller, and the supply commitment varies.

Spot Market: High volume (25,000 barrel to 300,000 barrel) contractual agreements between oil companies dictating delivery of petroleum products or crude oil in the near future for an established sales price. Since this market reacts quickly, and is an alternative to wholesale sales, it provides a good indication of the direction of wholesale price trends. Also referred to as Cash Market.

Spot Price: The current value of any product on a volume basis.

Sulfur: A yellowish nonmetallic element, sometimes known as "brimstone." It is present at various levels of concentration in many fossil fuels whose combustion releases sulfur compounds that are considered harmful to the environment. Some of the most commonly used fossil fuels are categorized according to their sulfur content, with lower sulfur fuels usually selling at a higher price.

Note: No. 2 Distillate fuel is currently reported as having either a 0.05 percent or lower sulfur level for on-highway vehicle use or a greater than 0.05 percent sulfur level for off-highway use, home heating oil, and commercial and industrial uses. Residual fuel, regardless of use, is classified as having either no more than 1 percent sulfur or greater than 1 percent sulfur. Coal is also classified as being low-sulfur at concentrations of 1 percent or less or high-sulfur at concentrations greater than 1 percent.

Sweet crude oil: Crude oil with a low sulfur content.

Terminal: Plant and equipment designed to receive and process crude oil or gas to remove water and impurities.

Throughput: The total amount of raw materials processed by a refinery or other plant in a given period.

United States: For the crude oil statistics, the United States includes the 50 States, the District of Columbia, Puerto Rico, the Virgin Islands, and all American Territories and Possessions. For the petroleum products data, United States includes the 50 States and the District of Columbia.

Upstream: The processes of exploring for oil; developing oil fields; and producing oil from the oil fields. The opposite of upstream is downstream.

Wellhead: The point at which the crude (and/or natural gas) exits the ground. Following historical precedent, the volume and price for crude oil production are labeled as "wellhead," even though the cost and volume are now generally measured at the lease boundary. In the context of domestic crude price data, the term "wellhead" is the generic term used to reference the production site or lease property.

WTI (West Texas Intermediate): The benchmark grade of domestic crude oil, traded on the NYMEX.

APPENDIX II: NORTHEAST PETROLEUM TERMINALS

TABLE A2.1(A)
MAINE PETROLEUM TERMINALS
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Bangor	ExxonMobil Oil Corporation	730 Lower Main Street Bangor, ME 04401	9	T-01-ME-1000	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery	ExxonMobil Pipeline	98,800 bbls	Conventional Regular Unleaded #1 Low Sulfur Diesel #2 High Sulfur Diesel Conventional Premium #2 Low Sulfur Diesel	XOM
Bangor	Webber Energy Fuels	700 Main Street Bangor, ME	9			Barge			147,600 bbls		
Bangor	Webber Tanks, Inc.	225 South Main Street Bangor, ME							82,675 bbls		
Bucksport	Webber Tanks, Inc.	93 River Road Bucksport, ME 04416		T-01-ME-1012	Jet Fuel, Refined Products	Barge, Tanker	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery		810,000 bbls	#2 High Sulfur Diesel: 350,000 bbls Jet Fuel: 120,000 bbls K-1 Kerosene: 50,000 bbls #2 Low Sulfur Diesel: 150,000 bbls Conventional Premium: 50,000 bbls Conventional Regular Unleaded: 90,000 bbls	Tosco-Exxon, Webber
Bucksport	Sprague Energy Corporation	Route 15 River Road Bucksport, ME 04416	2	T-01-ME-1014	Refined Products	Transport Truck, Rail, Vessel			231,000 bbls	#4 Residual Fuels #5 Residual Fuels #6 Residual Fuels	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE A2.1(A)
MAINE PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Hampden	Coldbrook Energy, Inc.	809 Main Road North Hampden, ME 04444		T-01-ME-1002					131,000 bbls		
Searsport	Sprague Energy Corporation	Mack's Point 70 Trundy Road Searsport, ME 04974	4		Asphalt, Refined Products	Tanker, Barge, Transport Truck, Rail	Top Loading		1,283,932 bbls	#2 High Sulfur Diesel Asphalt #6 Residual Fuels	
Searsport	Irving Oil Corporation	52 Station Avenue Searsport, ME 04974		T-01-ME-1006	Jet Fuel, Refined Products	Barge, Tanker, Transport Truck			1,065,952 bbls		Tosco-Exxon, Irving
South Portland	Portland Pipe Line Corp.								2,634,000 bbls		
South Portland	Sprague Energy Corporation	59 Main Street South Portland, ME 04106	41	T-01-ME-1003	Asphalt, Jet Fuel, Refined Products	Rail, Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Automatic Additive Injection System, Vapor Recovery		1,638,377 bbls	#1 Low Sulfur Diesel: 32,739 bbls Additives: 438 bbls Asphalt: 252,392 bbls Aviation Gas: 41,775 bbls Jet Fuel: 110,690 bbls K-1 Kerosene 319,042 bbls #2 High Sulfur Diesel: 646,924 bbls #2 Low Sulfur Diesel	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE A2.1(A)
MAINE PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
South Portland	ExxonMobil Oil Corporation	170 Lincoln Street South Portland, ME 04106	19	T-01-ME-1004	Refined Products	Pipeline, Barge, Transport Truck, Tanker	Automated Card/Key Stop, Top Loading, Automatic Additive Injection System, Bottom Loading	ExxonMobil Pipeline	639,600 bbls	Conventional Regular Unleaded #1 Low Sulfur Diesel #2 High Sulfur Diesel Conventional Premium #2 Low Sulfur Diesel	Getty, Irving, ConocoPhillips, Citgo,
South Portland	Gulf Oil, Limited Partnership	175 Front Street South Portland, ME 04106	9	T-01-ME-1008	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Automatic Additive Injection System, Vapor Recovery		732,782 bbls	#6 Residual Fuels: 18,280 bbls #2 Low Sulfur Diesel #2 High Sulfur Diesel: 180,353 bbls Conventional Regular Unleaded: 317,938 bbls Conventional Premium: 75,093 bbls K-1 Kerosene	Catamount, Texaco, Sunoco, Irving, Coastal, Gulf
South Portland	Global Companies, LLC	1 Clark Road South Portland, ME 94106	12	T-01-ME-1009	Refined Products	Barge, Tanker, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery		659,377 bbls	#4 Residual Fuels Bunker Fuels K-1 Kerosene: 91,318 bbls #6 Residual Fuels: 243,289 bbls #2 High Sulfur Diesel: 324,770 bbls	Global
South Portland	Irving Oil Corporation	102 Mechanic Street	12						831,100 bbls		

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE A2.1(B)
MAINE PETROLEUM TERMINALS
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Bangor	Mobil Oil Corporation	730 Lower Main Street Bangor, ME 04414	Refined Products	Pipeline, Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery	Mobil Inb	109,800 bbls	Unleaded: 46,700 bbls #1 Low Sulfur Diesel: 9,600 bbls #2 High Sulfur Diesel: 23,200 bbls Premium Unleaded: 18,900 bbls #2 Low Sulfur Diesel: 14,000 bbls
Hampden	Gulf Oil, Limited Partnership	799 Main Road North, Hampden, ME 04444-9641	Refined Products	Pipeline, Transport Truck	Top Loading, Automated	Mobil Pipeline	69,780 bbls	#2 Fuel: 45,468 bbls Unleaded: 13,930 bbls Super: 10,382 bbls
Searsport	Irving Oil Corporation	52 Station Avenue Searsport, ME 04974	Jet Fuel, Refined Products	Barge, Tanker, Transport Truck				
Searsport	Sprague Energy Corporation	Mack's Point P.O. Box 435 Searsport, ME 04974	Petrochemicals, Refined Products	Barge, Transport Truck, Rail	Automated, Top Loading		383,932 bbls	#6 Oil Liquid Ca Coal Petroleum Gypsum Cement Cl Iron Oxid Alumina H Bauxite Aggregate Pulp Logs
South Portland	CITGO Petroleum Corporation	102 Mechanic Street South Portland, ME 04116-2828	Refined Products	Barge, Transport Truck	Automated		831,093 bbls	

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.1(B)
MAINE PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
South Portland	Cargill Energy	1 Clarks Road P.O. Box 2167 South Portland, ME 04106	Refined Products	Rail, Barge, Transport Truck	Automated		500,000 bbls	Diesel Fuel Fuel Oil Kerosene
South Portland	Gulf Oil, Limited Partnership	175 Front Street South Portland, ME 04106	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Automatic Additive Injection System, Vapor Recovery		732,952 bbls	#6 Fuel: 177,859 bbls #2 Low Sulfur Diesel bbls #2 High Sulfur: 107,944 bbls Unleaded: 230,938 bbls Premium Unleaded: 75,093 bbls Kerosene: 141,118 bbls Mid-Grade
South Portland	Koch Refining & Koch Materials	5 Central Avenue P.O. Box 2620 South Portland, ME 04106	Asphalt, Refined Products	Barge, Transport Truck		Koch Refinery, Koch Material	333,333 bbls	
South Portland	Mobil Oil Corporation	170 Lincoln Street South Portland, ME 04106	Refined Products	Pipeline, Barge, Transport Truck	Automated, Top Loading, Automatic Additive Injection System, Bottom Loading	Mobil Out	639,600 bbls	Unleaded: 162,800 bbls #1 Low Sulfur Diesel: 21,400 bbls #2 High Sulfur: 183,000 bbls Jet Fuel: 119,900 bbls #2 Low Sulfur Diesel: 101,500 bbls Premium Unleaded: 83,200 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.1(B)
MAINE PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
South Portland	Motiva Enterprises LLC	102 Mechanic Street South Portland, ME 04106	Refined Products	Barge, Transport Truck, Tanker	Automated, Vapor Recovery, Automatic Additive Injection System, Bottom Loading, Top Loading		838,503 bbls	Unleaded Mid-Grade Premium Unleaded #2 Low Sulfur Diesel #2 High Sulfur
South Portland	Sprague Energy Corp.	59 Main Street South Portland, ME 04106	Refined Products	Rail, Barge, Transport Truck	Automated, Top Loading, Bottom Loading		1,404,000 bbls	Kerosene #2 High Sulfur Diesel Fuel Gasoline Bulk Hand

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.2(A)
Massachusetts Petroleum Terminals
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Braintree	CITGO Petroleum Corporation	385 Quincy Avenue Braintree, MA 02184	19	T-04-MA-1155	Refined Products	Barge, Transport Tuck, Tanker	Automated Card/Key Stop		1,129,868 bbls	#2 High Sulfur Diesel: 366,000 bbls #2 Low Sulfur Diesel: 99,000 bbls Additives: 1,368 bbls RFG Regular Unleaded: 663,500 bbls	Citgo, Rio, Sprague, Sunoco, Valero, XOM
Chelsea	Gulf Oil, Limited Partnership	90 Everett Avenue Chelsea, MA 02150-2337									
Chelsea	Global Companies, LLC	11 Broadway Chelsea, MA 02150	16	T-04-MA-1152	Refined Products	Transport Truck, Barge, Tanker	Automated/ Manned		684,600 bbls	#2 High Sulfur Diesel: 262,100 bbls #6 Residual Fuels: 391,000 bbls Bunker Fuels #1 Low Sulfur Diesel #4 Residual Fuels: 31,500 bbls	Global
Chelsea	Gulf Oil, Limited Partnership	281 Eastern Avenue Chelsea, MA 02150	15	T-04-MA-1153	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Bottom Loading, Top Loading, Automatic Additive Injection System, Vapor Recovery		1,137,026 bbls	#2 Low Sulfur Diesel: 106,565 bbls #2 High Sulfur Diesel: 339,249 bbls Conventional Regular Unleaded: 490, 531 bbls Conventional Premium: 146,631 bbls #1 Low Sulfur Diesel: 54,050 bbls	Catamount, Gulf, Hess

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE A2.2(A)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
East Boston	ConocoPhillips	445 Chelsea Street East Boston, MA 02128	0	T-04-MA-1154							
East Boston	Swissport Fueling, Inc	Boston Logan Intl Airport 02128									
Everett	Sprague Energy Corporation	43 Beacham Street Everett, MA 02149	22		Asphalt	Barge, Tanker, Transport Truck	Top Loading		429,000 bbls	Asphalt	
Everett	ExxonMobil Refining & Supply Co.	52 Beachum Street Everett, MA 02149	33	T-04-MA-1156	Refined Products	Barge, Transport Truck, Tanker	Automated Card/Key Stop, Automatic Additive Injection System, Vapor Recovery, Bottom Loading		2,100,000 bbls	RFG Premium RFG Regular Unleaded #2 High Sulfur Diesel Jet Fuel #2 Low Sulfur Diesel	ConocoPhillips, Hess, Irving, Shell, Tesoro, Texaco, Valero, XOM
Fall River	Northeast Products Co.	52 Ferry Street Fall River, MA							40,000 bbls		

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE A2.2(A)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Nantucket	Harbor Fuel Oil Corp.	15 Sparks Ave. Nantucket, MA 02554		T-04-MA-1173							
New Bedford	Global Companies, LLC	30 Pine Street New Bedford, MA 02740	4	T-04-MA-1172	Refined Products	Barge, Transport Truck	Top Loading, Automatic Additive Injection System		248,055 bbls	Marine Fuel #6 Residual Fuels: 192,204 bbls #2 High Sulfur Diesel: 55,851 bbls #4 Residual Fuels	Global
Quincy	Sprague Energy Corporation	728 Southern Artery Quincy, MA 02169		T-04-MA-1176	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading		675,000 bbls	Ultra Low Sulfur Diesel #2 High Sulfur Diesel #6 Residual Fuels #2 Low Sulfur Diesel Jet Fuel K-1 Kerosene #4 Residual Fuels	
Quincy	Sprague Energy Corporation	740 Washington Street Quincy, MA	8	T-04-MA-1180		Transport Truck			540,000 bbls	#2 Low Sulfur Diesel	
Revere	Irving Oil Terminals Inc.	41 Lee Burbank Highway Revere, MA	0	T-04-MA-1160	Refined Products				80,000 bbls	Ethanol: 80,000 bbls	Getty, Irving

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

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TABLE A2.2(A)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Revere	Global Petroleum Corporation	140 Lee Burbank Highway Revere, MA 02151	31	T-04-MA-1162	Refined Products	Tanker, Pipeline, Rail, Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery, Automated Additive Injection System		2,086,700 bbls	#2 High Sulfur Diesel K-1 Kerosene #2 Low Sulfur Diesel Conventional Regular Unleaded	Citgo, Global, Sunoco
Sandwich	Global Companies, LLC	Three Coast Guard Road Sandwich, MA 02563	8	T-04-MA-1164	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Automated Additive Injection System		95,389 bbls	#1 Low Sulfur Diesel: 32,979 bbls #2 High Sulfur Diesel: 62,410 bbls	Global
Somerset	NRG Somerset Power LL	1606 Riverside Avenue Somerset, MA							545,000 bbls		
Somerset	PG&E Generating	Brayton Point Road, Somerset, MA							500,000 bbls		
Springfield	Springfield Terminals, Inc.	145 Armory Street Springfield, MA	0	T-04-MA-1150							

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE A2.2(A)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Springfield	L. E. Belcher, Inc.	615 St. James Ave 01109	0	T-04-MA-1151						#2 Low Sulfur Diesel K-1 Kerosene Premium Diesel	
Springfield	Springfield Terminals, Inc.	1095 Page Blvd. Springfield, MA 01104	0	T-04-MA-1159							
Springfield	Global Companies, LLC	160 Rocus Street Springfield, MA 01104	9	T-04-MA-1166	Refined Products	Pipeline, Transport Truck	Top Loading	Buckeye Pipeline	170,000 bbls	#2 High Sulfur Diesel: 128,000 bbls #2 Low Sulfur Diesel: 27,000 bbls K-1 Kerosene: 15,000 bbls	Global
Springfield	L. E. Belcher, Inc.	195 Armory Street Springfield, MA 01105	0	T-04-MA-1167						#2 Low Sulfur Diesel K-1 Kerosene Premium Diesel	
Springfield	ExxonMobil Oil Corporation	145 Albany Street Springfield, MA 01105	10	T-04-MA-1168	Refined Products	Barge, Pipeline, Transport Truck	Automated Card/Key Stop, Top Loading	ExxonMobil Pipeline	280,500 bbls	K-1 Kerosene Conventional Regular Unleaded Conventional Premium #2 Low Sulfur Diesel #1 Low Sulfur Diesel	Citgo, ConocoPhillips, Gulf, Hess, Shell, Sunoco, Texaco, XOM
Springfield	F L Roberts Inc	275 Albany St. Springfield MA 01105		T-04-MA-1158							

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE A2.2(A)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Springfield	Stellar Propane Service Corp.	60 Hannon St. Springfield MA 01105		T-04-MA-1181							
Springfield	Springfield Terminals, Inc.	1053 Page Blvd Springfield, MA 01104	0	T-04-MA-1179							Citgo, LEBelcher, Springter, Sunoco, Tosco-Exxon, XOM
Springfield	Albany Street Terminals, LLC	167 Albany Street, Springfield MA		T-04-MA-1174							
Waltham	Global Companies, LLC	800 South Street Waltham, MA 02454									
Walpole	Callahan Company, Inc.	18 Industrial Road Walpole, MA 02081	22						3,571 bbls		

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 4.

TABLE A2.2(B)
MASSACHUSETTS PETROLEUM TERMINALS
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Beverly	Armory Terminal, Inc.	72 Cherry Hill Drive Beverly, MA 01915	Refined Products	Pipeline, Transport	Automated		100,000 bbls	Gasoline
Beverly	Cargill Energy	Division of Cargill Incorporated 72 Cherry Hill Drive Beverly, MA 01915						
Boston	Mobil Oil Corporation	467 Chelsea Street Boston, MA 02128	Refined Products	Pipeline, Barge, Transport Truck	Automated, Automatic Additive Injection System, Top Loading, Vapor Recovery	Mobil	804,400 bbls	Premium Unleaded: 108,600 bbls Unleaded: 188,300 bbls Jet Fuel: 196,100 bbls Jet AB: 77,400 bbls Ethanol: 180,000 bbls #2 Low Sulfur Diesel: 44,100 bbls
Braintree	CITGO Petroleum Corporation	385 Quincy Avenue Braintree, MA 02184	Refined Products	Barge, Transport Truck, Tanker	Automated		1,384,784 bbls	
Chelsea	AFMC/Global	11 Broadway Chelsea, MA 02150		Barge, Tanker, Transport Truck			716,000 bbls	Residual: 358,000 bbls Other: 358,000 bbls
Chelsea	Chelsea Terminal/Global	11 Broadway Chelsea, MA 02150	Refined Products	Barge, Transport Truck	Automated		716,000 bbls	Residual: 358,000 bbls Distillate: 358,000 bbls Kerosene #4 Fuel #6 Fuel

Source: OPIS Petroleum Terminal Encyclopedia (2000).

