Carter Energy Message: How Stiff a Prescription?

What kind of an energy future is contemplated in President Jimmy Carter's national energy plan? And what kind of a society?—a fair question inasmuch as the energy systems of the future could have a lot to do with shaping patterns of growth. No scenarios for the future have been set forth in the information about the plan which has been presented by Carter Administration officials. Yet, though the exercise is highly speculative, it is perhaps revealing to look at the Carter plan from the standpoint of whether it implies an energy future and way of life quite different from the present, or whether it points to conditions not much different from those which Americans know now. The plan can be viewed either way, as the comments of environmentalists and other observers make clear.

For the purpose of trying to characterize the Carter plan in this manner, two reports issued several weeks prior to the announcement of the plan offer handy points of reference. One is the report of the Rockefeller Brothers Fund task force of environmental leaders, entitled *The Unfinished Agenda: The Citizen's Policy Guide to Environmental Issues* (*Science*, 25 February). This report called for making a break with policies that have favored further development of large-scale, big-technology, and highly capital-intensive energy systems (of which the present generation of 1000-megawatt nuclear plants is typical) and going in the direction of small-scale, decentralized "soft" technologies, with an emphasis on conservation and use of the various forms of solar energy regarded as suitable for application at the local, neighborhood, and householder levels. In this scenario, which was only sketchily presented, nuclear power would be rapidly phased out altogether, while coal and other fossil fuels would be used carefully in making the transition to the new energy era.

The other report was the Ford Foundation–sponsored study *Nuclear Power, Issues and Choices* prepared by a group made up of people such as Harold Brown of the California Institute of Technology (now Secretary of Defense), Abram Chayes of the Harvard Law School, Richard L. Garwin of IBM's Thomas J. Watson Research Center, Carl Kaysen of the Massachusetts Institute of Technology, and Hans H. Landsberg of Resources for the Future. This report (*Science*, 1 April) attracted much attention from the press and the Carter Administration, principally because of its recommendations—put forward as an antiproliferation measure—to defer indefinitely the reprocessing of nuclear fuel and recycling of plutonium and to abandon the present Clinch River breeder reactor project.

But, at the same time, the report, though probingly critical in its review of the economic and potential safety problems associated with the present generation of light water reactors, indicated that there was no feasible alternative to relying for the next several decades on continued development of some mix of nuclear and coal-fired electric generating plants. The potential of conservation for restraining growth of energy demand was recognized, but the alternative energy sources—solar, geothermal, and fusion—were not seen as providing a significant fraction of energy in the United States until "rather far into the 21st century."

The Carter energy plan appears to reflect more nearly the basic attitudes of the Ford Foundation study than it does those of the environmental leaders. Although perhaps somewhat more optimistic than the Ford study in assessing the potential of solar and other alternative energy sources for the near to middle term, the plan leaves no doubt but what a substantial expansion of both coal-fired and nuclear generation will be necessary if dependence on insecure foreign sources of petroleum is to be reduced. In fact, along with energy conservation and development of alternative energy sources through a vigorous R & D effort, to have the electric utility industry go from oil and natural gas to coal and uranium is one of the plan's three major strategies.

Moreover, besides looking to a 400-million ton expansion in the use of coal by 1985 (a two-thirds increase), the plan recommends speeding up nuclear power plant licensing procedures, which now generally take 10 years or longer. And, although the plan President Carter has presented to Congress does not say how many nuclear plants are envisioned, Robert Fri, acting administrator of the Energy Research and Development Administration (ERDA), has put the number at between 300 and 400, or some five to six times the number (65) now operating and from two to three times the total number of those either operating, under construction, or on order.

Nonetheless, while there has not yet been time for them to analyze its ultimate implications, most environmental leaders appear to regard the plan as an enormous improvement over the energy policies of past administrations and as worthy of unstinting support. On 20 April, the day Carter announced the plan, representatives of ten groups such as the Sierra Club, Friends of the Earth, Environmental Action, and the Natural Resources Defense Council issued a statement praising it. As they sized it up, the plan places "fundamental reliance" on energy conservation, encourages use of renewable energy sources, relies on "local initiatives and decentralized energy sources," and seeks to avoid nuclear proliferation. "Unlike the Nixon/Ford plans, which were dominated by energy supply interests, the Carter plan is designed to protect the environment, the worker, the consumer, and future generations of Americans," they added.

