The Reagan Budget: More of the Same

Defense R & D and basic research are slated for large increases, but life sciences would get little growth

The election year budget that President Reagan submitted to Congress on 1 February deviates little from the Administration's previous spending blueprints. At a time when deficits are growing and a tight squeeze is being placed on nondefense spending, outlays on R & D are slated to rise substantially. Military programs account for the lion's share of the increases for science and technology, and the physical sciences and engineering are accorded especially favorable treatment. The life sciences, however, are given relatively short shrift.

The Administration is proposing to spend a total of $53.1 billion on R & D in fiscal year (FY) 1985, a 14 percent increase over current spending levels. But military programs, including those managed by the Department of Energy (DOE), would claim some $36 billion, or almost 70 percent of the total. The Department of Defense (DOD) alone is planning for a 22 percent increase in spending on science and technology. In contrast, nonmilitary R & D would remain at about this year's level, which means that after inflation is taken into account, it would decline in real terms. The Administration is forecasting a 4.9 percent inflation rate.

As in previous years, however, the overall figures mask a strong underlying trend. The Reagan budget again proposes substantial increases in support for basic research, while cutting back heavily in funding for some areas of applied research and development. Energy programs in particular would once more bear the brunt of the cuts. If these proposals hold up as the budget goes through the congressional mill, basic research would for the first time be the largest single component of the federal budget for nondefense R & D. In the late 1970's, support for basic research represented a relatively small fraction of the total (see chart).

The physical sciences and engineering would, however, get a disproportionately large share of the basic research increase. They are scheduled for a 14 percent rise, compared to a 5 percent boost in the life sciences. As a result, several new programs would be started in the physical sciences, but only one—an agricultural biotechnology program funded by the Department of Agriculture—would get the green light in the biological sciences. The new programs include the much-ballyhooed space station, two particle accelerators, three long-awaited research satellites, an array of radiotelescopes, and a feasibility study for deep drilling of the continental lithosphere.

George A. Keyworth, II

"In spite of the huge deficits, this is an absolutely urgent area of attention."

These proposals have confounded one of the worst fears raised by some scientists—that the relatively generous increases in last year's budget would not be maintained in future years as the federal deficit balloons. They have, and George A. Keyworth II, President Reagan's science adviser, is characteristically ebullient. In an interview with *Science*, he said "we have now got to convince the Congress that in spite of the huge deficits that this is urgent—not because the scientific community is entitled to it, but because the availability of talent and new ideas is by no means certain." In an election year when support for high-technology industry is expected to be at least a minor political theme, these increases should not be difficult to sustain. But in the future, it may be hard to convince both the Office of Management and Budget and Congress that science and technology should be given special treatment in the face of mounting deficits.

Congress will, however, make some modifications to this year's proposals. As in previous years, the Pentagon is unlikely to get the massive increase it is seeking, and some of the proposed cuts in nonnuclear energy programs are expected to be denied. And the Administration's parsimony toward the life sciences will not be matched by Congress. A repeat of last year's performance, when the Administration proposed zero growth for the National Institutes of Health (NIH) and Congress came through with a healthy 10 percent boost, is expected.

Another area of contention is likely to be support for science education. Bills are pending in Congress that would provide a huge boost in funding for the National Science Foundation's (NSF) education programs, but the Administration has proposed the same level as this year, about $75 million. Keyworth says his office has spent more time on this issue than any other, yet he predicts that "this year we are not going to be able to spend all the money we have in the foundation because there is a lot more will than ideas." The Administration has not yet determined the appropriate federal role in improving science education, but, says Keyworth, "we continue to hold it as a high priority and we are frantically trying to keep up with what is happening across the country and be responsive to it." Democratic candidates for the Presidency are certain to ensure that it remains a live issue.

The following are among the highlights in the proposals:

• **Space Science**. The major glamor item in the R & D budget is the Administration's endorsement of NASA's long-term goal of putting a manned space station into orbit. A downpayment of

$150 million has been proposed for a project that could ultimately cost between $8 billion and $20 billion. The initial funding will support design studies, with the first launch of components by the space shuttle in the late 1980's.

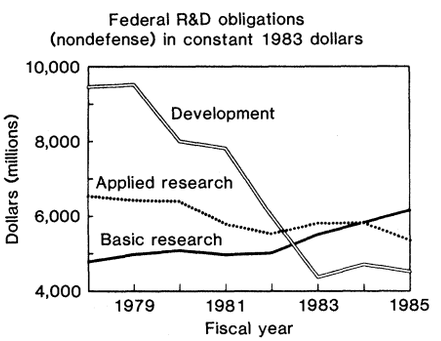
NASA had a tough time selling its plans to the White House. DOD, which has very little military use for a space station, vigorously opposed the project, according to White House sources, and Keyworth himself initially expressed a great deal of skepticism. "I found it very hard to be a strong supporter of the space station when there was no definition of what we were going to do—when its sole goal was permanent manned presence [in space]," Keyworth says. What changed his mind? When it became clear that many people "especially the President" looked at the space station as a way to achieve new goals, such as further exploration of the moon and Mars, rather than as an end in itself, Keyworth says. As for the argument that the space station can be justified as a base for industrial manufacturing, Keyworth says "many of the proposed manufacturing arguments . . . when we examined them in detail just plain lack credibility."