Table A2.2(b)
Massachusetts Petroleum Terminals – Continued
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Chelsea	Chelsea-Sandwich, L.L.C.	11 Broadway Chelsea, MA 02142						#2 High Sulfur: 285,300 bbls Residual: 365,500 bbls
Chelsea	Gulf Oil, Limited Partnership	90 Everett Avenue Chelsea, MA 02150-2337						
Chelsea	Gulf Oil, Limited Partnership	281 Eastern Avenue Chelsea, MA 02150	Refined Products	Barge, Transport Truck	Automated, Bottom Loading, Top Loading, Automatic Additive Injection System, Vapor Recovery		1,187,771 bbls	#2 Low Sulfur Diesel: 135,600 bbls #2 High Sulfur: 243,215 bbls Unleaded: 396,030 bbls Mid-Grade: 25,000 bbls Super Unleaded: 147,876 bbls Bonded Je: 186,000 bbls #1 Fuel: 54,050 bbls
Everett	Exxon Company U.S.A.	52 Beachum Street Everett, MA 02149	Refined Products	Barge, Transport Truck, Tanker	Automated, Automatic Additive Injection System, Vapor Recovery, Bottom Loading			#2 High Sulfur Jet Fuel #2 Low Sulfur Diesel Mid-Grade Premium Unleaded Unleaded
Everett	Motiva Enterprises LLC	52 Beacham St. Everett, MA 02149	Refined Products					
Jamaica Plains	Mello Fuel Co.	37 Brookley Road Jamaica Plains, MA 02130	Refined Products	Transport Truck			100,000 bbls	#2 Fuel
New Bedford	Coastal Oil New England	Fairhaven Bridge New Bedford, MA		Barge, Transport Truck, Tanker			30,000 bbls	

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.2(B)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
North Weymouth	Sprague Energy Corp.	5 Bridge Street North Weymouth, MA 02191	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading		498,766 bbls	Petroleum Dry Bulk
Quincy	Deepwater Oil Terminals	728 S. Artery Quincy, MA 02169		Barge, Tanker, Transport Truck				
Quincy	Sprague Energy Corp.	TRT Terminal 728 Southern Artery Quincy, MA 02169	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading		417,000 bbls	Kerosene #2 High Sulfur Diesel Fuel Bulk Hand
Quincy	Sprague Energy Corp.	Quincy Terminal 728 Southern Artery Quincy, MA 02169	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading		634,000 bbls	#2 High Sulfur #6 Fuel Diesel Fuel Jet Fuel Kerosene
Revere	Coastal Oil New England, Inc.	222 Lee Burbank Highway Revere, MA 02151	Refined Products	Rail, Pipeline, Barge, Transport Truck	Automated		1,413,000 bbls	#2 Oil Kerosene Jet Fuel Gasoline Diesel Ethanol

Source: OPIS Petroleum Terminal Encyclopedia (2000).

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TABLE A2.2(B)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Revere	Global Petroleum Corporation	140 Lee Burbank Highway Revere, MA 02151	Refined Products	Barge, Transport Truck	Automated		2,241,000 bbls	#2 High Sulfur: 910,000 bbls Kerosene: 87,200 bbls #2 Low Sulfur Diesel: 209,900 bbls Unleaded: 1,033,000 bbls
Revere	Irving Oil Terminals Inc.	41 Lee Burbank Highway Revere, MA 02151	Jet Fuel, Refined Products	Barge, Tanker, Transport Truck	Vapor Recovery		752,615 bbls	Jet Fuel: 97,002 bbls
Salem	Cargill Energy	25 Derby Street Salem, MA 01970	Refined Products	Barge, Transport Truck			340,000 bbls	Fuel Oil Kerosene Residual
South Boston	Coastal Oil New England, Inc.	900 1st Street South Boston, MA 02127	Refined Products	Rail, Barge, Transport	Automated		2,564,000 bbls	#6 Oil #4 Oil #2 Fuel Jet Fuel Kerosene Diesel Fuel
Springfield	Gulf Oil, Limited Partnership	P. O. Box 31 FPS 55 Randall Place Springfield, MA 01108		Transport Truck	Top Loading, Automated		85,994 bbls	#2 Oil: 80,864 bbls Kerosene: 5,130 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.2(B)
MASSACHUSETTS PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Springfield	Mobil Oil Corporation	145 Albany Street Springfield, MA 01105	Refined Products	Pipeline, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery	Mobil Inb	279,500 bbls	Unleaded: 45,800 bbls #2 Fuel: 185,200 bbls Premium Unleaded: 35,300 bbls #2 Low Sulfur Diesel: 11,600 bbls #1 Fuel
Springfield	Wyatt Energy, Inc.	1053 Page Boulevard Springfield, MA 01104	Refined Products	Pipeline, Transport Truck			60,000 bbls	#2 Fuel: 50,000 bbls Kerosene: 10,000 bbls
Waltham	Global Petroleum Corporation	P. O. Box 9161 Waltham, MA 02454						

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.3(A)
NEW HAMPSHIRE PETROLEUM TERMINALS
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
N. Walpole	Sprague Energy Corporation	1 Main Street N. Walpole, NH 03609	3		Refined Products	Tanker, Rail, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading		9,511 bbls	K-1 Kerosene: 2,000 bbls #2 Low Sulfur Diesel: 2,000 bbls #2 High Sulfur Diesel: 5,000 bbls	
Newington	Sea-3, Inc.	103 Old Dover Road Newington, NH 03801	0						587,000 bbls	Liquefied Propane	
Newington	Sprague Energy Corporation	126 River Road Newington, NH 03801	29	T-04-NH-1050	Refined Products	Transport Truck			1,165,211 bbls	#2 Low Sulfur Diesel K-1 Kerosene Jet Fuel; Cement Tallow Asphalt	Citgo, Coastal, Shell, Sprague, Sunoco, XOM
Newington	Sprague Energy Corporation	78 Patterson Lane Newington, NH 03801	12	T-04-NH-1057		Vessel, Transport Truck, Rail			679,004 bbls		Citgo, Coastal, Sprague, Sunoco, XOM
Portsmouth	Sprague Energy Corporation	Two International Drive Suite 200 Portsmouth, NH 03801	0								

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE A2.3(A)
NEW HAMPSHIRE PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Portsmouth	Sprague Energy Corporation	290 Gosling Road Portsmouth, NH 03801	0	T-02-NH-1054					342,000 bbls		
Portsmouth	Irving Oil Terminals Inc.	50 Preble Way Portsmouth, NH 03802	6	T-02-NH-1056	Refined Products				552,000 bbls		XOM

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 1.

TABLE A2.3(B)
NEW HAMPSHIRE PETROLEUM TERMINALS
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Manchester	Fuel Storage Corp.	889 Elm St. P. O. Box 1032 Manchester, NH 03105	Asphalt	Barge, Tanker, Transport Truck				
Newington	Coastal Oil New England, Inc.	78 Paterson Lane Newington, NH 03061	Refined Products	Transport Truck, Barge	Automated		497,000 bbls	Diesel #2 High Sulfur Kerosene
Newington	Sprague Energy Corp.	290 Gosling Road Newington, NH 03801	Crude Oil, Refined Products	Rail, Barge, Transport Truck	Automated, Top Loading, Bottom Loading		1,165,211 bbls	#2 High Sulfur Diesel Kerosene
Newington	Sprague Energy Corp.	78 Patterson Road Newington, NH 03801	Asphalt, Refined Products	Rail, Barge, Transport Truck			738,000 bbls	#2 High Sulfur Diesel Kerosene Asphalt Gasoline
Portsmouth	Irving Oil Terminals Inc.	50 Preble Way Portsmouth, NH 03802	Refined Products				552,000 bbls	
Portsmouth	Sprague Energy Corp.	290 Gosling Road	Refined Products	Rail, Barge, Transport Truck			342,000 bbls	#2 High Sulfur #2 Oil #6 Oil Other

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Albany	Citgo Asphalt Refining Co.	0 Port of Albany, NY 12202	0								
Albany	Cibro Petroleum Products	Port of Albany 301 Normanskill Street Albany, NY 12202		T-14-NY-1401	Asphalt	Barge, Tanker, Transport Truck, Rail					
Albany	Westway Terminal	P.O. Box 156 Port of Albany Albany, NY 12202	3						108,000 bbls		
Albany	ExxonMobil Oil Corporation	50 Church Street Albany, NY 12202	10	T-14-NY-1403	Refined Products	Rail, Barge, Transport Truck	Automated Card/Key Stop, Bottom Loading, Vapor Recovery, Top Loading, Automatic Additive Injection System		692,400 bbls	Conventional Premium Conventional Regular Unleaded #1 Low Sulfur Diesel #2 High Sulfur Diesel #2 Low Sulfur Diesel	Agway, Citgo, ConocoPhillips, Getty, Griffith, Hess, Irving, Valero

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Baldwinsville	Stratus Petroleum Corp.	7431 Hillside Road Baldwinsville, NY 13027		T-16-NY-1450	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Bottom Loading, Top Loading, Automatic Additive Injection System	Buckeye	114,500 bbls	#2 Low Sulfur Diesel: 114,500 bbls Jet Fuel; K-1 Kerosene	
Baldwinsville	Supreme Energy Inc LLC	7437 Hillside Road Baldwinsville, NY 13027	0	T-16-NY-1492							
Big Flats	Griffith Energy Inc. - Big Flats	3351 Rt. 352 Big Flats, NY 14814		T-16-NY-1471							
Brewerton	Buckeye Terminals, LLC	County Route 37 West Brewerton, NY 13029	6	T-16-NY-1456	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Bottom Loading, Vapor Recovery	Buckeye	393,000 bbls	#2 High Sulfur Diesel: 195,000 bbls K-1 Kerosene 34,000 bbl; #2 Low Sulfur Diesel: 32,000 bbls Conventional Premium: 22,000 bbls Conventional Regular Unleaded: 110,000 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Bronx	Castle Port Morris Terminal	939 East 138th Street Bronx, NY 13454	12	T-13-NY-1352	Asphalt, Refined Products	Barge, Tanker, Transport Truck	Top Loading		788,000 bbls	#6 Residual Fuels: 423,000 bbls #2 High Sulfur Diesel: 270,000 bbls Asphalt: 95,000 bbls	
Bronx	Stuyvesant Fuel Service	642 Southern Blvd. Bronx, NY 13455	0	T-13-NY-1353							
Bronx	Stuyvesant Fuel Terminal Co. LLC	1040 East 149th Street Bronx, NY 10455	9						571,428 bbls		
Bronx	Getty Terminals Corp.	4301 Boston Post Road Bronx, NY 13466		T-13-NY-1354	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Bottom Loading, Vapor Recovery		23,500 bbls	#2 High Sulfur Diesel: 5,810 bbls RFG Regular Unleaded: 17,690 bbls	Exxon-Mobile, Sprague
Bronx	Fred M. Schildwachter & Sons	1400 Ferris Place Bronx, NY 13461	10	T-13-NY-1357		Barge			105,350 bbls	#2 High Sulfur Diesel	
Brooklyn	BP Products North America, Inc.	125 Apollo Street Brooklyn, NY 11222		T-11-NY-1301	Refined Products	Pipeline, Transport Truck, Barge		Buckeye	53,000 bbls	#2 Low Sulfur Diesel: 53,000 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Brooklyn	Metro Terminals Corporation	498 Kingsland Avenue Brooklyn, NY 11222	26	T-11-NY-1302	Refined Products	Barge, Pipeline, Transport Truck	Automatic Additive Injection System, Vapor Recovery, Top Loading, Bottom Loading	Buckeye	200,000 bbls	#6 Residual Fuels: 20,000 bbls #2 High Sulfur Diesel: 40,000 bbls K-1 Kerosene #2 Low Sulfur Diesel: 15,000 bbls Conventional Premium: 10,000 bbls Conventional Regular Unleaded: 20,000 bbls	Hess
Brooklyn	Motiva Enterprises LLC	(Brooklyn Terminal) Brooklyn, NY 11222		T-11-NY-1304	Refined Products	Pipeline, Barge, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Bottom Loading, Vapor Recovery	Buckeye	54,818 bbls		Gulf, RAD, Rio, Texaco, Tosco-Exxon, Valero
Brooklyn	Amerada Hess Corporation	722 Court Street Brooklyn, NY 11231		T-11-NY-1308	Refined Products	Barge, Transport Truck					Hess
Brooklyn	Bayside Fuel Oil Depot Corp.	One North 12th Street Brooklyn, NY 11211	0	T-11-NY-1313							

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Brooklyn	Bayside Fuel Oil Depot Corp.	510 Sackett Street Brooklyn, NY 11214	0	T-11-NY-1316							
Brooklyn	Ditmas Oil Associates, Inc.	364 Maspeth Avenue Brooklyn, NY 11211	0	T-11-NY-1323							
Brooklyn	Bayside Fuel Oil Depot Corp.	1100 Grand Street Brooklyn, NY 11211	0	T-11-NY-1325							
Brooklyn	Bayside Fuel Oil Depot Corp.	1776 Shore Parkway Brooklyn, NY 11214		T-11-NY-1326							Bayside, Texaco
Brooklyn	A. R. Fuels, Inc.	2125 Mill Avenue Brooklyn, NY 11234	0	T-11-NY-1331						Premium Diesel	
Brooklyn	Bayside Fuel Oil Depot Corp.	537 Smith Street Brooklyn, NY 11231	0	T-11-NY-1332							

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Buffalo	Buckeye Terminals, LLC	625 Elk Street Buffalo, NY 14210	0	T-16-NY-1458	Refined Products			Buckeye	436,534 bbls		
Buffalo	ExxonMobil Corporation	625 Elk Street Buffalo, NY 14210	8			Pipeline		Buckeye	388,500 bbls		
Catskill	Kingston Oil Supply	1 Amos Post Road Catskill, NY	0	T-16-NY-1496							
College Point	The Energy Conservation Group LLC	119-02 23rd Ave. College Point, NY		T-11-NY-1333							
East Meadow	Getty Terminals Corp.	1500 Hempstead Turnpike East Meadow, NY 11554									
East Setauket	Northville Industries Corporation	19 Belle Mead Road East Setauket, NY 11733	0	T-11-NY1319							
Flushing	Lefferts Oil Terminal, Inc.	31-70 College Point Boulevard Flushing, NY 11354	0	T-11-NY-1306							

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Flushing	Allied Aviation Service of New York	Fuel Facility Bldg. #42 Flushing, NY 11371	0	T-11-NY-1335							
Geneva	Buckeye Terminals, LLC – Geneva	459 W. River Road Geneva, NY		T-16-NY-1462							
Glenmont	CITGO Petroleum Corporation	495 River Road Glenmont, NY 12077	11	T-14-NY-1402	Refined Products	Barge, Transport Truck	Automated Car/Key Stop		1,221,000 bbls	#2 High Sulfur Diesel: 381,000 bbls #2 Low Sulfur Diesel: 119,000 bbls Additives: 444 bbls Conventional Premium: 54,000 bbls Conventional Regular Unleaded: 164,000 bbls Low Sulfur Kerosene: 79,000 bbls	Apex, Catamount Gulf, Citgo, Motiva, TransMontaine, Valero, Warex
Glenmont	Petroleum Fuel & Terminal – Glenmont	552 River Road Glenmont, NY 12077	12	T-14-NY-1405	Refined Products	Barge, Tanker, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery		2,136,858 bbls		

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Glenwood Landing	ExxonMobil Oil Corporation	Glenwood Landing Terminal Shore & Glenwood Road Glenwood Landing, NY 11547	7		Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Bottom Loading, Vapor Recovery		93,500 bbls	Conventional Regular Unleaded Conventional Premium #2 Low Sulfur Diesel	Hess
Green Island	Petroleum Fuel & Terminal - Green Island	Center Island 1 Osgood Avenue Green Island NY, 12183	16	T-14-NY-1406	Refined Products	Transport Truck, Barge	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery		182,500 bbls	#2 High Sulfur Diesel: 95,000 bbls K-1 Kerosene: 45,000 bbls #1 Low Sulfur Diesel: 42,500 bbls	
Green Island	Stratus Petroleum Corp.	1 Osgood Ave. Green Island, NY 12183-1539	16	T-14-NY-1406	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading		210,000 bbls	#2 Low Sulfur Diesel: 210,000 bbls	Williams
Harrison	Castle Astoria Terminals, Inc	500 Mamaroneck Avenue Harrison, NY 10528	0								

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Holtsville	Northville Industries Corporation	Holtsville Terminal 586 Union Avenue Holtsville, NY 11742		T-11-NY-1310	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Vapor Recovery, Automatic Additive Injection System, Top Loading, Bottom Loading				RAD, Texaco, Tosco, Tosco-Exxon
Inwood	Carbo Industries Inc.	555 Doughty Blvd Inwood, NY 11696	0	T-11-NY-1300							
Inwood	Motiva Enterprises LLC		15						259,000 bbls		
Inwood	ExxonMobil Oil Corporation	464 Doughty Boulevard Inwood, NY 11096	8	T-11-NY-1305	Refined Products	Pipeline, Barge, Transport Truck	Automated Card/Key Stop	Buckeye Inbound	210,200 bbls	Conventional Regular Unleaded Conventional Premium #2 Low Sulfur Diesel	Citgo, Getty, Hess, Sprague, XOM
Jamaica	Lefferts Oil Terminal, Inc.	Building 140 JFK Inter'l Airport Jamaica, NY 11430	0	T-11-NY-1330							

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Jamaica	Allied New York Services Inc.	Bldg. #90 Jamaica, NY 11430	0	T-11-NY-1334							
Kingston	Heritagenergy Inc.	1 Deleware Ave. Kingston, NY		T-16-NY-1497							
Lawrence	Motiva Enterprises LLC	(Long Island Terminal) 74 East Avenue Lawrence, NY 11559		T-11-NY-1312	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Bottom Loading, Vapor Recovery	Buckeye	206,000 bbls	Conventional Regular Unleaded Conventional Mid-Grade Conventional Premium #2 High Sulfur Diesel #2 Low Sulfur Diesel Jet Fuel	Texaco
Lawrence	Carbo Industries Inc.	1 Bay Boulevard Lawrence, NY 11559		T-11-NY-1324	Refined Products	Pipeline, Barge, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery		5,900,000 bbls	#2 Low Sulfur Diesel	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Long Island City	Getty Terminals Corp.	30-23 Greenpoint Avenue Long Island City, NY 11101	4	T-11-NY-1311	Refined Products	Pipeline, Barge, Transport Truck	Automatic Card/Key Stop, Vapor Recovery, Bottom Loading	Buckeye	30,015 bbls	RFG Regular Unleaded: 30,015 bbls	Metro, Sprague
Marcy	Bray Terminals, Inc.	River Road Marcy, NY 13403	3		Refined Products, Lube Oil	Pipeline	Top Loading	Buckeye	111,000 bbls	#2 High Sulfur Diesel: 85,000 bbls K-1 Kerosene: 25,000 bbls Lube Base Oils: 1,000 bbls	
Marcy	Buckeye Terminals, LLC	9586 River Road - Route 49 Marcy, NY 13403	6	T-16-NY-1463	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Bottom Loading, Vapor Recovery	Buckeye Pipe Line	279,000 bbls	#2 High Sulfur Diesel: 93,000 bbls K-1 Kerosene: 51,000 bbls #2 Low Sulfur Diesel: 23,000 bbls Conventional Premium: 22,000 bbls Conventional Regular Unleaded: 90,000 bbls	
Marcy	Amerada Hess Corporation	9570 Riverside Drive Marcy, NY 13403		T-16-NY-1464	Refined Products	Pipeline, Transport Truck		Buckeye			Citgo, Gulf, Hess

