Production Presses U.S. Petrochemicals Capacity

Nationally, growth in the production of chemicals and allied products continues to outpace that of total manufacturing (see Chart 1). An important component of that growth, petrochemicals production, has risen 15 percent since 1982. Strong domestic consumption—spurred by an expanding economy and the continued substitution of plastics and synthetics—has been a major help for the petrochemicals industry. Petrochemicals exports also are rising, propelled by the dollar’s decline over the past three years. Moreover, lower oil and natural gas prices have reduced raw material and production costs.

This industry growth is good news for Louisiana and Texas, which account for most of U.S. basic petrochemicals production. But the benefits are not limited to this area. Increased exports of chemicals are contributing to reducing the U.S. trade deficit. And the substitution of less-expensive plastics and synthetics has lowered the prices of some goods.

Continued expansion of the U.S. petrochemicals industry will require new investment, however. With the output of some basic petrochemicals already at full capacity and shortages reported, a major decision now facing many domestic producers of basic petrochemicals is whether market conditions justify expanding capacity.

Demand for Basic Petrochemicals

Intermediate and finished-good products are made from basic (or building-block) petrochemicals, such as ethylene, propylene, butadiene, and benzene. Demand for these, therefore, is derived from the demand for downstream products. The growth in demand for U.S.-produced petrochemicals has three principal sources—a strongly expanding national economy, the continued substitution of plastics and synthetics for other materials, and the devaluation of the dollar.

This substitution is important to growth in petrochemicals consumption. Technological innovation has introduced lower-priced petrochemical substitutes for wood, metal, and fiber products. At the same time, the depletion of natural resources has made some of these natural commodities more expensive. Nearly a third of all plastics are used in packaging and more than a fifth are used in building and construction. Other uses are expanding rapidly in a broad number of consumer and industrial products.

A sixth of U.S. shipments of petrochemicals are sold overseas. Although basic petrochemicals ordinarily are not exported, their downstream derivatives—intermediate and end-use products—are sold abroad. Exports of petrochemicals, like other domestically produced goods and services, are influenced by the value of the U.S. dollar. In the late 1970s, net exports of petrochemicals grew rapidly as the dollar declined in value (see Chart 2). But in the early 1980s, the surplus narrowed considerably as the dollar appreciated 64 percent from 1980 to 1985 and net exports slipped. With the dollar’s recent fall, U.S. exports of petrochemicals have been rising, while the growth of imports has slowed considerably (see Chart 3). The decline in the dollar should stimulate exports of petrochemicals for some time.

Changes in Domestic Production and Foreign Supply

While demand for U.S. petrochemicals products has been rising, production costs have been falling. Though lower oil and natural gas prices have meant reduced raw material and production costs, that is just one part of the story. Producers have taken active steps to reduce costs and improve efficiency.

During the 1970s, steep price rises for crude oil and natural gas added immensely to production and raw material costs. Chemical companies invested heavily in new technology to reduce costs as well as to comply with increasingly stringent environmental regulations. Advanced instrumentation and automatic controls have allowed higher utilization of feedstocks, and energy conservation measures have reduced processing costs. In 1978, producing a pound of ethylene typically consumed 14,400 British thermal units (Btu). By 1986, however, that figure had been reduced by 44 percent to 8,100

NOTICE TO OUR READERS

This is the final issue of Energy Highlights. The Federal Reserve Bank of Dallas will continue to report on energy developments in The Southwest Economy, a new publication about which you will soon be hearing more.
Chart 1
U.S. FACTOR OUTPUT
240 (INDEX, 1970 = 100)

CHEMICALS AND
ALLIED PRODUCTS

TOTAL MANUFACTURING

80 120 160 200 240

'70 '72 '74 '76 '78 '80 '82 '84 '86 '88

SOURCE: Board of Governors, Federal Reserve System.

Chart 2
PETROCHEMICALS EXPORTS
AND THE DOLLAR
160 (INDEX, 1987 = 100)

TRADE-WEIGHTED VALUE
OF THE DOLLAR

NET PETROCHEMICALS
EXPORTS

0 40 80 120


SOURCES: Board of Governors, Federal Reserve System.
U.S. Department of Commerce.

Chart 3
U.S. PETROCHEMICALS TRADE
16 BILLION DOLLARS

EXPORTS

IMPORTS

0 4 8 12


SOURCE: U.S. Department of Commerce.

Chart 4
TEXAS EMPLOYMENT IN
CHEMICALS AND ALLIED PRODUCTS
88 THOUSAND WORKERS

1986 1987 1988


U.S. SEISMIC CREW COUNT
375 CREWS

(SEASONALLY ADJUSTED)

75 150 225 300

1986 1987 1988

Federal Reserve Bank of Dallas.

