# Presidential candidates answer science-policy questions

PHYSICS TODAY, in conjunction with The American Physical Society, recently submitted four questions on science policy to the three major Presidential candidates. The questions were:

- What mechanisms do you plan to use to get scientific advice as President?
- How would you rate the relative importance of the various energy options and the role of basic research in developing those options?
- What are your views regarding Federal support for basic and applied physical science and long-range planning?
- Earlier this year, following the invasion of Afghanistan by the USSR, the US government took several actions intended to limit scientific and high-technology exchanges between the US and the Soviet Union. All high-level bilateral scientific exchanges were deferred, and working-level exchanges are continuing only on a selective basis. Soviet-bloc nationals have been prohibited from attending some scientific conferences in the US (PHYSICS TODAY, April, page 81). Do you think such international scientific communication and US participation in proposed large-scale international scientific ventures should be influenced by international political developments?

The candidates' responses are printed below in full.

## Anderson

I am disappointed with the present Administration's failure to seek advice from the scientific community on several important issues. I was a leader in the fight to recreate the Office of Science and Technology Policy within the Executive Office of the President to ensure that our President would have experts readily available for consultation. The office will become increasingly important as we face the difficult challenges of developing alternative energy sources, providing viable community transportation, and reinvigorating our space program in the 1980's.

**Energy** conservation deserves the highest priority in US energy planning because it is the least expensive way to provide energy services for homes, transportation, and industry. A recent study by the National Academy of Sciences concluded that, "throughout the

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## Carter

I plan to continue to draw broadly on the expertise of the nation's science and engineering communities for bringing me, and the White House staff, sound advice on issues having scientific and technological components.

The Office of Science and Technology Policy, in the Executive Office of the President, under the direction of Frank Press, my Science and Technology Adviser, has been most effective in working with these communities to help establish sound science and technology policy. OSTP's consultations with outside groups, such as the American Physical Society, the Industrial Research Institute, the National Academy of Sciences, and many other organizations, as well as numerous individual scientists and engineers outstanding in their fields have allowed my office a

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## Reagan

I believe that the less government interference, the better. This is particularly true of science, where great and specialized minds are at work. But a limited government role is appropriate. We should work harder at involving the scientific community in determining priorities for the nation's scientific and technological endeavors, education of scientists and engineers, and increasing the scientific and technical knowledge of the public at large.

The role of the President's Science Adviser in the Reagan Administration would be more informal and more public. The President's staff would be improved in quality, representing all specialties and disciplines.

Experience shows that the best people are generally below 30 or over 65. The young people, such as White House Fellows, are selected from among the best. The more mature people provide

0031-9228 / 80 / 100049-04 / $00.50 

experience, while the best scientists between 30 and 65 are generally less available. Staff appointments should generally not exceed two years, so that the staff does not lose active contact with the world of science.

My Office of Science and Technology will also seek out volunteer help to answer all reasonable questions and suggestions. The executive branch needs the participation of outstanding scientists and groups of scientists.

My Science Adviser and his staff will attempt to gather advice from experts, individually and in groups, in an informal way, instead of relying on "Blue Ribbon Panels," which are often partisan and work in secret.

In addition, I will explore the feasibility of a "Science Court," to help arrange public discussions of controversial scientific issues. This will help guide the public, the Congress, and the executive branch. The purpose would be public exposure, not decision making.

**Energy**. As President, I will look to all energy sources to help solve the energy crisis. Fossil fuels, such as oil and coal, will contribute most if excessive and burdensome government interference is eliminated. Licensing of reactors should be freed of repetitive hearings which do nothing to add to safety. One comprehensive hearing with proper representation would suffice to establish a plant without risk to life and limb. Reprocessing of nuclear wastes, an activity hampered only in the US and essential to all forms of breeder reactors, will be encouraged as long as it is safe. Of course, all forms of breeders, those using fast neutrons, those based on the thorium cycle, and the fusion–fission hybrid should be compared.

Solar electricity in the form of solar cells is a long-run possibility. In the short run, solar energy is most useful in domestic applications, such as the heating of houses, and in conjunction with energy-saving devices in industry.

In general, energy saving by industry can make an enormous contribution in many ways—which are best handled by private enterprise. I believe the government should limit its role to providing essential research support. Such research should be directed at coal gasification and liquefaction, and pure controlled fusion.

**Basic research**. In recent years, basic science has developed in imaginative ways. Unfortunately, the same is not true of applied science. Productivity in the US has declined for six straight quarters, which is unprecedented. The decline was in part due to insufficient emphasis on applied science. Indeed, emphasis on applied science may be turning into a question of survival.

In fact, advances in basic science are apt to lead to new opportunities in applied science. Advances in applied science often create new tools for basic science. It would probably be healthy if some basic scientists and applied scientists would spend a few years in each other's field.

