Bush Budget Highlights R&D

Big increases are proposed for selected areas of science and technology—especially the space program—in an otherwise austere budget, but prospects in Congress are uncertain

LIKE A PROUD FATHER displaying his first offspring, D. Allan Bromley, President Bush's science adviser, introduced the Administration's 1991 budget to a packed press conference on 29 January: "I think we have, in a difficult budget year, a document relating to research and development that is excellent," said Bromley.

At a time when much of the federal budget is under severe stress, the Administration is proposing a 7% increase in government spending on R&D in fiscal year 1991. That would bring the total to $68.1 billion, with another $3.1 billion budgeted for research facilities.

Big science would be a big winner. The National Aeronautics and Space Administration, for example, would get a $2.8-billion increase, in part to start bending metal for the space station and to prepare for its next megaproject—exploration of the moon and Mars. The Administration is proposing an $850-million boost for the Strategic Defense Initiative (SDI). The budget for the Superconducting Super Collider (SSC) would climb by $100 million. And biomedicine's entry into the big science league, the Human Genome Project, would almost double in funding, from $87 million to $154 million.

Some areas of little science would also share in the largess: The National Science Foundation would see its funding soar by 14%, to $2.38 billion, and basic research across the federal government would get an 8% increase (see chart).

BASIC RESEARCH

Department or Agency	BUDGET AUTHORITY (Dollar amounts in millions) 1990 Enacted	1991 Proposed	Dollar change	Percent change
HEALTH AND HUMAN SERVICES	4,714	4,993	+279	+6
NATIONAL SCIENCE FOUNDATION	1,651	1,853	+202	+12
ENERGY	1,512	1,658	+146	+10
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	1,596	1,823	+226	+14
DEFENSE-MILITARY	924	978	+54	+6
AGRICULTURE	511	553	+42	+8
OTHER AGENCIES	489	508	+19	+4
TOTAL	11,398	12,366	+968	+8

SOURCE: OMB

But Bromley's enthusiasm is not likely to be shared in some parts of the federal R&D enterprise. The National Institutes of Health, for example, would get an increase barely sufficient to keep pace with inflation—even though its proposed total includes a modest boost for research related to acquired immunodeficiency syndrome (AIDS). And, like its predecessor, the Bush Administration would like to take the knife to some of the National Oceanic and Atmospheric Administration's research programs.

In many respects, the first complete Bush budget follows fiscal blueprints for R&D drawn up by the Reagan Administration. But there are a few notable departures. For the first time in more than a decade, the budget includes a far bigger increase for civilian R&D than for military R&D—12% and 4%, respectively. During the Reagan years, the military's share of federal R&D spending expanded from half to two-thirds of the total. Congress has begun to shift the balance back in the past 2 years, and the Bush Administration's proposals would continue the trend. But even so, defense-related programs would still claim 60% of all government research dollars.

The Administration is also trying to put its stamp on federal science and technology with a few new initiatives of its own. It is requesting an additional $50 million to double the size of the competitive grants program at the U.S. Department of Agriculture (USDA) and is promising $50-million installments in future years. It is also planning a major increase in federal support for research on the politically prominent topic of global change. With a collection of high-tech NASA satellites known as the Earth Observation System as its centerpiece, global change research would pass the $1-billion-a-year mark next year (see chart, p. 518).

All these proposals should be taken with a large grain of salt, however, for they are embedded in a budget that will be unpalatable on Capitol Hill, especially during an election year.

Looming over the whole enterprise is the dreaded Gramm-Rudman-Hollings deficit reduction law. It will trigger automatic, across-the-board cuts next fall unless the projected federal deficit in fiscal 1991 is reduced to $64 billion. That's a tall order, for the 1990 deficit is currently expected to end up around $123 billion.

