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# World Supplies of Natural Gas

Once regarded as a nuisance, natural gas is emerging as an important substitute for oil. During the past 10 years, proved reserves of natural gas have doubled, whereas those of petroleum have not grown. Worldwide, natural gas with a total energy content approaching that of oil has been found in about 50 countries, and as the search continues, world reserves of gas will probably surpass those of petroleum. Already some less-developed countries (LDC's) such as Thailand, once totally dependent on imported hydrocarbons, are using local natural gas. The pace at which petroleum will be displaced in developing countries will depend on arrangements for technical, financial, and managerial assistance. Such arrangements are not easy to achieve. Most LDC's are overburdened with debt, and their currencies are usually not freely convertible.

There are three major reasons for speculating that much more natural gas will be found. First, some petroleum companies that for decades were interested only in discovering oil are now more willing to look for gas. Second, geophysical prospecting methods continue to improve. The third reason relates to geochemistry. Natural gas is created and can survive in circumstances where oil either cannot be formed or is unstable. For example, source rocks for petroleum must contain what was originally lipid-rich organic matter. Natural gas can be derived from all kinds of organic matter, including cellulose. It can be formed through a broader range of temperatures than those required for petroleum and is stable at temperatures at which other hydrocarbons are destroyed.

In most instances the proven reserves of natural gas are in countries where it was found in association with oil. In 1984, of a world total of about 100 trillion cubic meters, reserves, in these units, were Soviet Union, 39.6; Iran, 13.6; United States, 5.6; Qatar, 4.2; Algeria, 3.6; Saudi Arabia, 3.4; and Nigeria, 3.1. Natural gas has also been found in about 30 countries in which no petroleum has been discovered.

The proven reserves in the Soviet Union have nearly doubled in the last 10 years. The energy content of Soviet gas reserves is now substantially larger than that of the oil reserves of Saudi Arabia. In recent years, exports to Western Europe have increased. A new development is an agreement by Turkey to import gas from the Soviet Union.

In an era of cheap oil, many of the developing countries became dependent on it. Sooner or later, they must reduce this dependency by utilizing alternate lower cost and preferably domestic sources of energy. A World Bank study in ten LDC's has shown that they could save foreign exchange and obtain energy more cheaply by developing local resources of natural gas. Costs for them of clean, nonpolluting natural gas delivered at the city gate are estimated to be between \$0.61 to \$1.79 per million Btu's. Comparable costs for unrefined petroleum are about \$5.

A few of the LDC's will export some of their gas, but the major use will be internal. To explore for, develop, and create even a limited distribution system for it, a minimum of 5 years is usually required. In addition, front-end costs are large, though later expenditures are small. Thus foreign investors must have great confidence in the stability of agreements and on the chances of being repaid in hard currencies if they are to risk their capital. In this situation, the World Bank is playing an important role. It has increased its involvement in energy matters and has assembled a group expert in exploration and development of natural gas. Thus far it has assisted in efforts in about 20 countries, furnishing funds for feasibility studies, bringing the necessary parties to an investment together, and helping arrange terms that are fair to all concerned. As such efforts continue, the substitution of natural gas for petroleum will expand.

—PHILIP H. ABELSON