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**COVER** The combined red and blue beams from the two-color laser geodimeter travel across the south moat of the Long Valley caldera (California) during measurements of geodetic baselines established to monitor crustal deformation. The city of Mammoth Lakes lies in the foreground with the Ritter Range of the Sierra Nevada forming the skyline. See page 213. [Peter Bozek, U.S. Geological Survey, Menlo Park, CA 94025]

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## Trends in the Use of Oil

A drop in the price of oil was predictable, and many companies last year adjusted their policies accordingly. However, the full extent of the decrease was not widely foreseen. A situation in which crude oil brings less than \$15 a barrel could lead to important sequelae provided that the dip endures for a few years. Already, significant effects have been noted in the oil-producing regions of the United States.

The first huge jump in the price of oil in 1973–1974 (a quadrupling) had little immediate effect on decreasing consumption. In part because of price controls during the following 4 years, imports into the United States increased substantially. But the further tripling of the price in 1978–1979 expedited a worldwide response. Energy was conserved. More efficient equipment and processes were employed. Other energy sources were substituted for oil. Exploration for oil in hostile environments where costs were high was encouraged and was profitable in view of the artificially high price umbrella provided by OPEC.

From 1978–1984, total world oil consumption dropped 4.3 million barrels per day (mbd). Oil production by non-OPEC countries increased 6.7 mbd. Production by OPEC countries dropped 11.9 mbd. Non-oil energy use increased the equivalent of 16 mbd. In 1984, OPEC held only 31.5% of the world oil market, down from a peak of 47.8%. The OPEC share of the world energy market was 12.5%, down from 22.4%.

In the short term, demand for oil is inelastic, and there is little that OPEC can do to quickly increase its share of the oil market. Prices of competing natural gas and coal are already trending lower. Use of oil products in transportation will respond only slightly to the lower cost. People who have installed insulation will not rip it out. Some of the demand for oil has been irreversibly lost. For example, France was at one time highly dependent on oil for generation of its electricity. Now more than 60% of its power is supplied by nuclear energy. The goal is 80%, with most of the remainder to be hydropower. Worldwide in 1985, 45 nuclear power plants began commercial operation. There are now 361 nuclear power plants operating in 26 countries. During 1985, operating nuclear capacity rose 20.7% to 249 gigawatt electric. This total is the oil equivalent of about 6 mbd.

If the world price of oil remains in the range of \$15 or less a barrel, OPEC is very likely to gradually increase its market share. This is particularly true in the United States. Geophysical exploration for oil has been curtailed, stripper wells are being closed off, and the use of oil in the generation of electricity has begun to increase.

During the last few months, practically all the major U.S. oil companies have announced cuts of as much as 50% in their exploration and development budgets. Drilling had already dropped greatly in expectation of a weakness in the price of oil, and a further decrease in drilling is now occurring. At present, the number of rigs active is only about a fourth the number in 1981. Correspondingly, many earth scientists have been fired. University enrollments in geology and geophysics are down sharply in the oil-producing states. In the contiguous 48 states, most of the easily available oil has been produced. In 1984, 453,000 stripper wells that produced 10 bd or less accounted for 15% of U.S. production. About half of that oil cost \$10 or more a barrel to produce. Depending on the level of oil prices during the next year, many wells will be abandoned and plugged.

In 1979, when the price of oil tripled, electric utilities burning it made great efforts to use cheaper sources of electricity. As a result, a large fraction of the oil-fired plants were idled, and the use of oil for electricity dropped from 1.74 mbd in 1978 to 0.46 mbd in 1984. But that trend is being reversed. Already there have been announcements of increased use of oil. This will not amount to much in the short term, but over a decade could become a substantial factor in the renaissance of OPEC. Growth in demand for electricity is likely to outstrip new construction of non-oil plants. Approximately 80 gigawatt electric of oil-fired plants are now idle. If these were employed, they would consume about 2 mbd.

The course of events during the next decade will depend largely on the price level for oil during the next year or two. If prices hover around \$10 per barrel, production in the United States will drop substantially and imports will climb. At \$20 per barrel, adverse effects would be minimal.—PHILIP H. ABELSON