

# Energy, technology and future options

Among many groups in society today, there is increasing concern about creating new options for the future. Environmental groups hope that the President, the Congress and private industry will become aware of some options for the environment—new choices requiring a drastically different view of economic priorities.

During the past month, there have been many signs that such a new view is emerging. But before it gets general acceptance, it will face concerted opposition. The first recent sign of a new orientation came when the Environmental Protection Agency in June announced 1976 nitrogen oxide standards for emissions from autos; the auto companies say they probably cannot meet the standards. The remaining option, according to EPA officials is to restrict automobiles in urban areas and substitute public mass transit (SN: 7/3/71, p. 8).

Then last week, the National Petroleum Council, a high-level group of oil company executives that advises the Interior Department, announced completion of the first stage of a study of United States energy needs—including projections to 1985. But testimony at House and Senate hearings, also held last week, suggests the new study may be simply a rehash of old ideas and that the oil companies may themselves be the major block to a meaningful energy policy. Significantly, the Federal Trade Commission announced last week that it was looking into increasing concentration of monopolistic power within energy industries—with particular reference to oil company takeovers of coal producers—and a House small business subcommittee was examining the same problem.

Perhaps the key dilemma in any major shift in national priorities is the need to soften the economic blow for the scientists, engineers, executives and workers who become unemployed when a major industry closes its factories or changes its course. Last week Rep. John W. Davis (D-Ga.) continued hearings on the Conversion Research and Education Act before his subcommittee on Science, Research and Development. The Davis hearings pertained particularly to ailing aerospace and defense industries and their displaced employes. But the conversion bill, if passed, could become a prototype for a Federal structure to smooth the shift to new priorities on a broader scale. Significantly, an employment option frequently men-

tioned for the aerospace engineers is public mass transit.

A large hindrance to conversion to new priorities is the way the nation defines economic objectives. Traditional cost-benefit analyses are viewed as favorable for a project if there is an excess of benefits over costs—that is, a profit. But ignored in most of these analyses are what Harvard economist John Kenneth Galbraith calls “external diseconomies,” the uncalculated and now unpaid human and ecological costs. For the automobile, these would include air pollution, suburban sprawl and the costs of road-building. For an electrically powered mass transit system, they would include the increased sulfur oxides and particulates emitted by power plants. But a mass transit system would use far less total energy than automobiles; and it would seem far easier to control emissions from a finite number of power plants than from millions of automobiles.

The NPC report on energy needs appeared to ignore any option but the continuing proliferation of energy-using machines and thus a possible doubling of total energy needs by 1985. The report acknowledged certain assumptions, such as the ones that nuclear power would “be utilized to the maximum extent possible consistent with feasible development programs” and that “coal production would be increased as needed to meet requirements.” Underlying all of the assumptions was the big unacknowledged one: That there would be no substantial change in Americans’ energy-using habits and thus there would be a continuing acceleration of energy use. And

even where assumptions were acknowledged, little leeway was left for options. For instance, John G. McLean, NPC’s energy outlook chairman, flatly said at a press conference that coal gasification processes on any significant commercial scale would not be possible until 1985 or later.

But Dr. Clarence Johnson of Hydrocarbon Research, Inc., says significant commercial coal gasification could come in five to seven years with optimum funding, and other scientists give similar estimates.

Dr. E. F. Osborn, director of the Interior Department’s Bureau of Mines, basing his conclusion on foreign experience and other available data, says highly reactive coals in the Powder River region of Montana, Wyoming and North Dakota can very likely be gasified underground in *in situ* retorts—thus eliminating many environmental liabilities such as strip-mine land devastation. In a May 12 memo to a National Academy of Engineering energy committee, Dr. Osborn implied the bureau is ready to go ahead with a pilot project.

Another light is thrown on nonpolluting power production from coal, as well as on the NPC’s assumption that nuclear plants will “be utilized to the maximum,” in *Poisoned Power*, a book by nuclear critics Drs. John W. Gofman and Arthur R. Tamplin, published in June. “The nuclear power industry wants the public to think that the choice is between dirty fossil-fueled plants and nuclear power plants,” says the book. “This is simply ridiculous. The technology [such as coal gasification] to stop the poisonous emissions



Metcalf: Who makes energy policy?



Davis: Conversion to new priorities.

from outmoded fossil-fueled plants is far developed, and could be installed in the near future, if the demand for this were insistent." The answer to energy needs, they say, is to continue to rely on fossil fuels instead of getting a larger percentage of energy from what they view as the hazardous nuclear plants.

**Hearings on the NPC** before a Senate subcommittee chaired by Sen. Lee Metcalf (D-Mont.) last week strongly suggested there is a paralysis in creating options for United States energy policy, partly because such policy is really a function of industry. "... A central article of faith [of the NPC]," said Prof. Robert Engler, political scientist with the City University of New York and author of the *Politics of Oil*, "... is that Government must not become involved in any use planning of energy resources . . . [and] that no published study by the NPC leave the impression that industry has not been thinking in long-range terms and wisely for the commonweal."

