whereby the United States will target some of its missiles at Soviet missile silos, instead of just at cities, the purpose being to facilitate a less than all-out nuclear exchange. To underline the message, the FY 1975 budget requests funds for "more accurate missile guidance systems, higher yield warheads, and a new stand-off cruise missile for air launched delivery. . . . Later decisions to produce and deploy these weapons will depend on the outcome of ongoing SALT negotiations." More accurate guidance systems and higher yield warheads are not needed for destroying Soviet cities; their only purpose can be to threaten the other side's missile silos.

Research and development expenditures for strategic weapons include $649 million for the Trident submarine's missile (up from $528 million last year), $143 million for the Minuteman III missile, a MIRVed version of the Minuteman I which it is fast replacing, and $40 million for a phase array radar to warn of a sea-launched missile attack. The SALT agreement limited ABM systems to two sites, an arrangement which proponents of a complete ban said would lead to intensified research on improving the allowed installations. So it has come about. In addition to $61 million being spent on RDT&E for the ABM system at Grand Forks, North Dakota, the Defense Department plans to lay out $160 million (up from $110 million last year) on general research for ABM defense of missile sites. This, presumably, is the insurance tab for seeing the Soviets have an interest in renewing the ABM agreement when its present term expires. The purpose of the research funds is described as being "to develop an option for a more effective defense of the Minuteman force, should such a defense be required in the future."

Building or threatening to build new and more frightening weapons may indeed encourage the Soviets to try and negotiate them away. On the other hand it may also encourage them to develop counter weapons of their own. According to former Assistant Secretary of the Treasury Murray L. Weidenbaum, between 1957 and 1970 81 major weapons were canceled after $12 billion had been spent on them. Waste apart, Weidenbaum says he "can think of nothing that reduces our national security more than building a new weapon that does not work or is abandoned, but which nevertheless evokes a strong response by a rival power."

The Pentagon budget briefing is more an occasion for window dressing and flip chart artistry than explanation of what the Defense Department is doing and why. This year's briefing was entrusted solely to accountants, headed by Assistant Secretary of Defense (comptroller) Terence E. McClary, who unanimously refused to address any questions about the significance of the figures they were purportedly explaining. Asked why the Trident submarine program had been slowed down and then speeded up again within the last few months, McClary gave the illuminating answer, "Yes, we have gone in two ways—these are the dynamics of decision-making in the Pentagon." The dynamics of public image making in the Pentagon have also gone two ways with this year's budget. To the public and Congress the Defense Department is claiming it has less real money than ever before; to the Russians the message is that they will have to match another costly round in the strategic arms race unless they behave well at the SALT negotiating table.—NICHOLAS WADE

Science Foundation

"The energy crisis has rallied attention to the importance of research and development to society," said H. Guyford Stever, director of the National Science Foundation (NSF) and the science adviser to the President, at a press briefing on the proposed 1975 budget for NSF. Indeed, the nation's basic research agency fared well during the budget preparation process; it is seeking a record $788.2 million in obligations, or 13.5 percent more than it was awarded last year, and $675 million in actual outlays, also a 13 percent increase. Energy, basic research, and science policy are to be the big gainers; other NSF programs are merely holding even or are getting minimal increases.

In recent years, NSF has often received increases when the research budgets of other agencies—such as those in defense and space—have been cut. Then, NSF's added funds were to pay for picking up projects discarded by these sponsors. This year, however, NSF seems to have won its increase on its own merits—and perhaps this has occurred in part because, for the first time, its director has had an inside track to the budget-makers through his new role as science adviser to the government. As someone at the briefing quipped on the favorable new NSF budget: "It appears that the director of the National Science Foundation has been talking with the President's science adviser."

The new budget would make a total of one-third, or 32 percent, of NSF's activities relate to energy. They would include programs for training students and technicians, expanded international energy research, energy policy studies, and an expansion of NSF's lead role in the solar energy field. But the energy increments would also boost NSF's principal basic research program of Scientific Research Project Support (SRPS). Of the proposed $363.7 million in obligated funds for SRPS, fully 36 percent would be for energy-related projects.

The politically visible applied program of Research Applied to National Needs (RANN) would receive a doubling of its 1974 obligations, or $148.9 million. Of this, 69 percent will go for energy-related projects. The new energy research and development policy office, set up last year to assist Stever in his science advisory role, would rise from $2.5 million in fiscal 1974 to $4.5 million. One-quarter of the $12.7 million obligation for graduate student support would be for additional energy fellowships. Finally, NSF claims an added $4 million to help administer its energy-related programs.

