

Macroeconomic and Industrial Effects Of Higher Natural Gas Prices

**By
David K. Henry
H. Kemble Stokes, Jr.**

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EXECUTIVE SUMMARY

Over the past year, there has been some concern over the potential economic impact of unusually high natural gas prices. Although natural gas prices declined from \$10 per thousand cubic feet (mcf) in December 2005 to about \$6 recently, the Energy Information Administration (EIA) expects prices to return to the unprecedented price levels of last year as we move back into this winter's heating season.¹ The recent decline reflected recovery of the natural gas industry from the hurricanes of last year, increased supply moving into the U.S. through pipelines and liquefied natural gas terminals, and moving away from last winter's heating season. Because of the expected resurgence of natural gas prices, there has been continuing concern over the potential economic impact of unusually high natural gas prices.

We examined the macroeconomic and industrial impacts of a \$2 per mcf increase in natural gas prices above those embodied in the EIA long run price projections for natural gas through 2020. Oil prices were assumed to follow the EIA baseline, with no significant impact from the rise in natural gas prices. We used INFORUM's LIFT model of the U.S. economy to analyze the impact of higher natural gas prices.

We concluded that these levels of higher natural gas prices would (1) cause the economy to grow moderately more slowly through 2008, but the effects would not be enough to cause a recession; (2) reduce the growth in industry output and job creation in the economy; and (3) induce individual and business consumers to use less natural gas and, alternatively, use more electricity.

In summary, we found that-

- In 2006, real Gross Domestic Product (GDP) growth slows by 0.1 percentage points below the baseline growth. In 2007 and 2008, growth falls by another 0.1 percentage points. Given the strong momentum of economic growth, such slowdowns are far from what it would take to induce a recession. After 2007, real GDP growth rates more-or-less follow the baseline forecast through 2020.²
- The unemployment rate is 0.1 percentage point higher through 2010, at the height of the labor market impact. After 2010, the difference diminishes as the economy adjusts.
- Compared with the baseline, the higher natural gas prices push up consumer prices, as measured by the personal consumption expenditure (PCE) price index,

¹ *Short-Term Natural Gas Outlook*, presentation by EIA's Barbara Mariner-Volpe to the National Association of State Energy Officials, August 2006; found on http://www.eia.doe.gov/pub/oil_gas/natural_gas/presentations/2006/ngoutlook/index.html

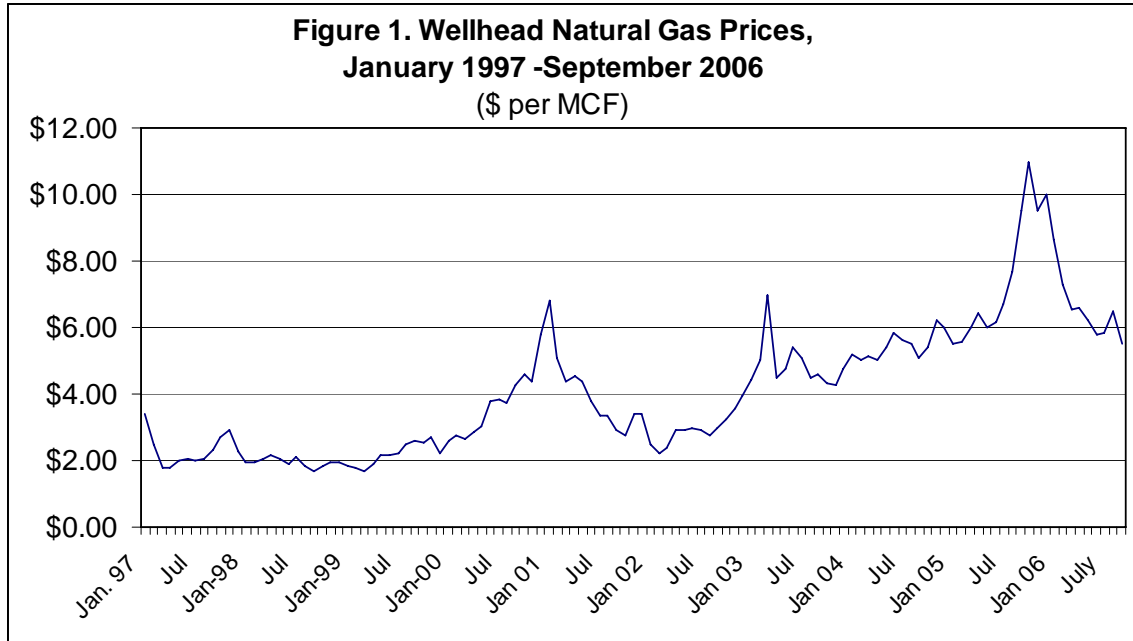
² Potential energy efficiency gains by industries in response to natural gas price increases could reduce GDP and employment impacts, particularly near the end of the simulation horizon. The effects of these additional energy efficiencies gains were not included in this simulation.

by 0.2 percent and 0.5 percent for 2006 and 2007, relative to their baseline levels. By 2008, the PCE deflator is 0.6 percent greater than the baseline level.