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Marcy	Sunoco Logistics Partners L.P.	9678 River Road Marcy, NY 13403	0	T-16-NY-1493							
Mount Vernon	Sprague Energy Corporation	40 Canal Street Mount Vernon, NY 10550	12	T-13-NY-1356					100,000 bbls	#2 Low Sulfur Diesel K-1 Kerosene	Sprague
Mount Vernon	West Vernon Petroleum Corp.	701 S Columbus Ave Mount Vernon, NY 10550		T-13-NY-1361							
New Hamburg	New Hamburg Terminal Corp.	Point Street New Hamburg, NY 12590		T-14-NY-1423							
New Windsor	Warex Terminals Corp. - New Windsor	1184 River Road New Windsor, NY 12553			Refined Products	Barge, Transport Truck	Automated Card/Key Stop		20,000 bbls	Conventional Premium: 20,000 bbls	
New Windsor	ExxonMobil Oil Corporation	1281 River Road New Windsor, NY 12553	9	T-14-NY-1413	Refined Products	Rail, Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery		312,500 bbls	Conventional Regular Unleaded Conventional Premium #2 Low Sulfur Diesel #2 High Sulfur Diesel	Agway, Citgo, ConocoPhillips, Getty, Gulf, Hess, Sprague, Valero, XOM

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
New Windsor	Warex Terminals Corporation – North Terminal	1254 River Road New Windsor, NY 12553		T-16-NY-1499							
New Windsor	Warex Cargo Terminal	1096 River Road New Windsor, NY 12553	8	T-14-NY-1411	Refined Products	Barge, Tanker, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery		501,275 bbls	#2 High Sulfur Diesel: 185,417 bbls #2 Low Sulfur Diesel: 54,952 bbls Conventional Premium: 66,060 bbls Conventional Regular Unleaded: 111,548 bbls Jet Fuel: 67,131 bbls K-1 Kerosene: 16,167 bbls	Citgo, ConocoPhillips, Gulf, Shell, Sunoco, Texaco, Tosco, Tosco-Exxon, Tosco-Mobil, Valero
Newburgh	Warex Terminals Corporation	49 River Road Newburgh, NY 12550	11	T-14-NY-1414	Refined Products	Barge, Tanker, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery		195,785 bbls	#2 High Sulfur Diesel: 133,880 bbls #2 Low Sulfur Diesel: 3,071 bbls Conventional Premium: 20,786 bbls Conventional Regular Unleaded: 38,048 bbls	Citgo, Gulf, Sunoco, Texaco, Tosco, Valero

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Newburgh	Amerada Hess Corporation	Roseton Terminal 924 River Road Newburgh, NY 12550		T-14-NY-1421					1,300,000 bbls		
Newburgh	Warex Terminals Corporation	1254 River Road Newburgh, NY 12550	11	T-16-NY-1499	Refined Products	Barge, Tanker, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery		177,025 bbls	Conventional Premium: 22,619 bbls #2 Low Sulfur Diesel: 47,191 bbls K-1 Kerosene: 12,000 bbls #2 High Sulfur Diesel: 95,215 bbls	Citgo, ConocoPhillips, S.R.& M., Shell, Sunoco, Texaco, Tosco, Tosco-Exxon, Tosco-Mobil, Valero
Oceanside	Sprague Energy Corporation	7 Hampton Road Oceanside, NY 11572	21	T-11-NY1315		Transport Truck, Vessel			238,000 bbls	#2 High Sulfur Diesel #2 Low Sulfur Diesel K-1 Kerosene	Gulf
Oneonta	TEPPCO	955-205 State Highway North Oneonta, NY 13820	2		Natural Gas Liquids	Transport Truck, Pipeline	Automated Card/Key Stop, Automatic Additive Injection System	TEPPCO	2,857 bbls	Propane: 2,800 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Oswego	NRG Energy, Inc.	261 Washington Blvd. Oswego, NY	4						1,548,000 bbls		
Oswego	Sprague Energy Corporation	One West Van Buren Street Oswego, NY 13126	5		Asphalt, Refined Products	Transport Truck	Top Loading		514,994 bbls	#2 High Sulfur Diesel: 238 bbls #6 Residual Fuels: 129,366 bbls Asphalt: 209,848 bbls Bulk Liquids: 175,542 bbls #4 Residual Fuels #6 Residual Fuels Asphalt	
Oyster Bay	Commander Terminals LLC	1 Commander Square Oyster Bay, NY 11771	21	T-11-NY-1336	Refined Products	Barge, Transport Truck	Automatic Additive Injection System, Vapor Recovery, Top Loading, Bottom Loading		118,000 bbls	#2 High Sulfur Diesel: 60,000 bbls #2 Low Sulfur Diesel: 8,000 bbls Conventional Premium: 12,000 bbls Conventional Regular Unleaded: 30,000 bbls Ethanol: 8,000 bbls	Getty, Global, Petroleum Heat and Power, Stuyvesant Fuel
Peekskill	Meenan Oil Co.	Roa Hook Road Peekskill, NY 10566	0	T-13-NY-1358							
Plainview	Northville Industries Corporation	150 Fairchild Avenue Plainview, NY 11803	0	T-11-NY-1303	Refined Products	Pipeline	Automated Card/Key Stop, Top Loading				

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Plattsburgh	Griffith Terminal	4736 Rt. 9 Plattsburgh, NY 12901				Barge, Tanker, Transport Truck				K-1 Kerosene	
Port Chester	Westmore Fuel Co., Inc.	2 Purdy Ave Port Chester, NY 10573	T-13-NY-1360								
Port Ewen	Kingston Oil Supply	North Broadway Port Ewen, NY 12466	0	T-16-NY-1495						#2 High Sulfur Diesel #4 Residual Fuels Propane	
Poughkeepsie	Meenan Oil Co.	154 Garden Street Poughkeepsie, NY 12601	0	T-14-NY-1422							
Rensselaer	Sunoco Logistics Partners L.P.	58 Riverside Avenue Rensselaer, NY 12144-2900			Refined Products	Barge, Transport Truck	Automated Card/Key Stop		20,000 bbls	Conventional Premium: 20,000 bbls	
Rensselaer	Petroleum Fuel & Terminal Co.	54 Riverside Avenue Rensselaer, NY 12144	12	T-14-NY-1404	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery		723,000 bbls	K-1 Kerosene: 84,000 bbls #2 High Sulfur Diesel: 225,000 bbls #2 Low Sulfur Diesel: 80,000 bbls Conventional Premium: 37,000 bbls Conventional Regular Unleaded: 240,000 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Rensselaer	Amerada Hess Corporation	367 American Oil Road Rensselaer, NY 12144		T-14-NY-1415	Refined Products	Barge, Transport Truck					Hess
Rensselaer	Bray Terminals, Inc.	50 Riverside Avenue Rensselaer, NY 12144	15	T-14-NY-1416	Refined Products	Barge, Tanker	Automated Card/Key Stop, Top Loading, Bottom Loading, Automatic Additive Injection System, Vapor Recovery		396,000 bbls	Conventional Premium: 37,000 bbls K-1 Kerosene: 18,000 bbls Conventional Regular Unleaded: 81,000 bbls #2 High Sulfur Diesel: 160,000 bbls #2 Low Sulfur Diesel: 100,000 bbls	
Rensselaer	Sprague Energy Corporation	540 Riverside Avenue Rensselaer, NY 12144	8	T-14-NY-1417	Refined Products	Barge, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom, Loading		1,044,000 bbls	#4 Residual Fuels #6 Residual Fuels #2 Low Sulfur Diesel K-1 Kerosene	
Rensselaer	Getty Terminals Corp.	49 Riverside Avenue Rensselaer, NY 12144	7	T-14-NY-1418	Refined Products	Barge, Transport Truck	Bottom Loading, Vapor Recovery		173,743 bbls	Conventional Regular Unleaded: 75,000 bbls Ethanol: 909 bbls #2 Low Sulfur Diesel: 22,834 bbls #2 High Sulfur Diesel: 75,000 bbls	Getty, Gulf

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Rensselaer	TransMontaigne Product Services Inc.	58 Riverside Avenue Rensselaer, NY 12144	0	T-14-NY-1420					583,542 bbls		
Rensselaer	International Petroleum Traders, LLC (IPT, LLC)	End Riverside Ave Ext. Rensselaer, NY 12144	12	T-16-NY-1461	Jet Fuel, Refined Products	Barge, Tanker, Transport Truck	Automated Card/Key Stop, Top Loading, Bottom Loading, Vapor Recovery, Automatic Additive Injection System		333,632 bbls	RFG Regular Unleaded: 78,160 bbls #2 Low Sulfur Diesel: 154,547 bbls Aviation gas: 30,635 bbls Conventional Regular Unleaded: 78,160 bbls Jet Fuel: 63,536 bbls Ethanol: 41,273 bbls Conventional Premium: 41,273 bbls	
Riverhead	ConocoPhillips	Riverhead Terminal 212 Sound Shore Road Riverhead, NY 11901		T-11-NY-1318	Crude Oil, Refined Products	Tanker, Transport Truck, Barge					

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Rochester	Buckeye Terminals, LLC	754 Brooks Avenue Riverhead, NY 14624-0587	3	T-16-NY-1468	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Bottom Loading, Vapor Recovery, Automatic Additive Injection System	Buckeye Pipe Line	149,000 bbls	#2 Low Sulfur Diesel: 21,000 bbls Conventional Premium: 31,000 bbls Conventional Regular Unleaded: 73,000 bbls	
Rochester	Amerada Hess Corporation	1975 Lyell Avenue Riverhead, NY 14606		T-16-NY-1469	Refined Products	Pipeline, Transport Truck		Buckeye			Gulf, Hess
Rochester	Petroleum Fuel & Terminal	1935 Lyell Avenue Rochester, NY 14608	7						276,297 bbls		
Rochester	Buckeye Terminals, LLC	(Rochester II Terminal) 675 Brooks Avenue Riverhead, NY 14619	7	T-16-NY-1472	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Vapor Recovery, Top Loading, Bottom Loading	Buckeye, Mobil, Sun	224,100 bbls	#2 High Sulfur Diesel #2 Low Sulfur Diesel Conventional Premium Conventional Regular Unleaded	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Rochester	Sunoco Logistics Partners L.P.	1840 Lyell Avenue Rochester, NY 14606	10	T-16-NY-1473	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Vapor Recovery, Bottom Loading	Sun	158,520 bbls	#2 Low Sulfur Diesel: 10,000 bbls Conventional Premium: 40,000 bbls Conventional Regular Unleaded: 90,000 bbls Ethanol: 10,000 bbls Transmix: 10,000 bbls Additives: 715 bbls	
Rochester	United Refining Company	1075 Chili Avenue Rochester, NY 14624		T-16-NY-1474	Refined Products	Rail, Pipeline, Transport Truck	Automated Card/Key Stop, Top Loading	Buckeye & Atlantic	190,000 bbls	K-1 Keronsene #2 Low Sulfur Diesel #2 High Sulfur Diesel	United Re
Rochester	Griffith Energy Inc. - Rochester	335 McKee Rd Rochester, NY 14624		T-16-NY-1470							
Selkirk	TEPPCO	P.O. Box 68 Selkirk, NY 12158	3		Natural Gas Liquids	Transport Truck, Pipeline, Rail	Automated Card/Key Stop, Automatic Additive Injection System	TEPPCO	6,428 bbls	Propane: 6,428 bbls	
Seneca	Kiantone Pipeline Corporation	530 Myer Rd Seneca, NY 14424			Crude Oil	Pipeline			500,000 bbls	Crude Oil: 500,000 bbls	
Sleepy Hollow	Castle North Terminal	11 River Street Sleepy Hollow, NY 10591	4	T-13-NY-1365	Refined Products	Barge, Transport Truck	Top Loading		19,000 bbls	#2 High Sulfur Diesel: 19,000 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Staten Island	ExxonMobil Oil Corporation	4101 Arthur Kill Road Staten Island, NY 10307	31		Refined Products	Pipeline, Barge		Colonial	1,906,900 bbls		
Staten Island	Kinder Morgan	500 Western Avenue Staten Island, NY 10303		T-13-NY-1362		Barge, Tanker, Transport Truck	Vapor Recovery, Automatic Additive Injection System	Buckeye, Colonial	130,000 bbls		
Tonawanda	Marathon Petroleum Company LLC	4000 River Road Tonawanda , NY 14150-6514			Asphalt	Barge, Transport Truck	Top Loading		163,000 bbls		
Tonawanda	United Refining Company	4545 River Road Tonawanda , NY 14150		T-16-NY-1457	Asphalt, Jet Fuel, Refined Products	Pipeline, Barge, Transport Truck	Bottom Loading, Top Loading, Automated Card/Key Stop, Vapor Recovery	Atlantic	325,000 bbls	Jet Fuel Conventional Premium Conventional Regular Unleaded #2 High Sulfur Diesel #2 Low Sulfur Diesel K-1 Kerosene	Gulf, Noco, Sunoco

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

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(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Tonawanda	NOCO Energy Corporation	700 Grand Island Boulevard Tonawanda , NY 14151-0086	42	T-16-NY-1459	Asphalt, Jet Fuel, Lube Oil, Refined Products	Rail, Pipeline, Barge, Transport Truck	Bottom Loading, Vapor Recovery, Top Loading, Automated Card/Key Stop, Automatic Additive Injection System	Sun	1,113,000 bbls	#1 Low Sulfur Diesel: 11,500 bbls #2 High Sulfur Diesel: 128,700 bbls #2 Low Sulfur Diesel: 75,500 bbls #5 Residual Fuels: 77,000 bbls #6 Residual Fuels: 107,000 bbls Conventional Premium: 51,000 bbls Conventional Regular Unleaded: 117,250 bbls Jet Fuel: 29,000 bbls Petrochemicals: 81,000 bbls Asphalt: 291,800 bbls	Noco, Sunoco, Tosco-Exxon, United Re
Tonawanda	Sunoco Logistics Partners L.P.	3733 River Road Tonawanda , NY 14150	9	T-16-NY-1484	Refined Products	Rail, Pipeline, Transport Truck	Automated Card/Key Stop, Vapor Recovery, Automatic Additive Injection System, Bottom Loading	Sunoco Logistics Pipeline	328,814 bbls	K-1 Kerosene: 8,700 bbls #2 Low Sulfur Diesel: 80,000 bbls Conventional Premium: 55,000 bbls Conventional Regular Unleaded: 176,000 bbls Ethanol: 30,000 bbls Transmix: 10,000 bbls Additives: 238 bbls	Citgo, Gulf, Sunoco

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Utica	Buckeye Terminals, LLC	Utica Terminal 37 Wurz Avenue Utica, NY 13502	6	T-16-NY-1486	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Top Loading	Buckeye	201,900 bbls	K-1 Kerosene: 17,300 bbls Conventional Regular Unleaded: 54,100 bbls #2 High Sulfur Diesel: 91,400 bbls Conventional Premium: 21,400 bbls #2 Low Sulfur Diesel: 17,700 bbls	
Vestal	Buckeye Terminals, LLC	(Binghamton Terminal) 3301 Old Vestal Road Vestal, NY 13850	8	T-16-NY-1451	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop	Mobil, Buckeye	101,300 bbls	#2 Low Sulfur Diesel Conventional Premium Conventional Regular Unleaded	
Vestal	CITGO Petroleum Corporation	3212 Old Vestal Road Vestal, NY 13850	7	T-16-NY-1454	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop	Buckeye	123,276 bbls	#2 High Sulfur Diesel: 50,000 bbls #2 Low Sulfur Diesel: 14,800 bbls Additives: 238 bbls Conventional Premium: 15,000 bbls Conventional Regular Unleaded: 43,000 bbls Transmix: 238 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Vestal	Buckeye Terminals, LLC	3121 Shippers Road Vestal, NY 13851-0527	10	T-16-NY-1488	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Bottom Loading, Top Loading, Vapor Recovery	Buckeye Pipe Line	436,000 bbls	#2 High Sulfur Diesel: 197,000 bbls K-1 Kerosene: 49,000 bbls #2 Low Sulfur Diesel: 52,000 bbls Conventional Premium: 39,000 bbls Transmix: 15,000 bbls Conventional Regular Unleaded: 84,000 bbls	
Vestal	Amerada Hess Corporation	440 Prentice Road Vestal, NY 13850		T-16-NY-1489	Refined Products	Pipeline, Transport Truck		Buckeye			
Warners	ExxonMobil Oil Corporation	(Joint Venture Facility with Amerada Hess) Syracuse Terminal, 6700 Herman Road Warners, NY 13164	8		Refined Products	Pipeline	Automated Card/Key Stop, Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery	Buckeye, Sun	376,900 bbls	Conventional Premium Conventional Regular Unleaded #2 Low Sulfur Diesel Premium Diesel	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(A)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Waterloo	Buckeye Terminals, LLC	(Geneva Terminal) 459 West River Road Waterloo, NY 13165	5	T-16-NY-1462	Refined Products	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System, Bottom Loading, Top Loading, Vapor Recovery	Buckeye Pipe Line	108,000 bbls	#2 High Sulfur Diesel: 36,000 bbls K-1 Kerosene: 14,000 bbls #2 Low Sulfur Diesel: 36,000 bbls Conventional Premium: 8,000 bbls Conventional Regular Unleaded: 14,000 bbls	
Watkins Glen	TEPPCO	Highway 14 North Watkins Glen, NY 14891			Natural Gas Liquids	Pipeline, Transport Truck	Automated Card/Key Stop, Automatic Additive Injection System	TEPPCO	1,200,000 bbls	Propane: 1,200,000 bbls	

Sources: OPIS Petroleum Terminal Encyclopedia (2006), ILTA Terminal Member Directory (2006), and US Army Corps of Engineers Port Series Reports, No. 41.

