Science for '75: Largest R&D funding ever proposed

Are good times ahead for science and technology in the United States? The President's science adviser, H. Guyford Stever, thinks so, at least in comparison with the relatively austere period that followed science's golden era of the early 1960's.

Stever says he thinks the nearly decade-long period during which "society as a whole" seemed to be calling for a "leveling off" of the rapid growth of science and technology is over. Now he senses a rebirth of public support for science and technology, in large part a result of the energy crisis.

"I personally think we're through with that [earlier] period. . . . I don't think things are going to turn around to a great golden era, but I honestly believe there is a major movement that will help science and technology."

Already, Stever says, the unemployment rate for engineers, one measure of the health of science and technology, has dropped to 0.6 percent. The last time it was that low was in 1965, at the height of activity for the Apollo program.

Stever made his comments after outlining the largest research and development budget ever proposed by the Federal Government. It calls for an increase of $1.7 billion in funds for federally sponsored R&D during fiscal 1975 (starting this coming July 1). If approved by Congress, this would be the largest dollar increase in more than 10 years and a 10 percent rise over 1974 levels. Overall, the R&D program amounts to $19.6 billion, up from $17.9 billion in fiscal 1974.

The increases must be viewed with caution. All or nearly all the rise in the Federal R&D budget (depending on which sets of figures you use), is absorbed by bolstered support in just two areas—defense and energy. Defense R&D is slated for an increase of $1 billion, to $9.58 billion. Energy R&D is slated for an increase of $816 million, to $1.8 billion (see adjacent article).

Still the bolstered research and development program will bring benefits to many areas of science. The National Science Foundation, the main agency for support of basic science, is allotted $788 million in the budget, up $142 million. Included is a 25 percent increase in scientific research project support. This establishes "the most vigorous program of basic research in the science disciplines in the foundation's history," says NSF Director Stever. The scientific fields receiving the largest increases are chemistry, engineering and materials research—areas strongly related to energy research.

The Very Large Array radio astronomy facility being constructed in New Mexico receives $13 million (up $8 million) in NSF's budget. This will restore the construction schedule after a cutback last year. "We would like a partial working capability in calendar 1976," says Stever.

The largest reduction at NSF is $11.3 million from the experimental R&D incentive program. All experiments begun in the first two years of the program have been fully funded to completion, but no new ones will be started.

For medical research and development (the majority of it at the National Institutes of Health), actual expenditures would rise to $2 billion in fiscal 1975. But authorizations—indicators of future spending—are down for all member institutes except those for heart disease and cancer.

Social research and development is to be funded at $835 million, about even with fiscal 1974. Included are funds for continuing social experiments in three areas: health insurance, income maintenance and housing allowances. □

CONDUCT OF R&D (MILLIONS)

Department or agency	Obligations 1974 estimate	Obligations 1975 estimate
Defense—Military functions	8,573	9,581
National Aeronautics and Space Administration	3,309	3,122
Health, Education, and Welfare	2,332	2,228
Atomic Energy Commission	1,429	1,702
National Science Foundation	530	654
Transportation	358	396
Agriculture	393	412
Interior	287	510
Commerce	210	266
Environmental Protection Agency	174	336
Veterans Administration	85	94
Housing and Urban Development	65	70
Justice	52	56
All other	132	128
Total conduct of research and development	17,930	19,556

Energy funding

In keeping with President Nixon's pledge to commit $10 billion to energy research and development over the next five years, Federal funding of projects directly related to energy is scheduled to nearly double in fiscal 1975 to $1.8 billion—about 10 percent of the R & D budget. Approximately $216 million of related basic research, manpower development and study of environmental effects is also being proposed.

The biggest winners in the energy sweepstakes are coal and breeder reactors, with budget allocations for coal research more than doubling to $565.8 million. About half the coal research funds will support Department of Interior programs aimed at producing clean-burning synthetic fuels from high-sulfur coal. Much of the breeder reactor funding will go into development of a liquid metal fast breeder-reactor demonstration plant in the 350-400 megawatt range.