On the other hand, there has been some criticism of the plan voiced by certain citizens' groups that look at energy issues from an environmental perspective. It has come from the Scientists' Institute for Public Information (SIPI) in New York and from the Critical Mass Energy Project and two other Washington-based groups founded by Ralph Nader.

Alan McGowan, president of SIPI, has said that "while the American people are under the impression that President Carter's program is conservation, coal, and solar energy, the President's energy advisor James Schlesinger is quietly preparing an expanded nuclear energy agenda, up to and including the breeder reactor." (Although the Administration is canceling the existing Clinch River breeder demonstration project, a broad program of breeder research will be pursued.) For their part, the Nader groups have found a lot of good in the Carter plan, but they have also found some omissions, such as the plan's "failure" to seek horizontal divestiture in cases where oil companies have gone into the coal business and the absence of any proposal to call for an end to "numerous subsidies for nuclear power, such as the limited liability provided by the Price-Anderson Act."

But some environmentalists praise the Carter plan even as they acknowledge

that it is by no means a prescription for the small-scale, decentralized, soft-technology energy future which has been held out as an ideal. Denis Hayes, who 8 years ago as a recent Stanford University undergraduate was national coordinator of the original "Earth Day" movement, is now on the staff of the Worldwatch Institute in Washington where he is writing a book on energy policy. According to Hayes, if all elements in the Carter plan are accepted by the Congress (an unlikely eventuality, he concedes) and are strictly observed, conditions will be created in which an energy future of the kind envisioned by the environmentalists might begin coming about spontaneously.

First, Hayes thinks that the conservation elements in the plan—the combination of fuel taxes, tax credits (such as for home insulation), new energy efficiency standards, utility rate reforms, the proposals for "cogeneration" of electricity along with industrial-process steam, "district heating" (piping hot water from power plants to nearby dwellings), and the like—could be enough to reduce the annual rate of growth in energy demand to a point well below the 1.8 percent the Administration has set as its goal. Beyond that, Hayes believes that faithful observance of the plan's promise not to sacrifice environmental protection to energy development would mean fewer new nuclear and coal-fired electric generating plants. The plan specifically calls for stricter requirements for the siting of nuclear plants and the monitoring of safety violations. Furthermore, it is uncompromising in its insistence that coal-fired plants be operated in full compliance with the Clean Air Act.

A significant part of the research program included in the plan is aimed at achieving the clean burning of coal. But, as Hayes points out, even if this research effort should prove successful, there would still remain the question of whether limits must not be placed on the amount of carbon dioxide—an inevitable combustion product of coal and other hydrocarbons—released into the atmosphere. A $3-million study of the effects of CO_2 on the atmosphere and the global climate is called for in the plan.

(At a press briefing on the plan 21 April, Robert Fri of ERDA observed: "It is conceivable that the carbon dioxide problem could be to the fossil-fuel program [what] proliferation is to the nuclear program: a sort of show-stopper or limitation on the indefinite expansion of that program. . . . This is about a year's study. . . . Meanwhile, we are going to retain the mix of coal and nuclear in the system so that we have the opportunity to go the way that is best in the future.")

A commitment to the "soft" energy path clearly would bring, for better or worse, marked social and economic changes. Given the country's conservatism, no President and no Congress is ever likely to embrace such changes wholesale; if the soft path should be chosen, it is more likely to be through force of circumstances and gradual improvisation than by conscious policy. Even Pres-

Stanford Goes to Washington

It's well known that Harvard sent Henry Kissinger to handle foreign affairs for the Nixon-Ford Administrations and that Caltech dispatched Harold Brown to head the Defense Department for Jimmy Carter, thus putting men with academic backgrounds in some of the most sensitive government posts. But operating just outside the glare of the media spotlights, Stanford University has managed to infiltrate several faculty members into subcabinet posts, including some with major responsibilities for scientific matters. The trend is not pronounced enough to start talking of a "Stanford mafia" dominating Washington affairs, but it was enough to inspire the Stanford publicity office to issue a press release headlined "Stanford in Washington, Faculty Division."