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Albany	Agway Petroleum Corporation	184 Port Road Port of Albany Albany, NY 12202	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery, Automatic Additive Injection System		319,400 bbls	#2 High Sulfur: 166,400 bbls Kerosene: 52,500 bbls #2 Low Sulfur Diesel: 33,500 bbls Premium Unleaded: 33,500 bbls Unleaded: 33,500 bbls
Albany	Cibro Petroleum Products	Port of Albany Albany, NY 12202	Asphalt	Barge, Transport Truck, Rail, Tanker				Asphalt: 225,000 bbls #2 Low Sulfur Diesel: 600,000 bbls Residual: 500,000 bbls
Albany	Mobil Oil Corporation	50 Church Street Albany, NY 12202	Refined Products	Rail, Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery, Automatic Additive Injection System		945.1 bbls	Premium Unleaded: 83,300 bbls Special: 64,700 bbls Unleaded: 143,100 bbls #1 Low Sulfur Diesel: 87,900 bbls #2 High Sulfur: 363,600 bbls
Astoria	Castle Astoria Terminal	17-10 Steinway St. Astoria, NY 11105	Refined Products	Barge, Transport Truck, Tanker, Pipeline	Top Loading, Automatic Additive Injection System		1,430,000 bbls	Asphalt: 140,000 bbls #2 High Sulfur: 339,000 bbls #2 Low Sulfur Diesel: 31,000 bbls Residual: 920,000 bbls
Bath	Bath Petroleum Storage Inc.	P. O. Box 708 Bath, NY 14810	Natural Gas	Rail, Transport Truck			1,120,000 bbls	Propane Butane
Brewerton	Agway Petroleum Corporation	Route 37 Brewerton, NY 13029	Refined Products	Pipeline, Transport Truck	Automated, Vapor Recovery, Bottom Loading, Automatic Additive Injection System	Buckeye Pipeline	383,800 bbls	#2 High Sulfur: 187,300 bbls Kerosene: 33,000 bbls #2 Low Sulfur Diesel: 32,000 bbls Premium Unleaded: 22,500 bbls Unleaded: 109,000 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Bronx	Amerada Hess Corporation	1392 Commerce Avenue Westchester Creek Bronx, NY 10461						
Bronx	Castle Port Morris Terminal	939 East 138th St. Bronx, NY 10454	Refined Products	Barge, Tanker, Transport Truck	Top Loading		693,000 bbls	#2 High Sulfur: 270,000 bbls Residual: 423,000 bbls
Bronx	Getty Terminals Corp.	4301 Boston Post Road Bronx, NY 10466	Refined Products	Barge, Transport Truck	Automated		25,445 bbls	Gasoline: 22,500 bbls Distillate: 2,945 bbls RFG
Brooklyn	Amerada Hess Corporation	722 Court Street Brooklyn, NY 11231	Refined Products	Barge, Transport Truck				
Brooklyn	Amoco Oil Company	125 Apollo Street Brooklyn, NY 11222	Refined Products	Pipeline, Barge, Transport Truck		Buckeye Pipeline	128,000 bbls	Gasoline: 70,000 bbls Distillate: 53,000 bbls
Brooklyn	Metro Terminals Corporation	500 Kingsland Avenue Brooklyn, NY 11222	Refined Products	Barge, Pipeline, Transport Truck	Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery	Buckeye Pipeline		#2 High Sulfur: 40,000 bbls Kerosene: 5,000 bbls #2 Low Sulfur Diesel: 10,000 bbls Premium U: 10,000 bbls Residual: 20,000 bbls Unleaded: 20,000 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Brooklyn	Metro Terminals Corporation	498 Kingsland Avenue Brooklyn, NY 11222	Refined Products	Pipeline, Barge, Transport Truck	Automatic Additive Injection System, Top Loading, Bottom Loading, Vapor Recovery	Buckeye Pipeline	105,000 bbls	Gasoline: 40,000 bbls #2: 40,000 bbls #6: 20,000 bbls #2 Low Sulfur Diesel: 10,000 bbls Kerosene: 5,000 bbls #4
Brooklyn	Motiva Enterprises LLC	(Brooklyn Terminal) 25 Paidge Ave. Brooklyn, NY 11222	Refined Products	Pipeline, Barge, Transport Truck	Automated, Automatic Additive Injection System, Bottom Loading, Vapor Recovery	Buckeye Pipeline	43,300 bbls	
Buffalo	Mobil Oil Corporation	625 Elk Street Buffalo, NY 14210	Refined Products	Pipeline, Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery	Mobil	362,645 bbls	Premium Unleaded: 80,800 bbls Unleaded: 188,000 bbls #1 Low Sulfur Diesel: 16,600 bbls #2 High Sulfur: 18,200 bbls #2 Low Sulfur Diesel: 54,400 bbls
Cold Spring	Mobil Oil Corporation	95 Shore Road Cold Spring, NY 11724	Refined Products	Barge, Transport Truck	Automated, Top Loading		53,500 bbls	#2 Fuel O: 53,900 bbls
Flushing	Coastal Oil New York, Inc.	3170 College Point Boulevard Flushing, NY 11354	Refined Products	Barge, Transport Truck			68,000 bbls	#2 Diesel #4 Residual #6 Residual
Geneva	Agway Petroleum Corporation	West River Road Geneva, NY 14456	Refined Products	Pipeline, Transport Truck	Vapor Recovery, Automatic Additive Injection System, Top Loading, Bottom Loading	Buckeye Pipeline	111,600 bbls	#2 High Sulfur: 37,000 bbls Kerosene: 14,400 bbls #2 Low Sulfur Diesel: 36,300 bbls Premium Unleaded: 9,500 bbls Unleaded: 14,400 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

Table A2.4(b)
New York Petroleum Terminals – Continued
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Glenmont	CITGO Petroleum Corporation	495 River Road Glenmont, NY 12077	Refined Products	Barge, Transport Truck	Automated		1,204,672 bbls	
Glenmont	Sears Petroleum & Transport Corp.	Route 144 Glenmont, NY 12077	Refined Products	Barge, Tanker, Transport Truck	Automated, Top Loading, Bottom Loading		2,000,000 bbls	
Glens Falls	Bray Terminals, Inc.	P.O. Box 956 Glens Falls, NY 12801	Refined Products	Rail, Barge, Transport Truck	Automated, Top Loading, Bottom Loading		400,000 bbls	#2 Unleaded Kerosene Ethanol Premium Unleaded #2 Low Sulfur Diesel
Glenwood Landing	Mobil Oil Corporation	Shore & Glenwood Road Glenwood Landing, NY 11547	Refined Products	Barge, Transport Truck	Automated, Bottom Loading, Vapor Recovery		77,300 bbls	Unleaded: 36,000 bbls #2 Fuel O: 10,000 bbls Premium Unleaded: 27,500 bbls #2 Low Sulfur Diesel: 3,900 bbls
Green Island	Stratus Petroleum	P. O. Box 1539 Green Island, NY 12183-1539	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading		210,000 bbls	Distillate: 210,000 bbls
Holtsville	Tosco Refining Co.	586 Union Avenue Holtsville, NY 11742	Refined Products	Pipeline, Transport Truck	Automated, Vapor Recovery, Automatic Additive Injection System, Top Loading, Bottom Loading	Proprieta	375,000 bbls	#2 High Sulfur: 123,000 bbls Kerosene: 38,000 bbls #2 Low Sulfur Diesel: 67,000 bbls Premium Unleaded: 77,000 bbls Unleaded: 70,000 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Inwood	Mobil Oil Corporation	464 Doughty Boulevard Inwood, NY 11096	Refined Products	Pipeline, Barge, Transport Truck	Automated	Buckeye	284,900 bbls	Unleaded: 35,400 bbls #2 Fuel O: 86,400 bbls Premium: 53,500 bbls #2 Low Sulfur Diesel: 5,100 bbls Special #2 Diesel
Jericho	Getty Terminals Corp.	125 Jericho Turnpike Jericho, NY 11753						
Johnson City	Sunoco Inc.	4324 Watson Boulevard Johnson City, NY 13790	Refined Products	Pipeline, Transport Truck	Automated	Sun Pipeline	60,000 bbls	Gasoline: 50,000 bbls Distillate: 10,000 bbls
Lawrence	Carbo Industries Inc.	1 Bay Boulevard Lawrence, NY 11559	Refined Products	Pipeline, Barge, Transport Truck	Automated, Vapor Recovery, Automatic Additive Injection System, Top Loading, Bottom Loading	Buckeye Pipeline	5,900,000 bbls	#2 Oil Gasoline Diesel
Lawrence	Motiva Enterprises LLC	(Long Island Terminal) 74 East Ave. Lawrence, NY 11559	Refined Products	Pipeline, Transport Truck	Automated, Vapor Recovery, Automatic Additive Injection System, Bottom Loading	Buckeye Pipeline	259,000 bbls	Unleaded Mid-Grade Premium Unleaded #2 High Sulfur #2 Low Sulfur Diesel
Liverpool	Stratus Petroleum	P. O. Box 237 Liverpool, NY 13088	Refined Products	Pipeline, Transport Truck	Automated, Automatic Additive Injection System, Top Loading, Bottom Loading	Buckeye Pipeline	176,500 bbls	Gasoline: 62,000 bbls Distillate: 114,500 bbls Jet Fuel Kerosene

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Long Island City	Getty Terminals Corp.	3023 Greenpoint Avenue Long Island City, NY 11101	Refined Products	Pipeline, Barge, Transport Truck	Automated	Buckeye	30,015 bbls	Gasoline: 30,015 bbls
Marcy	Agway Petroleum Corporation	Riverside Drive Marcy, NY 13403	Refined Products	Pipeline, Transport Truck	Automated, Vapor Recovery, Automatic Additive Injection System, Bottom Loading	Buckeye	272,200 bbls	#2 High Sulfur: 91,000 bbls Kerosene: 50,000 bbls #2 Low Sulfur Diesel: 23,500 bbls Premium Unleaded: 21,800 bbls Unleaded: 85,900 bbls
Marcy	Amerada Hess Corporation	Riverside Drive P. O. Box 265 Marcy, NY 13403	Refined Products	Pipeline, Transport Truck		Buckeye		
Marcy	Bray Terminals, Inc.	River Road Marcy, NY 13403	Refined Products, Lube Oil	Barge, Pipeline, Transport Truck	Automated		150,000 bbls	#2 Low Sulfur Diesel Kerosene #2 Oil
Mount Vernon	Amoco Oil Company	40 Canal Street Mount Vernon, NY 10550	Refined Products	Barge, Transport Truck	Automated		90,000 bbls	Gasoline: 63,000 bbls #2: 18,500 bbls Diesel: 7,500 bbls
Mount Vernon	West Vernon Petroleum Corp.	701 South Columbus Avenue Mount Vernon, NY 10550	Refined Products				70,000 bbls	#2 Low Sulfur Diesel Residual

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
New Windsor	Coastal Oil New York, Inc.	River Road New Windsor, NY 12553		Barge, Transport Truck	Automated		521,000 bbls	Jet Fuel #2 Fuel Gasoline Diesel Kerosene
New Windsor	Mobil Oil Corporation	1281 River Road New Windsor, NY 12553	Refined Products	Rail, Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery		312,500 bbls	Unleaded: 106,600 bbls Premium: 61,600 bbls #2 Low Sulfur Diesel: 36,100 bbls #2 High Sulfur: 108,200 bbls Special
New Windsor	Sunoco Inc.	49 River Road New Windsor, NY 12553	Refined Products	Barge, Transport Truck	Automated		104,000 bbls	Gasoline: 58,000 bbls Distillate: 46,000 bbls
Newburgh	Amerada Hess Corporation	590 River Road Newburgh, NY 12250	Refined Products	Transport Truck, Barge, Tanker				
Oceanside	Gulf Oil, Limited Partnership	P. O. Box G Oceanside, NY 11572		Barge, Tanker, Transport Truck	Top Loading, Bottom Loading, Automated		77,185 bbls	#2 Low Sulfur Diesel: 5,000 bbls #2 High Sulfur: 24,000 bbls Unleaded 24,000 bbls Premium Unleaded: 24,000 bbls Kerosene Mid-Grade
Oceanside	RAD Energy Corp	7 Hampton Road Oceanside, NY 11572	Refined Products	Transport Truck, Barge, Tanker	Automated, Vapor Recovery, Automatic Additive Injection System, Bottom Loading, Top Loading		228,000 bbls	Unleaded Mid-Grade Premium Unleaded #2 Low Sulfur Diesel #2 High Sulfur Kerosene Ethanol Oxygenate

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Oswego	Sprague Energy Corp.	1 W. Van Buren Street Oswego, NY 13126	Refined Products, Asphalt, Petrochemicals	Barge, Transport Truck	Top Loading		501,245 bbls	Petroleum #4 Oil #6 Oil
Plainview	Tosco Refining Co.	Plainview Terminal 150 Fairchild Avenue Plainview, NY 11803	Refined Products	Pipeline	Automated, Top Loading		10,000 bbls	#2 High Sulfur: 10,000 bbls
Plattsburgh	Griffith Terminal	P. O. Box 947 Plattsburgh, NY 12901		Barge, Tanker, Transport Truck				Kerosene
Rensselaer	Amerada Hess Corporation	P. O. Box 29 River Road East Greenbush Rensselaer, NY 12144	Refined Products	Barge, Transport Truck				
Rensselaer	Getty Terminals Corp.	49 Riverside Avenue Rensselaer, NY 12144	Refined Products	Barge, Transport Truck			330,775 bbls	Gasoline: 152,150 bbls Oxygenate: 909 bbls Distillate: 174,605 bbls RFG
Rensselaer	Gulf Oil, Limited Partnership	P. O. Box 439 60 Riverside Avenue Rensselaer, NY 12144	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading		405,055 bbls	#2 High Sulfur: 190,042 bbls Unleaded: 98,000 bbls Kerosene: 14,721 bbls Premium Unleaded: 69,560 bbls Mid-Grade: 32,732 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Rensselaer	Petroleum Fuel & Terminal Co.	54 Riverside Avenue Rensselaer, NY 12144	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery		560,000 bbls	Gasoline Kerosene Fuel Oil
Rensselaer	Sprague Energy Corp.	Riverside Avenue P. O. Box 215 Rensselaer, NY 12144	Refined Products	Barge, Transport Truck	Automated, Top Loading, Bottom Loading		1,044,000 bbls	#2 High Sulfur #4 Oil #6 Oil Diesel Fuel Kerosene
Rensselaer	Sunoco Inc.	58 Riverside Avenue Rensselaer, NY 12144	Refined Products	Barge, Transport Truck	Automated		414,000 bbls	Gasoline: 109,000 bbls Distillate: 305,000 bbls
Riverhead	Tosco	Riverhead Terminal 212 Sound Shore Road Riverhead, NY 11901	Refined Products, Crude Oil	Barge, Transport Truck, Tanker			5,200,000 bbls	Unleaded Premium Unleaded #2 High Sulfur Diesel Crude Oil #6 Oil MTBE
Rochester	Agway Petroleum Corporation	754 Brooks Avenue Rochester, NY 14619	Refined Products	Pipeline, Transport Truck	Vapor Recovery, Automatic Additive Injection System, Bottom Loading	Buckeye, Sun/Atlantic	152,000 bbls	Premium Unleaded: 32,600 bbls Unleaded: 119,400 bbls
Rochester	Amerada Hess Corporation	1975 Lyell Avenue Rochester, NY 14606	Refined Products	Pipeline, Transport Truck		Buckeye Pipeline		

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Rochester	Coastal Oil New York, Inc.	1935 Lyell Avenue Rochester, NY 14606	Refined Products	Pipeline, Transport Truck	Automated		197,000 bbls	#2 High Sulfur Diesel Kerosene Gasoline
Rochester	Gulf Oil, Limited Partnership	837 Buffalo Road Rochester, NY 14624-1809			Automated, Top Loading, Bottom Loading	Buckeye	256,525 bbls	#2 High Sulfur: 123,828 bbls Kerosene: 11,990 bbls Unleaded: 60,527 bbls Mid-Grade: 48,200 bbls Unleaded: 11,980 bbls
Rochester	Mobil Oil Corporation	675 Brooks Avenue Rochester, NY 14619	Refined Products	Rail, Pipeline, Transport Truck	Automated, Vapor Recovery, Automatic Additive Injection System, Top Loading, Bottom Loading	Mobil, Buckeye, Atlantic	258,346 bbls	Unleaded: 93,200 bbls Premium Unleaded: 30,400 bbls #2 Low Sulfur Diesel: 69,000 bbls #2 High Sulfur: 22,900 bbls Special
Rochester	Sunoco Inc.	1840 Lyell Avenue Rochester, NY 14606	Refined Products	Pipeline, Transport Truck	Automated	Sun, Buckeye	150,000 bbls	Gasoline: 130,000 bbls Distillate: 20,000 bbls
Rochester	United Refining Company	P. O. Box 8919 Rochester, NY 14624	Refined Products	Rail, Pipeline, Transport Truck	Automated, Top Loading	Buckeye	190,000 bbls	Kerosene Diesel #2 High Sulfur
Rome	Sears Oil Company, Inc.	Lado Avenue Rome, NY 13440		Rail, Barge, Transport Truck			700,000 bbls	

Source: OPIS Petroleum Terminal Encyclopedia (2000).

Table A2.4(b)
New York Petroleum Terminals – Continued
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Rome	Sears Oil Company, Inc.	P. O. Box 389 Rome, NY 13442-0389						
Selkirk	TEPPCO	P. O. Box 68 Selkirk, NY 12158-0068	Natural Gas	Transport Truck, Pipeline, Rail	Automated	TEPPCO	42,000 bbls	Propane: 6,428 bbls
Sleepy Hollow	Castle North Terminal	11 River St. Sleepy Hollow, NY 10591	Refined Products	Barge, Transport Truck	Top Loading		21,688 bbls	#2 High Sulfur: 19,000 bbls #2 Low Sulfur Diesel: 2,688 bbls
Staten Island	GATX, Port of New York	500 Western Ave. Staten Island, NY 10303		Barge, Tanker, Transport Truck	Vapor Recovery, Automatic Additive Injection System		130,000 bbls	Chemicals
Staten Island	Mobil Oil Corporation	P. O. Box 188 Staten Island, NY 10307	Refined Products	Pipeline, Barge	Automated	Colonial	2,359,463	
Syracuse	Coastal Oil New York, Inc.	475 Solar Street Syracuse, NY 13204	Refined Products	Pipeline, Transport Truck	Automated	Buckeye Pipeline	306,000 bbls	Kerosene #2 High Sulfur Unleaded Mid-Grade Premium Unleaded Diesel

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Syracuse	Mobil Oil Corporation	502 Solar Street Syracuse, NY 13204	Refined Products	Pipeline, Transport Truck	Automated, Top Loading, Bottom Loading, Vapor Recovery	Mobil, Buckeye	297,300 bbls	Unleaded: 101,300 bbls Premium Unleaded: 469,000 bbls #2 High Sulfur: 29,400 bbls #2 Low Sulfur Diesel: 42,400 bbls
Syracuse	Sunoco Inc.	301 West Hiawatha Boulevard Syracuse, NY 13204	Refined Products	Pipeline, Transport Truck	Automated	Sun Pipeline		
Syracuse	Sunoco Inc.	540 Solar Street Syracuse, NY 13204	Refined Products	Pipeline, Transport Truck	Automated	Buckeye	212,000 bbls	Gasoline: 140,000 bbls Distillate: 72,000 bbls
Tonawanda	Marathon Ashland Petroleum LLC	4000 N. River Road Tonawanda, NY 14150	Asphalt	Barge, Transport Truck	Top Loading		163,000 bbls	
Tonawanda	NOCO Energy Corp	700 Grand Island Boulevard P. O. Box 86 Tonawanda, NY 14151-0086	Refined Products, Asphalt, Jet Fuel, Lube Oil	Rail, Pipeline, Barge, Transport Truck	Top Loading, Bottom Loading, Vapor Recovery	Sun Pipeline	1,220,000 bbls	Gasoline: 275,000 bbls #2 High Sulfur: 204,000 bbls Kerosene: 97,000 bbls Jet Fuel: 185,000 bbls Asphalt: 310,000 bbls #6 Fuel O: 65,000 bbls Chemicals: 96,000 bbls Propane: 180,000 bbls
Tonawanda	Sunoco Inc.	3733 River Road Tonawanda, NY 14150	Refined Products	Pipeline, Transport Truck	Automated	Sun Pipeline	330,000 bbls	Gasoline: 162,000 bbls Distillate: 168,000 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Tonawanda	United Refining Company	4545 River Road Tonawanda, NY 14150	Refined Products, Asphalt	Pipeline, Barge, Transport Truck	Bottom Loading, Top Loading, Vapor Recovery,	Atlantic	325,000 bbls	Jet Fuel Mid-Grade Unleaded #2 High Sulfur #2 High Sulfur Diesel Kerosene
Utica	Mobil Oil Corporation	37 Wurz Avenue Utica, NY 13502	Refined Products	Pipeline, Transport Truck	Automated, Top Loading	Buckeye	193,344 bbls	Unleaded: 60,400 bbls
Utica	Sears Oil Company, Inc.	Route 49 Utica, NY	Refined Products	Pipeline, Barge, Transport Truck	Automated, Top Loading, Bottom Loading	Buckeye	155,000 bbls	
Vestal	Agway Petroleum Corporation	Shippers Road Vestal, NY 13851	Refined Products	Pipeline, Transport Truck	Vapor Recovery, Automatic Additive Injection System, Bottom Loading	Buckeye	319,800 bbls	#2 High Sulfur: 195,900 bbls Kerosene: 18,800 bbls #2 Low Sulfur Diesel: 33,000 bbls Premium Unleaded: 22,300 bbls Unleaded: 49,800 bbls
Vestal	Amerada Hess Corporation	440 Prentice Road Vestal, NY 13850	Refined Products	Pipeline, Transport Truck		Buckeye		
Vestal	CITGO Petroleum Corporation	3212 Old Vestal Road Vestal, NY 13850	Refined Products	Pipeline, Transport Truck	Automated	Buckeye	122,752 bbls	

Source: OPIS Petroleum Terminal Encyclopedia (2000).