- Real disposable income is reduced up to 0.4 percent in 2008 leading to an overall reduction in personal consumption expenditures of 0.1 percent during the simulation period.
- Industrial output growth is affected adversely—but the impact is small—across all sectors of the economy through 2008.
- The competitiveness of domestic natural gas intensive manufacturing industries is adversely affected. The import share of domestic consumption for such industries as agricultural chemicals, other chemicals and stone, clay, and glass products rises significantly.
- Higher energy prices mean that the number of jobs that the economy creates is reduced. In this scenario, instead of creating 1.9 million new jobs in 2006, the economy creates 1.8 million new jobs—a difference of 100,000 jobs. In 2007, the impact is a bit larger, with employment 206,000 jobs below the baseline. Missing jobs peak in 2008 at around 229,000—accounting for about 0.2 percent of total private employment.
- The main channel through which higher gas prices affect the economy is through lower real incomes. Consequently, the impact on jobs and production is broad-based. Construction, wholesale and retail trade, and finance and insurance are industries that experience the most jobs lost relative to the baseline. Gas utilities and industries that are natural gas intensive such as agricultural fertilizers and chemical producers have the largest employment effects relative to their size.
- Reductions in real income account for the bulk of job loss relative to the baseline in general consumer-related industries such as wholesale trade, retail trade, and construction. In general, jobs impacts by state are proportional to the size of these sectors for each state, which are, in turn, roughly proportional to each state's employment share. Therefore, California, Texas, New York and Florida lose the most jobs relative to the baseline, in that order. Pennsylvania, Ohio, and Illinois come in close together at fifth place.

NATURAL GAS PRICES

Natural gas prices (wellhead price) were relatively stable through 1999, staying around \$2 per thousand cubic feet (mcf). (See Figure 1.) In 2000, natural gas prices doubled to almost \$4 per mcf and then peaked briefly to \$6 per mcf early in 2001. Although natural gas prices have been volatile, particularly during the home heating season, they have also trended upward. Prices climbed to over \$10 per mcf by the fall of 2005 and since then dropped to about \$6 per mcf.



Domestic wellhead natural gas prices increased 28 percent between 1990 and 1999 and industrial natural gas prices increased by 8 percent in the same period. (See Table 1.) However, between 1999 and 2005, wellhead and industrial prices of natural gas increased by 283 percent and 170 percent, respectively. These higher prices can be attributed to improved economic growth beginning in 2003, large increases in natural gas-fired electric generating capacity, and high oil prices. These demand increases occurred at a time of limited growth in natural gas supplies in North America. In addition, some of the price strength in 2004 and 2005 can be attributed to production disruptions in the Gulf of Mexico due to an active hurricane season.

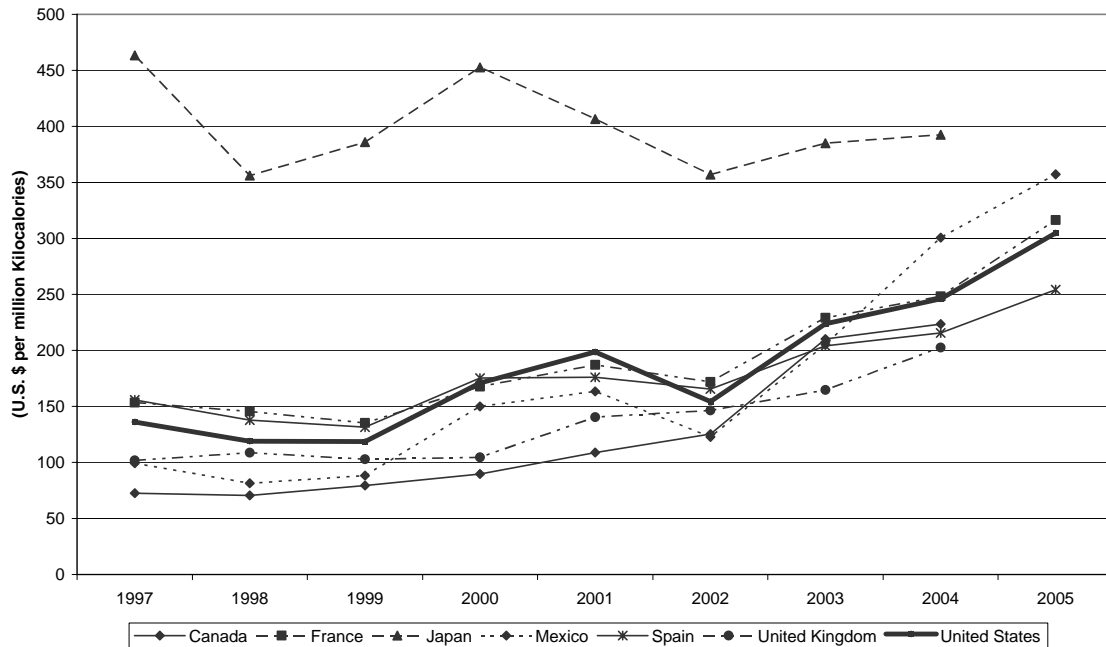
Table 1. U.S. Average Natural Gas Prices, 1990-2005