The search for alternative energy sources will get only about half the support given to coal or breeders—$236.8 million altogether. The largest slice will go to fusion research, where the Atomic Energy Commission is funding two new tokamaks. The Doublet-3 tokamak of Gulf Atomic Corp. will test scaling laws to see if a large fusion device acts in a manner predicted by experience with smaller machines. The TDX tokamak at Princeton will introduce a "diverter cleaner" to remove im-

Space budget shows increase

With the splashdown of Skylab, only a single U.S. manned space flight—the Apollo-Soyuz rendezvous with the Soviet Union—remains until 1979. Yet the budget for the National Aeronautics and Space Administration calls for the first overall increase in space spending in eight years.

The Administration's proposed budget of $3.25 billion for NASA would provide an increase of about $207 million over fiscal 1974. If approved by Congress, this would mark the end of a downward trend that has lasted ever since fiscal 1965, when the monumental development costs of Apollo began to taper off.

The space shuttle is the cause of most of the increase, with a proposed boost of almost 70 percent to $800 million. This is less than the agency

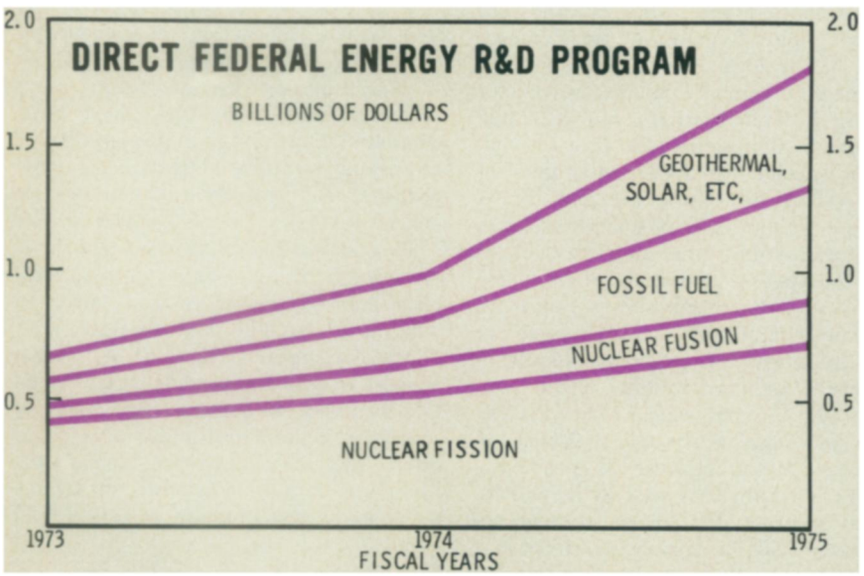
nearly doubles in new R&D budget

purities that have plagued contained plasmas.

Laser fusion will receive $10 million for unclassified research, but a separately funded military laser fusion program has been allocated $56.3 million. When questioned by SCIENCE NEWS about the significance of this apportionment, AEC Chairman Dixy Lee Ray replied that both funds will support basic research that could result in a new source of power for civilian use, but that much of the technology involved is classified. These allocations do not include high-energy laser programs of the Department of Defense.

Under the aegis of the National Science Foundation, $50 million has been allocated for solar-energy development. The immediate goal is demonstration of technological feasibility of solar collectors for use in the heating and cooling systems of buildings. Geothermal energy development was allocated $44.7 million, spread among several agencies.

Though the thrust of energy R & D has supposedly been to achieve energy self-sufficiency by 1980, in accordance with President Nixon's "Project Independence," Dixy Lee Ray told reporters the project's goal was "not well defined" and spoke instead of developing the "capability" of self-sufficiency.

