

DOE Budget: Material Gains and Energy Losses

Decades ago, the idea of a nuclear reactor that would "breed" more fuel than it burned seemed very attractive. Last week, however, President Reagan signed into law a \$14.1 billion appropriation bill that includes funds for several controversial Department of Energy (DOE) research programs but not for the Clinch River Breeder Reactor in Tennessee, the effort to build a prototype commercial breeder at a projected cost of \$3.6 billion.

Congress completed its work on the DOE budget surprisingly quickly, finishing three months before the fiscal year 1984 begins on Oct. 1. It refused to go along with the administration's request for major reductions in funding for solar energy and stayed close to the proposed budget for high-energy physics. Again, Congress made it clear that efforts to abolish DOE were "undesirable and unnecessary" (SN: 2/5/83, p. 87).

Much controversy surrounded funding for the breeder reactor demonstration project and for three new facilities to house materials science research. In the case of the Clinch River Breeder Reactor, both the Senate and the House of Representatives indicated funding would resume only if a new financing plan that brings more private money into the venture can be worked out.

One day after the appropriation bill's passage, a new financing plan, which carries the endorsement of several prominent Wall Street investment firms, was presented to DOE Secretary Donald P. Hodel. The plan involves raising \$1 billion by selling shares of future sales of electricity produced by the Clinch River plant. A DOE spokesman says Hodel was very enthusiastic about the plan, but whether the administration will endorse it is unknown. Critics of the plan point out that the Tennessee Valley Authority, which would be an important customer for the electricity, may not need the additional generating capacity until well after the year 2000.

No one seems to know what will happen on Oct. 1 when federal funding runs out. Already about \$1.5 billion has been spent on the project, the site is cleared, excavation has begun and much of the equipment is ordered or has been delivered. It may be months before Congress again considers a bill to provide funds for the reactor, and that bill would be very vulnerable.

Much smaller amounts of money are involved in funding for the new materials science facilities, but a bitter debate has cen-

tered on the process by which these proposals came to be included in the budget. Many materials scientists were surprised when the administration proposed the creation of a National Center for Advanced Materials (NCAM) at the Lawrence Berkeley Laboratory (LBL) in Berkeley, Calif. (SN: 5/7/83, p. 295). They complained that DOE failed to consult the materials science research community.

Congress reacted by cutting construction funds for NCAM from \$25.9 million to \$3 million, while leaving about \$8 million for research-related activities. Robert K. Johnson, LBL staff scientist, says, "It will allow us to get a substantial start on NCAM, although at a slower pace than we had originally envisioned."

Meanwhile, a DOE panel is reviewing the NCAM proposal.

Panel says to stop Brookhaven accelerator

For decades the High Energy Physics Advisory Panel (HEPAP), which is made up of prominent physicists, has advised the Department of Energy (DOE) and its predecessor, the Atomic Energy Commission, to build various pieces of equipment for experimental physics. Now, for the first time, HEPAP has recommended scrapping a facility already under construction. That facility is the Colliding Beam Accelerator (CBA), also known as ISABELLE, at the Brookhaven National Laboratory in Upton, N.Y.

The CBA was planned to accelerate beams of protons to energies up to 400 billion electron-volts and collide them with each other. Over \$200 million has already been spent on the CBA, with a large tunnel and other structures in place. Estimates of the cost of completion run to three times what has already been spent. A subcommittee of HEPAP, which met at Woods Hole, Mass., advised that the money wasn't worth spending. Delays in the CBA's construction meant that the interesting physics had already passed it by. Construction was begun four years ago with completion originally scheduled for 1984.

DOE has not yet said whether it will accept the recommendation, but in the past it has always followed HEPAP's advice. Congress has occasionally proven harder to convince.

In the early 1970s the CERN laboratory in Geneva had shown that interesting physics could be done with proton-

proton collisions at 45 billion electron-volts per beam. A 10-fold increase in energy seemed a logical next step, and the CBA was planned as part of a balanced approach to the next energy plateau that included fixed target accelerators and other kinds of colliding beams. With the projected completion pushed up to the end of the decade, the CBA apparently became superfluous to HEPAP. Physicists' interest seems also to have shifted somewhat: They now want proton-antiproton and proton-electron collisions as well as proton-proton ones, and newer plans provide for these.