Year	Wellhead Price	Industrial Price
Dollars per thousand cubic feet (mcf)		
1990	1.71	2.90
1991	1.64	2.68
1992	1.74	2.83
1993	2.04	2.97
1994	1.85	2.96
1995	1.55	2.62
1996	2.17	3.35
1997	2.32	3.59
1998	1.96	3.14
1999	2.19	3.12
2000	3.68	4.45
2001	4.00	5.24
2002	2.95	4.02
2003	4.88	5.89
2004	5.46	6.56
2005	7.51	8.46

Source: Energy Information Administration.

Unlike oil contracts—which are traded in a global market, and hence have a single world price—natural gas prices vary considerably from country to country. (See Figure 2.) However, it is apparent from the level and the change in natural gas prices in these seven countries that (except for Japan) the patterns of price change appear to be similar. The dissimilarities in price become an important part of the assumptions in this simulation.

Figure 2. Natural Gas Prices for Industry, Selected Countries

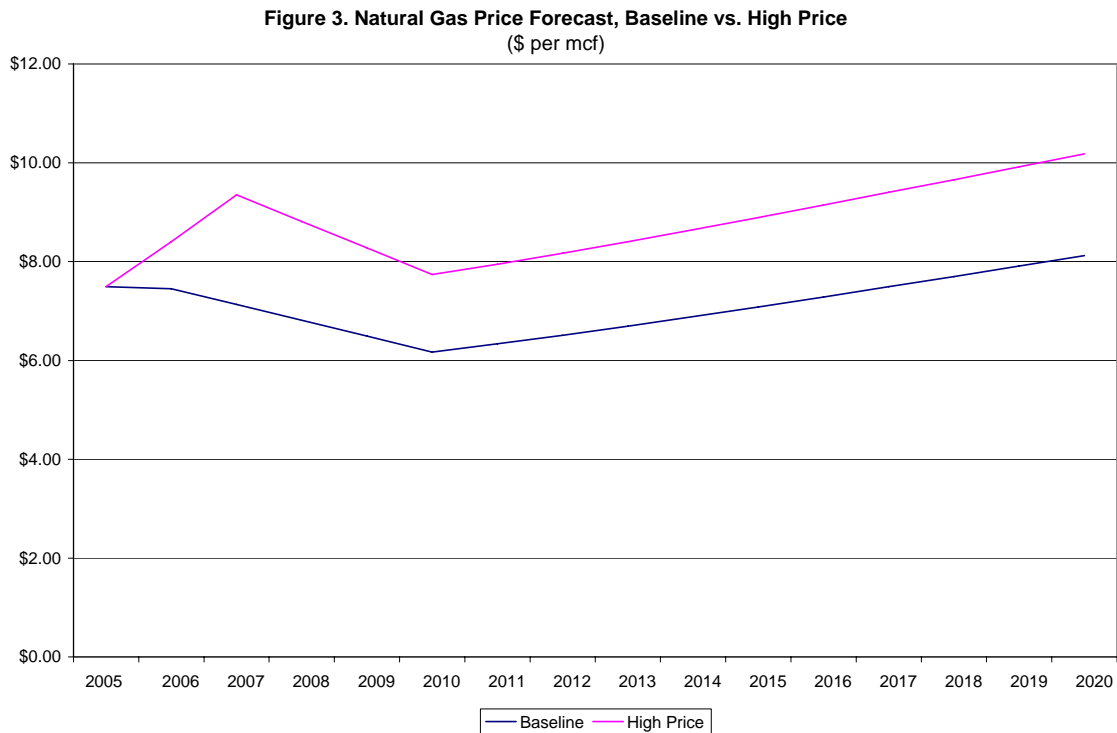


Source: International Energy Agency

METHODOLOGY

We used the LIFT (Long-term Interindustry Forecasting Tool) model of the U.S. economy to perform the simulation. This model was developed and is maintained by the Inforum research group at the University of Maryland. LIFT is an Interindustry-Macroeconomic (IM) model that combines input-output structure with econometric equations in a dynamic and detailed framework. It is a 97-sector general equilibrium representation of the U.S. economy that employs a "bottom-up" approach to macroeconomic modeling; that is, macroeconomic results in the model are determined in large part through the aggregation of sector-level variables. A more complete description of the LIFT model can be found on <http://www.inforum.umd.edu/Lift.html>.

