

Impact of Interruptible Natural Gas Service on Northeast Heating Oil Demand

Executive Summary

The following article is the Executive Summary from the recently published Energy Information Administration (EIA) report *Impact of Interruptible Natural Gas Service on Northeast Heating Oil Demand*, SR/OOG/2001-01. The report was undertaken to assess the relationship between interruptible gas service contracts and heating oil demand in the Northeast during the winter of 1999-2000. The report may be accessed electronically on the Energy Information Administration web site at: http://www.eia.doe.gov/oil_gas/natural_gas/analysis_publications/nat_analysis_publications.html

The Natural Gas and Heating Oil Market in January-February 2000

Natural gas and distillate fuel oil¹ prices can rise rapidly during winter peak-demand months especially when stocks are low and demand increases quickly. Such was the case in the Northeast in mid-January 2000 when a sudden surge of cold weather blanketed the area, substantially increasing demand. During the week ended January 22, 2000, temperatures in the Northeast shifted from being up to 17 percent warmer than normal to 24 percent colder than normal. This large temperature shift drastically increased heating requirements at a time that the market was experiencing supply constraints. Distillate fuel oil stocks were low, and the colder weather led to distillate delivery problems as well as natural gas capacity constraints in some areas. The low temperatures and high gas demand also triggered service interruptions to natural gas customers without guaranteed (firm) service contracts, which led to purchases of other fuels, especially petroleum products. These elements came together to create rapid and extremely large price increases in the distillate fuel oil and natural gas markets.

- From January 11 to January 20, 2000, spot prices (market prices for immediate delivery) for natural gas in the New York City market rose from \$2.65 to \$15.34 per million Btu (MMBtu), an increase of nearly 500 percent. Natural gas prices at the Algonquin Pipeline citygate, which serves the

Boston area, peaked at \$12.54 per MMBtu on January 20, 2000.

- Between January 14 and February 4, 2000, New York Harbor spot prices for home heating oil rose by 133 percent while residential prices for home heating oil in New England increased by 66 percent.

The high prices and supply constraints in both markets caused great concern. Public meetings were held in February 2000 to discuss what may have caused the extreme market conditions in the Northeast and how to avoid such problems in the future. Some meeting participants pointed to interruptible gas service contracts as a major contributor to the fuel oil price spikes because of the increased demand for backup fuel when gas deliveries were suspended. Under interruptible contracts, a customer agrees to gas service without a guarantee of supplies in return for discounted rates. Roughly 10 to 15 percent of all natural gas deliveries by interstate pipeline companies (excluding transportation for other pipelines) in 1997 were on an interruptible basis.

In February 2000, Senator Joseph Lieberman asked the Department of Energy (DOE) to study how service interruptions by natural gas suppliers affected the distillate fuel oil market this past winter. To meet his request and to evaluate other factors affecting oil and gas markets, the Energy Information Administration (EIA) surveyed major gas suppliers and customers in New England and the Middle Atlantic States (New Jersey, New York, and Pennsylvania) on the extent of natural gas service interruptions during the 1999-2000 heating season and the types of fuels burned as alternatives to natural gas. Two surveys were conducted: Form EIA-903, "Natural Gas Service Interruptions in the Northeast During December 1999, and January and February 2000," and Form EIA-904,

¹Distillate fuel oil is a general classification for one of the fractions produced from crude oil. It is used primarily for space heating and on- and off-highway diesel engine fuel as well as power generation. It includes products known as No. 1, No. 2, and No. 4 fuel oils and No. 1, No. 2, and No. 4 diesel fuels.

"Customer Survey of Natural Gas Service Interruptions in the Northeast During January and February 2000." The respondents to Form EIA-903 were 34 natural gas companies who accounted for nearly all of the volumes delivered to end users under interruptible contracts in the Northeast in 1998, while respondents to Form EIA-904 were 97 end users in New England who received natural gas under interruptible service contracts. (Appendix B of the report provides details on the data collection methodology.)

This report examines the data collected from these companies in the context of the overall energy market in the Northeast. The main purpose of the report is to provide insight into the level and duration of interruptions of natural gas service and the extent of fuel switching between natural gas and other energy markets. An earlier EIA report *The Northeast Heating Fuel Market: Assessment and Options* that addressed the ability of Northeast natural gas customers to switch to distillate fuel oil was released in May 2000. In addition, a report with policy recommendations was issued by DOE's Office of Policy in November 2000 that addressed the role of interruptible gas contracts in the New England heating oil market.

Reductions in Natural Gas Service

An interruption of natural gas service is said to occur if gas service was discontinued to comply with a specific order by the local distribution company (LDC) or pipeline company and the service disruption was not tied to a previously determined schedule as to occurrence or duration. Thus the end user could not predict precisely when or even if a service disruption would occur. For example, customers holding interruptible service contracts would expect that service likely will be suspended sometime during the winter but the date and duration of the interruption(s) would be completely unknown.

