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A Perspective on the Houston Economy

# Petrochemical Outlook Still Bleak for 2002

*Despite the decline of natural gas prices to the $2–$3 range, the outlook is for weak petrochemical profits and limited expansion in 2002.*

Economic growth along the Texas Gulf Coast is now slowing rapidly. Weak demand for oil and natural gas, both at home and abroad, has put downward pressure on oil and gas prices and taken the steam out of drilling and oil exploration activity. The domestic rig count, which rose to 1,278 in July, has fallen to near 1,000 working rigs in recent weeks and seems likely to decline further as we enter the coming year. This loss of momentum in drilling removes the single factor that has kept Houston and the Gulf Coast growing, even as the U.S. and global economies moved to the brink of recession.

This article looks at the other end of the oil industry—the downstream petrochemical and refining industries and particularly petrochemicals. The economics here are the reverse of upstream, where falling energy prices reduce exploration activity. In contrast, falling energy prices are good news downstream. They reduce the cost of feedstock and of energy used to run chemical processes and often result in higher profits and a wave of capacity expansion. Over long periods, the combination of upstream drilling and downstream chemicals and refining provides a nice balance to the Gulf Coast regional economy.

As oil and gas prices weaken, can downstream profits and related construction provide a significant boost to the regional economy? Unfortunately, the answer is no, at least not through next year. The advantages of lower feedstock costs are not enough to offset weak demand and serious overcapacity for many petrochemicals. Despite the decline of natural gas prices to the $2–$3 range, the outlook is for weak petrochemical profits and limited expansion in 2002.

## FEEDSTOCK PRICES

Last winter, some of the coldest weather of the previous 100 years put natural gas prices on a wild ride. In January, prices received by Gulf Coast gas producers briefly pushed to near $10 per million Btu (MMBtu) and remained above $5 for most of the heating season. The deregulation of natural gas in the late 1980s left a substantial oversupply of gas production capacity in the United States, and the typical price remained near $2 per MMBtu for much of the decade.

Demand for natural gas grew rapidly in the late 1990s, however, led by a strong economy, by the fuel's environmentally friendly features and especially by its use in electric power production. The winter price spike of 2000–01 was widely read by many as the end of the natural gas glut in the United States and the beginning of a new era of higher natural gas prices, needed to bring new reserves into production.

Natural gas prices, however, have steadily weakened throughout this year, and inventories have risen to the highest levels of the past decade. From May to September, natural gas was injected into storage at rates 53 percent higher than last year and 39 percent higher than 1999. Working gas in storage in October was 15.6 percent higher than last year, according to the Department of Energy. These growing inventories pushed gas prices below $4 in May, below $3 in August and briefly below $2 in October. Forecasts of another very cold winter have now pulled gas prices back near $3.

U.S. and Canadian petrochemical producers have historically relied on relatively cheap and abundant natural gas liquids as an important competitive advantage over the rest of the world. Outside North America, petrochemicals are typically produced from naphtha, a light distillate found in oil. Naphtha's price is set in world oil markets. For much of the 1990s, the price advantage between natural gas liquids (with prices highly correlated to natural gas) and naphtha (correlated to oil) fell squarely in favor of natural gas. The typical price ratio in the 1990s was 10:1 (for example, $20 per barrel for oil and $2 per MMBtu for gas), yielding substantially more raw material per dollar from gas.

The run-up in natural gas prices last winter seemed to threaten the existing competitive balance between U.S. producers and the rest of the world. A U.S. location brings many advantages beyond price: access to the world's largest market, political stability, a highly developed pipeline system, and cheap, plentiful storage capacity in salt caverns. However, assuming that world oil markets were to remain in their historical range of $17–$22, a natural gas price of $3–$4 would provide rough parity between natural gas and naphtha for the production of ethylene, for example, and take away any U.S. feedstock cost advantage based on natural gas.

How much have Gulf Coast chemical producers benefited from the recent fall in natural gas prices? Table 1 shows the cost of producing ethylene, the key chemical building block on the Gulf Coast, from either natural gas-based ethane or light naphtha. As the price of natural gas fell from near $5 in May to near $2 in September, the cost advantage returned to ethane by July. However, the combination of an October rise in gas prices to $3 (following a forecast of cold winter weather) and a decrease in crude oil prices from $30 per barrel to $20 (as prospects for economic growth dimmed after the Sept. 11 attacks) pushed the advantage back to the oil side. Somewhat surprisingly, despite the long slide in natural gas prices, ethane is again at a cost disadvantage relative to naphtha. It is not the price of natural gas but the price of gas relative to oil that counts.