All this emphasis on energy has very much the air of a crash program, and it raises the question of whether the energy funds are being taken from other activities. NSF officials say that the energy thrust is not gouging other programs. First, in SRPS they say existing research projects will simply continue, with additional energy funds, because they have been magically labeled energy related. Second, SRPS's nonenergy research is receiving an independent increase of approximately 9 percent. Together, these raises result in very favorable increases in several basic science disciplines: chemistry (42 percent); earth sciences (29 percent); engineering (33 percent); materials (28 percent); and physics (24 percent). Independent of the energy budget, an increase of 20 percent is sought for astronomy. An additional $13 million

in funds for building the very large array (VLA) telescope was requested, even though last year Congress lopped a similar $10 million request for the VLA in half. Science policy, technology assessment, and such activities are also receiving increases, including the Science and Technology Policy Office, which was set up last year to aid Stever as science adviser.

Apart from these increments, other NSF program budgets will be struggling to keep up with inflation. The four national research centers are proposed to receive only minor increases. The National Center for Atmospheric Research will receive only $1 million more—although even that amount may signal NSF's renewed confidence in that recently troubled establishment.

There are casualties too. The Experimental Research and Development Incentives Program was virtually exterminated with a cut from $12.3 million to $1 million. RANN's fire research is to transfer to the Department of Commerce. Institutional Grants for Science, which received $7 million in obligations last year, was cut out altogether. The Science Education Improvement Program dropped by $6 million to $61 million. The latter two programs are popular on Capitol Hill and Congress will probably try to restore these funds.

If the Congress approves anything like this proposed budget, the NSF could find itself in fiscal 1975 with a new mix of activities, emphasizing energy, and bolstering basic research and science policy. However, the mood in Congress during the last year or so has been to fiddle, sometimes drastically, with the Administration's NSF budget proposals. Last year, both the authorization and appropriation reports included various floors and ceilings on NSF's spending, forcing several programs to change their plans. A recently launched General Accounting Office investigation of RANN, requested by one of RANN's chief backers, Senator Edward M. Kennedy (D–Mass.), may also indicate skepticism.

Finally, by the time this budget undergoes congressional scrutiny, it will be spring, and the crisis atmosphere of the winter's energy shortage, in which this budget was prepared, may be giving way to more sober reflection on these new trends.—DEBORAH SHAPLEY

Synthetic Fuels: Will Government Lend the Oil Industry a Hand?

For half a century now, the American petroleum industry has kept a covetous eye on the nation's immense deposits of coal and oil shale, secure in the knowledge that it would someday be practicable to make synthetic oil and gas from these vast hydrocarbon reserves. Until recently the prospect of a synthetic fuel industry remained a tantalizing mirage, shimmering just beyond the grasp of profitability, but now that vision is fast approaching reality.

The combined effects of government and industry research, and the exploding prices of conventional petroleum, have brought synthetic oil and gas* well within a comfortable profit margin. The federal government has begun leasing large tracts of rich Western shale lands, and even before the Organization of Petroleum Exporting Countries (OPEC) succeeded in doubling the world market price of oil, private industry was pressing ahead with plans to build at least one shale oil plant on private land and two commercial coal gasification units in the West.

Notwithstanding this swift progress in the fortunes of synthetic fuels, the White House, urged on by a number of federal energy officials and the oil and gas industries, appears to have concluded that the government ought to be doing even more than it already is to accelerate the birth of a new industry in the interest of national self-sufficiency. The clearest indication of this tilt toward synthetic fuels, but by no means the only sign, appeared in a little noticed section of President Nixon's energy message to Congress on 23 January. Urging a rapid increase in domestic energy supplies, he called for "maximizing the production of our oil, gas, coal, and shale reserves by using existing technology. . . ." Later in the message, under the heading "Stimulation of synthetic fuel production," Nixon asked federal energy chief William E. Simon to evaluate possible "financial or economic incentives or regulatory changes" that may be needed to overcome present constraints on a "major increase in the commercial production . . . of synthetic fuels."

Well before the January message there were scattered signs that the Administration was gradually moving toward a commitment both to share the financial risks inherent in the first commercial shale and coal-conversion plants and to help industry raise billions of dollars in capital to build such plants. No formal proposals have emerged yet and no money is changing hands. But there is a ground swell of opinion in the Administration that it ought to.

"One of the major presidential priorities is to get these pioneer plants online with existing technology," an official of the Office of Management and Budget (OMB) remarked in late November. By early December a clutch of "task forces" under the Atomic Energy Commission's national security affairs chief, Major General Edward B. Giller, was exploring the incentives problem in conversations with oil and gas industry representatives. Among the incentives then (and still) under discussion in the AEC, the Interior Department, and the OMB were low-interest loans to industry; guaranteed loans, in which the government would take the loss if a synthetic fuel venture failed; accelerated tax write-offs for first-generation plants; oil import tariffs or government purchase contracts that would put a floor under prices, and thus profits, on synthetic fuels; an easing of patent restrictions; and, to expedite construction, special dispensations from environmental laws for pioneer plants.

"There is no consensus [in the Administration] as to what should be done to promote synthetic fuels," an AEC official close to these discussions said

* The term "synthetic fuel" is widely used to describe any burnable gas or liquid derived from oil shale or coal.