Some energy customers contract for natural gas services for only a short period or on a seasonal basis. Service suspensions specified in seasonal or short-term contracts are not considered an interruption as long as the terms of the arrangement are not disrupted during the period of performance for the contract. Interruptions can be triggered by system operating conditions and/or temperatures. The supplier LDC or pipeline company has the right to suspend service at any time that it deems necessary to maintain system integrity or in order not to compromise service to its firm service customers. In some contracts with temperature-controlled provisions, service is suspended automatically when the

outside temperature falls below a certain threshold and is not resumed until temperatures are above the threshold for a sustained period determined by the LDC.

Natural gas service may also be suspended voluntarily by customers with switchable or dual-fuel capability, even when delivery capacity is available. Some demand shifted from natural gas to distillate fuel oil during January and February 2000 because of the relative fuel prices. However, this behavior was motivated by market conditions under competition and would not be considered a service interruption.

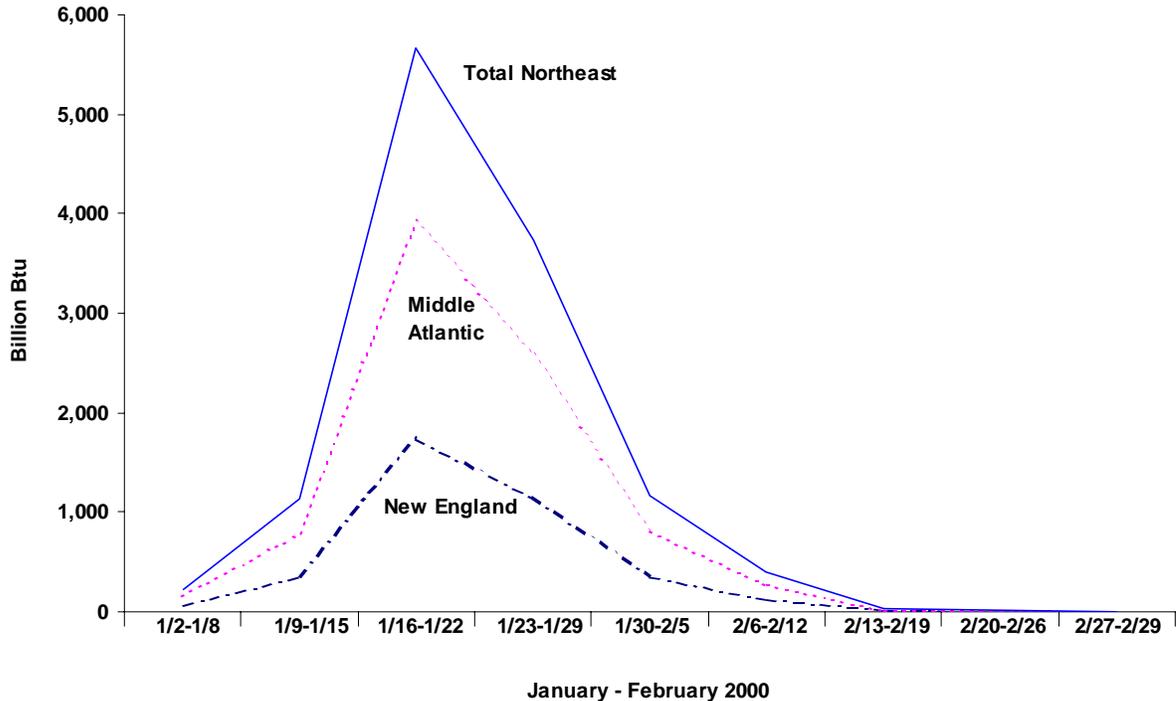
The interruption data cited in this report are based on the volumes reported by gas suppliers on Form EIA-903. As subsequently discovered, these volumes included reductions in gas consumption because of economic switching and termination of seasonal service in addition to interrupted volumes. Although these *reported interruptions* exceed shifts from gas service due to unexpected interruptions alone, they are informative as an upper limit on volumes of fuel switching owing to gas service interruptions.

Highlights

During the peak week (ended January 22), reported gas service interruptions in the Northeast represented 49 percent of the LDCs' and pipeline companies' planned service levels to interruptible customers for that week. Overall, however, interruptions were limited and no firm service customer was interrupted. Approximately 12.4 trillion Btu or 13 percent of the total planned level of natural gas service to interruptible customers was interrupted in the Northeast during January and February 2000.

