

FSC'S LAW & ECONOMICS INSIGHTS

Issue 04-4

Fisher, Sheehan & Colton, Public Finance and General Economics

July/August 2004

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High Winter Natural Gas Heating Costs for Poor

NOTE TO READERS

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Fisher, Sheehan & Colton
Public Finance and General Economics
34 Warwick Road, Belmont, MA 02478-2841
617-484-0597 *** 617-484-0594 (fax)
editor@fsconline.com (e-mail)
<http://www.fsconline.com>

Natural Gas Usage by Industrial Customers Contributes to Unaffordable Winter Natural Gas Heating Costs for Poor

Large natural gas users directly contribute to the unaffordable home heating problems now faced by low-income residential consumers. A recent analysis by Fisher, Sheehan & Colton, Public Finance and General Economics (FSC) concluded that industrial use of natural gas, as well as the spiraling use of natural gas for electricity production (used largely by industrial and commercial customers), are substantive contributors to the unaffordability of winter heating fuels used by low-income customers.

Natural Gas-Fired Generation

One of the primary factors increased prices of natural gas today is the increased demand attributable to the dramatically expanded use of natural gas fuel for electric power generation. A May 2001 report by the staff of the Public Utilities Commission of Ohio (PUCO) identified the increased use of natural gas for electric generation as a major contributor to the high gas prices in the 2000/2001 winter heating season. The PUCO staff observed:

. . .an increase in the development of new electric generating plants is occurring across the country. This growth is in response to restructuring efforts in the electric industry and also in response to the growing demand for electricity. Many of the new electric generating plants utilize natural gas as a fuel source. This development has contributed to increasing the demand for natural gas supplies across the country.

Driving this increased use of natural gas for electric generation is the rise of unregulated power plants operated by non-utility generators. The significance of this fact is at least two-fold.

First, the factors underlying increased natural gas prices will persist for the foreseeable future and the trend toward higher gas prices is likely to remain.

In particular, the increases attributable to non-utility generators are not tied to the rate of economic growth. Whether high, moderate or low economic growth rates are experienced:

. . .total natural gas consumption is projected to increase from 1999 to 2020. The projections for domestic consumption in 2020 range from 32.2 trillion cubic feet per year in the low economic growth case to 36.1 trillion cubic feet in the high growth case, as compared with an estimated 21.4 trillion cubic feet in 1999.

Rising demand by electricity generators accounts for 57 percent of this increase in gas consumption in the most likely scenario, although growth is also expected in the residential, commercial, industrial, and transportation sectors. DOE states:

Natural gas consumption in the electricity generation sector is projected to grow steadily throughout the forecast as demand for electricity increases and retiring nuclear and older oil and gas turbines and combined cycle facilities replace gas steam plants. In the reference case, natural gas consumption for electricity generation (excluding cogeneration) is projected to increase from 3.8 trillion cubic feet in 1999 to 11.3 trillion cubic feet in 2020. In 2017, electricity generation is projected to surpass the industrial sector as the largest consumer of natural gas.

According to DOE, “the next few years promise to provide an extraordinary boom in natural-gas-fired generating capacity additions, marked by

the introduction into commercial service of about 22 gigawatts of new gas-fired capacity in 2000.” Natural-gas-fired generating technology, DOE states, will be “the preferred choice in the 2010-2020 time period.” As DOE reports:

While most areas of the country entered the 1990s with sufficient generating capacity, the need for new capacity started to grow in the mid-1990s. Natural gas turbine and combined-cycle plants were the units of choice for new plant construction because of their relatively low costs, high efficiencies, and short construction lead times. From 1995 through 1999, natural-gas-fired capacity in the United States increased by 21.4 gigawatts. The largest increase, 6.7 gigawatts, was in 1999. Twenty-two gigawatts of gas-fired generating capacity was added in 2000. Estimates for additional planned gas-fired capacity for 2001 generally are in the range of 25 gigawatts.

Weather Impacts

Second, as DOE notes, the growth in natural gas prices is irrespective of winter weather: “with an expanding economy and an increase in planned construction of new gas turbines, future demand for natural gas is expected to increase regardless of whether the coming winters will be warm or cold.”

In contrast, hot summer weather may have a significant impact on winter heating bills. There is ample information available upon which to base this conclusion. Consider, for example, the information presented by the U.S. Department of Energy’s (DOE) Energy Information Administration in its 2003 analysis of high natural gas prices during the 2002/2003 winter heating season in the Midwest and Northeastern areas of the nation.

According to this EIA/DOE analysis, one of the primary contributing factors to the high gas prices faced by residential consumers, including low-income consumers, was the relatively low

storage volumes experienced going into the heating season. Because of this low storage, natural gas consumers, including low-income consumers, were subject to high and volatile spot market prices needed to meet natural gas demand.

One reason for the low storage and the increasing need to rely on expensive spot market gas is the surge in natural gas usage by large volume users, including industrial users and electric producers. Electric producers, EIA/DOE says, include cogeneration facilities.