TABLE A2.4(B)
NEW YORK PETROLEUM TERMINALS – CONTINUED
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Vestal	Coastal Oil New York, Inc.	3121 Shippers Road Vestal, NY 13851	Refined Products	Pipeline, Transport Truck	Automated	Buckeye	156,000 bbls	#2 Oil Jet Fuel Gasoline Diesel
Vestal	Mobil Oil Corporation	3301 Old Vestal Road Vestal, NY 13850	Refined Products	Pipeline, Transport Truck	Automated	Mobil, Buckeye	109,086 bbls	Unleaded: 20,100 bbls #1 Low Sulfur: 62,000 bbls #2 Low Sulfur Diesel: 62,000 bbls Unleaded: 45,100 bbls #2 Fuel: 29,300 bbls
Warners	Amerada Hess Corporation	P. O. Box 216 Warners, NY 13164-0216	Refined Products	Pipeline, Transport Truck		Buckeye		
Warners	Mobil Oil Corporation	(Joint Venture Facility with Amerada Hess) 6700 Herman Road Warners, NY 13164	Refined Products	Pipeline, Transport Truck		Mobil, Buckeye		430,700 bbls
Watkins Glen	TEPPCO	P. O. Box 312 Watkins Glen, NY 14891-0312	Natural Gas	Pipeline, Transport Truck	Automated	TEPPCO		Propane: 1,200,000 bbls
West Oneonta	TEPPCO	P. O. Box 218 West Oneonta, NY 13861	Natural Gas	Transport Truck, Pipeline	Automated	TEPPCO	5,000 bbls	Propane: 714 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

Table A2.5(a)
Vermont Petroleum Terminals
(2006)

City	Company	Address	Number of Tanks	ExSTARS Terminal Number	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity	Exchange / Throughput Partners
Burlington	ExxonMobil Oil Corporation	2 Flynn Avenue, VT 05401	10	T-03-VT-1100	Refined Products	Rail, Transport Truck	Automated Card/Key Stop, Bottom Loading, Top Loading, Vapor Recovery		294,400 bbls	Conventional Regular Unleaded, #2 High Sulfur Diesel, Conventional Premium, #2 Low Sulfur Diesel	Agway, ConocoPhillips, Irving, Shell, XOM
Hartford	Sprague - White River Junction	127 Roundhouse Road, VT 05001	3		Refined Products	Rail, Tanker, Transport Truck	Automated Card/Key Stop, Bottom Loading, Top Loading		8,000 bbls	K-1 Kerosene: 2,000 bbls; #2 High Sulfur Diesel: 6,000 bbls	
Middlebury	Sprague - Middlebury	103 Exchange Street, VT 05753	9		Refined Products	Rail, Tanker, Transport Truck	Top Loading, Bottom Loading		3,100 bbls	#2 High Sulfur Diesel: 2,200 bbls; #2 Low Sulfur Diesel: 500 bbls; K-1 Kerosene: 400 bbls	

Source: OPIS Petroleum Terminal Encyclopedia (2006) and ILTA Terminal Member Directory (2006).

TABLE A2.5(B)
VERMONT PETROLEUM TERMINALS
(2000)

City	Company	Address	Terminal Type	Supplied and Outloaded by	Outloading Features	Pipeline Used by Terminal	Total Storage Capacity	Individual Storage Capacity
Burlington	Mobil Oil Corporation	2 Flynn Avenue Burlington, VT 05401	Refined Products	Pipeline, Transport Truck	Vapor Recovery, Automated, Top Loading, Bottom Loading		197,900 bbls	Unleaded: 86,800 bbls #2 High Sulfur: 180,900 bbls Premium Unleaded: 77,100 bbls #2 Low Sulfur Diesel: 58,700 bbls
Rutland	Rutland Gas and Oil Company, Inc.	156 Granger Street Rutland, VT 05701	Refined Products	Transport Truck			15,000 bbls	#2 High Sulfur: 110,000 bbls Kerosene: 15,000 bbls #2 Low Sulfur Diesel: 30,000 bbls

Source: OPIS Petroleum Terminal Encyclopedia (2000).

APPENDIX III: RETAIL GASOLINE MARKET SHARES BY COUNTY

TABLE A3.1
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CUMBERLAND, MAINE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,645	28.1
CITGO	913	15.6
GULF	771	13.2
BJS	450	7.7
IRVING	438	7.5
TEXACO	325	5.5
OTHERS	1,316	22.5
TOTAL	5,858	100.0
HHI		1,420

Source: MPSI (2006).

TABLE A3.2
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
PENOBSCOT, MAINE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,210	29.7
CITGO	872	21.4
IRVING	791	19.4
EXXON	578	14.2
GULF	300	7.4
OTHERS	323	7.9
TOTAL	4,074	100.0
HHI		1,992

Source: MPSI (2006).

TABLE A3.3
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
BARNSTABLE, MASSACHUSETTS

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	4,438	29.7
CITGO	1,715	11.5
GULF	1,621	10.8
EXXON	1,339	9.0
SUNOCO	1,283	8.6
SHELL	1,242	8.3
GETTY	1,026	6.9
OTHERS	2,285	15.3
TOTAL	14,949	100.0
HHI		1,434

Source: MPSI (2006).

TABLE A.3.4
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
BERKSHIRE, MASSACHUSETTS

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
OTHERS	530	100.0
TOTAL	530	100.0
HHI		2,316

Source: MPSI (2006).

TABLE A3.5
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ESSEX, MASSACHUSETTS

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	6,006	24.9
SUNOCO	2,499	10.4
HESS	2,475	10.3
HAFFNERS	1,935	8.0
CITGO	1,625	6.7
SHELL	1,621	6.7
EXXON	1,353	5.6
GULF	1,277	5.3
OTHERS	5,346	22.1
TOTAL	24,137	100.0
HHI		1,092

Source: MPSI (2006).

TABLE A.3.6
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
FRANKLIN, MASSACHUSETTS

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	636	24.3
SUNOCO	453	17.3
EXXON	342	13.1
CITGO	334	12.8
OTHERS	852	32.6
TOTAL	2,617	100.0
HHI		1,387

Source: MPSI (2006).

TABLE A3.7
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
HAMPDEN, MASSACHUSETTS

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
SUNOCO	3,132	16.5
MOBIL	2,760	14.6
CITGO	2,610	13.8
SHELL	2,010	10.6
PRIDE	1,380	7.3
EXXON	1,211	6.4
GULF	1,017	5.4
OTHERS	4,822	25.5
TOTAL	18,942	100.0
HHI		986.2

Source: MPSI (2006).

TABLE A3.8
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
HAMPSHIRE, MASSACHUSETTS

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	896	17.9
CITGO	707	14.1
CUMBERLAND FARMS	590	11.8
GULF	483	9.6
SHELL	390	7.8
PRIDE	345	6.9
SUNOCO	290	5.8
GETTY	285	5.7
OTHERS	1,027	20.5
TOTAL	5,013	100.0
HHI		998.3

Source: MPSI (2006).

TABLE A3.9
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
MIDDLESEX, MASSACHUSETTS

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	12,338	26.1
SHELL	4,680	9.9
EXXON	4,191	8.9
SUNOCO	4,031	8.5
CITGO	3,125	6.6
GULF	3,004	6.4
HESS	2,385	5.0
OTHERS	13,509	28.6
TOTAL	47,263	100.0
HHI		1,084

Source: MPSI (2006).

TABLE A3.10
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
NORFOLK, MASSACHUSETTS

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	6,119	26.9
SHELL	2,464	10.9
SUNOCO	2,450	10.8
GULF	1,785	7.9
CITGO	1,762	7.8
TEXACO	1,281	5.6
GETTY	1,202	5.3
OTHERS	5,646	24.9
TOTAL	22,709	100.0
HHI		1,177

Source: MPSI (2006).

TABLE A3.11
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
SUFFOLK, MASSACHUSETTS

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	1,956	14.7
HESS	1,536	11.5
SUNOCO	1,536	11.5
SHELL	1,164	8.8
TEXACO	1,058	8.0
CITGO	938	7.1
OTHERS	5,112	38.4
TOTAL	13,300	100.0
HHI		768.2

Source: MPSI (2006).

TABLE A3.12
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WORCESTER, MASSACHUSETTS

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	6,623	23.0
SHELL	3,006	10.4
EXXON	2,537	8.8
GETTY	2,492	8.6
CITGO	2,298	8.0
SUNOCO	2,070	7.2
GULF	1,594	5.5
OTHERS	8,214	28.5
TOTAL	28,834	100.0
HHI		996.6

Source: MPSI (2006).

TABLE A3.13
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
BELKNAP, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
IRVING	1,391	30.6
MOBIL	975	21.5
CITGO	785	17.3
GULF	399	8.8
OTHERS	990	21.8
TOTAL	4,540	100.0
HHI		1,857

Source: MPSI (2006).

TABLE A3.14
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CARROLL, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
CITGO	537	22.0
IRVING	524	21.4
MOBIL	444	18.2
SUNOCO	276	11.3
GULF	273	11.2
EXXON	131	5.4
OTHERS	258	10.6
TOTAL	2,443	100.0
HHI		1,589

Source: MPSI (2006).

TABLE A3.15
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CHESHIRE, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
CITGO	1,191	37.8
SUNOCO	554	17.6
MOBIL	544	17.3
GULF	342	10.8
OTHERS	522	16.6
TOTAL	3,153	100.0
HHI		2,243

Source: MPSI (2006).

TABLE A3.16
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
COOS, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
CITGO	431	19.0
IRVING	413	18.2
MOBIL	314	13.9
COASTAL	281	12.4
GULF	215	9.5
OTHERS	613	27.0
TOTAL	2,267	100.0
HHI		1,181

Source: MPSI (2006).

TABLE A3.17
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
GRAFTON, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,190	25.0
CITGO	942	19.8
IRVING	621	13.1
SHELL	618	13.0
EXXON	392	8.2
SUNOCO	341	7.2
GULF	327	6.9
OTHERS	323	6.8
TOTAL	4,754	100.0
HHI		1,532

Source: MPSI (2006).

TABLE A3.18
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
HILLSBOROUGH, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	4,152	25.8
SHELL	2,194	13.6
CITGO	2,020	12.5
EXXON	1,655	10.3
SUNOCO	1,036	6.4
GULF	940	5.8
OTHERS	4,119	25.6
TOTAL	16,116	100.0
HHI		1,234

Source: MPSI (2006).

TABLE A3.19
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
MERRIMACK, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,438	19.4
SUNOCO	815	11.0
IRVING	789	10.7
CITGO	779	10.5
GULF	726	9.8
SHELL	700	9.5
EXXON	699	9.4
HESS	536	7.2
OTHERS	922	12.5
TOTAL	7,404	100.0
HHI		1,080

Source: MPSI (2006).

TABLE A3.20
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
MONADNOCK, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	55	100.0
TOTAL	55	100.0
HHI		5,279

Source: MPSI (2006).

TABLE A3.21
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ROCKINGHAM, NEW HAMPSHIRE

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	2,975	19.9
CITGO	1,664	11.1
SUNOCO	1,455	9.7
IRVING	1,358	9.1
GETTY	1,249	8.4
EXXON	945	6.3
SHELL	927	6.2
GULF	877	5.9
OTHERS	3,483	23.3
TOTAL	14,933	100.0
HHI		920.5

Source: MPSI (2006).

TABLE A3.22
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
STRAFFORD, NEW HAMPSHIRE

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
SHELL	906	17.2
GULF	843	16.0
MOBIL	803	15.3
IRVING	710	13.5
GETTY	680	12.9
CITGO	405	7.7
OTHERS	906	17.2
TOTAL	5,253	100.0
HHI		1,247

Source: MPSI (2006).

TABLE A3.23
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
SULLIVAN, NEW HAMPSHIRE

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
CITGO	652	37.9
SHELL	347	20.2
MOBIL	292	17.0
OTHERS	429	24.9
TOTAL	1,720	100.0
HHI		2,241

Source: MPSI (2006).

TABLE A3.24
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ALBANY, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	4,852	38.7
SUNOCO	1,612	12.9
HESS	1,420	11.3
STEWARTS	1,145	9.1
CITGO	1,059	8.4
GETTY	883	7.0
OTHERS	1,562	12.5
TOTAL	12,533	100.0
HHI		2,027

Source: MPSI (2006).

TABLE A3.25
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
BRONX, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
BP	4,660	31.6
MOBIL	1,728	11.7
HESS	1,348	9.1
GETTY	1,199	8.1
SUNOCO	1,012	6.9
SHELL	906	6.1
OTHERS	3,915	26.5
TOTAL	14,768	100.0
HHI		1,447

Source: MPSI (2006).

TABLE A3.26
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CATTARAUGUS, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	220	100.0
TOTAL	220	100.0
HHI		2,082

Source: MPSI (2006).

TABLE A3.27
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CAYUGA, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
SUNOCO	345	20.4
MOBIL	330	19.5
KWIK FILL	199	11.8
OTHERS	818	48.3
TOTAL	1,692	100.0
HHI		1,453

Source: MPSI (2006).

TABLE A3.28
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CHAUTAUQUA, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	1,069	100.0
TOTAL	1,069	100.0
HHI		1,227

Source: MPSI (2006).

TABLE A3.29
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
DUTCHESS, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	3,580	27.0
SUNOCO	1,808	13.6
CITGO	1,741	13.1
GULF	1,518	11.4
GETTY	1,228	9.2
HESS	1,138	8.6
STEWARTS	958	7.2
OTHERS	1,312	9.9
TOTAL	13,283	100.0
HHI		1,435

Source: MPSI (2006).

TABLE A3.30
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ERIE, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	9,382	32.8
SUNOCO	6,168	21.5
NOCO	2,945	10.3
CITGO	2,411	8.4
KWIK FILL	1,873	6.5
DELTA SONIC	1,491	5.2
OTHERS	4,369	15.3
TOTAL	28,639	100.0
HHI		1,804

Source: MPSI (2006).

TABLE A3.31
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
GENESEE, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	308	100.0
TOTAL	308	100.0
HHI		4,280

Source: MPSI (2006).

TABLE A3.32
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
GREENE, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	584	44.2
SUNOCO	219	16.6
OTHERS	517	39.2
TOTAL	1,320	100.0
HHI		2,685

Source: MPSI (2006).

TABLE A3.33
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
KINGS, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
BP	7,082	24.5
MOBIL	4,702	16.2
HESS	2,717	9.4
SUNOCO	2,391	8.3
EXXON	2,337	8.1
GETTY	2,038	7.0
OTHERS	7,687	26.5
TOTAL	28,954	100.0
HHI		1,203

Source: MPSI (2006).

Table A3.34
Retail Gasoline Company Market Share by Counties
Livingston, New York

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	197	100.0
TOTAL	197	100.0
HHI		5,725

Source: MPSI (2006).

Table A3.35
Retail Gasoline Company Market Share by Counties
Madison, New York

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
SUNOCO	247	61.4
OTHERS	155	38.6
TOTAL	402	100.0
HHI		4,519

Source: MPSI (2006).

TABLE A3.36
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
MONROE, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	6,787	35.1
SUNOCO	3,692	19.1
HESS	2,957	15.3
CITGO	1,666	8.6
KWIK FILL	1,605	8.3
DELTA SONIC	1,298	6.7
OTHERS	1,332	6.9
TOTAL	19,337	100.0
HHI		2,024

Source: MPSI (2006).

TABLE A3.37
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
MONTGOMERY, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
SUNOCO	520	22.2
MOBIL	385	16.4
COASTAL	346	14.8
STEWARTS	274	11.7
GULF	230	9.8
OTHERS	590	25.1
TOTAL	2,345	100.0
HHI		1,369

Source: MPSI (2006).

TABLE A3.38
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
NASSAU, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	9,811	19.7
EXXON	7,080	14.2
HESS	6,452	12.9
BP	4,083	8.2
GETTY	3,417	6.8
SUNOCO	2,957	5.9
CITGO	2,581	5.2
SHELL	2,545	5.1
OTHERS	10,981	22.0
TOTAL	49,907	100.0
HHI		997.2

Source: MPSI (2006).

TABLE A3.39
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
NEW YORK, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,905	26.0
BP	1,469	20.1
EXXON	770	10.5
AMOCO	590	8.1
GETTY	433	5.9
OTHERS	2,150	29.4
TOTAL	7,317	100.0
HHI		1,508

Source: MPSI (2006).

TABLE A3.40
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
NIAGARA, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
SUNOCO	1,290	17.7
SMOKIN JOES	1,184	16.3
MOBIL	1,007	13.8
NOCO	550	7.6
KWIK FILL	461	6.3
CITGO	424	5.8
OTHERS	2,355	32.4
TOTAL	7,271	100.0
HHI		983.2

Source: MPSI (2006).

TABLE A3.41
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ONONDAGA, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	6,011	37.3
SUNOCO	3,752	23.3
HESS	2,091	13.0
CITGO	1,994	12.4
OTHERS	2,272	14.1
TOTAL	16,120	100.0
HHI		2,279

Source: MPSI (2006).

TABLE A3.42
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ONTARIO, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	851	100.0
TOTAL	851	100.0
HHI		2,608

Source: MPSI (2006).

TABLE A3.43
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ORANGE, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	3,160	29.4
SUNOCO	1,680	15.6
CITGO	1,583	14.7
EXXON	965	9.0
GULF	929	8.6
STEWARTS	546	5.1
OTHERS	1,903	17.7
TOTAL	10,766	100.0
HHI		1,536

Source: MPSI (2006).

TABLE A3.44
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
OSWEGO, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	216	100.0
TOTAL	216	100.0
HHI		3,476

Source: MPSI (2006).

TABLE A3.45
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
PUTNAM, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,042	23.5
CITGO	656	14.8
GETTY	574	12.9
SUNOCO	490	11.0
OTHERS	1,675	37.8
TOTAL	4,437	100.0
HHI		1,269

Source: MPSI (2006).

TABLE A3.46
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
QUEENS, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	7,628	21.4
BP	5,715	16.0
HESS	4,063	11.4
EXXON	3,837	10.8
SUNOCO	2,766	7.8
GETTY	2,474	6.9
CITGO	1,944	5.5
OTHERS	7,239	20.3
TOTAL	35,666	100.0
HHI		1,153

Source: MPSI (2006).