The latest Sanford coup came on 21 April when the President announced that he would nominate Richard C. Atkinson, 48, as director of the National Science Foundation (NSF). Atkinson, an experimental psychologist on leave from Stanford since mid-1975, has already been serving as deputy director and then acting director of NSF. He is said to have been the National Science Board's top choice to become the next full-fledged director. (The board, the policy-making body for NSF, was the chief but not exclusive source of nominations for the post.)

If confirmed by the Senate as expected, Atkinson will become the first behavioral scientist to head NSF. That has led some observers to speculate that NSF's social and behavioral sciences programs, long relatively neglected, may be due for invigoration. Atkinson is known to feel that the social and behavioral sciences deserve some "special attention," but he is not a disciplinary chauvinist. He had strong backing for the job from physicists, chemists, and other "hard" scientists, both on the National Science Board and elsewhere. His top priorities, if he becomes director, are said to include, among other things, the strengthening of basic research, a reevaluation of how NSF can best carry out its role in applied research, measures to ensure the flow of young scientists into basic research when tenure pipelines are clogged, and evaluation of NSF activities by outside reviewers.

Atkinson joins these other Stanford faculty members in Washington:

▶ Donald Kennedy, on leave as professor of human biology while serving as director of the Food and Drug Administration.

▶ David A. Hamburg, on leave as professor of psychiatry while serving as president of the Institute of Medicine of the National Academy of Sciences, which often advises the government.

▶ Norman Kretchmer, former medical professor, now director of the National Institute of Child Health and Human Development.

▶ Barbara Babcock, on leave as professor of law while heading the civil division of the Justice Department.

▶ Thomas Ehrlich, on leave as law school dean while serving as president of the Legal Services Corporation, a government-funded organization that provides financial support for legal services for the poor.

One jubilant Stanford publicist told *Science* that the invasion of government by his school was just one more bit of evidence that "we're in the same league as Harvard and Berkeley in lots of different dimensions." He boasted that Stanford ranked first in production of National Medal of Science winners in each of the past 3 years, third in the esteem of NSF fellowship winners, and fourth in grants from the National Endowment for the Humanities, not to mention its successful fund-raising drive which is about to top $300 million, the largest such sum ever raised.

But one of the Stanford infiltrators put it this way: "I think its about time we got our chance in Washington after Harvard has practically destroyed the place."—P.M.B.

ident Carter's less than revolutionary plan faces strong opposition and is likely to be weakened in Congress.

Yet circumstances may in fact be such as to bring the nation to accept changes far greater and more sweeping than is now readily conceivable. In early February, when the environmental leaders' *Unfinished Agenda* report was being discussed at a conference in Washington, Robert O. Anderson, chairman of the board of Atlantic Richfield, observed: "The change that's proposed here, if put all together, is rather massive, and really we're talking about a more austere way of life. . . . Now this is an election society has to make; no leader can be asked to make a change of that magnitude. I can only think maybe this is the time that the rather affluent life of Athens is going to be supplanted by the more austere life of Sparta. It happened in Greece, and maybe that's the way we are going."

—LUTHER J. CARTER

Drinking Water: Getting Rid of the Carbon Tetrachloride

Protecting the purity and safety of drinking water is a lot more complicated than it used to be. An illustration is the recent case of contamination of the Kanawha and Ohio rivers with carbon tetrachloride, a suspected carcinogen and known liver poison. On 18 February, the Environmental Protection Agency (EPA) reported that agency scientists had detected unusually high concentrations of the chemical in the rivers near Huntington; the contaminated area extended for about 45 miles up the Ohio and another 30 miles or so into the Kanawha River. The scientists calculated that 70 tons of carbon tetrachloride had somehow found their way into the rivers.