Indeed, the continuing pressure on natural gas supply is *largely* driven by increases in natural gas consumption by the industrial sector and electric generation sector. EIA/DOE's projection of natural gas consumption by this sector of the economy from 1990 through the year 2025 shows that industrial customers and electric generators are the primary drivers of consumption increases during that time period.

The surge in natural gas usage that has occurred in recent years is projected to continue. DOE projects that natural gas consumption will substantially increase in these sectors through the year 2025.

Why Gas Storage is important To Low-Income Heating Customers

Not only does the additional demand for natural gas as a fuel for electric power generation place direct upward pressure on natural gas prices, but it impedes the ability of natural gas companies to replenish their storage during the non-heating months as well. The lack of adequate gas supplies in storage further drives gas prices up in the winter heating season, particularly if there is severe weather (even in the short-term). As the PUCO staff noted:

The changing prices for natural gas across the country in the first half of 2000 and the use of natural gas by the electric industry in parts of the country during the summer of 2000 disrupted the usual practice of natural

gas companies to refill their storage facilities in preparation for the 2000 heating season. Natural gas in storage provides, on a national average, about 20% of the winter heating season's natural gas demand.

Because prices for natural gas were historically high last summer, natural gas companies across the nation were slow to buy and inject gas into storage, hoping to capture more reasonably priced gas before the limited refill season came to a close. Lower, more reasonably priced wholesale gas was not widely available for injection into storage by the time the 2000-2001 winter heating season began. Nationally, the natural gas industry entered the 2000-2001 heating season with lower than usual storage levels to draw from over the 2000-2001 winter. This conservative approach to storage, combined with harsher winter weather, exacerbated the rise in gas prices over the course of the winter.

The U.S. Department of Energy (DOE) agreed. In projecting a doubling of natural gas prices for the 2000/2001 winter heating season, the DOE attributed the causes not only to lagging production due to low prices and high crude oil prices, but also to "increases in summer power generation demand, which helped constrain inventory accumulations to half their normal rate. . ." As DOE noted in late 2000:

Current wellhead prices are nearly double the price from one year ago. Although rising crude oil prices have encouraged natural gas prices to grow, the principal explanation for these high (and sustained) gas prices has been the strained supply situation. In sum, the injection rate for gas into storage continues to be too small to assure the market of sufficient supplies for next winter's heating season. . . Hot summer weather in portions of the country, particularly Texas and California, which consume large amounts of gas for electricity generation, drew gas away from storage injections.

DOE concluded that “natural gas that would normally be added to storage has, to some extent, been used (indirectly through electric utilities) to run air conditioners.”

Why Hot Weather Affects Natural Gas Storage

One impact that increased natural gas usage by industrial and electric generators has involves the upward pressure on gas prices during the non-heating season. As DOE notes, “in general, storage is filled during low utilization periods (April – October) and withdrawn during high utilization periods (winter).” DOE continues, however, to note: “increased demand for natural gas in the electricity generation sector during the traditional off-peak period in recent years has increased competition for gas to refill storage and put upward pressure on natural gas prices.” DOE states:

In order for storage of gas to be economical in competitive markets, the cost of storing generally should be less than the differential between the cost of natural gas in the withdrawal period and in the refill periods. With relatively high gas prices in mid-2000 (during the off-peak period), incentives to rebuild inventories to levels closer to the average were diminished.

DOE explained how the process is affected when competing off-season demands for natural gas are introduced:

Although the industry ended the 1999 – 2000 heating season with natural gas stocks slightly above average in March 2000, rising spot prices over the next 5 months due to continued strong demand, particularly for electricity generation, inhibited gas storage refill activity.

* * *

As the refill season began in April 2000, spot prices exceeded \$3 per million Btu—levels seen only briefly in the fall of 1999.

Gas demand continued to strengthen, and priced jumped to over \$4 per million Btu by the end of May 2000, then declined slightly in July and took off again in August. Although supply adjusted to the increasing prices, the adjustment occurred at a slower pace, and additional supplies were readily absorbed by a growing market. By the middle of September, spot prices had crossed the \$5 per million Btu threshold. Undoubtedly, the high prices contributed to 5 consecutive months of lower than average storage injections. (emphasis added).

Summary

The increasing reliance on natural gas by large industrial natural gas users is at least one significant contributing factor to the fly-up in natural gas prices in recent years. This contribution comes not only through the increased industrial uses of natural gas as a fuel, but in the continuing switch to natural gas fired co-generation facilities. The continuing construction of gas-fired non-utility generation plants, primarily to serve large industrial and commercial customers, also contributes to the natural gas price crisis. At a fundamental level, assertions that large users are not involved with the home heating affordability problems faced by low-income customers are in error.

Fisher, Sheehan and Colton, Public Finance and General Economics (FSC) is a research and consulting firm with offices in Belmont (MA), Scappoose (OR), and Iowa City (IA).

FSC specializes in providing economic, financial and regulatory consulting. The areas in which *FSC* has worked include infrastructure financing, public enterprise planning and development, natural resource economics, community economic development, telecommunications, public sector labor economics, planning and zoning, regulatory economics, energy law and economics, fair housing, and public welfare policy.