TABLE A3.47
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
RENSSELAER, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,206	20.3
STEWARTS	1,116	18.8
HESS	970	16.3
SUNOCO	830	14.0
CITGO	785	13.2
GULF	454	7.6
OTHERS	575	9.7
TOTAL	5,936	100.0
HHI		1,491

Source: MPSI (2006).

TABLE A3.48
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
RICHMOND, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
CITGO	1,316	16.9
MOBIL	1,307	16.8
GETTY	887	11.4
BP	663	8.5
GULF	632	8.1
SUNOCO	575	7.4
SHELL	391	5.0
OTHERS	2,002	25.8
TOTAL	7,773	100.0
HHI		1,005

Source: MPSI (2006).

TABLE A3.49
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ROCKLAND, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,099	19.4
SUNOCO	959	16.9
SHELL	843	14.8
GETTY	620	10.9
CITGO	593	10.4
GULF	469	8.3
EXXON	405	7.1
OTHERS	690	12.2
TOTAL	5,678	100.0
HHI		1,253

Source: MPSI (2006).

TABLE A3.50
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
SARATOGA, NEW YORK

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	3,025	32.2
HESS	1,794	19.1
STEWARTS	1,455	15.5
SUNOCO	851	9.1
CITGO	688	7.3
GETTY	618	6.6
GULF	573	6.1
OTHERS	399	4.2
TOTAL	9,403	100.0
HHI		1,859

Source: MPSI (2006).

TABLE A3.51
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
SCHENECTADY, NEW YORK

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	1,764	26.6
GULF	850	12.8
HESS	814	12.3
SUNOCO	748	11.3
STEWARTS	722	10.9
CITGO	675	10.2
GETTY	391	5.9
COASTAL	365	5.5
OTHERS	308	4.6
TOTAL	6,637	100.0
HHI		1,442

Source: MPSI (2006).

TABLE A3.52
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
SUFFOLK, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
HESS	8,158	14.9
MOBIL	5,824	10.6
CITGO	5,039	9.2
EXXON	4,689	8.5
BP	3,503	6.4
GETTY	3,384	6.2
OTHERS	24,250	44.2
TOTAL	54,847	100.0
HHI		689.1

Source: MPSI (2006).

TABLE A3.53
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
SULLIVAN, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	97	100.0
TOTAL	97	100.0
HHI		10,000

Source: MPSI (2006).

TABLE A3.54
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ULSTER, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	2,915	32.6
CITGO	1,284	14.4
HESS	1,251	14.0
SUNOCO	1,246	13.9
STEWARTS	1,093	12.2
GETTY	605	6.8
OTHERS	546	6.1
TOTAL	8,940	100.0
HHI		1,869

Source: MPSI (2006).

TABLE A3.55
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WARREN, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,365	36.6
STEWARTS	580	15.5
HESS	500	13.4
SUNOCO	410	11.0
CITGO	355	9.5
GULF	310	8.3
OTHERS	210	5.6
TOTAL	3,730	100.0
HHI		2,058

Source: MPSI (2006).

TABLE A3.56
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WAYNE, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	404	46.5
KWIK FILL	204	23.5
OTHERS	261	30.0
TOTAL	869	100.0
HHI		2,971

Source: MPSI (2006).

TABLE A3.57
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WESTCHESTER, NEW YORK

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	5,995	20.9
GETTY	3,532	12.3
SUNOCO	3,433	12.0
SHELL	3,129	10.9
CITGO	2,851	10.0
EXXON	2,754	9.6
BP	1,862	6.5
GULF	1,849	6.5
OTHERS	3,226	11.3
TOTAL	28,631	100.0
HHI		1,142

Source: MPSI (2006).

TABLE A3.58
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ADDISON, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	572	42.7
CITGO	222	16.6
GULF	204	15.2
EXXON	135	10.1
OTHERS	207	15.4
TOTAL	1,340	100.0
HHI		2,491

Source: MPSI (2006).

TABLE A3.59
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
BENNINGTON, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	362	20.7
CITGO	314	17.9
STEWARTS	236	13.5
EXXON	178	10.2
GULF	178	10.2
SHELL	167	9.5
OTHERS	315	18.0
TOTAL	1,750	100.0
HHI		1,304

Source: MPSI (2006).

TABLE A3.60
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CALEDONIA, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	643	31.9
IRVING	464	23.0
GULF	223	11.1
CITGO	180	8.9
OTHERS	507	25.1
TOTAL	2,017	100.0
HHI		1,815

Source: MPSI (2006).

TABLE A3.61
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
CHITTENDEN, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	750	48.5
CITGO	397	25.7
OTHERS	398	25.8
TOTAL	1,545	100.0
HHI		3,111

Source: MPSI (2006).

TABLE A3.62
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ESSEX, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
OTHERS	266	100.0
TOTAL	266	100.0
HHI		1,399

Source: MPSI (2006).

TABLE A3.63
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
FRANKLIN, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,055	42.9
SHELL	370	15.0
EXXON	304	12.4
CITGO	204	8.3
GULF	152	6.2
OTHERS	375	15.2
TOTAL	2,460	100.0
HHI		2,397

Source: MPSI (2006).

TABLE A3.64
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
GRAND ISLE, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	353	53.4
CITGO	177	26.8
OTHERS	131	19.8
TOTAL	661	100.0
HHI		3,752

Source: MPSI (2006).

TABLE A3.65
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
LAMOILLE, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	579	40.5
CITGO	340	23.8
SHELL	320	22.4
OTHERS	191	13.4
TOTAL	1,430	100.0
HHI		2,805

Source: MPSI (2006).

TABLE A3.66
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ORANGE, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	390	27.9
SHELL	248	17.7
CITGO	221	15.8
OTHERS	539	38.6
TOTAL	1,398	100.0
HHI		1,545

Source: MPSI (2006).

TABLE A3.67
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
ORLEANS, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
GULF	446	26.6
MOBIL	261	15.6
OTHERS	967	57.8
TOTAL	1,674	100.0
HHI		1,343

Source: MPSI (2006).

TABLE A3.68
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
RUTLAND, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,039	25.0
CITGO	784	18.8
GULF	421	10.1
STEWARTS	358	8.6
SHELL	354	8.5
SUNOCO	289	6.9
EXXON	277	6.7
OTHERS	639	15.4
TOTAL	4,161	100.0
HHI		1,343

Source: MPSI (2006).

TABLE A3.69
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WASHINGTON, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	1,041	33.4
EXXON	522	16.7
CITGO	368	11.8
SHELL	365	11.7
SUNOCO	207	6.6
GULF	165	5.3
OTHERS	450	14.4
TOTAL	3,118	100.0
HHI		1,785

Source: MPSI (2006).

TABLE A3.70
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WINDHAM, VERMONT

Company	Gas Estimated Volume (In Thousands of Gallons Per Month)	Market Share (%)
MOBIL	608	21.2
SHELL	546	19.1
CITGO	522	18.2
SUNOCO	442	15.4
GULF	327	11.4
OTHERS	420	14.7
TOTAL	2,865	100.0
HHI		1,545

Source: MPSI (2006).

TABLE A3.71
RETAIL GASOLINE COMPANY MARKET SHARE BY COUNTIES
WINDSOR, VERMONT

Company	**Gas Estimated Volume (In Thousands of Gallons Per Month)**	**Market Share (%)**
MOBIL	1,298	32.8
CITGO	776	19.6
SHELL	698	17.6
GULF	370	9.3
SUNOCO	250	6.3
OTHERS	571	14.4
TOTAL	3,963	100.0
HHI		1,966

Source: MPSI (2006).

Appendix IV: Regional Retail Heating Oil Prices

Table A4.1
Retail Heating Oil Price
Maine –Aroostook

Company Name	Town	Price	Date
DEAD RIVER COMPANY	HOULTON	$2.399	8/31/2006
DEAD RIVER COMPANY	CARIBOU	$2.499	8/21/2006
DEAD RIVER COMPANY	MARS HILL	$2.499	8/31/2006
DEAD RIVER COMPANY	FORT KENT	$2.499	8/21/2006
DEAD RIVER COMPANY	MADAWASKA	$2.499	7/17/2006
DEAD RIVER COMPANY	PRESQUE ISLE	$2.499	8/31/2006
TULSA INC	VAN BUREN	$2.499	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.399	$2.499	$2.485

Table A4.2
Retail Heating Oil Price
Maine – Bangor

Company Name	Town	Price	Date
GRIFFIN OIL	LEVANT	$2.389	8/21/2006
MORIN FUEL	BRADLEY	$2.449	8/31/2006
MALENFANT S FUEL	OLD TOWN	$2.469	8/21/2006
ARTIC ENERGY INC	CORINTH	$2.499	8/31/2006
CHASE & KIMBALL OIL CO	DOVER FOXCROFT	$2.499	8/31/2006
MAINE ENERGY INC	BANGOR	$2.539	8/31/2006
FOSTER ENERGY	HAMPDEN	$2.549	8/31/2006
WHITNEY ENERGY INC	LINCOLN	$2.549	8/31/2006
NEWENGLAND HEATING OIL	E HOLDEN	$2.579	8/31/2006
ROY BROS INC/WEBBER	OLD TOWN	$2.619	8/21/2006

Source: www.newenglandoil.com

Low	High	Average
$2.389	$2.619	$2.514

TABLE A4.3
RETAIL HEATING OIL PRICE
MAINE – DOWNEAST

Company Name	Town	Price	Date
GRAY ROBERT L	BROOKSVILLE	$2.420	8/31/2006
KELLEY OIL	CHERRYFIELD	$2.489	8/31/2006
HOMETOWN FUEL	EASTBROOK	$2.499	8/31/2006
NO FRILLS OIL CO	HANCOCK	$2.519	8/31/2006
HUNTLEY PLUMBING & HEATING	MACHIAS	$2.559	8/31/2006
A B RAMSDELL CO INC	EASTPORT	$2.569	8/31/2006
EMERSON ENERGY FUELS	ELLSWORTH	$2.569	8/31/2006
FOSTER RH INC	MACHIAS	$2.569	8/31/2006
ISLAND PLUMBING & HEATING	NORTH EAST HARBOR	$2.570	8/31/2006
HAMMOND & SONS OIL CO	HARRINGTON	$2.580	8/31/2006
HANCOCK OIL CO	ELLSWORTH	$2.619	8/31/2006
MATTHEWS & SONS	CHERRYFIELD	$2.769	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.420	$2.769	$2.561

TABLE A4.4
RETAIL HEATING OIL PRICE
MAINE – LEWISTON-AUBURN

COMPANY NAME	TOWN	PRICE	DATE
BOB'S CASH FUEL	MADISON	$2.399	8/31/2006
D W S CASH FUEL	GREENVILLE	$2.459	8/31/2006
CHARLIE S CASH FUEL	SKOWHEGAN	$2.499	8/31/2006
TWITCHELLS FUEL	FARMINGTON	$2.499	8/31/2006
S K FUEL	RANGELEY	$2.530	8/31/2006

Source: www.newenglandoil.com

TABLE A4.5
RETAIL HEATING OIL PRICE
MAINE – KENNEBEC

Company Name	Town	Price	Date
FIELDINGS OIL CO INC	AUGUSTA	$2.359	8/31/2006
MAIN STREET FUEL	RICHMOND	$2.449	8/31/2006
LITCHFIELD FUEL CO	LITCHFIELD	$2.499	8/31/2006
LOG CABIN FUEL	GARDINER	$2.540	8/31/2006
WILLIAMS RUSS FUEL INC	GARDINER	$2.540	8/31/2006
WADLEIGH S	HALLOWELL	$2.549	8/31/2006
WINGATE-LATHE/DOWNEAST ENERGY	HALLOWELL	$2.549	8/31/2006
STAPLES OIL COMPANY	PITTSFIELD	$2.549	8/31/2006
R J ENERGY SERVICES	AUGUSTA	$2.549	8/31/2006
J & S OIL CO INC	WINSLOW	$2.579	8/31/2006
FABIAN OIL INC	OAKLAND	$2.579	8/31/2006
DOWNEAST ENERGY	WATERVILLE	$2.599	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.359	$2.599	$2.524

TABLE A4.6
RETAIL HEATING OIL PRICE
MAINE – LEWISTON-AUBURN

Company Name	Town	Price	Date
DISCOUNT ENERGY	LEWISTON	$2.129	8/31/2006
LISBON FUEL CO	LISBON FALLS	$2.379	8/31/2006
PIELA OIL CO	LISBON FALLS	$2.379	8/31/2006
FOSTER-RUSSELL CO	BRIDGTON	$2.419	8/31/2006
FABIAN OIL	JAY	$2.499	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.129	$2.499	$2.361

TABLE A4.7
RETAIL HEATING OIL PRICE
MAINE – MIDCOAST

Company Name	Town	Price	Date
HARDMAN OIL CO., INC.	WHITEFIELD	$2.379	9/1/2006
MIDNIGHTOIL	NEWCASTLE	$2.390	8/31/2006
MONTGOMERY OIL CO INC	SAINT GEORGE	$2.400	8/31/2006
DRESDEN CASH FUEL	DRESDEN	$2.449	8/31/2006
MARK S APPLIANCE AND HEATING	WARREN	$2.450	8/31/2006
GRAY S HEATING OILS	FRIENDSHIP	$2.490	8/31/2006
COMMUNITY FUELS INC	SWANVILLE	$2.500	8/21/2006
CONSUMERS FUEL CO.	BELFAST	$2.529	8/31/2006
PATTERSON FAMILY FUEL	STOCKTON SPRINGS	$2.559	8/31/2006
COASTAL FUEL CO	ROCKLAND	$2.589	8/31/2006
P.G. WILLEY & CO	CAMDEN	$2.590	8/31/2006
PEN-BAY OIL CO	ROCKPORT	$2.599	8/31/2006
RJ PHILBROOK & SON	ROCKLAND	$2.689	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.379	$2.689	$2.509

TABLE A4.8
RETAIL HEATING OIL PRICE
MAINE – PORTLAND

Company Name	Price	Date
CASH ENERGY	$2.129	8/31/2006
DISCOUNT ENERGY	$2.129	8/31/2006
YORKIE OIL	$2.139	8/31/2006
AJS DISCOUNT OIL	$2.159	8/31/2006
DAVES OIL	$2.159	8/29/2006
PAULS OIL SERVICE	$2.249	8/31/2006
PINE STATE ENERGY	$2.259	8/31/2006
CONROYS OIL SERVICE	$2.269	8/31/2006
SEWALL & CO	$2.379	8/31/2006
THIBEAULT ENERGY	$2.379	8/31/2006
PRICE-RITE FUEL	$2.399	8/31/2006
YERXAS	$2.399	9/1/2006
A&T FUEL	$2.400	8/10/2006
KLEEN OIL CO	$2.429	8/31/2006
MAINE HEAT MIZER	$2.429	8/25/2006
DEAD RIVER OIL CO	$2.439	8/31/2006
WEBBER	$2.459	8/31/2006
ROYAL OIL & PROPANE CO	$2.479	9/1/2006
GARLANDS OIL SERVICE	$2.499	8/31/2006
IRVING OIL CORP	$2.699	7/12/2006

Source: www.newenglandoil.com

Low	High	Average
$2.129	$2.699	$2.344

TABLE A4.9
RETAIL HEATING OIL PRICE
MAINE – YORK

Company Name	Price	Date
CASH ENERGY	$2.129	8/31/2006
DISCOUNT ENERGY	$2.129	8/31/2006
YORKIE OIL	$2.139	8/31/2006
REDDING OIL CO.	$2.229	8/29/2006
CONROYS OIL SERVICE	$2.269	8/31/2006
TOP IT OFF OIL	$2.309	8/31/2006
RUCK OIL INC	$2.359	8/31/2006
BICKFORD OIL	$2.389	8/24/2006
GILS OIL SERVICE	$2.389	8/10/2006
CHAMPAGNES ENERGY	$2.399	8/31/2006
PRICE-RITE FUEL	$2.399	8/31/2006
BORDERLINE FUELS INC	$2.439	8/31/2006
DOWNEAST ENERGY	$2.479	8/31/2006
EMERY B F CO	$2.479	8/31/2006
ROYAL OIL & PROPANE CO	$2.479	9/1/2006
FALL S AGWAY	$2.499	8/31/2006
GARLAND S OIL SERVICE	$2.499	8/31/2006
MAXIMUM ENERGY	$2.499	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.129	$2.499	$2.362

TABLE A4.10
RETAIL HEATING OIL PRICE
MASSACHUSETTS – WESTERN

Company Name	Town	Price	Date
MOODY ENERGY INC	DALTON	$2.469	8/28/2006
PAYLESS OIL	PITTSFIELD	$2.549	8/28/2006
SWEATLAND-PIERCE-HARRISON	PITTSFIELD	$2.549	8/28/2006
OIL EXPRESS	LENOX DALE	$2.559	8/28/2006
BROWN OIL INC	DALTON	$2.580	8/28/2006
SAV-MOR OIL CO	PITTSFIELD	$2.590	8/28/2006
LIPTON ENERGY	PITTSFIELD	$2.599	8/28/2006
LA VALLEY OIL CO	NORTH ADAMS	$2.599	8/28/2006
O'CONNELL OIL ASSOC	NORTH ADAMS	$2.599	8/28/2006
PREITE OIL CO	NORTH ADAMS	$2.599	8/28/2006
WEST OIL CO	NORTH ADAMS	$2.599	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.469	$2.599	$2.572

TABLE A4.11
RETAIL HEATING OIL PRICE
MASSACHUSETTS – NORTHWESTERN

Company Name	Town	Price	Date
MAY & HALLY INC	GROTON	$2.440	8/28/2006
MURRAY-DAVENPORT OIL CO	ATHOL	$2.449	8/28/2006
MURRAY-DAVENPORT OIL CO	GARDNER	$2.449	8/28/2006
MURRAY-DAVENPORT OIL CO	WINCHENDON	$2.449	8/28/2006
RIVERS BROTHERS INC	FITCHBURG	$2.490	8/28/2006
RON'S FUEL OIL	ATHOL	$2.499	8/28/2006
WILSON BROTHERS HEATING & AIR CONDITIONING	PEPPERELL	$2.499	8/28/2006
ORANGE OIL CO	NEW SALEM	$2.499	8/28/2006
CLEGHORN OIL INC	FITCHBURG	$2.499	8/28/2006
ASHBY OIL CO INC	ASHBY	$2.499	8/28/2006
K W WOOD FUEL CORP	AYER	$2.499	8/28/2006
BANKOWSKI OIL & HEATING INC	GARDNER	$2.499	8/28/2006
CHAIR CITY OIL INC	GARDNER	$2.499	8/28/2006
CRYSTAL OIL CO	GARDNER	$2.499	8/28/2006
PEOPLE'S FUEL INC	GARDNER	$2.499	8/28/2006
BRIDEAU OIL CORP	LEOMINISTER	$2.499	8/28/2006
FRATICELLI OIL CO	LEOMINISTER	$2.499	8/17/2006
LEOMINSTER ICE CO	LEOMINISTER	$2.499	8/28/2006
SHIRLEY FUEL & GAS CO	SHIRLEY	$2.499	7/17/2006
LORDEN OIL CO	TOWNSEND	$2.499	8/28/2006
MACKIN CONSTRUCTION CO INC	GREENFIELD	$2.500	8/28/2006
A R SANDRI INC	GREENFIELD	$2.549	8/28/2006
RICE OIL CO	GREENFIELD	$2.549	8/28/2006
MOCK'S FUEL & SVC CO	ORANGE	$2.549	8/28/2006
FRANKLIN-WARE FUEL CORP	SHELBURNE FALLS	$2.549	8/28/2006
COUNTRY OIL & PLUMBING	BERNARDSTON	$2.570	8/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.440	$2.570	$2.501