While science cannot be planned, the environment in which science and scientists can develop must be considered. In addition to universities, industrial laboratories, and nonprofit organizations, national laboratories have made great contributions. One of the primary functions of the Science Adviser is to find the best means to bring about a reasonable balance between these organizations and their activities.

**International science**. I believe that transfers of high technology and information should be examined within the context of our overall foreign policy objectives. I believe that our national security could be jeopardized by the flow of technology and information which may materially assist the Soviet military. As President, I would carefully review contacts to see if they should be regulated.

## Carter

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full range of accurate information and expert advice on science-related matters.

Members of the American Physical Society have been of particular value to the Administration in this consultive process. Their studies on solar photovoltaics and nuclear waste were important to us in the formulation of policy related to these energy technologies.

Many of our key agencies and offices are headed by scientists, and I will continue to make such appointments. Several members of the Administration's science team have been members of the American Physical Society, among them Harold Brown, Frank Press, Robert Frosch and Edward Frieman. A former APS president is now the Chairman of the National Science Board, and two APS members have recently been nominated by me to serve as director and deputy director of the National Science Foundation.

OSTP's work directly with the mission agencies, such as DOD, DOE, USDA, NIH and EPA, has also contributed significantly to creating better science and technology policy. We will continue to rely on such contacts and their coordination to improve science advising in the Executive Office.

**Energy**. All the components of our energy program are important and have their place in America's energy future. However, for the near-term I would say that conservation and improved energy efficiency are most important because they are at hand and cheap. With a minimum of expense and economic impact they will help us buy the time needed to develop alternative resources and technologies.

We have an abundance of such resources—coal, oil shale, uranium—and we are moving ahead in the R&D necessary to use them in the most economic and environmentally sound ways.

Our efforts to develop a strong synthetic fuel industry in this country, based on our abundant coal and oil shale, has a high priority in this Administration because of the necessity to reduce our dependence on imported oil. The use of biomass will also make a contribution toward this end.

Adequate research is being supported in fusion and those solar energy technologies—such as photovoltaics—which will play an important role in the more distant future. In the case of solar technologies available today or near at hand, a variety of incentives have been introduced to encourage their wider use and further development by the private sector.

Our near-term focus in nuclear energy is on improving the safety and reliability of light water reactors, which are essential to the nation's production of electricity during the coming years. We will also continue research toward breeder reactor systems that are safe, efficient and minimize the availability of weapons-grade materials.

I view basic research as one of the most essential elements in pursuing all aspects of our energy program. That is why I created an Office of Energy Research in the DOE, with a research budget that now exceeds $1 billion. Research in several other agencies—DOD, NASA, EPA, USDA, DOT, DOC—is also related to and has an impact on our energy program. This will be continued and expanded wherever it is deemed necessary to the success of our energy goals.

**Basic research**. Throughout my administration I have repeatedly emphasized my view that the support of research was an essential investment in the nation's future. I backed up this view with significant increases in Federal support of research in three consecutive budgets—increases designed to help compensate for a previous 10-

year period when such support declined in real terms. Particularly affected by their neglected support during that period were the physical and mathematical sciences and engineering, to which we are now giving special attention. These areas of basic and applied science underly much of our industrial activity, and their strength is essential to the success of our industrial innovation. As part of our new economic policy and programs for the revitalization of our industry, we will be giving additional support to these areas. I will seek additional funds from Congress to permit 3% real growth above inflation of basic research in Fiscal Year 1981, and my FY 1982 budget request will continue this level of growth. The programs will include fostering new government–industry–university cooperative programs that will stimulate new interest and activity in these disciplines.

With reference to long-term planning for science, we view this as essential. Nature does not reveal here secrets according to Federal budget cycles. Nor can we expect our high-technology industry to succeed if its research is focused only on short-term needs and quick payoffs. Continuity and stability of support, and multi-year planning are necessary to conduct successful research—to plan programs, to design and build the proper facilities, to train, assemble, and hold together good research teams. We have been taking all this into consideration in developing new approaches to the planning and support of our science programs.

**International science.** We cannot conduct business as usual with the USSR in the light of their invasion of Afghanistan and their treatment of dissident scientists. However, we recognize the importance of contacts and exchanges with the Soviets, and these should be continued where they are advantageous to us or humanitarian in nature. Legitimate Soviet scientists should have no problems obtaining visas to attend open scientific meetings in the US. Attendance at restricted meetings involving sensitive technologies will require licensing according to long-standing statutory requirements. International scientific ventures with the USSR will be examined carefully. We are concerned about Congressional initiatives that would close down all scientific contacts with the Soviets. We are maintaining the structure of scientific cooperation so that beneficial exchanges can be expanded if the political situation should warrant it. I hope this becomes the case, as we, the Soviets, and the world have much to gain by living in peace and sharing the great benefits that can be derived from a broad exchange of new scientific knowledge.