Inforum's February 2006 forecast provided the baseline GDP, industry, and energy forecasts, including natural gas, for the simulation. The Inforum baseline natural gas price forecast is similar—but not identical—to the natural gas price forecast of the EIA through 2020. The baseline natural gas price forecast is the lower line in Figure 3. It shows a slight decline through 2010 before a continuous increase through 2020. The upper line is the high natural gas price used in the simulation, i.e., higher by \$1 per mcf in 2006 and \$2 per mcf for 2007 through 2020.



In the baseline, we followed the EIA forecast for crude oil prices. We assumed that the price of oil, which is set in global markets, would not be significantly affected by the rise in natural gas prices in the United States. It is true that some natural gas users might be able to switch to oil, thereby increasing demand for oil. However, we judged that the amount of such switching would be very small relative to the size of the global oil market.

Also, our simulation did not include a similar upward adjustment to the natural gas price in foreign countries so that domestic industries that rely on natural gas for heating and for input to the production process, by this assumption, become somewhat less competitive. In addition, we did not allow for any greater natural gas use efficiencies by industries or consumers in response to the price increases, although the model can still estimate the extent of fuel switching that may happen.

MACROECONOMIC IMPACTS

Table 2 summarizes the macroeconomic impact of higher natural gas prices. A \$2 per mcf permanent increase in the cost of natural gas reduces the growth of real GDP 0.1 percentage points in 2006 through 2008. The level of GDP is between 0.1 and 0.2 percent below the baseline between 2006 and 2010. Real GDP remains 0.1 percent below baseline levels in 2015 and 2020.

Higher natural gas prices push up the unemployment rate by just 0.1 percentage points through 2010. After 2010, the impact on the unemployment rate begins to dissipate. By 2020, the number of jobs lost relative to the baseline because of higher natural gas prices is limited.

Compared to the baseline, the level of consumer prices (as measured by the PCE deflator) is 0.2 percent in 2006 and 0.5 percent in 2007 higher than baseline. Beginning in 2008, consumer prices are 0.6 percent above baseline. Real disposable income is reduced by between 0.1 and 0.4 percent throughout the simulation period.

Table 2. Macroeconomic Impact of Higher Natural Gas Prices

	2006	2007	2008	2009	2010	2015	2020
GDP Level (Percent Change from Base)	-0.1	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1
GDP Growth (Percentage Change from base, average annual change 2010-15 & 2015-20)	-0.1	-0.1	-0.1	0.1	0.0	0.0	0.0
Unemployment Rate (Percentage Point Difference)	0.1	0.1	0.1	0.1	0.1	0.0	0.0
PCE* Deflator (Percent Difference from Baseline)	0.2	0.5	0.6	0.6	0.6	0.7	0.8
Real Disposable Income (Percent Difference from Baseline)	-0.1	-0.3	-0.4	-0.3	-0.2	-0.2	-0.1
Interest Rates (Percentage Difference from Baseline)	0.0	0.0	0.1	0.1	0.1	0.0	0.0
Exchange Rates (Percentage Point Difference from Baseline)**	0.0	0.1	0.1	0.2	0.3	0.6	1.0
Real Export Growth (Percentage Point Difference in Growth Rate)	-0.1	-0.2	-0.1	0.0	0.1	0.1	0.1
Real Import Growth (Percentage Point Difference in Growth Rate)	-0.1	0.0	0.0	0.1	0.1	0.0	0.0

*Personal Consumption Expenditures

**Trade weighted exchange rate

Source: ESA estimates using the Inforum LIFT model.

We permitted the monetary policy assumptions embedded within LIFT to determine the reaction of the Fed to the combination of higher inflation and lower employment. In a supply shock of this type, the Fed's interest in lower inflation conflicts in the short run with interest in lower unemployment. As a result, interest rates in the higher natural gas price simulation rise by 10 basis points between 2008 and 2010.

Real export and import growth are depressed only slightly in 2006, the first year of higher natural gas prices. Export growth declines by 0.2 percentage points in 2007 while import growth is not affected after 2006. Over the long run, however, the exchange rate depreciates by 1.0 percent to compensate for increased prices for tradable goods produced in the United States relative to those produced abroad.

IMPACT ON CONSUMER SPENDING

Long-term higher natural gas prices have an immediate and long-term impact on consumer spending on energy goods and services. (See Table 3.) Total real personal consumption is reduced by 0.1 percent throughout the simulation period as a result of higher natural gas prices. In addition, real consumer spending for natural gas is lower by about 8 percent in 2007 and 2008. Spending for electric utilities and fuel oil and coal rises by between 4 and 5 percent through 2010 as consumers switch from natural gas to these other energy sources.

**Table 3. Change in Real Personal Consumption Expenditures (PCE)
And PCE For Energy Goods and Services**

	2006	2007	2008	2009	2010	2015	2020
	(Percent Change From Baseline)						
PCE	0.0	-0.1	-0.1	-0.1	-0.1	-0.1	0.0
Gasoline and oil	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel oil and coal	3.0	6.9	6.5	6.1	5.6	5.7	5.6
Electric utilities	2.0	4.7	4.4	4.0	3.6	3.5	3.4
Natural gas utilities	-3.8	-8.4	-7.9	-7.3	-6.7	-6.6	-6.6

Source: ESA estimates using the Inforum LIFT model.