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TABLE A4.12
RETAIL HEATING OIL PRICE
MASSACHUSETTS – CENTRAL

Company Name	Town	Price	Date
VINCENT OIL CO	SOUTHBRIDGE	$2.420	8/28/2006
CROWLEY FUEL CO	NORTH BROOKFIELD	$2.450	8/28/2006
HELLEN FUELS CORP	NORTH UXBRIDGE	$2.459	8/28/2006
BUTLER FUEL CORP	OXFORD	$2.479	8/28/2006
WACHUSETT FUEL OIL DISTRIBUTN	HOLDEN	$2.480	8/28/2006
SHERMAN OIL	WEST BROOKFIELD	$2.490	8/28/2006
GIGUERE & MARCHAND OIL SVC	BLACKSTONE	$2.499	8/28/2006
HARRIS OIL CO	MILLBURY	$2.499	8/28/2006
SUPERIOR OIL CO	MILLBURY	$2.499	8/24/2006
AL’S OIL SVC	SHREWSBURY	$2.499	8/28/2006
THOMPSON OIL CO	UPTON	$2.499	8/24/2006
J D BOUSQUET & SONS INC	DOUGLAS	$2.500	8/28/2006
NYDAM OIL SVC	LINWOOD	$2.509	8/28/2006
PETERSON OIL SVC	LINWOOD	$2.540	8/10/2006
MARTIN’S OIL	UXBRIDGE	$2.540	8/17/2006
HARVEY’S DISCOUNT OIL	WORCESTER	$2.540	8/28/2006
PIONEER OIL CO	WORCESTER	$2.540	8/28/2006
SUPER HEET INC	WORCESTER	$2.540	8/24/2006
NORTHBOROUGH OIL CO	NORTHBOROUGH	$2.549	8/28/2006
SOUTHBRIDGE TIRE CO	SOUTHBRIDGE	$2.570	8/28/2006
RADIO OIL CO	WORCESTER	$2.579	8/28/2006
CENTRAL MASSACHUSETTS OIL INC	RUTLAND	$2.580	8/28/2006
CITY OIL CO	CHARLTON	$2.590	8/24/2006
PLANTE HEATING CORP	CHARLTON	$2.590	8/28/2006
RAUSCHER’S OIL SVC	LANCASTER	$2.590	8/28/2006
T F BURKE INC	SOUTH LANCASTER	$2.590	8/17/2006
BEMIS & HOBBS INC	SPENCER	$2.590	8/24/2006
CAM’S OIL SVC INC	WEBSTER	$2.590	8/28/2006
WHITNEY BROTHERS OIL CO	CLINTON	$2.599	8/28/2006
WILLIAM JOLDA & SON	DUDLEY	$2.600	8/28/2006
RICHARDS OIL CO	NORTHBOROUGH	$2.610	8/28/2006
SENTRY OIL INC	RUTLAND	$2.610	8/28/2006
TASSE’S	SOUTHBRIDGE	$2.620	8/28/2006
PETROLEUM SERVICE OF WORCESTER	WORCESTER	$2.640	8/28/2006
PAYLESS OIL CO	AUBURN	$2.670	8/28/2006
C K SMITH & CO	WORCESTER	$2.670	8/28/2006
MC KINSTRY OIL CO	SOUTHBRIDGE	$2.700	8/17/2006
PETERSON OIL SVC	WORCESTER	$2.700	8/24/2006

Source: www.newenglandoil.com

Low	High	Average
$2.420	$2.700	$2.558

TABLE A4.13
RETAIL HEATING OIL PRICE
MASSACHUSETTS – EAST CENTRAL

Company Name	Town	Price	Date
ARCUDI OIL CORP	MILFORD	$2.500	8/28/2006
WHOLESALE FUEL CORP	FRAMINGHAM	$2.530	8/24/2006
JUNIPER FARMS BOLTON OIL INC	HUDSON	$2.530	8/28/2006
JUNIPER FARMS BOLTON OIL	MARLBOROUGH	$2.530	8/28/2006
ORLANDO ENVIRONMENTAL SVC	FRAMINGHAM	$2.540	8/28/2006
REYNOLDS OIL SVC INC	MILFORD	$2.540	8/28/2006
WYLIE & JULIAN OIL SVC	MILFORD	$2.540	8/28/2006
AMERICAN DISCOUNT OIL CO	HOLLISTON	$2.549	8/28/2006
HOLLISTON OIL SVC INC	HOLLISTON	$2.549	8/28/2006
B VITALINI INC	MILFORD	$2.550	8/28/2006
CUNNINGHAM OIL CO	PAXTON	$2.570	8/28/2006
DUNN OIL CO INC	MAYNARD	$2.570	8/28/2006
BURSAW GAS & OIL INC	ACTON	$2.589	8/28/2006
ARTHUR'S OIL CO	ACTON	$2.599	8/28/2006
KNIGHT FUEL CO	HUDSON	$2.600	8/24/2006
LAKESIDE OIL CO	MARLBOROUGH	$2.610	8/28/2006
JOHN E WOODCARE	NATICK	$2.690	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.500	$2.690	$2.564

TABLE A4.14
RETAIL HEATING OIL PRICE
MASSACHUSETTS – WEST CENTRAL

Company Name	Town	Price	Date
SUPRENA OIL CO	EAST LONGMEADOW	$2.339	8/24/2006
LUDWIN OIL & TIRE	CHICOPEE	$2.350	8/24/2006
DONOVAN OIL CO	EAST LONGMEADOW	$2.370	8/24/2006
MASSE & SONS OIL CO	HOLYOKE	$2.380	8/28/2006
SURNER HEATING CO	AMHERST	$2.389	8/28/2006
SOUTH HADLEY FUEL OIL	SOUTH HADLEY	$2.390	8/28/2006
KIERAS OIL INC	AMHERST	$2.399	8/28/2006
CRYSTAL ICE & FUEL CO	AGAWAM	$2.400	8/28/2006
U S OIL CO	EAST LONGMEADOW	$2.400	8/28/2006
WILLIMANSETT DISCOUNT FUEL CO	HOLYOKE	$2.400	8/24/2006
LUDLOW HEATING & FUEL CO	LUDLOW	$2.400	8/28/2006
CERNAK FUEL CORP	EASTHAMPTON	$2.410	8/28/2006
FORRESTALL MECHANICAL & FUEL	EASTHAMPTON	$2.410	8/28/2006
RICHARD’S FUEL INC	EASTHAMPTON	$2.410	8/28/2006
CHUDY OIL CO	THREE RIVERS	$2.410	8/28/2006
O’CONNELL OIL ASSOC INC	NORTHAMPTON	$2.419	8/28/2006
HALON OIL CO	GRANBY	$2.430	8/28/2006
DESMARAIS OIL CO	HOLYOKE	$2.430	8/28/2006
SQUIER OIL	MONSON	$2.430	8/28/2006
MATERA OIL CO	THORNDIKE	$2.450	8/28/2006
WHEELER OIL CO	CHESTER	$2.460	8/17/2006
AMBER ENERGY INC	GRANBY	$2.460	8/28/2006
SPRINGDALE OIL	HOLYOKE	$2.479	8/28/2006
CENTRAL OIL CO	CHICOPEE	$2.480	8/28/2006
HAMPDEN FUEL OIL CO	HAMPDEN	$2.480	8/28/2006
RAY KELLEY & SON	PALMER	$2.490	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.339	$2.490	$2.418

TABLE A4.15
RETAIL HEATING OIL PRICE
MASSACHUSETTS – SOUTHERN

Company Name	Town	Price	Date
LUZO FUEL	NEW BEDFORD	$2.240	8/28/2006
QUALITY OIL CO	ACUSHNET	$2.250	8/28/2006
STAR OIL	NEW BEDFORD	$2.270	8/30/2006
ARROW FUEL	ATTLEBORO	$2.290	8/28/2006
K & M FUEL	ATTLEBORO	$2.300	8/28/2006
BRODEUR & SONS INC	NEW BEDFORD	$2.320	8/28/2006
JUSTIN TIME INC	ATTLEBORO	$2.390	8/28/2006
E & V OIL CO	REHOBOTH	$2.399	8/21/2006
A-1 DISCOUNT OIL CO	NORTH DARTMOUTH	$2.400	8/28/2006
HILLER FUELS INC	MARION	$2.450	8/28/2006
DYER OIL CO	RAYNHAM	$2.450	8/21/2006
A G BETTENCOURT INC	WESTPORT	$2.450	8/28/2006
H J SAULNIER OIL CO	NORTH DARTMOUTH	$2.459	8/28/2006
AUTOMATIC OIL CO	NORTON	$2.459	8/28/2006
POWERS ENERGY CORP	NORTH ATTLEBORO	$2.499	8/14/2006
STAFFORD FUEL INC	FALL RIVER	$2.500	8/28/2006
SEARS BURNER SVC	NORTON	$2.539	8/28/2006
ATTLEBORO ICE & OIL CO	ATTLEBORO	$2.540	8/28/2006
LEES OIL SVC INC	WESTPORT POINT	$2.540	6/12/2006
DON ADAMS OIL	NEW BEDFORD	$2.559	8/28/2006
FAMILY DISCOUNT OIL	MATTAPOISETT	$2.599	8/28/2006
ABREAU OIL SVC	TAUNTON	$2.600	8/28/2006
ATTLEBORO PLAINVILLE OIL CO	PLAINVILLE	$2.629	8/28/2006
KIRLEY FUEL	PLAINVILLE	$2.629	8/28/2006
NORMAN'S FUEL CO	PLAINVILLE	$2.629	8/28/2006
JOHNNY'S OIL SVC	PLAINVILLE	$2.649	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.240	$2.649	$2.465

TABLE A4.16
RETAIL HEATING OIL PRICE
MASSACHUSETTS – NORTH OF BOSTON

Company Name	Town	Price	Date
VETERAN FUELS INC	IPSWICH	$2.229	8/31/2006
B&C FUEL CORP	CHELSEA	$2.299	8/31/2006
SOL'S FUEL CO	DANVERS	$2.340	8/31/2006
SPARTAN OIL	SALEM	$2.340	8/31/2006
ARCTIC OIL	LYNN	$2.350	8/31/2006
S & N OIL CORP	BEVERLY	$2.350	8/24/2006
JOHN'S OIL CO	LYNN	$2.390	8/31/2006
NEKOROSKI OIL CO	BEVERLY	$2.390	8/31/2006
CAPE ANN OIL	GLOUCESTER	$2.390	8/31/2006
DOM'S OIL CO	LYNN	$2.400	8/31/2006
BILL'S OIL SVC	BEVERLY	$2.400	8/31/2006
M D OIL & BURNER SVC	SALEM	$2.400	8/24/2006
ROYAL OIL INC	SALEM	$2.400	8/24/2006
ABSOLUTE OIL CO	PEABODY	$2.410	8/31/2006
ASHLEY FUEL INC	BEVERLY	$2.440	8/31/2006
ASHLEY FUEL INC.	GLOUCESTER	$2.440	8/31/2006
LOMBARDI OIL CO	NEWBURYPORT	$2.440	8/31/2006
EASTERN PROPANE GAS INC	DANVERS	$2.449	8/31/2006
NEWBURYPORT FUEL	NEWBURYPORT	$2.459	8/31/2006
HIGHLAND FUEL CO	LYNN	$2.490	8/31/2006
PURITY OIL CO	LYNN	$2.490	8/31/2006
FELICIA OIL CO	GLOUCESTER	$2.490	8/31/2006
J M WALSH & OIL CO	GLOUCESTER	$2.490	8/24/2006
JOHN S MARTIN CO	MARBLEHEAD	$2.490	8/17/2006
MICHAUD & RAYMOND	SALEM	$2.490	8/31/2006
STOCKER OIL CO	PEABODY	$2.499	8/31/2006
SUPERIOR ENERGY INC	PEABODY	$2.499	8/31/2006
KNIGHT OIL CO	AMESBURY	$2.530	8/31/2006
WELCH & LAMSON INC	SOUTH HAMILTON	$2.530	8/31/2006
HOLDEN'S OIL INC	PEABODY	$2.540	8/31/2006
BUY LOW FUEL	IPSWICH	$2.550	8/31/2006
TERENZONI OIL CO	PEABODY	$2.550	8/31/2006
ED & VIN'S OIL CO	LYNN	$2.590	8/31/2006
ALL STAR FUEL	SAUGUS	$2.590	8/24/2006
STADIUM OIL HEAT	GLOUCESTER	$2.590	8/31/2006
HOLLAND ENERGY	SALEM	$2.590	8/31/2006
HILL HEATING OIL & KEROSENE	LYNN	$2.599	8/31/2006
CIAMPA & DAUGHTERS FUEL CO	SAUGUS	$2.599	8/31/2006
STADIUM OIL HEAT	DANVERS	$2.599	8/31/2006
STADIUM OIL HEAT	PEABODY	$2.599	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.229	$2.599	$2.468

TABLE A4.17
RETAIL HEATING OIL PRICE
MASSACHUSETTS – NORTHWEST OF BOSTON

Company Name	Town	Price	Date
JEFF'S OIL	WAKEFIELD	$2.290	8/24/2006
HAFFNER'S SERVICE STATION INC	HAVERHILL	$2.339	8/31/2006
SIMARD GAS & OIL CO	HAVERHILL	$2.339	8/31/2006
HAFFNER'S SERVICE STATIONS INC	LAWRENCE	$2.339	8/31/2006
HAFFNER'S SERVICE STATION INC	LAWRENCE	$2.339	8/31/2006
HAFFNER'S SERVICE STATIONS	LOWELL	$2.339	8/31/2006
HAFFNER'S SERVICE STATIONS INC	WILMINGTON	$2.339	8/31/2006
DIFEO OIL CO	HAVERHILL	$2.349	8/24/2006
RONNIE'S OIL CO	HAVERHILL	$2.349	8/31/2006
MAHONEY OIL CO	LOWELL	$2.349	8/31/2006
MULDOON BROTHERS INC	LOWELL	$2.349	8/31/2006
FOSSIL FUEL INC	BURLINGTON	$2.350	8/24/2006
ROBERTO FUEL CORP	BURLINGTON	$2.390	8/31/2006
MACLELLAN OIL CO	TEWKSBURY	$2.399	8/31/2006
JOHNSON FUEL CO	WINCHESTER	$2.399	8/31/2006
CHUTE FUEL CO	WOBURN	$2.400	8/31/2006
CHAPMAN FUEL	DRACUT	$2.419	8/24/2006
CHAPMAN FUEL	LOWELL	$2.419	8/31/2006
H WRIGHT'S SVC INC	NORTH BILLERICA	$2.420	8/31/2006
NEVINS OIL CO	LAWRENCE	$2.460	8/31/2006
JOE BARRY'S OIL CO	WILMINGTON	$2.499	8/31/2006
EDGEMONT GARAGE & OIL	MERRIMAC	$2.500	8/31/2006
MARCHAND OIL CO INC	CHELMSFORD	$2.519	8/31/2006
RAY MARCHAND OIL CO	LOWELL	$2.519	8/31/2006
J A HEALY & SONS OIL CO	WESTFORD	$2.540	8/31/2006
COLONIAL OIL CO	CHELMSFORD	$2.559	8/31/2006
GAGNON BROTHERS OIL CO	NORTH CHELMSFORD	$2.559	8/8/2006
C P COOKE OIL CO	BILLERICA	$2.590	8/31/2006
COX FUEL CO	LOWELL	$2.590	8/31/2006
C P COOKE OIL CO	NORTH BILLERICA	$2.590	8/31/2006
STADIUM OIL HEAT	WOBURN	$2.599	8/31/2006
STADIUM OIL HEAT	WAKEFIELD	$2.599	8/31/2006
T J MARTIN CO	WOBURN	$2.699	8/24/2006
PARKER LANE WINN CO	WINCHESTER	$2.699	8/31/2006

Source: www.newenglandoil.com

Low	High	Average
$2.290	$2.699	$2.454

TABLE A4.18
RETAIL HEATING OIL PRICE
MASSACHUSETTS – WEST OF BOSTON

Company Name	Town	Price	Date
BASILE OIL CO	WATERTOWN	$2.490	8/28/2006
FORMAL OIL CO	WALTHAM	$2.520	8/28/2006
GENOVE OIL CO	WALTHAM	$2.559	8/28/2006
JAMES J HAYES OIL CO	WALTHAM	$2.599	8/21/2006
METROPOLITAN FUEL CORP	WATERTOWN	$2.620	8/28/2006
PORT OIL CORP	WATERTOWN	$2.620	8/28/2006
THERMOIL	WATERTOWN	$2.650	8/28/2006
BIGELOW OIL CO	NEWTON	$2.699	8/28/2006
ARLMONT FUEL CORP	ARLINGTON	$2.699	8/28/2006
JOHN WOODACRE	WELLESLEY	$2.699	8/28/2006
B L OGILVIE & SONS	WESTON	$2.700	8/21/2006
ABBOTT FUEL CO	NEWTON	$2.760	8/28/2006
CIANO BROTHERS OIL CO	WATERTOWN	$2.790	8/28/2006
BONNEY OIL CO INC	WALTHAM	$2.799	8/28/2006
HOME HEATING ENGINEERING CO	WALTHAM	$2.799	8/28/2006
TAYLOR & MURPHY	WALTHAM	$2.799	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.490	$2.799	$2.675

TABLE A4.19
RETAIL HEATING OIL PRICE
MASSACHUSETTS – SOUTHWEST OF BOSTON

Company Name	Town	Price	Date
EASTERN PETROLEUM CORP	MANSFIELD	$2.299	8/28/2006
OILMAN CO	FOXBORO	$2.339	8/28/2006
OIL ONLY	MANSFIELD	$2.350	8/28/2006
MURPHY COAL & OIL CO	STOUGHTON	$2.440	8/28/2006
BUCHANANS OIL INC	MANSFIELD	$2.450	8/28/2006
REYNOLDS OIL SVC INC	WRENTHAM	$2.540	8/28/2006
GEORGE T CRONIN & SON INC	NORFOLK	$2.540	8/28/2006
MANSFIELD OIL CO	EAST MANSFIELD	$2.550	8/21/2006
BAYSTATE PETROLEUM	FRANKLIN	$2.559	8/28/2006
COTTER EP OIL CO INC	NORWOOD	$2.570	8/21/2006
CLEVELAND FUEL OIL INC	WALPOLE	$2.589	8/28/2006
BENNYS OIL SVC	FRANKLIN	$2.590	8/28/2006
H BULLUKIAN & SONS INC	FRANKLIN	$2.590	8/28/2006
FRANK LAMPARELLI OIL CO	CANTON	$2.599	8/28/2006
FERNANDES FUEL CO	DEDHAM	$2.599	8/28/2006
TERENZI & SON OIL CO	MANSFIELD	$2.610	8/28/2006
HORAN OIL CORP	STOUGHTON	$2.649	8/28/2006
PREVETT OIL CO	DEDHAM	$2.699	8/28/2006
ANDERSON FUEL INC	NORTH SCITUATE	$2.699	8/28/2006
UNITED OIL HEAT	MANSFIELD	$2.719	8/28/2006
RAND-HANDY OIL CO	MARSHFIELD	$2.729	8/28/2006
SINCLAIRE OIL & HEATING INC	WALPOLE	$2.769	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.299	$2.769	$2.567