When making the announcement, the EPA managed to make a short-lived but big mistake when estimating how fast the "slug" of carbon tetrachloride was moving down the Ohio. The agency told the residents of Cincinnati that the slug would arrive at that city about 22 February, and that they should boil their water in order to get rid of the chemical. Unfortunately, the slug had already passed the intakes of the Cincinnati water company by the time the EPA made its announcement. Reports of what had happened on the river and how the mistake had occurred were often confusing and consequently, a number of people, including Thomas A. Luken, the freshman Democrat Representative from Cincinnati, are still asking what happened.

The answer is not entirely clear. For example, EPA officials are careful to point out that they still do not know the source of the 70 tons of carbon tetrachloride. But the slug was only the most spectacular incident in a series of events that the agency had been investigating for several months. One consequence of the investigation was the first use of the emergency provisions of the Water Pollution Control Act of 1972 and the Safe Drinking Water Act of 1974, which enable the EPA to shut down a suspected polluter if there appears to be an imminent hazard to human health. In this case, EPA forced the closing of the West Charleston plant of the FMC Corporation. The plant, located on the Kanawha about 60 miles from where it flows into the Ohio, makes carbon tetrachloride.

Chemicals Found in Drinking Water

The fact that the EPA was looking for carbon tetrachloride in river and drinking water in the first place is an outgrowth of the discovery in 1974 of small quantities of many organic chemicals, including carbon tetrachloride, in the drinking water of New Orleans. This discovery was one of the stimuli that prompted Congress to pass the Safe Drinking Water Act.

After the release of the New Orleans data, the EPA began to analyze the water supplies of some 80 cities around the country, including Huntington and Cincinnati, to see whether they, too, contained the chemicals. They did. But according to James Manwaring, chief of EPA's Water Supply Branch in region III, which includes West Virginia, the concentrations of carbon tetrachloride were always very low, a few parts per billion (ppb) or less. Then, in September of 1976, 10 ppb of the chemical turned up in the Huntington water supply. Manwaring says that EPA officials considered this to be a high value at the time, although not for long as things developed. The agency subsequently found much higher concentrations in Cincinnati drinking water and in the slug itself.

Nevertheless, the Huntington figures were sufficiently alarming that the EPA began looking for industrial plants above the city on the Ohio and Kanawha rivers that produce or use large quantities of carbon tetrachloride. (The rivers provide the water for 18 water companies serving some 1.8 million people.) The agency identified four plants—owned by Allied Chemical Corporation, Diamond-Shamrock Corporation, FMC Corporation, and PPG Industries, Inc.—and invoked section 308 of the Water Pollution Control Act against them. This section requires that the industries (i) supply the EPA with data on their discharges of the pollutant in question, and (ii) participate in a 45-day survey, during which the industries monitor the pollutant in their effluents while EPA monitors the concentration of the chemical in the rivers.

Manwaring says that the start of the survey was delayed, partly because of the unusually cold winter that hit the East and Midwest, but was scheduled to begin on 7 February. On that date, the FMC Corporation refused to participate in the survey and turned the EPA inspectors away from the gate of their West Charleston plant. The other three companies cooperated as planned in the survey.

According to Rich Blewitt, a spokesman for the FMC Corporation, the company refused to participate at that time because of hazardous conditions on the riverbanks where the effluent pipes are located. The banks were covered with ice and poorly lighted (monitoring is a 24-hour-per-day job). The FMC management did not want to subject company or EPA personnel to those conditions. They asked the agency to postpone the survey but the request was not granted, although a previous one had been.

On 8 February, the United States attorney in West Virginia obtained an injunction requiring FMC Corporation to participate in the survey, and on the same day, EPA inspectors were admitted to the plant. The hearing on the injunction was scheduled for 18 February in Parkersburg.

At this point life became hectic for EPA officials and scientists, for the next day (9 February), analysis of the Cincinnati drinking water showed that it con-