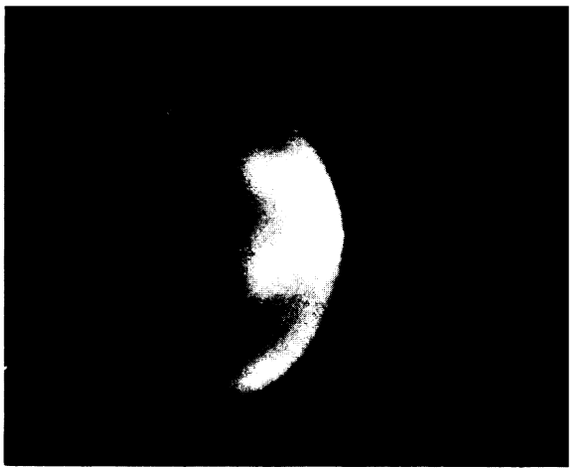


had asked for, and requires delaying the shuttle's first manned orbital flight four to six months until the second quarter of 1979, but NASA Administrator James Fletcher says he has a "firm commitment" in the form of "a piece of paper from OMB" that there will be no more cuts after this in the program's development budget. The Apollo-Soyuz mission, a single flight in 1975 in which political hopes will outweigh scientific experiments, will require only a slight increase, from $90 million to about $115 million.

Several new projects are getting their start in FY 1975. The largest is the Pioneer Venus program, which will send two spacecraft to the cloudy planet in 1978. One will study the atmosphere from orbit; the other will launch four probes to gather data all the way down to the surface (they will be soft-landers, although their survival on the surface is not a required part of the mission).

Two earth-orbiting satellites—Seasat and HCMM (Heat Capacity Mapping Mission)—will perform high-resolution monitoring of global ocean conditions (including wave height differences as small as 10 centimeters) and thermal variations (up to 10 times as accurately as the Earth Resources Technology Satellite) respectively. Seasat will be launched in 1978; the HCMM, in 1977.

The first large infrared telescope ever built will be constructed at a planned cost of $6.04 million on 14,000-foot Mauna Kea in Hawaii, chosen for its relatively low "sky noise." Although only a few parts of the infrared band can be seen through the atmosphere, the three-meter instrument is expected to offer much higher resolution than is available from smaller, satellite-borne instruments. Besides gathering data for the Mariner Jupiter-Saturn mission in 1977, it will be used in studies of galactic clusters, stellar origins and other phenomena. □



NASA

UV photo of Venus clouds from earth.

Scientists jubilant over early Mariner-Venus data

Venus was just a "secondary objective," a fortuitous skyhook whose gravity would pull the Mariner 10 spacecraft around on the vicarious first journey to Mercury, the solar system's tiniest planet. Plenty of probes had visited it before, yet for the same reason that it is the brightest world in the sky, Venus has remained a mystery.

Clouds. Seen by earthbound eyes, a blurred, impenetrable, featureless ball of fluff, refracting the light of the sun to brilliance—with Venus somewhere underneath.

Mariner 10 this week at long last provided the first close look. Mariner 10 is the first of all those spacecraft, American or Soviet, to take cameras along. One of its predecessors, Mariner 5 in 1967, first suggested that there might be something to see besides that featureless fluffball. The radio signal from Mariner 5 was bent and slowed by the Venusian atmosphere in a way that suggested the possibility of structural variations in the clouds, perhaps in the form of layering.

Earth-based photos by ultraviolet light, invisible to the unaided eye, showed vague blotches which some astronomers have guessed to be vast storms, interesting not only in their own right, but as indicators of the atmosphere's motion. Radar studies at Jet Propulsion Laboratory (which is controlling Mariner's flight) determined that Venus is rotating backwards from most of the other bodies in the solar system, taking about 243 days for a single "day." The atmosphere goes with it, but the stormlike features have suggested that the clouds are moving perhaps 50 times faster than the planet beneath.

The earliest photos this week from Mariner 10, taken of the planet's edge less than half an hour before the esti-