

From our reporter at the 9th World Energy Conference in Detroit.

Energy demand: Trouble for future

Energy demand is determined mainly by population expansion and industrialization, and though experts disagree violently on the validity of projections, certain outside limits are becoming clear: World population will almost certainly double in the next two or three decades, and energy demand is not likely to fall much below the average 5.2 percent a year that has held since World War II. At these rates, oil and gas would probably give out by around the turn of the century, currently recoverable fossil fuels and uranium for conventional reactors would peak out in another two decades or so, and even with the introduction of breeder reactors, total recoverable fossil and nuclear fuels would not be able to hold out far into the second half of the 21st century. Even if these outer limits could be reached, however, the environmental, social, financial and political costs would be unimaginable in today's terms.

Environment: U.S. goes its own way

The United States is diverging from other nations in its regulations for emissions from power plants burning fossil fuels—a particularly important issue in light of the probable switch away from gas and oil toward dirtier burning coal. While the U.S. Environmental Protection Agency insists on development of stack-gas scrubbers to remove sulfur dioxide pollution, a process that industry insists has not yet been perfected, other nations are relying more on very tall (600 feet and more) chimneys to spread the gas more evenly and on plant siting to make sure that atmospheric conditions are generally favorable for dispersal. A British study concluded that tall chimneys were effective in controlling surface air pollution, at much less cost than scrubbing.

Heat pollution from nuclear plants is of great concern. Netherlands scientists conclude that if the hot water is dispersed enough to keep average temperatures in a river or bay from rising more than 5 to 12 degrees C., and never exceed 35 degrees C., no species elimination will occur. Scientists from Poland suggest that such nuclear plants could be situated in cold harbors where the effluents would be beneficial: reducing ice jams, extending the navigation season and increasing the variety of fish.

Energy resources: To each his own

Two developments are expected to help increase production of oil and gas, especially for non-Arab countries. Off-shore drilling will probably be extended to depths as great as 9,000 feet, tapping potentially great new reserves. The work will require development of undersea enclosures to replace standing oil rigs now used in shallower waters. But the greatest source of additional oil may come through the advancing technology of secondary recovery. In many areas, initial recovery does not reach even a third of the oil in place.

Uranium exploration is not keeping up with projected needs. Though fuel for conventional light-water reactors is now only about two percent of the total investment in the plant, uranium prices are likely to rise very steeply as more reactors are built.

Japan, which now imports 85 percent of its fuel, is busily turning for help toward its one great domestic energy resource—volcanism. Two geothermal power stations with a total capacity of 33,000 kilowatts are now in operation

and four more are being prepared. Some experts expect as much as 20 million kilowatts could be tapped in Japan under present economic conditions.

Nuclear power: America lags behind

The American nuclear establishment is in trouble. The time required to place a reactor on line for power generation is reportedly almost twice that needed in some other countries. The Atomic Energy Commission has ordered inspection shutdowns for 21 power reactors owned by 14 utilities because of cracks and leaks found recently in three similar reactors. Two private consortiums formed to create uranium enrichment facilities have collapsed, which probably means the expensive, messy business must continue to be supported by the Government. The Atomic Energy Commission has announced that the breeder reactor demonstration plant at Clinch River will now likely cost \$1.7 billion instead of the originally estimated \$700 million.

While American nuclear capability languishes in a welter of environmental conflict and bureaucratic indecision, many other nations are making significant technological advances in the field. France has a liquid metal fast breeder reactor (LMFBR) generating commercial electricity and is joining with Italy and West Germany to build a 1.2 million kilowatt plant.

Some Canadian nuclear engineers believe they may have found a viable alternative, called "CANDU," to the environmentally objectionable breeder. This family of heavy-water (high deuterium content), high-pressure reactors makes the most efficient use of uranium from nature and could thus significantly extend the range of uranium resource recovery.

Britain is experimentally attacking the problem of nuclear wastes by sealing them in blobs of glass. Thus rendered insoluble, the wastes can be stored in pools of water for cooling at low cost. A production-scale demonstration facility is in the planning stages.

Energy transport: Quest for efficiency

The Soviet Union is a leader in efforts to use waste energy from power plants to heat homes and buildings in the surrounding area. Almost a third of the total capacity of its plants is used for this purpose. Overall efficiency of the plants approaches 70 to 80 percent, compared with about 40 percent for conventional power generation plants.

"Hydroneuclear" systems are sparking new attention. The systems would generate electricity in off-peak hours at nuclear plants to separate hydrogen from water. The hydrogen can then be burned without pollution at some later time, either to increase electrical generating capacity during peak hours or to transport the energy to remote areas. The combined system would provide optimum utilization of the nuclear fuel and reduce thermal pollution, since waste heat could also be used to generate hydrogen.

Energy uses: A time for innovation

New calculations call into question the old axiom that it is more efficient to heat houses by small fuel-burning units in the home than by electricity. Considering the inefficiency of most furnaces and the improved performance of electric heat pumps, investigators concluded that on the average, oil heating is only about 10 percent more efficient than electrical heating—but that home oil-burning units create 73 times as much pollution.

A report estimates that within the next decade, 10 percent of West Germany's automobiles may be replaced by electric cars, and that the development would add only about 2 percent to the nation's electric bill. Other authors report that a conventional engine uses two and a half times the fuel required to power an electric vehicle and that when technical difficulties are overcome, the United States may also have 5 million electric cars on the road in a decade.