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Factors Favoring Nuclear Power

Man's increasing requirements for energy have been met largely by enhanced consumption of fossil fuels. This has led to serious problems of air pollution and water pollution. While many sources contribute, some of the worst offenders today are coal-burning installations. These generate sulfur dioxide, fly ash, and carbon dioxide. Moreover, the mining processes often lead to polluted streams and ruined land. In addition, the large-scale burning of fossil fuels raises the specter of runaway climatic changes due to the "greenhouse effect."

For many years it has been clear that atomic energy is destined to be the primary energy source; reserves of fossil fuels are limited. However, until a few years ago, the day seemed distant when nuclear energy would become paramount. As long as electricity could be generated more cheaply from fossil fuel than from the atom, the conventional method would be employed despite the social cost of its unpleasant by-products.

We are now in a new era. Atomic energy has proved relatively safe, reliable, and clean. Radioactive wastes can be contained. The bookkeeping cost of nuclear power has become competitive. This was signaled by the contract for the nuclear power plant at Oyster Creek, New Jersey [*Science* **146**, 721 (1964)]. This plant, to be completed in 1967–68, is expected to deliver power at a cost as low as 3.66 mills per kilowatt-hour. In 1965, after the contract for the Oyster Creek plant had been announced, other utility companies contracted for eight major nuclear power plants, with a total capacity of about 5000 megawatts. This was about one-fifth of the aggregate capacity of all the electrical power plants authorized during the year. In 1966 so far six major nuclear plants have been authorized; they account for about half of the new power capacity. The competitive position of nuclear power is likely to get even better. Enthusiasts have estimated that in very large plants power might be produced for less than 2 mills per kilowatt-hour. In contrast, the lowest foreseeable cost for conventional power is 3 to 4 mills.

The projected low cost for nuclear power seems optimistic. Yet nuclear power is becoming cheaper, and the trend will continue. A solid basis for optimism can be seen in a recently issued annual report of the Atomic Energy Commission.* This two-part report sets forth clearly the manifold U.S. activities in atomic energy. Part of the two documents details progress in matters related to civilian electrical power. A methodical program is making nuclear energy cheaper and safer. Experiments with different kinds of fuel elements are permitting greater allowable burn-up of fissionable material. New methods for reprocessing fuel elements will diminish the cost of this phase of reactor technology. Progress in waste management permits much of the waste to be contained safely as solids, and at less expense.

A continuing effort is being made to guarantee reactor safety. To this end the commission has sponsored a series of studies called SPERT (Special Power Excursion Reactor Test). These tests simulate reactor accidents and include both destructive and nondestructive tests with reactor cores. As a result, effective containment can be designed. Of equal importance are continuing advances in designing automatic safety into reactors.

In the contest between conventional and nuclear power, the balance is shifting rapidly. In a few years most new major planned installations are likely to be nuclear.—PHILIP H. ABELSON

**U.S. Atomic Energy Commission Annual Report to Congress for 1965* and *Supplement* (Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.)