Whether or not energy industries actually make United States energy

policy, there seems little doubt they fail to perceive a broad range of options. That such options will increasingly be needed was stated succinctly by Dr. Harvey Brooks, dean of engineering and applied physics at Harvard and member of the President's Science Advisory Committee, before the Davis subcommittee. He spoke of the vast unmet needs for research, development and application in social and environmental areas, needs which could be partly met by the now unemployed defense and aerospace engineers. Then he looked at the future:

"Within the next 60 years, mankind will have to come to a new equilibrium with its environment. Many current increasing trends, from population to per capita energy consumption, will have to saturate or slow down drastically. The management of this transition represents an enormous challenge to science and technology as well as to political wisdom. To continue [to leave our brainpower idle] only means we are prepared to sacrifice the future for the sake of present comfort and convenience." □

## RETURN TO ACADEMIA

### McElroy leaving NSF

The coming departure from the Washington scene of the top man for the National Science Foundation, the agency most concerned with the health of basic scientific research in the United States, is not news to gladden the hearts of academic scientists. It is not all to his doing, but in the two years since Dr. William D. McElroy took over the helm at NSF, the agency's Congressional visibility and appropriated funds have risen considerably. Dr. McElroy last week was named by the University of California regents to become chancellor of the university's San Diego campus at La Jolla. He will stay with NSF until next Feb. 1, to oversee planning for the 1973 budget.

In the last few months NSF has been partially rebuffed for its proposals to reduce science education support in favor of more applied science research, but Dr. McElroy says his decision to leave is in no way related to those criticisms. "I have been pleased with my interactions with OMB [Office of Management and Budget] and Congress," he says. "I wasn't dissatisfied at all."

When President Nixon appointed him director in mid-1969 Dr. McElroy says he told colleagues he intended to stay only two or three years before returning to academic life. "I've enjoyed it," he says of his Washington stint. "It was new and different, and it was fun." But the return to academia beckoned. "I like working with academic people. It's a challenging and interesting life, even at the administrative level." The chancellorship of the modern, new San Diego campus, with its strong emphasis on science, was attractive. "When you're 54 and something like this comes along, you take it."

What his departure may mean for NSF is far too early to tell. Dr. McElroy had succeeded Dr. Leland Hayworth, who was well liked but considered by some to be overly mild mannered for the aggressive necessities of Washington influence-seeking. Dr. McElroy was welcomed in part for his outgoing warmth and affirmativeness. He is generally regarded as having been successful in scientific politics.

"I am sorry to see Dr. McElroy leave the National Science Foundation, for I feel that he has amassed a remarkable record of achievement there and has proven himself to be an administrator of the first magnitude," says Rep. John W. Davis (D-Ga.). Davis is chairman of the House Subcommittee on Science, Research and Development, which authorizes funds for NSF. Dr. Philip Handler, president of the National Academy of Sciences,

M 82 AND NGC 253

### Hydroxyl in two other galaxies

The universality of physical effects is one of the important questions in cosmology. For centuries astronomers and physicists have wondered whether physical laws deduced from phenomena found on earth and in the solar system can be applied without change to distant galaxies and whether distant galaxies are made of the same matter (there are persistent suggestions that some may be antimatter) as our own. In the absence of evidence to the contrary, scientists generally assume the universality of physical laws, but there are those who warn that this assumption should not be taken for granted.

Lately, with the discovery that various chemical molecules inhabit the interstellar space of our galaxy and betray their presence with radio waves, a possible means of testing the universality of chemistry came to hand. It has been taken up, and the hydroxyl radical (OH) has now been discovered in the interstellar space of two other galaxies.

The work was done by Dr. Leonid N. Weliachew of the Meudon Observatory in France, who is visiting the California Institute of Technology. Using the radio interferometer at Caltech's Owens Valley Observatory, he found OH in the galaxies M 82 in the constellation Ursa Major and NGC 253 in the constellation Sculptor.

Hydroxyl makes its presence known with radio waves of about 18 centimeters wavelength. It may emit the



Hale Observatories

*Chemistry in galaxies: OH in M 82.*

waves if it is hot enough or it may absorb them from the radiation of some source lying behind it.

The most powerful OH emitters in our galaxy, if placed in the Andromeda Nebula, the nearest galaxy to our own, would be beyond the detection limit of presently available instruments, says Dr. Weliachew. He therefore decided to try to find OH by its absorption and chose two galaxies that have strong radio sources in their centers. Absorption by OH clouds lying between the centers and the edges of the galaxies showed up as slight dips in the spectra of the centers.

The discovery probably means that interstellar chemistry of the sort familiar in our own galaxy is a widespread characteristic of galaxies, and it lends support to the assumption that the physical laws we know are universal. □