Where the interesting physics is going, according to the HEPAP subcommittee, is into the desert. The subcommittee recommended that serious consideration be given to the so-called "deserttron," a giant colliding beam apparatus designed to go into the trillions and tens of trillions of electron-volts, which would cost several billion dollars. It gets its name because it would have to be a ring dozens of miles across, and the feasible sites in the United States for such a thing seem to be in the deserts of the Southwest. Some theorists suggest, however, that the energy range it would enter is also a desert, that is, that no interesting physics is likely to be found there. In the sharp debate now in progress over that suggestion, the HEPAP subcommittee has apparently come down on the other, positive, side.

—D. E. Thomsen

cluded, for example, a thorough DOE review. Instead, the universities took their proposals directly to Congress and hired a consulting firm to help in the lobbying.

The outcry was immediate. H. H. Johnson of Cornell University in Ithaca, N.Y., for example, in a July 15 letter to SCIENCE, calls the universities' actions "irresponsible." He writes, "If all universities were to adopt the Columbia-Catholic technique, then no research program in any university would be immune from sudden and arbitrary cancellation. Research support would then be a matter of which university could mount the most effective lobbying effort."

Theodore Litovitz, director of the Vitreous State Laboratory, makes a distinction between funding for construction and for

"What's at issue is the shaping of NCAM's programs so that they are responsive to the genuine needs of industry and to the benefit of overall national science policy," says Johnson. Because the NCAM project will take six years to complete at a cost of about \$174 million, Congress decided to proceed cautiously until all the reviews are completed.

Funding for new buildings for the Vitreous State Laboratory at the Catholic University of America in Washington, D.C., and for the National Center for Chemical Research at Columbia University in New York was not in the original proposed budget or even discussed in congressional committees. These items appeared without warning on the House floor during debate on the DOE appropriation bill. Neither project went through conventional channels that in-

research. "Historically, we have gone through peer review on research projects," he says. "There isn't a penny in here for research." Catholic University asked for \$13.9 million to build new facilities to house the laboratory, now in cramped quarters in several campus buildings. Litovitz adds, "What we're talking about here is a laboratory which has an international reputation. Our whole thrust is to get basic research into technology as fast as possible."

Columbia University needed a \$20 million building to replace crowded, outdated organic chemistry laboratories. A spokesman for Columbia, commenting on the unusual method used to

obtain funds, says it was "the only avenue open" for seeking funds from DOE so late in the budget process.

In the end, Congress awarded \$5 million to each of the construction projects providing that DOE conducts a thorough review before any money is spent. Louis C. Ianniello, DOE materials science division director, says, "There are some problems as the result of the procedure we went through. Usually it doesn't happen this way. I don't think everybody's decided how we're going to handle it." At the moment, DOE officials are waiting for guidance from the White House Office of Management and Budget.

—I. Peterson

Reagan approves plan to revamp the federal laboratories

A year-long review of the federal-laboratory system, unveiled by the White House July 15, outlined a number of "serious deficiencies" which the reviewers said were affecting both the quality and effectiveness of work done at these laboratories. The President was obviously impressed with the White House Science Council's analysis and the series of corrective measures it recommended. Following a July 12 briefing on the review panel's report, President Reagan authorized the Office of Management and Budget (OMB), together with the Office of Science and Technology Policy, to immediately begin implementing recommendations contained in the Science Council report.

An anticipated \$15 billion of next year's \$45 billion research and development (R&D) budget will go to support work conducted within the nation's more than 700 federal laboratories. But the review panel reports that largely as a result of management shortcomings, the United States is generally not getting an adequate return on its massive investment in these labs.