IMPACT BY INDUSTRY

Table 4 shows the estimated impact on annual growth of real output for the major sectors of the economy. The greatest impact—a rise of almost a half of one percentage point—occurs in the mining sector in 2007, which includes drilling for natural gas. Other than mining, the rise in natural gas prices reduces output growth in construction and manufacturing by about 0.2 percent and wholesale and retail trade and services by 0.1 percent. Even in these, the hardest hit sectors, higher energy prices cause growth to slow—but growth continues. For example, the baseline shows growth of 3.6 percent in the manufacturing non-durables sector, which includes such natural gas intensive industries as chemicals and agricultural fertilizers, in 2007. With higher natural gas prices, manufacturing non-durables’ growth is projected to be a slower—but still positive—3.4 percent.

**Table 4. Industrial Output Effect of Higher Natural Gas Prices
By Aggregate Industry Sectors**

	05-06	06-07	07-08	08-09	09-10	AAG* 10-15	AAG 15-20
	(Percentage Change in Growth From Baseline)						
Agriculture, forestry & fisheries	-0.1	-0.2	-0.1	0.1	0.0	0.0	0.0
Mining	0.3	0.4	-0.1	0.0	0.0	0.0	0.0
Construction	-0.1	-0.2	-0.1	0.2	0.1	0.0	0.0
Manufacturing							
Nondurables	-0.1	-0.2	-0.1	0.0	0.0	0.0	0.0
Durables	-0.1	-0.3	-0.2	0.1	0.1	0.0	0.0
Transportation	0.0	-0.1	-0.1	0.0	0.0	0.0	0.0
Utilities	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Trade	0.0	-0.1	-0.1	0.1	0.0	0.0	0.0
Finance, Insurance and Real Estate	-0.1	-0.2	-0.1	0.1	0.0	0.0	0.0
Services	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0

* average annual growth

Source: ESA estimates using the Inforum LIFT model.

These impacts illustrate two general points. First, all industries—not just natural gas intensive sectors in manufacturing—are affected by higher energy prices. Although there is a small offset from the decline of the dollar, it is not enough to offset the loss of jobs because of the decline in domestic demand. Second, while higher natural gas prices slow output and employment across all industries, the economy, as a whole, and all major sectors continue to grow. In the simulation, the economy keeps growing because the decline in real income is quite limited. The impact is broad based, however, and spread throughout the economy.

The small size of the impact in the simulation indicates the improbability of a recession occurring because of a shock of this size to natural gas prices. There are two reasons for this. First, the economy's sensitivity to energy prices is somewhat less today than in the past. Second, natural gas constitutes only a portion of all U.S. energy use. Thus, the decline in real income (as a result of consumers paying more for natural gas and products that use natural gas) is very modest.

NATURAL GAS INTENSIVE GOODS PRODUCING INDUSTRIES

We also examined the impact to “natural gas intensive” industries, those that spend the highest amount for natural gas as a portion of their overall shipments. Table 5 shows the top 22 natural gas intensive industries for 2002, the latest available data. These 22 were

**Table 5. Natural Gas Intensive Industries in the U.S., 2002
Ranked By Natural Gas Costs as a Percent of Shipments**

Rank	NAICS	Industry	Natural Gas Consumption	Natural Gas Costs Portion of Value of Shipments
			Billion cubic feet	Percent
1	325311	Nitrogenous fertilizer	542.5	45.3
2	331311	Alumina refining	n.a.	13.5
3	325181	Alkalies and chlorine	94.0	12.4
4	327121	Brick and structural clay	200.0	9.5
5	327211	Flat glass	51.0	8.4
6	325182	Carbon black	30.9	8.3
7	327420	Gypsum products	n.a.	7.0
8	327213	Glass container	51.0	5.9
9	325199	All other basic organic chemical	572.0	5.3
10	327212	Other pressed and blown glass	n.a.	4.3
11	325110	Petrochemicals	203.0	4.0
12	325193	Ethyl alcohol	56.9	3.6
13	322130	Paperboard mills	183.0	3.5
14	331111	Iron and steel	406.0	3.5
15	325211	Plastics	404.0	3.0
16	327410	Lime	7.0	2.8
17	325191	Gum and wood chemicals	n.a.	2.1
18	325188	All other inorganic chemicals	75.0	2.0
19	322121	Paper (except newsprint) mills	201.0	1.9
20	322122	Newsprint mills	15.0	1.7
21	324110	Petroleum refineries	799.0	1.6
22	325192	Cyclic crude and intermediate	42.0	1.0

Source: ESA estimates using Census and EIA data.

selected out of a review of natural gas costs of 335 goods-producing (manufacturing) industries at the 6-digit NAICS (North American Industry Classification System) level.³ The natural gas intensive manufacturing industries accounted for over half of all natural gas consumed by manufacturing in 2002, less than 20 percent of all manufacturing GDP and about 2 percent of the total U.S. GDP.