The Administration is seeking to get under the Gramm-Rudman ceiling without raising taxes, mostly by restraining growth

BIG SCIENCE SCORECARD

	1990 Enacted	1991 Proposed
STRATEGIC DEFENSE INITIATIVE	3,819	4,663
SPACE STATION	1,928	2,627
MOON/MARS INITIATIVE	859	1,267
SUPERCONDUCTING SUPER COLLIDER	218	318
NATIONAL AEROSPACE PLANE	254	277
HUMAN GENOME PROJECT	87	154

A few of the projects featured in the budget. (The aerospace plane is now part of the Moon/Mars Initiative.)

in many politically popular programs, such as Medicare and farm support payments. Congress is sure to balk. In particular, in spite of all the talk of a "peace dividend" from the political changes in the Soviet Union and Eastern Europe in recent months, the defense budget is slated to grow, from $301.6 billion to $306.9 billion. Though the increase falls short of the projected 4.2% inflation rate, many defense critics are looking for much more substantial defense savings that they can apply to civilian programs.

How the R&D proposals will fare in the next few months as the overall budget is broken up and distributed among myriad committees on Capitol Hill is anybody's guess. But if past years are anything to go by, it is worth noting that Congress has generally added a little to the overall amount requested for civilian R&D—especially for biomedical and environmental research—and trimmed from the defense side of the ledger.

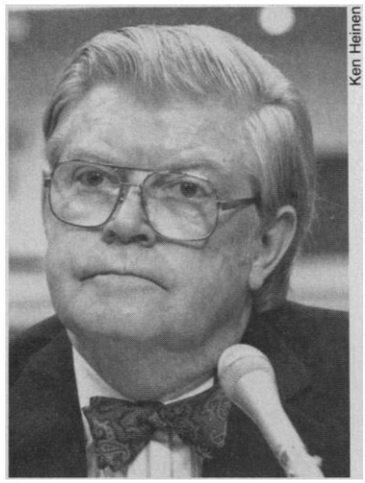
The big increases proposed for NASA and NSF could face some difficulty this year, however, in part because they fall under the jurisdiction of appropriations subcommittees in the House and Senate that also handle funding for the Department of Housing and Urban Development. That puts their programs in direct competition with housing programs that are slated for surgery in the Bush budget but are likely to be protected by the Democratic Congress. In fact, that's exactly what happened last year, and Congress ended up trimming the requests for both NSF and NASA.

Nevertheless, the budget delivered to Capitol Hill this week will be the starting point for the upcoming debate. The following are among the highlights for R&D.

■ **Biomedical research.** There used to be a long standing tradition in Washington that the Administration (whatever its political stripe) would propose little or no budget increase for the National Institutes of Health, safe in the knowledge that Congress would always come to the rescue. This year, the Administration has changed the script a little.

It has proposed a small increase of 4.7%, from $7.58 billion to $7.93 billion, just enough to keep NIH ahead of inflation. That would also permit NIH to fund 5095 new and competing grants in 1991, 462 more than it expects to fund this year. But since the agency was funding more than 6000 new grants a few years ago, the 1991 figure is unlikely to prompt much elation in the biomedical research community.

The picture, moreover, is skewed a little by the continued growth in funding for AIDS research and the Human Genome Project. Some $800 million of the total would be spent on AIDS research in 1991, up from $744 million this year, and NIH's share of the genome project would rise from $57 million to $108 million. Everything else would get an increase of only 3.7%—not enough to keep up with inflation, notes acting NIH director William Raub.



"Excellent" for science. *Bromley accentuates the positive in describing the big increases proposed for R&D.*

The Alcohol, Drug Abuse, and Mental Health Administration is in a similar situation. Its research budget is slated to increase by 5.3%. But since the average cost of individual grants is also rising, it will end up funding only 20% of non-AIDS–approved grants in fiscal 1991, down from 33% this year.

Will Congress come to the rescue? It may be harder this year than in previous years for NIH's friends on Capitol Hill to deliver a big increase because of the mounting pressure to slash the deficit. Even last year, in spite of some dire warnings from biomedical scientists about the looming crisis in funding new grants, Congress approved only a modest increase, amounting to less than 6%.

■ **Defense.** The changing international political climate is not reflected in the overall level proposed for defense R&D. Military programs, including those funded by the Department of Energy (DOE), would account for $41.4 billion in fiscal 1991, a 4% increase from the $39.9 billion that will be spent this year. More than 90% of the total would be devoted to advanced development and engineering, most of it related to specific weapons systems.

