state & society

Roberts of ERDA sees need for breeder reactor

Dwindling US uranium reserves may force Americans to supplement conventional energy sources with the breeder reactor by the end of this century, according to ERDA's Richard W. Roberts. Roberts, the agency's Assistant Administrator for Nuclear Energy since 30 June 1975, is confident that the pace of the US breeder program matches the country's needs. (The Clinch River Breeder Reactor, a 350–400-MW prototype, is scheduled to become critical in the late fall of 1983.) He acknowledges, however, that some foreign competitors have surpassed the US in breeder development.

Concern for safety, Roberts told us, has played a substantial role in the history of conventional nuclear reactors. As for the breeder reactor, "I believe it will be an extremely safe system," he said. He also commented on the use of nuclear energy in space exploration and roles for physicists in nuclear energy.

Roberts, who holds a PhD in physical chemistry from Brown University, is responsible for the development of nuclear power systems. Programs under his direction include the continued development of conventional reactors and of special reactors and generators for the Navy and space vehicles, R&D on the Liquid Metal Fast Breeder Reactor, the provision of nuclear fuel material and R&D on the nuclear fuel cycle. Roberts came to ERDA from the Department of Commerce, where he was Director of the National Bureau of Standards. Before that, he did research and held management positions at General Electric Co's R&D center in Schenectady.

Breeders for the future. The US may have to switch from conventional nuclear reactors to breeders (which produce more plutonium fuel than they consume) by the end of the century, Roberts told us, because at that time its resources of uranium could well be insufficient to meet the needs of additional reactors for their 40-year lifetime. "Right now," he said, "we can only utilize U^{235}, which occurs as about 0.7% of the ore mined. The breeder reactor promises to convert that other 99.3% that is U^{238} into plutonium and use it as fuel." According to Roberts, ERDA's three diffusion plants have stockpiled enough U^{238} hexafluoride of high purity to supply 500 1000-MW breeder reactors for 250 years.

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Need for the breeder becomes more evident when one notes that last year nuclear reactors supplied 9% of the

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Agencies reduce in-house R&D in favor of industry

Reductions in the in-house component of major Federally funded R&D programs appear to have resulted from Government policy decisions taken over the past three years. Federal spokesmen invoke various explanations to account for the cutback on in-house research: A Commerce Department official cites the Administration's preference for a limited Federal role as the essential consideration, while the Department of Defense ascribes its policy to specific aspects of the DOD's in-house operations.

Information that suggests the switch to increased private-sector research is Federal—not just DOD—policy is confirmed by agency officials we consulted. While in absolute terms Federal support increased in terms of current dollars for both industrial and in-house R&D over the FY 1975–77 period, according to National Science Foundation figures the *relative* share for industry out of the total increased by 4.3%.

In-house R&D fraction diminishes. The trend in relative support for in-house activities has been downward at DOD and within the Federal R&D program as a whole, though NASA and ERDA show modest gains in this area as well as in the industrial sector (see table). The two agencies and DOD account for over 90% of Federal expenditures for R&D in industry. Earlier figures cited by Sam Silverman in a study on Federal support for science and technology reveal the same movement away from in-house activities. Silverman, a former employee at one of the DOD in-house labs (Air Force Cambridge Research Laboratories, Bedford, Mass.) contends that there exists "... a broader trend [than at DOD] toward more industrial funding, though this is not consistent from one department to another."

We asked Michael I. Yarymovych, Assistant Administrator for Field Operations at ERDA, about the applicability to his agency's in-house program of a policy shift. Yarymovych, who is responsible for ERDA's field structure and the agency's relations with the national laboratories, told us the data are accurate and "... the points [Silverman] makes concerning trends in funding patterns ... are valid." Similar confirmation came from a NASA spokesman, though he added that it will be some time before the policy shift there becomes evident from the budget numbers.

It is Defense Department policy, according to statements by Malcolm Currie, Director of Defense Research and Engineering, and his deputy, John L. Allen, to increase the private sector's share of R&D work at the expense of the in-house effort. Currie set a 30% funding limit on the in-house component of the Technology Base program for FY 1977 (see PHYSICS TODAY, November 1975, page 104), and a laboratory-utilization study directed by Allen recommended that "manning of the Physical Science and Engineering laboratories should by reduced by 10–15% from the FY 1974 end strength." Their recommendation is expected to result in a staff reduction of about 10% by FY 1978.