³ *Impacts of Rising Natural Gas Prices on the U.S. Economy and Industries*, Economics and Statistics Administration, <https://www.esa.doc.gov/ngfr.cfm>, June 2005

Table 5 displays wide variations in natural gas intensities between industries. The nitrogenous fertilizer industry is, by far, the most dependent on natural gas than any other industry. In 2002, the cost of natural gas, both as a fuel and feedstock, accounted for about 45 percent of this industry's value of shipments. The next industry most dependent on natural gas is alumina refining where natural gas accounted for about 14 percent of the value of shipments.

Competitiveness pressures are felt most acutely in industries most dependent on natural gas inputs, either directly like nitrogenous fertilizer manufacturing, or indirectly, like motor vehicles. Motor vehicles use products that are made by industries that consume significant amounts of natural gas like products from the glass industry, aluminum products derived from the alumina industry, metal products that are derived from the iron and steel industry and so on.

Table 6 shows estimates of the change in the import share of domestic consumption of products produced by those industries that were significantly impacted by a domestic increase in the price of natural gas in the simulation period. The industries that lose the most to imports are the agricultural chemical industry, which includes nitrogenous fertilizers, and the other chemicals industry. The other chemicals industry contains seven of the top 22 natural gas intensive industries—alkalies and chlorine, carbon black, all other basic organic and inorganic chemicals, petrochemicals, ethyl alcohol, and cyclic crude and intermediate.

**Table 6. Percentage Point Change in Import Share of Domestic Consumption
With Higher Natural Gas Prices, Compared to the Baseline
Selected Goods Producing Industries***

	2006	2007	2008	2009	2010	2015	2020
Manufacturing							
Non-durables							
Agricultural fertilizers	0.2	0.5	0.8	1.0	1.0	0.9	1.0
Plastics and synthetics	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Drugs	0.0	0.0	0.1	0.1	0.1	0.1	0.2
Other chemicals	0.2	0.7	0.8	1.0	1.0	1.3	1.5
Rubber products	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Plastic products	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Durables							
Stone, clay, and glass	0.1	0.2	0.3	0.4	0.3	0.5	0.6
Primary ferrous metals	0.0	0.1	0.1	0.1	0.1	0.1	0.2
Primary nonferrous metals	0.0	0.1	0.1	0.1	0.1	0.1	0.2
Metal products	0.0	0.0	0.1	0.1	0.1	0.2	0.3
Engines and turbines	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Metalworking machinery	0.0	0.0	0.0	0.1	0.1	0.2	0.3
Special industry machinery	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Service industry machinery	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Motor vehicles	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Motor vehicle parts	0.0	0.1	0.1	0.1	0.1	0.2	0.2
Medical instruments	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Ophthalmic goods	0.0	0.1	0.1	0.2	0.2	0.3	0.3
Other instruments	0.0	0.1	0.1	0.1	0.1	0.2	0.3
Miscellaneous manufacturing	0.0	0.0	0.0	0.1	0.2	0.3	0.4

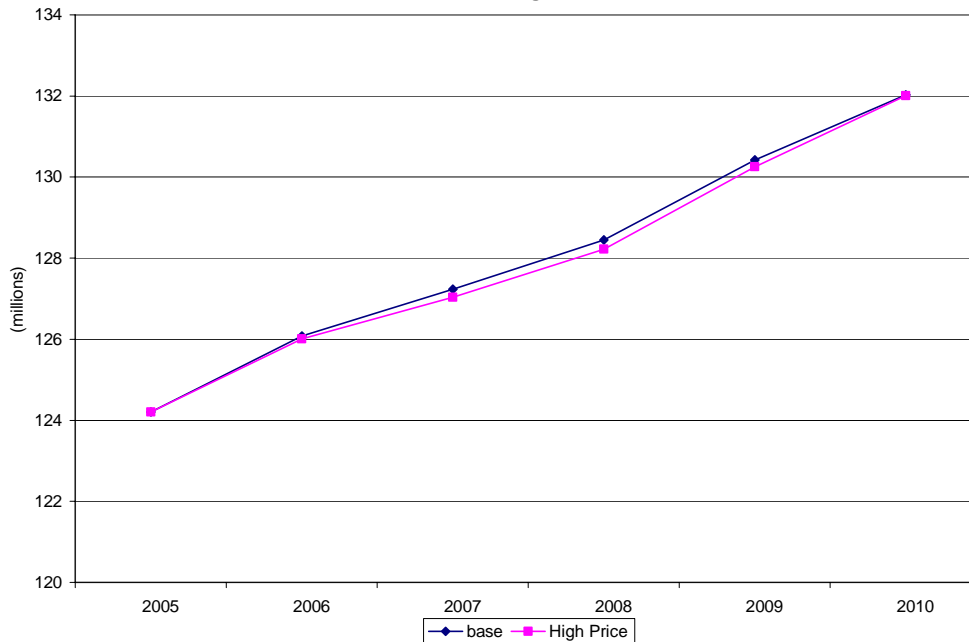
*Industries that had an import to domestic consumption change of 0.1 percentage point or greater.

