that the committee is "still considering how to organize itself to deal with the project."

Many of the critics of the newly proposed study might agree that ERDA's solar program needs some reassessment. In fact, a number of solar advocates might not mourn too deeply the loss of the "power tower" concept, a huge, complex, and expensive system that does not appear to have the flexibility for decentralized applications that photovoltaics have. In a recent article in *Foreign Affairs*, a prominent advocate of nonnuclear energy futures, Amory Lovins, who is a British representative of Friends of the Earth, also criticizes the "ingenious, high technology" schemes that dominate ERDA's solar research budget but supply energy "at a scale inappropriate for most end-use needs."

While the critics might agree with some of Hirsch's technical views, the way his directorate handled a recent solar study that reflected unfavorably on nuclear power has heightened the critics' concern. The circumstance was the

# Nuclear Power Economics: Report Heats Up Debate

The Council on Economic Priorities (CEP), a New York public interest group, has published a major study casting doubt on the reliability and economic advantages of nuclear power plants.

The principal finding, that the reliability of nuclear power plants declines as they increase in size, has angered utility executives and the nuclear industry. Currently, 87 percent of all new nuclear capacity planned to be added in the next decade will be made up of plants 900 megawatts and larger.

"A return to smaller unit sizes (400 to 800 Mw) could increase nuclear power's competitiveness with coal" the study concludes. And it reaches a related conclusion which will also delight the foes of new nuclear construction. "Overall, postponing commitment to new [nuclear] generating facilities, where possible, may reduce ultimate generating costs. Moreover, postponement could facilitate more reliable plant design."

Utilities with a heavy commitment to new nuclear power plants, such as Commonwealth Edison of Chicago, have called the CEP conclusions "distorted" because of a few lemons among large nuclear plants. Somewhat more mildly, the Atomic Industrial Forum (AIF) calls the CEP conclusions "premature."

The study compared the capacity factors (CF's) of 38 nuclear plants which came into operation from 1968 to 1974 and 250 coal plants which operated from 1961 to 1973. Capacity factor—the percent of time in which the plant actually operates—is a key index of the reliability of generating plants. Utilities build nuclear plants, as well as most coal-fired plants, to supply base-load power for their generating systems. Whenever a plant has to be shut down for some reason—maintenance, repairs, or refueling, for example—the utility must buy substitute power, often at much higher prices. Hence it is very important to the efficiency of the system, as well as its cost, that such plants operate as much of the time as possible.

Nuclear power plants, when proposed by utilities or the nuclear industry, have often been justified on the grounds that they will operate at CF's of 70 to 80 percent. However, the CEP study found that commercial nuclear power plants have had an average CF of 59.3 percent. Commercial coal plants have had an average CF of 66.9 percent, considered only a little better. The larger versions of both types of plant are less reliable than average. The best reliability, with CF's in the 60 to 70 percent range, have been achieved by both coal and nuclear plants of the smaller, 600-Mw type. This finding is in dramatic contrast with the arguments that the industry has sometimes made that nuclear plants will become more reliable as they become larger.

The CEP study also partially rebuts another pronuclear argument, namely, that, as nuclear power plants age (or "mature" as the industry says), their CF's will rise. Indeed, CEP found that pressurized water reactors do get more reliable with age. But boiling water reactors, CEP found, show no such improvement.

Why so many difficulties with larger scale nuclear plants? "It seems that the industry has been scaling up too rapidly," says study director Charles Komanoff, an applied mathematician. He notes that the timetables for nuclear plant construction have not permitted much learning from older, smaller plants to be fed into the construction of newer, larger ones. The CEP report recommends, on the basis of this argument and several other ones, that it may be more cost-effective, in the long run, to slow down construction and make fewer errors.

The principal line of attack on the CEP study has been the argument that the size of the sample of nuclear power plants, of only 110 unit-years of operation, is not large enough to justify such sweeping conclusions. A. David Rossin of Commonwealth Edison, for example, argues that the conclusions would be different if Komanoff had left out the Palisades 800-Mw plant and the Brown's Ferry 1100-Mw plant, both of which Rossin calls "one of a kind" in their unusually poor operating performance. Komanoff answers that if he took out two "lemons" as well as two of the reactors that have performed unusually well (only four plants have CF's above 70 percent), his charts would remain the same. As for the small-sample argument, Komanoff notes that additional data for operations in 1975 and the first part of 1976, published in the report's appendix, bear out his initial conclusions.

According to several experts, a genuine public debate, both at the national level and locally, where utilities are selecting power plant types and sizes, has been hindered by lack of data on the operating history of U.S. plants. Robert Hanfling, a deputy assistant administrator of the Federal Energy Administration (FEA), says that the collection of consistent data for so many different plants is "a major contribution" of the CEP study. In fact, FEA has bought the public interest group's data base outright. Initial FEA studies of nuclear power plant performance do not agree with the CEP conclusions. However, Hanfling says FEA will put forward some more definitive conclusions when agency spokesmen testify before the New York State Public Service Commission at hearings on the economics of coal and nuclear power early in 1977. In the meantime, he notes, utilities around the country are making half-billion and billion dollar commitments to new power plants "on the basis of very erratic information and a finite number of choices."—D.S.