In terms of resource use, the panel found that laboratories with clearly defined missions performed better than those without. Performing best of all were those having both a clear mission and close interaction with the users of their research. As a rule, panel chairman David Packard said, Defense Department labs most often met these dual criteria.

For contrast, Packard pointed to three Department of Energy (DOE) weapons-oriented centers — Lawrence Livermore Laboratory, Los Alamos National Laboratory and Sandia Laboratories; all, he said, were ripe for mission redefinition. "A good deal of their effort was diverted to alternate-energy programs in the 1970s," the Hewlett-Packard board chairman said. He added that although considerable money was pumped into those areas then, "We did not get any mileage out of it." As a result, he said, "We're recommending that those laboratories increase their involvement with weapons."

Similar problems plague many of DOE's former nuclear laboratories, Packard said. Noting his panel would like to see the government do more materials-science work, he suggested materials could become "a very important new mission opportunity

... allocated to these laboratories."

Packard's panel also recommended:

- setting up an oversight committee for each laboratory — with university and industry representation — to monitor the lab's programs for productivity, excellence and appropriateness to mission.
- giving laboratory directors between 5 and 10 percent of their institution's budget for discretionary spending to encourage independent research. The oversight panel could adjust spending if it was found the independent programs selected did not spur sufficient innovation,
- using some discretionary money to fund relevant research at universities, en-

couraging labs to cooperate, not compete, with universities and industry,

- authorizing OMB to fund R&D programs on a predictable, multi-year basis,
- allowing laboratory size to increase or decrease (to zero, if necessary), depending on its mission and the quality of its work,
- appointing laboratory directors for a finite term which could be cut short or extended, depending on both the laboratory's and director's performance, and
- creating personnel systems independent of the Civil Service so that labs can offer more competitive salaries and can reward the best performers.

—J. Raloff

Rape season: Legacy of our past?

The males of many mammalian species, including higher primates, go through a predictable period of rutting—a seasonal period of sexual excitation accompanied by increased aggression—and scientists have wondered if men experience a similar rhythm, a vestige of our evolutionary past. A statistical analysis of rape reports from 16 locations has now revealed a clear cyclical pattern for crimes of sexual violence, and the authors of the study speculate that seasonal environmental cues such as temperature may indeed play a role in these periods of heightened sexual aggression.

Richard P. Michael and Doris Zumpe of Emory University in Atlanta analyzed two years of FBI crime statistics from 13 states and three large cities. Using census data, they calculated monthly rates for four crimes in each locale—rape, assault, robbery and murder—and (as they report in the July *AMERICAN JOURNAL OF PSYCHIATRY*) they found that in 14 locations rape peaked in the summer, specifically in the eight-week stretch from July 7 to Sept. 8. They also discovered a significant annual rhythm for assault, which also tended to peak in the summer months, but the other two crimes showed no such pattern: Robbery peaked in the wintertime, but in only five locations, while murder showed no seasonal pattern.

They also found that assault and rape were closely related; although rape was much rarer than assault, the relative magnitude of the two seasonal changes was

very close. In addition, the authors report, the magnitude of these changes was closely related to temperature changes in each location, a finding that lends support to the long-suspected link between temperature and human behavior.

However, Michael and Zumpe emphasize that the temperature-behavior link cannot be simply explained as a matter of hot weather facilitating aberrant social interaction. If that were the case, they note, geographical differences in temperature would also be expected to influence the rates for assault and rape, which they did not; locations such as Puerto Rico and Arizona had rape and assault rates comparable to those of Illinois and Maine. The old "thermic law of crime," which predicts increased human aggression in hotter climates, simply doesn't hold, the scientists conclude.

The summertime peaks for rape and assault suggest that sexual aggression is a subcategory of assaultive behavior—a behavior which, the authors speculate, may be entrained by environmental cues. Day length is known to act through the retina, brain and sex glands in triggering increased aggression at the start of mating season in many non-human primates, they say; and while the act of rape is certainly something different from natural mating behavior, they add, the involvement of the neuroendocrine system in seasonal patterns of human aggression is consistent with what is known of other social animals.

—W. Herbert