The reported gas service interruptions for customers in the Northeast with distillate fuel oil as their backup were the equivalent of between approximately 78 and 84 thousand barrels of distillate per day during the peak week. This corresponds to about 11 percent of the average daily distillate consumption in the Northeast in January 2000 and a smaller but immeasurable share of distillate consumption in the peak week. The greatest level of interruptions was focused on the third week of January, when interruptions were much greater than for any other week in January or February (Figure ES1). Most (76 percent) of the interruptions during January and February 2000 occurred in the third and fourth weeks of January.

Figure ES1. Reported Natural Gas Volume Interrupted by Week, January and February 2000



Source: Energy Information Administration, Form EIA-903 "Natural Gas Service Interruptions in the Northeast During December 1999, and January and February 2000."

The estimated range of 78 to 84 thousand barrels per day of potential incremental distillate consumption is consistent with previously published estimates,² which ranged up to 100 thousand barrels per day for distillate fuel oil for both interruptions and economic switching combined. In fact, if the larger estimates are reliable, the 78 to 84 thousand-barrel-per-day range shows that more than 15 percent of the fuel shifting from gas to distillate is due to factors other than gas service interruptions. These distinctions have important implications for further analysis or policy formulation. Understanding motivations behind customer behavior is essential to understanding gas and fuel oil markets at critical times of the year.

Actual purchases of distillate fuel oil resulting from the interruptions, however, likely were less than the calculated equivalent volumes, because some customers drew down inventories slightly while others simply reduced operations or temporarily shut down. Data from a limited sample of interrupted customers in New

England who responded to Form EIA-904 indicate that less than half the volume of gas interrupted during January and February was replaced with distillate purchases.³ Scaled-back operations in the Middle Atlantic, as indicated by anecdotal evidence, would have further reduced the demand for distillate fuel oil.

Additional highlights include the following:

- **Interruptions represented a larger share of planned service levels in New England than in the Middle Atlantic.** During the peak week ended January 22, reported interruptions in New England were roughly equal to planned service levels, meaning that virtually no gas was delivered under interruptible service contracts. In contrast, interruptions in the Middle Atlantic during that week were only 39 percent of planned service levels. This relative pattern is present during the full 2 months, although at lower levels. Interruptions totaled 3,786 billion Btu in New England and 8,578 billion Btu in the Middle Atlantic, representing 28 percent and 11 percent, respectively, of planned

²Energy Information Administration, *The Northeast Heating Fuel Market: Assessment and Options*, SR/OIAF/2000-03 (Washington, DC, May 2000), p. 44. Petroleum Industry Research Foundation, Inc., *What Happened to Heating Oil?* (March 2000), p. 6.

³The findings from the EIA-904 customer survey are provided as illustrative, but they are not statistically valid for the overall regional market.

service levels to interruptible customers in the region.

- **Both large-volume and small-volume customers who responded to the EIA-904 maintained a fairly constant level of distillate inventories.** Throughout the 8-week period, the large customers, which included power producers, maintained their inventories within a narrow range: 90 percent full at its maximum on the week after the largest interruptions and 79 percent full in late February. On average the smaller customers maintained weekly inventories at 68 percent of their distillate capacity with 79 percent as the high and 63 percent as the low during the period.
- **The large-volume and small-volume customers have contrasting distillate inventories and inventory capacities.** Based on maximum potential interruption levels, the small customers had 14.3 days of distillate storage capacity available and 9.8 days of distillate inventories on hand. In contrast, large customers had only 3.7 days of storage capacity and 3.1 days of inventory.
- **Customers in the education, health, and housing/lodging industries accounted for 30 percent of the interruptions known by industry type⁴ in the Northeast during January and February 2000.** Customers in these categories relied less heavily on

distillate as a backup fuel and had more inventories on hand than the average interrupted customer. Like other customers interrupted, though, they made purchases to replace fuels burned during the interruption in natural gas service in order to maintain onsite stocks.

This study provides better information than previously available on the magnitude of fuel switching from natural gas to alternative fuels. It also contains information on customer behavior during the winter heating season, including times of intense demand when some portion of gas service is not available. This information highlights the complex interactions between interruptible gas service and other fuel markets. Customer reactions to gas service interruptions reflect varying operational objectives and economic circumstances.

The additional demand in the distillate market from interrupted gas customers may not have been as large as previously thought. However, if supplies are tight, additional purchases may have a disproportionate price response, so even small volumes of additional purchases may be difficult to accommodate. Further, although interruptible contracts may have had a limited role in recent fuel oil price spikes, that influence may increase over time as gas markets are expected to expand relative to the distillate fuel oil markets, especially heating oil, in the Northeast.

⁴About 50 percent of the volumes reported by respondents to Form EIA-903 could be categorized by primary business of the customer.