## Anderson

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economy, it is now a better investment to save a BTU than to produce an additional BTU." We need to retrofit homes, improve auto efficiency and increase energy productivity in industry. Unfortunately those sectors of the economy most in need of improved energy efficiency are also those least able to generate the necessary capital. I believe the Federal government can play an important role in shifting the necessary capital into energy-efficiency improvements, removing institutional barriers to such investment, and providing technical assistance and educational programs to motivate consumers to adopt energy-saving measures.

At the same time we need to expand our domestic production of fossil fuels. We must continue Federal support for research and development programs on enhanced oil recovery from existing reserves, production from oil shale, and heavy oil deposits. We should continue start-up funding for projects to develop synthetic gas and oil supplies using coal feedstocks and increase Federal support for efforts to define the availability of new gas resources from geopressurized methane, devonian shales, and tight sand formations.

Escalating problems with the cost and safety of nuclear fission have raised serious questions regarding its role in America's energy future. The Kemeny and Rogovin reports found major deficiencies in the management and practices of the Nuclear Regulatory Commission and the industry itself. Accordingly the NRC should be barred from issuing new operating licenses unless it certifies that the stringent safeguards recommended in the two reports have been incorporated into the plant's design, operating procedures and emergency plans. In addition, the Anderson/Lucey Administration will propose a moratorium on new construction permits, beyond those now being processed, until work has commenced on a permanent geologic disposal site. We have postponed the nuclear waste question for too long. If no suitable means of permanent disposal is available or technically feasible, then it would be irresponsible to put more nuclear power plants on the drawing board. If, on the other hand, a suitably safe means exists, we should begin a demonstration project at the earliest apropriate time.

We must also reevaluate the Clinch River breeder reactor in light of the project's rapidly increasing costs. Breeder reactors also raise a number of safety and waste-disposal questions that must be adequately addressed before any large-scale use should be made of that technology.

Harnessing the Sun's energy in active and passive solar applications should be one of our most important energy sources. However, the breakthrough required to realize the potential offered by the various solar technologies has yet to occur in practice. In part, this has been due to the competitive advantage traditional fuels have enjoyed because of controlled prices and also because the Federal program in solar energy has failed to offer sustained and adequate support for the most promising technologies. In the future, higher oil, gas, and electricity prices will sharply increase demand for the already cost-effective technologies and will provide necessary impetus for photovoltaic systems. The Federal government, however, should undertake a much larger effort to promote research and development, improve consumer confidence in solar technologies, remove institutional barriers, and make a substantial commitment in solar energy for its own use.

Finally, the Anderson/Lucey Administration will support accelerated funding of nuclear fusion research, contingent upon continued progress toward the demonstration of technical feasability.

**Basic research.** We need to reverse the 15-year decline in real-dollar terms of Federal support for basic reasearch and development. We must also establish more stable and predictable funding levels for basic and applied physical science, so that scientists can plan long-term projects with confidence. Investigators need assurance that they will not have their projects terminated because of fluctuations in support.

The Anderson/Lucey Administration will propose these initiatives to expand our science and technology base:

- A Federal program to reequip the laboratories in our universities, our nonprofit research centers, and our government facilities:
- extension of the investment tax credit to cover qualifying research and development expenditures by the nation's businesses and
- a stable and well-conceived long-term research program to reduce our potential vulnerability to foreign interference with the flow of raw materials.

In short, we are committed to ensuring that the Federal government carries out its responsibilities to support research in the basic and applied physical sciences and that it provides incentives for the private sector to increase

its support of these activities.

**International science.** I am concerned that the restrictions on Soviet–American scientific contacts have mixed together concerns about national security, human rights, and Soviet political adventurism to the point where they serve only to express a generalized annoyance with Soviet policy. Any limitations on international scientific exchanges should be clearly linked to the specific concerns that provoked them.

The scientific community has long recognized that, in the words of the Helsinki Agreement:

> Respect for human rights and fundamental freedoms by all states represents one of the foundations for a significant improvement of their mutual relations, and of international scientific cooperation at all levels.

This principle has been embodied in the cessation of US–USSR scientific symposia by the National Academy of Sciences in response to the forced exile to Gorki of Soviet academician Sakharov from his family and research facilities in Moscow.

The Anderson/Lucey Administration will strongly support the Helsinki process. The broadening of scientific exchanges, as well as expanded trade and cultural contacts, will depend upon practices by the Soviet government that are consistent with basic human rights standards.