Source: ESA estimates using the Inforum LIFT model.

INDUSTRIAL EMPLOYMENT (JOBS) IMPACTS

In 2006, the first year of the simulated natural gas price spike, the number of jobs added to the economy is lower by about 69,000. Thus, instead of adding 1.9 million jobs between 2005 and 2006 as is incorporated into the baseline, the higher natural gas prices imposed on the economy in this simulation reduce employment growth to 1.8 million. (See Figure 4.) In 2007, the total number of private sector jobs is 206,000 lower than in the baseline and in 2008, 229,000 jobs lower. After 2008, the difference declines, as the economy moves back to near baseline employment levels. By 2020, the number of total private sector jobs is reduced just 24,000 below the baseline.

**Figure 4. Total Private Sector Jobs,
Baseline and With Higher Natural Gas Prices**



Source: ESA estimates using Inforum LIFT model.

Table 7 shows jobs impacts by industry for 2007 and 2008, the years that had the highest job losses. Employment is affected across the economy, with the greatest number of jobs lost relative to the baseline—over three quarters of the total impact—in construction, manufacturing, and trade.

**Table 7. Employment Impact of Higher Natural Gas Prices:
Aggregate Industry Sectors, 2007 and 2008**

Sector	2007			2008		
	Impact on Employment (Relative to Baseline) Number of Jobs	Share of Jobs	Share of Total Impact	Impact on Employment (Relative to Baseline) Number of Jobs	Share of Jobs	Share of Total Impact
Agriculture,forestry,and fisheries	-6,015	-0.2%	2.9%	-8,679	-0.2%	3.8%
Mining	-1,984	-0.3%	1.0%	-2,407	-0.4%	1.1%
Construction	-50,800	-0.6%	24.7%	-59,697	-0.7%	26.1%
Manufacturing						
Non-Durables	-14,126	-0.2%	6.9%	-23,674	-0.4%	10.3%
Durables	-18,847	-0.2%	9.2%	-38,457	-0.4%	16.8%
Transportation	-4,965	-0.1%	2.4%	-7,060	-0.1%	3.1%
Utilities	507	0.0%	-0.2%	-927	0.0%	0.4%
Trade	-43,743	-0.1%	21.3%	-62,508	-0.2%	27.3%
Finance,Insurance & Real Estate	-26,510	-0.3%	12.9%	-16,793	-0.2%	7.3%
Services	-39,261	-0.1%	19.1%	-8,644	0.0%	3.8%
Total	-205,730	-0.2%	100.0%	-228,912	-0.2%	100.0%

Source: ESA estimates using the Inforum LIFT model.

Tables 8 and 9 show detailed industries that were the most affected in terms of number of jobs lost relative to the baseline and in terms of the share of that industry's baseline employment, respectively. In terms of the number of jobs, construction ranks at the top,

followed by retail and wholesale trade, and finance and insurance. The distribution of the remaining industries across the aggregate industry sectors is notable—a number of medical services industries, trucking, computer services, and even agriculture round out the industries with the largest absolute employment impacts. Three of these industries—other chemicals, metal products, and stone, clay, and glass—are in manufacturing industries that are natural gas intensive.

**Table 8. Employment Impact of Higher Natural Gas Prices:
Top 15 Industries, Ranked by Jobs Lost Relative to Baseline in 2008**

Industry	2007		2008	
	Employment Impact (Relative to Baseline)		Employment Impact (Relative to Baseline)	
	Number of Jobs	Share of Jobs In Sector	Number of Jobs	Share of Jobs In Sector
1 New construction	-50,808	-0.6%	-59,697	-0.7%
2 Retail trade	-22,095	-0.1%	-31,088	-0.2%
3 Wholesale trade	-12,872	-0.2%	-20,418	-0.3%
4 Finance & insurance	-26,253	-0.4%	-18,894	-0.3%
5 Private hospitals	-12,069	-0.3%	-13,709	-0.3%
6 Restaurants and bars	-8,770	-0.1%	-11,274	-0.1%
7 Nursing homes	-8,939	-0.4%	-10,900	-0.5%
12 Agriculture, forestry, and fisheries	-6,015	-0.2%	-8,679	-0.2%
13 Other chemicals	-4,856	-1.0%	-8,129	-1.8%
10 Metal products	-4,154	-0.3%	-7,146	-0.5%
11 Trucking	-5,072	-0.2%	-7,087	-0.2%
12 Other medical services	-6,340	-0.2%	-6,580	-0.2%
13 Stone, clay and glass	-2,406	-0.4%	-4,456	-0.8%
14 Computer and data processing services	-2,363	-0.2%	-4,381	-0.2%
15 Gas utilities	-3,863	-2.5%	-4,074	-2.7%
Top 15 Subtotal	-176,875		-216,512	
Total Jobs Lost	-205,750		-228,912	
Top 15 Industries as a Percent of Total	86.0%		94.6%	

Source: ESA estimates using the Inforum LIFT model.