Does the inventory buildup over the summer indicate that the overhang in gas production capacity has returned? Is the gas bubble back? All the data are not in, but what are available indicate that most of the gas that went into storage this summer was the result of a weak economy, not a surge in supplies from new gas reserves. It seems likely this current gas glut can be cured with a rebound in U.S. economic growth, presumably in a matter of months and not the years that were needed to work off the gas surplus of the 1990s.

## OVERCAPACITY

Current high levels of overcapacity in the U.S. petrochemical industry are the product of

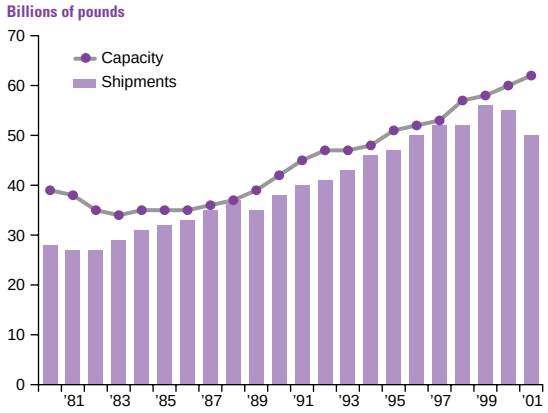
***Table 1***
**Ethylene Production Costs Based on Two Feedstocks, 2001**
**(Cents per pound)**

| | Ethane | Naphtha |
|---|---|---|
| May | 19.5 | 17.8 |
| June | 16.6 | 16.3 |
| July | 15.2 | 15.7 |
| August | 15.0 | 17.4 |
| September | 14.1 | 17.2 |
| October | 13.4 | 12.2 |

SOURCE: CMAI, Inc.

*Figure 1*

**U.S. Ethylene Capacity, 1980–2001**




SOURCE: CMAI, Inc.

two factors: the quantity of chemicals shipped is shrinking along with the U.S. industrial sector, and new capacity is coming online. Keeping our ethylene example, Figure 1 shows long-term trends in both ethylene capacity and the quantity of ethylene sold to customers each year. U.S. ethylene shipments peaked at 56 billion pounds in 1999, after averaging annual growth rates of 4.8 percent during 1990–99. Ethylene capacity in 1999 was in balance at 58 billion pounds.

In 2000, U.S. ethylene markets shrank by 1.5 percent, to 55 billion pounds, and in 2001 they may shrink by nearly 10 percent, to 50 billion pounds. Meanwhile, ethylene capacity is growing in the United States, the product of a number of projects announced in the late 1990s and only now coming onstream. By the end of this year, capacity will reach 62 billion pounds, leaving nearly 20 percent of U.S. capacity idle.

The immediate effect of this overcapacity has been to drive profit margins to very low levels. As Table 1 indicates, the cost of producing ethylene fell by nearly one-third between May and October as the cost of natural gas came down. However, the glut of capacity meant that producers were unable to hold on to any of the increased profit margins because ethylene's price fell as quickly as the cost of production.

Restoring balance between capacity and the quantity of ethylene demanded will not come easily or quickly. Perhaps the most certain element in filling the gap is the recovery of the U.S. economy, although the timing and pace of recovery are still unknown. Although the events of Sept. 11 have clouded our crystal balls, we still have every reason to expect solid U.S. economic growth to resume next year.

The last comparable glut of ethylene overcapacity came in the early 1980s (*see Figure 1*), and it was in large part managed by the closure of a number of older, inefficient facilities. In fact, it was 1989 before capacity returned to the 1980 preclosure levels. Closures are also likely to play a significant role in eliminating excess capacity this time.

