Refiners Responding to Changing Conditions

The U.S. refining industry is undergoing fundamental restructuring. The OPEC-induced oil price increases led to an overall decline in demand for petroleum products. High oil prices also promoted production of crudes that were uneconomical to produce because of their poor quality. The refining industry is responding to falling product demand and changing crude inputs by closing inefficient refineries and investing in new refining processes. Because of their large size and modern capital stock, Texas Gulf Coast refineries have an advantage over other U.S. refineries in adjusting to changing conditions.

Changes in Product Demand and Crude Supply

The decline in demand for petroleum products is the result of two factors. First, price increases promoted substitution of coal and natural gas for petroleum. Substitution played a significant role in reducing consumption of petroleum products from an average of 18.5 million barrels per day in 1979 to 17 million barrels per day in 1984. (See Chart 1.) Petroleum use as a share of total energy consumed dropped 50 percent for utilities, 30 percent in the residential and commercial sectors, and 5 percent for industrial uses.

Second, refineries face competition from imports of petroleum products. While imports of crude oil have fallen 51 percent since 1979, imports of refined products have risen slightly. (See Chart 2.) Refined products are increasing as a share of petroleum imports. In 1979, refined products were 20 percent of all imported petroleum, but by early 1984 they had increased to 30 percent. Foreign competition will intensify as other countries build more refineries for product export.

The oil price increases have also led to significant gains in production of poor-quality crudes. These crudes are considered to be of poor quality because they are heavy, meaning viscous, and typically contain a high concentration of contaminants. The higher costs of extracting poor-quality crudes made them uneconomical to produce when oil prices were low. The effect of higher prices is evidenced by the 23-percent increase in U.S. heavy crude production since 1978.

Refining poor-quality crudes requires special treatment, referred to as upgrading, to obtain products of acceptable quality. Most refineries did not have adequate upgrading capacity to process greater quantities of such crudes. (Continued on back page)

Texas Refiners Face Growing West Coast Surplus

Texas refiners already have greater than average capacity for processing poor-quality crude oil but will need to add to their upgrading capacity to handle the recent discoveries made in California. Already, the surplus of production over consumption on the West Coast is 800,000 barrels per day. Much of this is transported to the Gulf Coast for refining. The surplus will increase to 1.2 million barrels per day when production of crude from these new discoveries begins in the late 1980s. (See Chart 4.)

Refining these newly discovered crudes will present a special problem because of their exceptionally heavy weight and high concentration of contaminants. Generally, California refineries use a blend of Alaskan and California crudes to balance different weights and contaminants. Refining significant amounts of offshore crude would upset the balance and exceed the capacity for handling poor-quality crudes. Construction of additional upgrading facilities at California refineries is not feasible because of the high costs of meeting the state's stringent air quality regulations.

Refining of the new crudes is expected to occur at Gulf Coast refineries. Although there is currently some excess capacity in heavy crude processing facilities at Gulf Coast refineries, capacity is not sufficient to handle the significant increases in California heavy production. Additional investment in upgrading processes will be required to refine these crudes into desired products.

—Roger H. Dunstan
—Gary M. Ziegler
Chart 1
U.S. PETROLEUM PRODUCT CONSUMPTION


Chart 2
U.S. CRUDE AND PETROLEUM PRODUCT IMPORTS


Chart 3
REFINERY CAPACITY UTILIZATION RATES


Chart 4
PROJECTED WEST COAST OIL SURPLUS

SOURCE: Federal Reserve Bank of Dallas.

SEISMIC CREW COUNT


WELL PERMIT APPLICATIONS

ENERGY BRIEFS

A moderate recovery in the U.S. oil and gas industry has been sustained by stable oil prices, but the industry’s gains could be reversed if OPEC production continues to exceed quotas.