Table 9 shows the top 15 detailed industries in terms of the impact as a share of total employment in that industry. Other chemicals and stone, clay and glass, and metal products appear on both lists. Otherwise, the industries with the largest percentage declines in their workforces relative to the baseline include agricultural fertilizers, and gas utilities. Twelve of the 15 industries on this list are in manufacturing.

**Table 9. Employment Impact of Higher Natural Gas Prices:
Top 15 Industries, Ranked by
Jobs Lost Relative to Baseline as a Share of Jobs in Sector in 2008**

Industry	2007		2008	
	Employment Impact (Relative to Baseline) Number of Jobs	Share of Jobs In Sector	Employment Impact (Relative to Baseline) Number of Jobs	Share of Jobs In Sector
1 Agricultural fertilizers	-483	-1.1%	-1,238	-3.0%
2 Gas utilities	-3,863	-2.5%	-4,075	-2.7%
3 Other chemicals	-4,586	-1.0%	-8,129	-1.8%
4 Non-metallic mining	-750	-0.7%	-1,052	-0.9%
5 Stone, clay & glass	-2,406	-0.4%	-4,456	-0.8%
6 Office equipment	-95	-0.3%	-276	-0.8%
7 Crude petroleum and natural gas	-2,156	-0.6%	-2,494	-0.7%
8 Construction	-50,800	-0.6%	-56,697	-0.7%
9 Primary ferrous metals	-770	-0.3%	-1,893	-0.6%
10 Furniture	-1,801	-0.4%	-2,923	-0.6%
11 Textiles	-1,473	-0.4%	-1,956	-0.6%
12 Primary nonferrous metals	-526	-0.2%	-1,449	-0.6%
13 Service industry machinery	-587	-0.3%	-1,028	-0.5%
14 Metal products	-4,254	-0.3%	-7,146	-0.5%
15 Motor vehicles	-1,278	-0.3%	-2,553	-0.5%
Top 15 Subtotal	-75,828		-97,365	
All Jobs Lost	-273,720		-287,674	
Remaining Industries	27.7%		33.8%	

Source: ESA estimates using the Inforum LIFT model.

Finally, in view of the across-the-board-industry impacts, the four states with the largest jobs losses relative to the baseline are those with the largest overall employment—California, Texas, New York and Florida, in that order. (See Table 10.) Pennsylvania, Ohio, and Illinois are practically tied for the fifth spot, in terms of number of jobs lost as a result of energy prices.

**Table 10. Employment Impact of Higher Energy Prices,
By State, 2007 and 2008**

(Deviations from Baseline Values in Thousands of Jobs)

	2007	2008
Total private employment	205.8	228.9
Alabama	3.2	3.5
Alaska	0.4	0.5
Arizona	3.4	3.5
Arkansas	2.0	2.2
California	22.6	25.2
Colorado	3.3	3.5
Connecticut	2.5	2.8
Delaware	0.6	0.6
District of Columbia	0.3	0.3
Florida	11.1	11.6
Georgia	6.2	6.7
Hawaii	0.7	0.8
Idaho	1.0	1.0
Illinois	9.1	10.3
Indiana	5.3	6.3
Iowa	2.5	2.8
Kansas	1.9	2.2
Kentucky	3.2	3.7
Louisiana	3.0	3.2
Maine	1.1	1.2
Maryland	3.3	3.4
Massachusetts	4.6	5.2
Michigan	7.4	9.0
Minnesota	4.3	4.9
Mississippi	1.9	2.1
Missouri	4.3	4.8
Montana	0.7	0.7
Nebraska	1.4	1.5
Nevada	1.6	1.8
New Hampshire	1.1	1.2
New Jersey	6.0	6.7
New Mexico	1.0	1.1
New York	11.7	13.3
North Carolina	6.5	7.2
North Dakota	0.6	0.6
Ohio	9.2	10.9
Oklahoma	2.4	2.7
Oregon	2.9	3.1
Pennsylvania	9.3	10.6
Rhode Island	0.7	0.8
South Carolina	2.8	3.1
South Dakota	0.6	0.7
Tennessee	4.8	5.5
Texas	15.9	17.4
Utah	1.6	1.7
Vermont	0.5	0.5
Virginia	4.8	5.0
Washington	4.1	4.5
West Virginia	1.2	1.3
Wisconsin	4.7	5.3
Wyoming	0.4	0.4

Source: ESA using the Inforum LIFT model.