WELL PERMIT APPLICATIONS
2,400 APPLICATIONS

(T SEASONALLY ADJUSTED)

TEXAS

OKLAHOMA

LOUISIANA

0 600 1,200 1,800

1986 1987 1988

Oklahoma Corporation Commission.
Texas Railroad Commission.
Federal Reserve Bank of Dallas.
ENERGY BRIEFS

- Despite growing world consumption of oil, prices remain below OPEC target levels. The continued slippage of oil prices during the first quarter of the year can be attributed to high levels of production. OPEC overshot its production targets by more than two million barrels a day during the first quarter of 1988. In addition, February non-OPEC free-world oil production reached a two-year high of more than 23 million barrels a day. This high level was supported by big output gains in Canada, North Yemen, and the North Sea.

- Though generally falling since January, spot oil prices have been volatile. In March, the average price of a barrel of West Texas Intermediate crude (WTI) was $15.68—7 percent less than February's average price. However, conflict in Panama—a transshipment point for Alaskan crude oil destined for the East Coast—and reports that OPEC was attempting to restrain production added strength to oil prices over the course of the month, and March ended with WTI at $17.10 a barrel.

- Despite lower oil prices, U.S. and Texas rig counts both posted seasonally adjusted gains of more than 10 percent in March. The gain ended a six-month slide in the seasonally adjusted Texas count. Slight increases in the U.S. seismic crew count during the first two months of the year presaged the gains in the U.S. rig count.

- Although the Texas rig count fell by more than 16 percent from its September peak to February, employment in energy extraction declined by less than 3 percent from its more recent peak in October. Historically, extraction employment has reacted more slowly and less dramatically to oil price movements than has the rig count.

- The volatile Texas refining industry showed more than a 5-percent gain in production from September to February but only slight changes in employment. The increased production in Texas and in the nation reflects the growing U.S. consumption of petroleum products.

**SELECTED CRUDE OIL PRICES**

**35 DOLLARS PER BARREL**

**WEST TEXAS INTERMEDIATE SPOT PRICE**

**U.S. REFINER ACQUISITION COST FOR DOMESTIC OIL**

**TEXAS ENERGY EMPLOYMENT**

**105 (1984 = 100)**

**PETROLEUM REFINING**

**OIL AND GAS EXTRACTION**

**OIL FIELD MACHINERY**

**SOURCES:**
- I. P. Sharp Associates.
- U.S. Department of Energy.
- Federal Reserve Bank of Dallas.

**SOURCES:**
- American Petroleum Institute.
- Board of Governors, Federal Reserve System.
- U.S. Department of Energy.
- Federal Reserve Bank of Dallas.
Btu. Moreover, improved technology has reduced labor needs. In Texas, for example, nearly 15 percent fewer chemical workers were on the job in 1987 than in early 1982 (see Chart 4). But the value of petrochemicals shipments from plants in Texas during 1987 was up 15 percent over those for 1982—even after adjusting for inflation.

The high oil and natural gas costs in the 1970s also invited foreign competition. Petrochemical plants designed with the latest technology and fueled by the lowest-cost feedstocks in the world were built in the Middle East where natural gas had a near-zero price. Many thought that U.S. production of basic petrochemicals would fade as these new, low-cost producers sought to expand their markets. That now appears unlikely. Lower oil and natural gas prices have reduced Middle East production cost advantages. The United States also holds a considerable technological edge in downstream processing over competing European countries, while Middle East production of basic petrochemicals is too far from this country to compete for U.S. delivery of basic petrochemicals.

The chemicals and allied products industry is the largest manufacturing activity in Louisiana and Texas—constituting 17 percent of all factory output in Louisiana and 13 percent in Texas. And for both states, petrochemicals are the largest segment of the industry—accounting for 50 percent of value-added goods in Louisiana and 60 percent in Texas. Together, the two states account for more than 80 percent of the total U.S. production of basic petrochemicals from which downstream intermediate and finished goods are derived.

**Outlook for Petrochemicals**

The expansion of U.S. production of petrochemicals has shown no signs of abating. Industry estimates suggest that the inflation-adjusted value of total shipments will expand by 2.5 percent this year. Growing demand for U.S. petrochemicals products and reduced production costs suggest healthy growth into the 1990s. At the same time, however, the U.S. petrochemicals industry is pressing against its current capacity to produce ethylene and propylene. Without additional capacity to produce these basic petrochemicals, growth of the domestic industry will be stymied. The decision now facing many domestic producers of basic petrochemicals is whether or not to expand capacity to meet growing demand. This brief review of market conditions suggests they will.

—Edward L. McClelland
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