TABLE A4.20
RETAIL HEATING OIL PRICE
MASSACHUSETTS – SOUTH OF BOSTON

Company Name	Town	Price	Date
NICCOLI BROTHERS DISCOUNT OIL	BROCKTON	$2.299	8/28/2006
WAVERLY OIL CO	BROCKTON	$2.299	8/28/2006
TROJAN OIL CO	BROCKTON	$2.299	8/28/2006
CAMPELLO-KEITH OIL & COAL CO	BROCKTON	$2.340	8/28/2006
LA BELLE OIL CO	QUINCY	$2.340	8/28/2006
COMFORT-TEMP OIL	BROCKTON	$2.399	8/28/2006
GREELEYS OIL CO	HALIFAX	$2.399	8/28/2006
BEST BUY OIL	QUINCY	$2.399	8/21/2006
SAME DAY OIL	ROCKLAND	$2.399	8/21/2006
CBS OIL INC	LAKEVILLE	$2.400	8/28/2006
FORNI BROTHERS OIL CO	EAST BRIDGEWATER	$2.420	8/28/2006
CHURCHILLS OIL & GAS INC	MANOMET	$2.499	8/28/2006
COLETTI BROTHERS OIL	MIDDLEBORO	$2.499	8/21/2006
OIL MAN	MIDDLEBORO	$2.499	8/28/2006
CURTINS FUEL	N. ABINGTON	$2.499	8/28/2006
ALBERT CULVER CO	ROCKLAND	$2.540	8/21/2006
MELIA FUEL	MARSHFIELD	$2.549	8/28/2006
GILLESPIE-SHERBURNE FUEL CO	BROCKTON	$2.580	8/28/2006
SCUDDER BROTHERS FUEL CO	BROCKTON	$2.580	8/28/2006
NATURAL FUEL OIL INC	BROCKTON	$2.580	8/21/2006
SILVER CITY OIL CO	MIDDLEBORO	$2.600	8/21/2006
STEWIES OIL INC	RANDOLPH	$2.630	8/28/2006
G.W. CONDON, INC.	RANDOLPH	$2.699	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.299	$2.699	$2.467

TABLE A4.21
RETAIL HEATING OIL PRICE
MASSACHUSETTS – NORTH BOSTON

Company Name	Town	Price	Date
SUNSHINE OIL CO	MEDFORD	$2.290	8/28/2006
SARGENT'S OIL	MELROSE	$2.290	8/28/2006
C & C OIL	CHELSEA	$2.300	8/28/2006
HOWIE'S OIL	CHELSEA	$2.300	8/28/2006
B&C FUEL CORP	CHELSEA	$2.339	8/31/2006
COMMONWEALTH FUEL CORP	CHELSEA	$2.350	8/28/2006
ARCTIC OIL CO	MALDEN	$2.350	8/28/2006
METRO FUEL	MEDFORD	$2.390	8/22/2006
HAYES OIL PRODUCTS CO	CAMBRIDGE	$2.390	8/28/2006
FUEL 2000	REVERE	$2.390	8/28/2006
POWERS OIL CO	MALDEN	$2.399	8/28/2006
MELROSE OIL CO	MELROSE	$2.420	8/28/2006
RANCO FUEL	MEDFORD	$2.430	8/28/2006
INTER-CITY OIL HEATING INC	MALDEN	$2.460	8/28/2006
COD	REVERE	$2.490	8/28/2006
BARBARY COAST FUEL CORP	WINTHROP	$2.500	8/28/2006
ADILETTO FUEL CO	EVERETT	$2.529	8/28/2006
CANNATELLI FUEL CO	MALDEN	$2.539	8/28/2006
AUTOMATIC DISCOUNT FUEL	STONEHAM	$2.549	8/28/2006
STONEHAM FUEL INC	STONEHAM	$2.549	8/28/2006
J & J OIL CO	WINTHROP	$2.550	8/28/2006
AUGUST BROTHERS OIL CO	WINTHROP	$2.590	8/28/2006
HIGHLAND HEATING SVC	WINTHROP	$2.590	8/28/2006
CIAMPA & DAUGHTERS FUEL CO	MELROSE	$2.599	8/28/2006
KNIGHT-HARRISON FUELS	MELROSE	$2.599	8/28/2006
MYERS BROS OIL CO	REVERE	$2.599	8/28/2006
NORTH SHORE FUEL	REVERE	$2.599	8/28/2006
SUPINO BROTHERS OIL	EVERETT	$2.639	8/28/2006
CHRISTIES OIL SVC	MALDEN	$2.690	8/28/2006
GOODWIN OIL CO	REVERE	$2.690	8/21/2006
SIMIONE OIL CO	WINTHROP	$2.690	8/28/2006
SULLIVAN'S OIL CO	WINTHROP	$2.690	8/28/2006
JACKSON FUEL CORP	MEDFORD	$2.699	8/28/2006
ERICKSON FUEL CO	SOMERVILLE	$2.720	8/21/2006

Source: www.newenglandoil.com

Low	High	Average
$2.290	$2.720	$2.511

TABLE A4.22
RETAIL HEATING OIL PRICE
MASSACHUSETTS – SOUTH BOSTON

Company Name	Town	Price	Date
JAMAICA OIL CO	BRAINTREE	$2.299	8/28/2006
E J WHITE FUEL OIL CO	QUINCY	$2.390	8/28/2006
KELLEY’S DISCOUNT OIL	SOUTH WEYMOUTH	$2.400	8/28/2006
GILL OIL CO	EAST BOSTON	$2.430	8/28/2006
AVENUE FUEL CO	DORCHESTER	$2.450	8/28/2006
COMMERCIAL FUEL CO	DORCHESTER	$2.450	8/28/2006
BURKE OIL	DORCHESTER	$2.490	8/28/2006
C SIMONELLI & SONS INC	ROXBURY	$2.499	8/28/2006
METRO ENERGY	SOUTH BOSTON	$2.499	8/21/2006
COMMUNITY FUEL	ROXBURY	$2.550	8/28/2006
PRICED RIGHT OIL	ROXBURY	$2.550	8/28/2006
CARE FUEL CO	DORCHESTER	$2.559	6/12/2006
TEMPESTA BROTHERS OIL CO	DORCHESTER	$2.559	6/12/2006
ATLANTIC PRATT OIL CO	BRAINTREE	$2.590	8/28/2006
L & T OIL CO	BRAINTREE	$2.590	8/28/2006
D J CUTTER & CO	DORCHESTER	$2.620	8/28/2006
MC INTYRE BROTHERS	DORCHESTER	$2.620	8/28/2006
SCOTT-WILLIAMS INC	QUINCY	$2.629	8/28/2006
A C FUEL OIL CO	S. BOSTON	$2.640	8/28/2006
BROWN OIL CO	DORCHESTER	$2.650	8/28/2006
ACTION FUEL CO	DORCHESTER	$2.650	6/12/2006
POSITIVE ENERGY MANAGEMENT CO	DORCHESTER	$2.650	6/1/2006
A HOHMANN & CO INC	DORCHESTER	$2.650	8/28/2006
HERCULES FUEL CO	QUINCY	$2.650	8/28/2006
EDWARD BLONDELL CO	MILTON	$2.650	8/28/2006
ALVIN HOLLIS CO	SOUTH WEYMOUTH	$2.670	8/28/2006
MICCI FUEL CO	DORCHESTER	$2.690	8/28/2006
REGGIES OIL CO INC	QUINCY	$2.690	8/28/2006
EAST COAST PETROLEUM CORP	QUINCY	$2.690	8/28/2006
STAR FIVE OIL CORP CO	DORCHESTER	$2.700	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.299	$2.700	$2.572

TABLE A4.23
RETAIL HEATING OIL PRICE
MASSACHUSETTS – SPRINGFIELD AREA

Company Name	Town	Price	Date
CHARGE-LESS-OIL	SPRINGFIELD	$2.240	8/28/2006
THIBAULT FUEL OIL	SPRINGFIELD	$2.290	8/10/2006
BEST OIL	WESTFIELD	$2.350	8/28/2006
ECONOMY OIL	WEST SPRINGFIELD	$2.370	8/28/2006
BAY STATE OIL	WEST SPRINGFIELD	$2.390	8/28/2006
FAST FILL OIL	WEST SPRINGFIELD	$2.390	8/28/2006
QUICK STOP COLONIAL OIL	WEST SPRINGFIELD	$2.390	8/28/2006
SAVEWAY OIL	WEST SPRINGFIELD	$2.390	8/28/2006
VICKER'S INC	WEST SPRINGFIELD	$2.390	8/28/2006
CIRELLI INC	SPRINGFIELD	$2.390	8/28/2006
HOWARD FUEL SVC	SPRINGFIELD	$2.400	8/28/2006
EAST SPRINGFIELD OIL CO	SPRINGFIELD	$2.410	8/28/2006
MARK OIL INC	SPRINGFIELD	$2.440	8/28/2006
COLONIAL OIL CO	WEST SPRINGFIELD	$2.450	8/10/2006
COST LESS COD	WEST SPRINGFIELD	$2.450	8/10/2006
WESTFIELD FUEL CO	WESTFIELD	$2.455	8/28/2006
FOUNTAIN & SONS FUEL CO	WARREN	$2.520	7/10/2006

Source: www.newenglandoil.com

Low	High	Average
$2.240	$2.520	$2.395

TABLE A4.24
RETAIL HEATING OIL PRICE
MASSACHUSETTS – CAPE COD & ISLANDS

Company Name	Town	Price	Date
NEW ENGLAND FUEL	WAREHAM	$2.389	8/28/2006
TERRY'S HOME OIL	WAREHAM	$2.389	8/28/2006
PILGRIM DISCOUNT FUELS INC	OSTERVILLE	$2.390	8/28/2006
FALMOUTH DISCOUNT OIL	EAST FALMOUTH	$2.490	8/28/2006
COD DISCOUNT FUEL CO	EAST FALMOUTH	$2.540	8/28/2006
RED WING OIL CO	CENTERVILLE	$2.549	8/28/2006
CAPE DISCOUNT FUEL	ORLEANS	$2.550	8/28/2006
S & P SVC	CATAUMET	$2.590	8/21/2006
LOUD FUEL CO	EAST FALMOUTH	$2.590	8/28/2006
WYNNE OIL CO	EAST FALMOUTH	$2.640	8/28/2006
CARL F RIEDELL & SON INC	OSTERVILLE	$2.640	8/28/2006
P S IDEAL FUEL CO	EAST FALMOUTH	$2.649	8/28/2006
FALMOUTH COAL CO	FALMOUTH	$2.650	8/28/2006
MARCEY OIL CO	PROVINCETOWN	$2.690	8/28/2006
WHITELEY FUEL OIL	CHATHAM	$2.700	8/28/2006

Source: www.newenglandoil.com

Low	High	Average
$2.389	$2.700	$2.563

TABLE A4.25
RETAIL HEATING OIL PRICE
NEW HAMPSHIRE – NORTHERN

Company Name	Town	Price	Date
NUGENT MOTOR & BUS SVC	COLEBROOK	$2.380	7/17/2006
PRESBY OIL	BETHLEHEM	$2.427	7/17/2006
AL’S PLUMBING HEATING & FUELS	GROVETON	$2.469	7/17/2006
HARRIS ENERGY INC	LITTLETON	$2.499	7/17/2006
GORHAM OIL INC	GORHAM	$2.499	7/17/2006
MUNCE’S SUPERIOR INC	GORHAM	$2.499	7/17/2006
FITCH FUEL CO	LANCASTER	$2.540	7/17/2006
RIVERSIDE ENERGY INC	LITTLETON	$2.549	7/17/2006
STILES FUEL CO	WHITEFIELD	$2.549	7/17/2006
C N BROWN HEATING OIL	BERLIN	$2.599	7/17/2006
IRVING OIL CORP	BERLIN	$2.699	7/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.380	$2.699	$2.519

TABLE A4.26
RETAIL HEATING OIL PRICE
NEW HAMPSHIRE – EASTERN

Company Name	Town	Price	Date
VICTORY FUEL INC	NEWTON	$2.349	7/17/2006
LEO'S FUEL INC	PLAISTOW	$2.349	7/17/2006
RONNIES OIL SERVICE	PLAISTOW	$2.349	7/17/2006
C & L OIL	KINGSTON	$2.350	7/17/2006
BUXTON OIL CO	EXETER	$2.399	7/17/2006
HARTMANN OIL CO	EXETER	$2.399	7/17/2006
HARRYS FUEL	KINGSTON	$2.399	7/17/2006
FRED FULLER OIL CO	OSSIPEE	$2.399	7/17/2006
LOCAL PRIDE HEATING OIL	ROCHESTER	$2.399	7/17/2006
HANSCOM'S TRUCK STOP INC	PORTSMOUTH	$2.450	7/17/2006
WALTER S CLARK & SONS FUEL OIL	KINGSTON	$2.490	7/18/2006
RAY BEAUDOIN & SONS INC	ROCHESTER	$2.499	7/17/2006
FORTIER & SON INC	SOMERSWORTH	$2.499	7/17/2006
H & H OIL & GAS CO INC	GREENLAND	$2.539	7/17/2006
DIFEO OIL CO	ATKINSON	$2.549	7/17/2006
GEORGE'S FUELS	ROCHESTER	$2.549	7/17/2006
DI FEO OIL CO INC	HAMPSTEAD	$2.549	7/17/2006
GOODWIN OIL CO	PORTSMOUTH	$2.599	7/17/2006
RYE FUEL	GREENLAND	$2.599	7/17/2006
WOLFEBORO OIL CO	WOLFEBORO	$2.599	7/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.349	$2.599	$2.466

TABLE A4.27
RETAIL HEATING OIL PRICE
NEW HAMPSHIRE – CENTRAL

Company Name	Town	Price	Date
FRED FULLER OIL CO	BRISTOL	$2.399	7/17/2006
FRED FULLER OIL CO	LACONIA	$2.399	7/17/2006
FRED FULLER OIL CO	CONCORD	$2.399	7/17/2006
CONTOOCOOK VALLEY FUEL SVC	CONTOOCOOK	$2.449	7/17/2006
DUTILE & SONS INC	LACONIA	$2.449	7/17/2006
C N BROWN CO	TILTON	$2.449	7/17/2006
KIDDER FUELS INC	TILTON	$2.449	7/17/2006
DAVIS FUELS OF EPSOM	EPSOM	$2.499	7/17/2006
EASTERN PROPANE & OIL	EPSOM	$2.499	6/6/2006
AYER & GOSS INC	HENNIKER	$2.499	7/17/2006
J B VAILLANCOURT INC	HILLSBORO	$2.499	7/17/2006
FOLEY OIL CO	LACONIA	$2.499	7/17/2006
FRED FULLER OIL CO	MOULTONBOROUGH	$2.499	6/6/2006
NORTHWOOD OIL CO	NORTHWOOD	$2.499	7/17/2006
RYEZAK OIL CO	RUMNEY	$2.499	7/17/2006
LAVALLEE OIL INC	SUNCOOK	$2.499	7/17/2006
YEATON OIL CO	PLYMOUTH	$2.500	7/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.399	$2.500	$2.470

TABLE A4.28
RETAIL HEATING OIL PRICE
NEW HAMPSHIRE – WEST CENTRAL

Company Name	Town	Price	Date
GARY'S FUELS	NORTH HAVERHILL	$2.440	7/17/2006
EUGENE BOISVERT PLUMBING & HTG	WEST LEBANON	$2.520	6/6/2006
T-BIRD MINI MART	CLAREMONT	$2.529	7/17/2006
R E HINKLEY CO	CLAREMONT	$2.549	7/17/2006
LIMOGES OIL INC	CLAREMONT	$2.650	7/17/2006
IRVING OIL CORP	WEST LEBANON	$2.699	6/6/2006
GOODRICH OIL CO	NEWPORT	$2.700	7/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.440	$2.700	$2.584

TABLE A4.29
RETAIL HEATING OIL PRICE
NEW HAMPSHIRE – SOUTH CENTRAL

Company Name	Town	Price	Date
DANIELS PROPANE	NEW BOSTON	$2.390	7/17/2006
M L HALLE OIL SVC INC	MANCHESTER	$2.399	7/17/2006
FRED FULLER OIL CO	DERRY	$2.399	7/17/2006
BUXTON OIL CO INC	EPPING	$2.399	7/17/2006
PUTNAM FUEL CO	GOFFSTOWN	$2.399	7/17/2006
LORDEN OIL CO	HOLLIS	$2.399	7/17/2006
FRED FULLER OIL CO	HUDSON	$2.399	7/17/2006
CIARDELLI FUEL OIL CO	MILFORD	$2.399	7/17/2006
FRED FULLER OIL	MILFORD	$2.399	7/17/2006
J A BOURQUE & SONS INC	MANCHESTER	$2.400	7/10/2006
MC LEAN OIL	SALEM	$2.449	6/6/2006
MCDUFFIE PETROLEUM PRODUCTS	HUDSON	$2.449	7/17/2006
CRAWFORD VOGEL & WENZEL OIL CO	MANCHESTER	$2.450	7/17/2006
CHAMPAGNE OIL	AUBURN	$2.450	7/17/2006
VIKING OIL INC	AUBURN	$2.450	7/17/2006
C J PLUMBING & HEATING	DERRY	$2.459	7/17/2006
ROCHETTE'S OIL SVC	MERRIMACK	$2.459	7/17/2006
PALMER GAS/ERMER OIL	ATKINSON	$2.479	7/17/2006
WELLS OIL CO	DERRY	$2.479	7/10/2006
B & H OIL CO	SALEM	$2.499	7/17/2006
ABSCO HEATING & HOME SVC	MANCHESTER	$2.499	7/17/2006
DUSTON OIL CO	DERRY	$2.599	7/17/2006
IRIVING OIL	AMHERST	$2.699	7/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.390	$2.699	$2.452

TABLE A4.30
RETAIL HEATING OIL PRICE
NEW HAMPSHIRE – SOUTHWEST

Company Name	Town	Price	Date
C & L PETROLEUM	ALSTEAD	$2.449	7/17/2006
DISCOUNT OIL	KEENE	$2.479	7/17/2006
MONADNOCK FUEL CO	KEENE	$2.479	7/17/2006
BOB'S FUEL	WINCHESTER	$2.479	6/6/2006
RED'S OF JAFFREY	JAFFREY	$2.499	7/17/2006
CHESHIRE OIL CO	KEENE	$2.529	7/17/2006
DAVIS OIL CO	KEENE	$2.549	7/17/2006
WEBER ENERGY	KEENE	$2.569	7/17/2006
ALLEN & MATHEWSON ENERGY CORP	PETERBOROUGH	$2.599	7/17/2006
A W PETERS INC	PETERBOROUGH	$2.699	7/17/2006

Source: www.newenglandoil.com

Low	High	Average
$2.449	$2.699	$2.533