Several space scientists have recently voiced fears that the massive outlays on the space station, coming at a time when overall budgets are likely to be tight, will squeeze out many worthwhile science projects, just as spending on the shuttle crimped space science in the 1970's. In response, Keyworth points to three new projects that have been given the green light this year as evidence of the Administration's commitment to science at NASA. The three projects are a $325-million Mars Geoscience/Climatology Orbiter, a $650-million Upper Atmosphere Research Satellite to investigate the chemical composition of the upper atmosphere, and a $125-million Scatterometer experiment to measure global wind patterns on the surface of the oceans.

• **High Energy and Nuclear Physics.** Once again, DOE has been given a substantial boost in support for the construction and operation of particle accelerators and other nuclear physics facilities. The major new item in this area is construction of an electron accelerator at Newport News, Virginia, for nuclear physics research. The project will be managed by the Southeastern Universities Research Association, a consortium of universities whose design was chosen over a proposal by Argonne National Laboratory.

DOE has also given the go-ahead for a heavy ion accelerator at Brookhaven National Laboratory—an infusion of new funds that will provide a little relief after the cancellation last year of the Isabelle accelerator at Brookhaven. The new accelerator will be a modification of an existing machine, the alternating gradient synchrotron. Brookhaven officials are now hoping that they can link the new accelerator with a heavy ion accelerator that they would like to build in Isabelle's abandoned tunnel for a cost of $200 million.

As for the next generation of high-energy accelerators, the budget provides for continued design studies of a superconducting super collider, a behemoth with a circumference of perhaps 100 miles. A decision on whether to build the machine is expected in about 3 years' time.



Basic research is set to be the largest single component of the nondefense R & D budget. The Reagan Administration has accelerated trends changes that began in the late 1970's.

• **Biological Sciences.** Until Congress comes to the rescue, NIH is planning for a budget of $4.6 billion, an increase of just under 2 percent, or about 3 percent less than the expected rate of inflation. Nevertheless, NIH officials are planning to keep the promise made during the Carter Administration to fund 5000 new and competing grants. They have also decided not to renew the battle this year on overheads paid to universities receiving NIH grants. Last year, NIH proposed paying only 90 percent of the indirect costs; this year the plan is to pay them in full.

One bright spot in the proposals for biological sciences is a boost in the competitive grants program at the Department of Agriculture to $50 million. That still represents only about 5 percent of the department's R & D budget, however. Within the competitive grants program, the Administration is planning to spend $28.5 million on biotechnology.

• **Defense.** The bulk of the huge increase proposed for military R & D will go to applied research and development of new weapons systems, such as the MX and Trident II missiles, the B1 bomber, and an advanced cruise missile. Basic research supported by DOD is scheduled to rise by 15 percent, from $815 million to $939 million.

One area being billed as a major new thrust is ballistic missile defense—the so-called star wars idea advanced by Reagan last March. Spending in this area is scheduled to rise from about $1 billion to some $1.8 billion. Even that increase, however, falls short of the level recommended recently by a panel headed by former NASA Administrator James Fletcher. Keyworth says, however, that he expects spending in this area to increase rapidly in future years. "We have spent the last 10 months trying to answer the fundamental policy questions and we haven't really built a program yet."

• **National Science Foundation.** The proposals for NSF closely parallel last year's budget. Overall, NSF is scheduled for a 13.6 percent increase, to $1.5 billion, with the bulk of the addition going into support for the physical sciences and engineering. Among the major new items in the budget are a start on the Very Long Baseline Array of radiotelescopes, an array of instruments at fixed locations in the United States that will provide extremely high resolution. In essence, signals picked up by instruments in the array will be synthesized as though the individual telescopes were part of a continent-sized dish. This year's budget contains $15 million for the first installment toward the projected cost of $64 million.

NSF is also proposing to initiate a $10-million program to support multidisciplinary engineering centers at universities, and it plans to spend $20 million to improve academic researchers' access to supercomputers.

• **Energy.** The big change in the budget for energy research this year is elimination of construction funds for the Clinch River Breeder Reactor, which was axed by Congress last year. In most other respects, however, the energy budget closely follows previous years, with cuts or no growth planned for research on fossil fuels and renewable energy.

The National Center for Advanced Materials, a proposal that first appeared in DOE's budget last year although it was not subjected to the usual peer review, has been budgeted $10.8 million for FY 1985. However, it has been renamed the Berkeley Center for Advanced Materials, and no decision has been made on whether it will house the synchrotron light source that was the centerpiece of the original proposal.

—COLIN NORMAN