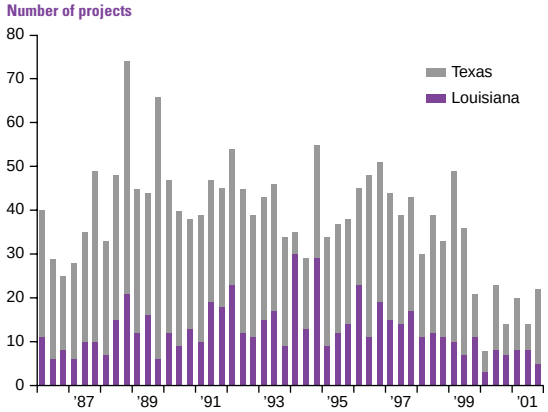
Poor profits will make routine maintenance decisions difficult for older and inefficient plants. In the Houston–Galveston and Beaumont–Port Arthur areas, plant closures are likely to be accelerated by the recent adoption of a state implementation plan to comply with air quality standards for ozone by 2007. Although the plan still lacks final Environmental Protection Agency approval, its goal is to reduce plant emissions of nitrogen oxides (NOX) by 90 percent except in grandfathered plants built before 1971, where the targeted emission reduction is 50 percent. Credits for NOX reductions can be earned through the shutdown of older, less efficient plants and then applied to other facilities to reduce the cost of their NOX compliance. With some companies facing bills well in excess of $100 million to bring their southeast Texas plants into compliance, hard decisions are likely to be made and plants closed.

Finally, the current pace of expansion of new facilities is running at a very low level. Figure 2 shows the number of new hydrocarbon processing projects announced in Texas and Louisiana from 1986 through the present. Since 1997–98, the number of projects has

*(Continued on back page)*

*Figure 2*

**New Hydrocarbon Project Announcements in Texas and Louisiana, 1986–2001**




SOURCE: *Hydrocarbon Processing*, February, June and October issues of each year.

The Houston economy continues to slow. Over the past six months, job growth has fallen to a 1.5 percent annual rate. Since July the Baker Hughes rig count has dropped by nearly 300 working rigs, clearly demonstrating that the drilling boom is over. The Houston Purchasing Managers Index, which has lost 10 points in the last three months, indicates that local mining and manufacturing are shrinking for the first time in two years.

### RETAIL AND AUTO SALES

Department stores report that they are steadily falling behind plan and that sales are running 4 to 5 percent below expectations. Furniture stores also saw sales soften in October as the effects of Tropical Storm Allison began to fade. Food stores report a surge in sales because consumers are eating out less and eating in more. October auto sales set a record, thanks to zero percent financing and other consumer incentives. Year-to-date sales are now equal to last year's record pace.

### ENERGY PRICES

Crude oil prices moved in a narrow range near $21–$22 throughout October. Price movements were primarily in response to speculation about OPEC production cuts. Markets have also become sensitive to economic news since Sept. 11, with fears that a global recession will bring a collapse in oil demand. Crude, gasoline and distillate inventories all rose during October. Jet fuel demand fell 15 percent below year-earlier levels. It now seems to have stabilized and may even have been turning around in late October.

As a result of weak demand and high inventories, the price of natural gas slipped briefly under $2 per MMBtu in late September. The price bounced sharply to over $3 after a long-range forecast of a very cold winter, then fell back as weather turned unseasonably warm across the country.

### REFINING AND PETROCHEMICALS

Refiners increased output as the fall turnaround season passed. Profit margins fell slightly in October from September's moderate levels. By late October, crude prices had stabilized and product prices were continuing to fall, putting more downward pressure on margins. Petrochemical producers saw little change in their situation. A combination of weak demand and a large overhang of capacity kept profits depressed. Lower natural gas prices reduced costs, but overcapacity meant the cost savings were simply passed on to customers.

### DRILLING AND OIL SERVICES

Conditions continue to weaken in the oil service industry. The number of rigs working in the United States slid to near 1,000 by early November, and prices for oil services have come under pressure. Day rates for rigs working shallow gulf waters have collapsed. Work in deeper waters, as well as foreign drilling activity, continues at a healthy pace, helping maintain oil service company revenues. These companies are delaying layoffs in hope that a quick rebound in the U.S. economy will revive natural gas demand and boost gas prices.

## Petrochemical Outlook *(Continued)*

trended steadily downward to its current low level. For ethylene, only three recent expansion announcements are in the works, with none coming online after 2004.

This low level of petrochemical and other downstream construction leaves a significant void in the Texas Gulf Coast's economic outlook. Downstream petrochemical plants are normally a dominant feature of the region's heavy construction. The bleak near-term outlook for petrochemical construction in 2002 is simply one more reflection of the industry's current poor profitability and cash flows, with few prospects for a near-term turnaround.

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