25 September 1970, Volume 169, Number 3952 **SCIENCE**

Scarcity of Energy

The United States is now faced with serious short-term and long-term problems in satisfying its needs for energy. In the short-term, there is a scarcity of fuels that meet antipollution regulations; in the long-term, we are faced with depletion of our petroleum and natural gas reserves.

The major air pollutant from stationary sources, SO_2, comes largely from thermal electric power plants. About 57 percent of the fuel for such plants is coal that typically contains 2 to 3 percent sulfur. To diminish air pollution, a number of cities, including New York, have adopted regulations that require in effect that fuels have no more than 1 percent sulfur. The result has been a curtailment of the use of coal in such cities, for only limited amounts of coal with 1 percent sulfur or less are available.

In an effort to comply with the regulations, many utilities have switched to fuel oil. This year the demand for residual fuel oil has already risen sharply but supplies have not increased correspondingly. The United States makes little residual fuel oil. More than 90 percent of the needs of northeastern United States are derived from foreign sources. Most comes from Venezuela, which produces high-sulfur oils that must be specially treated. Although new refining units have recently been installed, their capacity is not sufficient to meet demands. Another source is the low-sulfur oils of Africa, but their availability is limited by production cutbacks in Libya and by a worldwide shortage of tankers created partly by these cutbacks and partly by Syria's refusal to permit reopening of the Trans-Arabian pipeline. As a consequence of these developments, the cost of residual fuel oil in New York has already increased by more than 50 percent.

Faced with a shortage of oil, some utilities have attempted to turn to natural gas as an alternative. They have found that large supplies of this fuel are not available. Many gas companies are fearful about their ability to supply all the needs of their present customers this winter.

Somehow we will muddle through this present shortage—if necessary, by relaxing somewhat the antipollution regulations. However, the long-term energy problem will require more substantive actions. Not only is the United States depleting its reserves of petroleum and natural gas, but it is not moving decisively to fill the gap. About 74 percent of our total energy requirements are met by oil and natural gas. Importing our total supply of these products would at present cost us about $20 billion a year. We cannot afford such an adverse contribution to the balance of payments. Nor can we permit ourselves to become subject to economic or political blackmail.

Some intermediate-term relief could be obtained by granting higher prices to gas producers and by opening additional areas of the continental shelf. However, there is little visible evidence that higher prices could bring out substantial amounts of either oil or gas, and additional drilling of the continental shelves would increase our environmental problems.

The longer-term solutions to our energy problems involve becoming more prudent in the use of energy. The solutions also demand the skillful employment of coal and atomic energy. In principle, all our energy needs could be met for a long time with coal. This raw material could be processed to yield sulfur-free fuel, liquid hydrocarbons, and methane. In practice, however, the development of the use of coal is limping along and is underfinanced. A few hundred million dollars a year devoted to research, development, and demonstration plants could be the most valuable expenditure the government could make.—PHILIP H. ABELSON