By far the biggest single R&D program is SDI. A total of $4.66 billion has been proposed for fiscal 1991, including some $192 million to be spent by DOE, mostly for x-ray laser work. That's about the same amount as requested for SDI in fiscal 1990, but it is $850 million more than Congress actually approved.

Indeed, for the first time since President Reagan launched SDI in 1983, Congress actually cut the appropriation below the previous year's level. Undaunted, the Pentagon has come back with a request for 1991 that would provide big increases for kinetic energy weapons and a surveillance satellite that would be key elements in the first phase of a strategic defense system. According to SDI officials, 52% of the proposed budget would be devoted to near-term applications, up from 44% this year. Congress, however, seems even less disposed this year than last to grant any increases in SDI.

Other major R&D programs include $1.57 billion for the B-2 "Stealth" Bomber, $758 million for modernizing intercontinental ballistic missiles, $283 million for an advanced technology fighter, and $187 million related to the new SSN-21 nuclear attack submarine.

As for basic research, the Pentagon is proposing an increase of about 6%, which would bring the total to $977 million. Included is $98 million for the University Research Initiative, a program launched in

GLOBAL CHANGE RESEARCH

Department or Agency	BUDGET AUTHORITY (Dollar amounts in millions) 1990 Enacted	1991 Proposed	Dollar change	Percent change
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	489	661	+172	+35
NATIONAL SCIENCE FOUNDATION	55	103	+48	+87
ENERGY	50	66	+16	+32
AGRICULTURE	21	47	+26	+124
COMMERCE (NOAA)	18	87	+69	+383
INTERIOR	13	44	+31	+238
ENVIRONMENTAL PROTECTION AGENCY	13	26	+13	+100
TOTAL	659	1,034	+375	+57

1986 to build new bridges between the Pentagon and academe. It has hovered around that level for the past 3 years.

During the Reagan defense buildup, basic research slumped from about 4% of total defense R&D to a little over 2%. Science adviser Bromley says he would like to see the Pentagon put an increasing share of its research dollars into basic research as the Cold War thaws: "It seems to me critically important to maintain our defense basic research so as not to be technologically blind-sided."

■ **Space.** If there is one area of the federal budget that stands out in stark relief from the general fiscal austerity, it is the space program. NASA would get a budget of $15.1 billion, up from $12.3 billion this year.

A total of $2.6 billion would be spent on the space station, and for the first time some of the funds would be used to procure long lead-time hardware. The first parts of the station are scheduled to be lofted in early 1995, with permanent manned capability now scheduled for 1997. Assembly should be completed by 1999, all for $30 billion (including transportation).

NASA's budget also reflects the Administration's goal, enunciated by President Bush in a speech last July, to prepare the way for manned exploration of the moon and Mars. An agglomeration of programs, lumped together under the rubric of the Human Exploration Initiative, would begin developing some of the requisite technologies. The budget for fiscal 1991: $1.3 billion, a $408-million increase over this year's expenditure of $859 million.

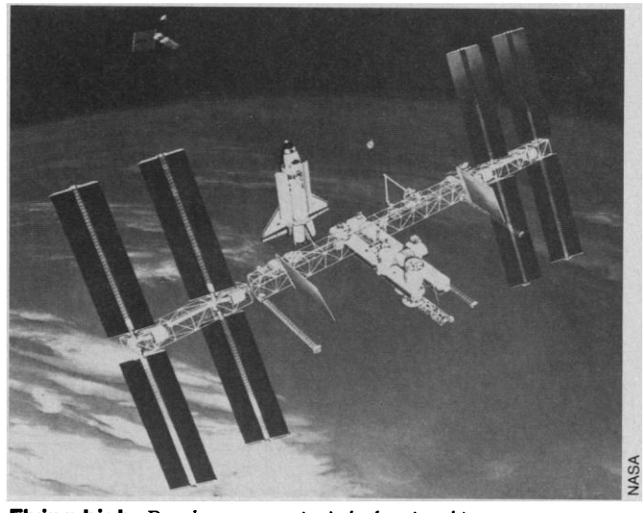
It is not clear how the space station—described by NASA Administrator Richard Truly as "the cornerstone of our space program in the 1990s and beyond"—will mesh with the Human Exploration Initiative. That is currently under study, according to the Office of Management and Budget.