Why the change? Betsy Ancker-Johnson, Assistant Secretary of Commerce for Science and Technology, verified the in-

Percentage shares of in-house and industry funding in the Federal R&D budget*

	FY 1975	FY 1976	FY 1977 (est.)
Government-wide			
In-house	28.3	27.4	25.8
Industry	44.0	45.9	48.3
NASA			
In-house	34.0	34.3	34.2
Industry	58.5	59.3	59.7
ERDA			
In-house	3.2	3.9	3.8
Industry	24.2	33.8	36.3
DOD			
In-house	30.7	29.7	27.3
Industry	62.2	63.8	66.5

*From NSF 75-334, "Federal Funds for Research, Development and Other Scientific Activities, FY 1975–77."

creased stress on private-sector research in her Department with the explanation that "it is very much a goal of this Administration to avoid doing anything in the Federal Government that can be done privately." For example, she told us, a considerable investigation has gone on to check that the National Bureau of Standards performs no tasks that ought to be done, or could be done, elsewhere. (It doesn't, according to Ancker-Johnson; she said NBS passed the test "extremely well.")

The rationale behind DOD's shift away from the in-house labs appears more complicated. On the one hand, Allen's study has noted that the Congress "has made clear its intention that DOD R&D has no mission to support science or scientific training" beyond the Department's own needs. This conclusion may stem from the 1970 "Mansfield amendment," which provided that no funds authorized for Defense use by the Congress could be applied to projects or studies not directly related to "a specific military function or operation." (The NSF absorbed much of DOD's less obviously defense-related basic research.) In apparent contrast to this restricted-role justification, however, Allen has said that the desire to increase technology transfer within the United States was one of the factors underlying the move to reverse the growth of the in-house share of research efforts: "To get high technology into industry rapidly," he said recently, "one just about has to develop the technology there in the first place."

Other considerations cited in the development of the Pentagon's present approach include the following:

- disproportionate growth in the in-house operation over the 1964–74 period, which culminated in a 43% in-house share, averaged over the independent Army, Navy and Air Force programs, in 1974;
- a layered management structure in the in-house enterprise that contributed to inertia, inhibiting response to new challenges;
- assertions of better capability (in specific areas) in industry and the universities, alluded to by Currie, and
- the accretion of personnel who constituted advocacy groups for "matured constituencies," areas of research or technology—a solid-state research effort concerning polycrystalline graphite, for example—for which Defense policymakers believe the demand has waned.

—FCB

Stever is new White House science adviser

The Senate confirmed on 9 August the nomination of H. Guyford Stever to be Director of the new Office of Science and Technology Policy. Stever, Director of the National Science Foundation since February of 1972, had served as part-time *ex officio* adviser to the President on scientific affairs since the abolition of the White House science office in mid-1973. In moving up to his present fulltime role, he becomes the first White House science adviser to serve on a statutory basis.

Stever's primary duty as OSTP director is, of course, to advise the President on scientific, technological and engineering aspects of issues confronting the White House; the science-policy act signed into law by President Gerald R. Ford in May includes among such issues problems of the economy, of national security and foreign relations, of health and of the use of resources and the environment. The White House science adviser holds membership on the Domestic Council and is expected to advise the National Security Council. The new legislation requires that he join with the Office of Management and Budget in annually reviewing Federal funding of R&D. Stever will also assist in the preparation of a yearly report from the President to the Congress on science and technology. His office, which is to include not more than four associate directors nominated by the President and subject to Senate approval, must also identify problems of a scientific nature that may affect Government decisions in a five-year forecast to be updated annually.

Before he took charge of the Foundation, Stever had been president of Car-

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negie-Mellon University in Pittsburgh (and one of CMU's predecessors, Carnegie Institute of Technology) since 1965. Earlier he headed MIT's Departments of Mechanical Engineering, Naval Architecture, and Marine Engineering. He earned his PhD in physics in 1941 from the California Institute of Technology.

Stever's research interests have included aeronautical, missile and spacecraft engineering, design and performance (especially aerodynamics) and radiation physics. He has also been active in scientific and engineering education and the determination of science policy. His best known research work consists of studies on condensation phenomena in high-speed flows and the growth of the boundary layer behind a shockwave.

—FCB

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country's demand for electricity. "Projections I've seen show the nuclear share increasing to about 25% by 1985," said Roberts, "and around the year 2000 they may supply as much as 50%." Yet the breeder can supply no significant amount of electricity, he predicts, until 1995 or beyond. As breeder technology matures, Roberts told us, utilities will probably shift over from the light-water reactors of