- Stable oil prices and lower drilling costs have buoyed the U.S. rig count. On a seasonally adjusted basis, the count increased in June for the second consecutive month and was 18 percent higher than the June 1983 level.
- Leading indicators of drilling activity—the seismic crew count and well permits—turned up in May. The number of crews operating was 9 percent higher than in the same month last year and reached its second highest level since late 1982.
- Recent increases in drilling activity have halted employment declines in the oil field machinery sector. Although drilling activity is still far below the levels of late 1981 and early 1982, its upturn has boosted equipment demand. If the upturn in drilling continues, there may be some modest employment gains in the oil field machinery sector.
- Drilling activity in the Gulf of Mexico continues to be a source of strength for the oil and gas industry. Mobile rigs working in the Gulf in May totaled 201, the highest number ever.
- Spot market prices for oil have declined slightly. Some crude prices have dropped 50 cents per barrel since May. The decline can be attributed to OPEC production exceeding its ceiling and to slower growth in world oil demand. After growing 3 percent during the first half of the year, demand for oil by industrialized countries is slowing and is expected to increase only 1 percent in the third quarter. Most OPEC members were producing above their quotas during the second quarter, but analysts believe OPEC will take some form of action to maintain the current price structure.
- Crude prices have declined despite continuing hostilities between Iran and Iraq. Excess capacity of world oil producers and growing doubt that the hostilities will result in a major supply disruption have prevented price increases.

CRUDE OIL PRODUCTION AND NATURAL GAS EXTRACTION
(Seasonally Adjusted)

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<th>Oil</th>
<th>Percent change from previous quarter</th>
<th>Daily average 1984-85</th>
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<td></td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
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<tr>
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<tr>
<td>United States</td>
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1. Louisiana, New Mexico, Oklahoma and Texas.
2. Preliminary figures.


REFINERY PRODUCTION
(Seasonally Adjusted)

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<tr>
<th>150 (1967 = 100)</th>
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Texas:

<table>
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<th>100</th>
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<td>2001</td>
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Sources: Board of Governors, Federal Reserve System, Federal Reserve Bank of Dallas.

TEXAS ENERGY EMPLOYMENT
(Seasonally Adjusted)

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<th>200 (1979 = 100)</th>
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Refiners (cont.)

Crudes. As a result, prices of poor-quality crudes were discounted significantly providing refiners an incentive to increase their upgrading capacity. Upgrading processes, as a share of refinery capacity, have increased 19 percent since 1979.

Refinery Closings

Declining demand and increasing foreign competition have led to the closing of some refineries. In 1981 the United States had 303 refineries, capable of processing 18.5 million barrels of crude oil per day. U.S. refining capacity had declined 14 percent by 1984, with 83 units closing. Texas mirrored the nation’s trend, shutting down 16 units and reducing capacity 16 percent.

The majority of closures have involved small refineries. Because refining is a declining-cost industry, small refineries have higher unit operating costs than larger refineries. Refineries shut down since 1981 had capacities averaging only 31,600 barrels of crude per day. This is much smaller than the capacity of the average U.S. refinery, which is 72,000 barrels per day.

More closures are expected, even though U.S. product demand is forecast to increase this year. The refinery utilization rate is still low, currently about 75 percent, despite recent closures. Although this is above the 1981 and early-1982 rates, utilization is still below the 90-percent level maintained in 1978. (See Chart 3.) Excess capacity may be exacerbated by the competition from foreign imports.

Outlook for Texas

Texas Gulf Coast refineries are in a better position to survive than refineries in the rest of the nation. The average capacity of Texas Gulf Coast refineries, is over twice the capacity of the average U.S. refinery. Because refining is a declining-cost industry, the large Gulf Coast refineries have significantly lower unit operating costs. Another advantage of large capacity is it enables the blending of different quality crudes. By blending a premium crude with a poor-quality crude, some of the refining problems posed by viscosity and contaminants can be eliminated.

Gulf Coast refineries are also well equipped with upgrading facilities. Although they have 17 percent of the nation’s total capacity, they have 21 percent of the country’s heavy crude processing capability. Gulf Coast refineries are working to maintain their advantage in handling the increasing production of poor-quality crudes. A majority of the nation’s new upgrading facilities announced within the past several years are being installed in Gulf Coast refineries.

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