■ **National Science Foundation.** Three years ago, the Reagan Administration pledged to double NSF's budget by 1992. But NSF's funds have grown from $1.7 billion in fiscal 1987 to just $2.08 billion in 1990. Nevertheless, NSF director Erich Bloch points to the increase proposed for next year—a 14.4% jump to $2.38 billion—as evidence that the Bush Administration supports the goal. It will now be achieved in 1993, he says.

NSF's research programs would get an 11% increase, to $1.81 billion, while a collection of programs aimed at improving science education and increasing the supply of scientists and engineers would grow by 30%, to $463 million. NSF's education directorate, which is included in the $463 million, would get a 23% increase, to $251 million. Congress has traditionally upped NSF's education funds, often at the expense of research support; this year, the foundation itself has come in with a big increase.

The research increases include $103 million for NSF's share of the global change initiative, an extra $25 million to fund 10 to 12 new science and technology research centers, and the first installments on two new astronomy facilities: the Laser Interferometer Gravitational Wave Observatory and a pair of 8-meter optical/infrared telescopes, one in each hemisphere.

■ **Department of Energy.** Support for research conducted by the Office of Energy Research would climb by $302 million to $2.65 billion in fiscal 1991. The largest share of this increase—$100 million—would go to the Superconducting Super Collider, which would wind up with a total of $318 million. The project may also receive another $200 million in funding from the state of Texas, which has pledged $1 billion in cash payments to the project. Energy Secretary James Watkins has confirmed that the cost of the accelerator could be $1 billion to $2 billion more than the $5.9 billion cited by DOE in the 1990 budget proposal it sent to Congress a year ago. Nevertheless, Watkins says he agrees with a panel of physicists that recently recommended against reducing the SSC's performance to shave costs.



Flying high. *But the space station's budget is a big target.*

Funding for the rest of high-energy physics would not be so rosy under the Bush proposals, with only a 6.7% increase in the budget for operations and construction at other accelerator facilities. Nuclear physics would fare better, getting a 14% increase. Included is $15 million to start construction of the Relativistic Heavy Ion Collider at Brookhaven National Laboratory.

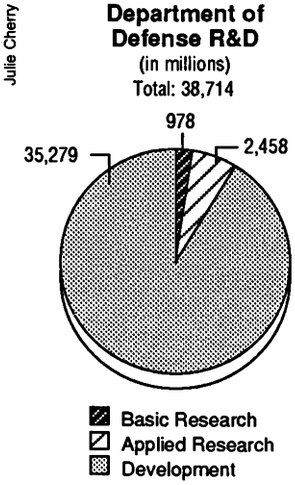
Basic energy sciences R&D also is slated to rise significantly by 13.8% to $649 million. Research efforts in materials science and chemistry are expanding. But a sizable chunk of the program's overall increase, some $21 million, is reserved for the construction of new synchrotron light research facilities at the Lawrence Berkeley Laboratory and Argonne National Laboratory.

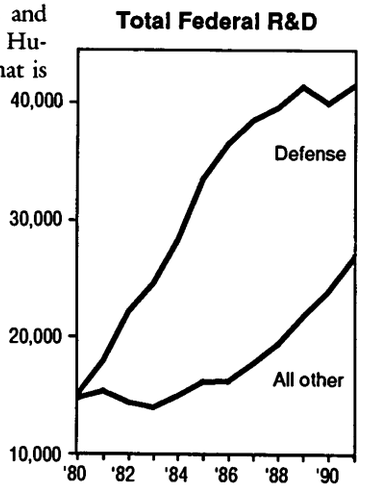
DOE's magnetic confinement fusion research program would be held to $325.3 million, a $5-million increase. Construction of the Compact Ignition Tokamak is on hold, pending completion of a formal independent review of the project.

The same might be said of the Bush Administration's entire budget as it winds its way through a series of reviews on Capitol Hill over the next 8 months.

■ COLIN NORMAN

With reporting from Mark Crawford, Richard Kerr, Joseph Palca, Marjorie Sun, and M. Mitchell Waldrop.





Turnaround. *Civilian R&D is rising more steeply than defense. (Defense above includes some energy programs.) Less than 3% of DOD's R&D is basic research (left).*