# Six scientists in search of a Congressional seat

Although science is becoming almost as frequent a topic of discussion on Capitol Hill as law or economics, lawyers and businessmen in Congress still vastly outnumber the scientists there. This year six candidates for Congress who have at least a master's degree in a physical science or the equivalent are known to us at this writing. They include incumbents Mike McCormack (D-Wash.), James Martin (R-N.C.) and Don Ritter (R-Pa.). In addition, three scientists are seeking first terms in the House of Representatives: John Berg (R), of Minnesota's fourth Congressional district; Winton Covey (R), running in the fourth district of West Virginia, and Jim Coyne, in Pennsylvania's eighth district.

McCormack seeks a sixth term in the House. He is chairman of the subcommittee on energy research and production as well as a member of the Committee on Public Works and Transportation. In the 96th Congress, he wrote three major bills involving scientific research: the Fusion Energy Research, Development and Demonstration Act, which would commit the nation to construction and successful operation of a magnetic fusion electric generating demonstration facility during this century; the Nuclear Safety, Research, Development and Demonstration Act, which would require risk analysis of each new electrical energy source and the Nuclear Waste Research, Development and Demonstration Act, which would set up a scheduled program to demonstrate high-level nuclear-waste glassification and storage. McCormack earned his MS degree in chemistry at Washington State University in 1949. He was employed as a research scientist at the Hanford Project from 1950 until 1970.

Martin is seeking a fifth term in Congress. He served this past term on the Ways and Means Committee's trade and health subcommittee. Traditionally a strong supporter of science on Capitol Hill, Martin last year sponsored legislation barring the Internal Revenue Service from revoking the tax-exempt status of scientific societies. Martin received his doctorate in 1960 in organic chemistry from Princeton University and taught at Davidson College, where he became an associate professor of chemistry in 1964. His background in chemistry has involved him in Congressional debates on food additives and carcinogens.

Ritter is seeking his second term in Congress (PHYSICS TODAY, August 1979, page 69). He is a member of the House Science and Technology Committee's energy development subcommittee and the Banking, Finance and Urban Affairs Committee. Ritter is the author of legislation that would provide a mechanism for assessing the comparative risk involved in regulatory actions in scientific and related fields. Ritter earned his doctorate in metallurgy from MIT in 1966. He was a Lehigh University faculty member and, later, managed the development of new research programs at Lehigh. Ritter says that he has used his expertise "to encourage support for basic research in a time of economic decline."

Berg, who ran unsuccessfully two years ago, received his PhD in physical chemistry from Iowa State University in 1961. He has worked at the 3M Company in St. Paul, Minnesota since 1961 and was co-author of four patents in imaging technology. Currently he is technical manager of the energy control products project at 3M. Having dealt, through his job, with Federal and state agencies, Berg has concluded that "there is a sad lack of understanding of science in government." Because so many of today's problems have their roots in science and technology, he said, they require people with expertise and knowledge in these areas to help solve them.

Covey received his PhD in soil physics from Texas A&M University in 1965. He has worked for the US Agricultural Research Service in Ithaca, N.Y. and as an associate professor of meteorology at Cornell University. Since 1968 he has been an associate professor and professor of natural sciences at Concord College. Covey's primary objectives are to strengthen national defense and to stop inflation. "Both of these call for economic growth and a severe pruning of government regulation and spending. About a 10-percent cut in nonmilitary Federal salaries is in order," he says. "Necessary military spending and the part of scientific research that supports it should be exempt from the budget cutting."

Coyne has been president of the Coyne Chemical Corporation since 1971, and president of the Rechem Company since 1976. He has served as an energy specialist with the House Committee on Science and Technology and has testified as an expert witness on alternative energy sources before the Environmental Protection Agency, the Senate and the House of Representatives. "Our country," says Coyne, "has been guided by a Congress that is unwilling to make the important commitment to the development of domestic energy alternatives. We continue to reply upon imported OPEC oil at a time when our own research base is fully qualified to develop the domestic energy sources that could lead to true energy independence." —MEJ

## in brief

The University of Illinois at Urbana-Champaign physics building has been renamed the "Loomis Laboratory of Physics" in honor of F. Wheeler Loomis. Loomis, a former president of the American Physical Society, headed the Illinois physics department from 1929 to 1957.

A new quarterly journal, *Solar Cells: Their Science, Technology, Applications and Economics*, is now being published. Annual subscriptions are available for SwFrs. 160.00 (approximately $97.00) from Elsevier Sequoia S.A., P.O. Box 851, 1001 Lausanne 1, Switzerland.

*Phase Transitions*, a quarterly journal edited by A. M. Glazer and R. Smoluchowski, has begun publication. A year's subscription costs $93.00 and may be ordered from Gordon and Breach Science Publishers Ltd., 42 William IV Street, London, W.C.2, UK. □