19 December 1980, Volume 210, Number 4476 **SCIENCE**

World Energy in Transition

The geopolitics of oil will be a very troublesome factor in global relationships during the next two decades. That is the message of a report issued on 20 November by the Senate Committee on Energy and Natural Resources, chaired by Senator Henry Jackson.* The document is the product of a yearlong study that included 15 hearings on the worldwide political, social, military, and economic problems that will contribute in major ways to determining the price and availability of oil through the rest of the century.

In a foreword to the report, Senator Jackson said, "[S]ociety in the 20th century has developed around easy-to-use, cheap oil, and most of our major institutions, including our military, are heavily dependent upon this particular form of energy. Oil is the lifeblood of the modern world. Without oil no modern economy can presently exist. . . . [T]he basic reason why the government must be concerned about access to oil is because of the threat to our national security and to world peace of oil supply disruptions and political manipulation of the consuming nations' access to oil."

For most of the world the era of cheap and secure oil supplies has ended. Every thoughtful person knew that eventually petroleum must become scarce. But what few people foresaw was how rapidly prices would increase or how many contingencies could arise leading to interruptions of supplies. A few years ago, it was commonly argued that world reserves were sufficient for 30 years and hence it was not necessary to move urgently toward greater energy efficiency or development of alternatives to oil. This seemed particularly true for the United States, where domestic sources supply about 83 percent of total energy consumption and more than half of petroleum requirements. Were the United States to assemble an emergency reserve of oil, it could place itself in a fairly good position to endure a yearlong interruption. Moreover, deregulation of domestic oil and natural gas is leading to greater energy efficiency, enhanced discoveries of natural gas, more tertiary recovery of oil, substitution of coal for oil and natural gas, and conversion of residual oil to more useful products. The United States is on its way toward energy independence. But what of Western Europe, Japan, and the Third World, which are more heavily dependent on imported oil? During the next decades their economies, political stability, and international policies will be subject to drastic upheavals by forces not under their own control. They will be candidates for manipulation by the petroleum exporting countries and, what is even more menacing, by the Soviet Union. Control of energy supplies by the U.S.S.R. could lead to a Russian bid for control of the Eurasian landmass.

During last summer and autumn, I met with leaders of science and technology in France, West Germany, and Japan. In all those countries I sensed an attitude of desperation. West Germany has been importing about 50 percent of its energy supplies, France about 73 percent, and Japan about 90 percent. Virtually all the oil these countries use is imported. Especially in France and Japan I encountered a steely determination to do whatever seemed necessary to move toward energy independence. The most impressive example was the Japanese actions with respect to nuclear energy. That country has had terrifying experiences with nuclear explosions. It has also endured enormously destructive earthquakes. Extrapolating from long historical records, the Japanese know that in the future they will be subject to more earthquakes and that no place on their main island is quake-free. Despite these circumstances, Japan is building and operating power reactors and in a few years will be second in the world in terms of installed nuclear power capacity. Already the Japanese are replacing oil in other applications by natural gas and coal.

The world will never be risk-free. But it will be safer when it becomes less dependent on oil from the Persian Gulf. The United States can do its part by developing alternative energy sources, lessening its imports of oil, and making more of its coal available for export.—PHILIP H. ABELSON

*"The Geopolitics of Oil" (Government Printing Office, Washington, D.C., 1980). The Executive Summary is reprinted in this issue; see p. 1324.