National Policy on Science and Technology

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National Policy on Science and Technology

A concept paper
prepared by
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for Governor James Carter

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QUESTIONS ON NATIONAL POLICY

1. Incentives for Innovation

   What role should government play in stimulating the innovativeness of U.S. industry?

2. Decision-Making

   What process should be followed in making decisions on government support for technologies (e.g., energy technologies)?

3. Assessment of the Public Impact of Technology

   What process should be followed in evaluating new technologies which may have an impact on the safety and well-being of the public?

4. Advisory Process for Science and Technology

   What structure should be utilized to incorporate scientific and technical advice in government policymaking?

UNDERLYING PHILOSOPHY ABOUT NATIONAL POLICY

o Old-style policies have complementary failures when they advocate that government should either do nothing or do everything. The proper role of government is in mutual reinforcement with other sectors.

o The reservoir of competent, honest talent in this country is enormous. Government should challenge and welcome as broad an involvement of this talent as possible.

o Progress in technology requires the use of technology in practice.

RESPONSES TO QUESTIONS ON NATIONAL POLICY

1. What role should government play in stimulating the innovativeness of U.S. industry?

We are currently experiencing an eight year leveling in R&D expenditures (in constant dollars) and a marked downturn in support of basic research. To some this lack of growth threatens to yield a dwindling base of knowledge and, thus a dwindling supply of innovations. Accordingly, there have been cries of crisis and appeals for federal action, i.e., for increased federal outlays for

R&D, tax reductions to industry for R&D expenditures, and relaxations of regulatory policies affecting investment in new technology.

o Is there a crisis?

Action, funds, and the inevitable bureaucracy which accompanies, must be based on more conclusive evidence than has been offered. For example:

- There is no conclusive evidence that new knowledge plays as direct a role in the process of innovation as is reflected in the concerns.

- There is no evidence that the current situation is any more than a foreseen correction in the growth of R&D, perhaps aggravated by a coincidental downturn in the general economy.

- Comparisons of the U.S. with other countries may not be valid since these other nations have started from a different base, have industries which are in different states of economic health (e.g., textiles), and have different government positions in regulating the public impact of technologies (e.g., pharmaceuticals).

o Should the President support tax incentives for R&D?

The problems of administering tax incentives for R&D in an economy as large and diverse as the U.S. are staggering (e.g., defining R&D in a nonambiguous way). Furthermore, knowledge of how industry selects R&D projects shows that industry already supports the most promising R&D that it knows of. There is no evidence that governmental incentives will do anything more than motivate the support of the marginal projects which do not now pass screening for support.

o Should the President support increased funding for basic research?

Industry will invest in basic research which supports the continued improvement of existing technology. However, it is unreasonable to expect that industrial support for basic research on technologies which do not yet exist, will yield results which are only collectively valuable, and which will obsolete existing

investments. Government support is, therefore, necessary for basic research on subjects outside the existing structure of industrial technology.

Government should not define needs for research outside the existing structure, but should use its purchasing power to stimulate others (e.g., universities and technical institutes) to utilize approaches to planning which will define needs for knowledge relevant to new structures for technology. That is, favorable consideration should be given to proposals which are based on explicit efforts, both to define needs for knowledge on new structures and to promote the utilization of such knowledge.

2. What process should be followed in making decisions on government support for technologies (e.g., energy technologies)?

There are important instances in which government support of technology is needed because the size and/or risk of investment exceeds the capacity of the private sector (e.g., coal gasification). In too many instances industry and other potentially progressive forces have been encouraged to withhold action and planning until government decides "the" best policy. Sensible and honest officials have found that adequate knowledge to determine "the" best policy does not exist. The result is a paralysis of action in both the public and the private sectors and an endless proliferation of studies pursuing the elusive goal of adequate knowledge.

Government should not paralyze other sectors of society; it should challenge and assist them. This is possible if government adopts an approach which: first, encourages the definition of competing technologies and second, bases support on the performance of technology in use. Such an approach would utilize competing feasibility studies and prototype designs, demonstration-plant commitments for the technology which has the most promising performance, active dissemination of feasibility, and performance data, etc.

In cases where the government is called upon for tax, land, or regulatory action to support a new technology (e.g., oil shale), such action should be focused on trial use. That is, the action should be temporary so as not to prejudge the result of trials and thus foreclose the development of competing technologies.

3. What process should be followed in evaluating new technologies which may have an impact on the safety and well-being of the public?

Technology may only be assessed on the basis of its performance in use. Any system based on advice of experts or anticipatory studies is doomed to provide misleading conclusions and an endless proliferation of more and more expensive and less and less conclusive studies. The issue is thus one of obtaining commitments to risky trials, not one of obtaining adequate knowledge.

The public is the only proper judge of technology and the risk entailed in its use. Government and scientists/engineers play proper roles only in minimizing this risk by as much as is practicable and in defining the risk as clearly as possible.

The judgement of the public should be sought in authorizations for specific demonstration sites for technology in use. Whether these authorizations are made through referenda or by local officials (who thereby risk their offices) is a matter for local choice. What is clear, is that to compete successfully in this marketplace for public support, a demonstration project must convince a local community that it will receive:

o specific, local benefits from the demonstration (e.g., lower utility rates),

o safeguards to minimize known risks and to learn and protect against risks arising in the course of experience,

o subsidization from the public as a whole (i.e., from the U.S. government) which will benefit from the knowledge generated by the demonstration.

4. What structure should be utilized to incorporate scientific and technical advice in government policymaking?

The scientific and technical community is firmly committed to the use of elite advisory groups at the White House. The community has been frustrated in its attempts to relate to the public and to agencies with in-house capability for science and technology. In response to this frustration, the community has placed its faith in a small group having personal influence with the President. The community was encouraged in this faith by a President who saw political value in an identification with the 'best and the brightest.'

Given the strength of the attachment to a White House advisory body, it will be politically difficult not to accept the above structure. This is especially the case for a Democratic candidate who could win enthusiastic support from a scientific and technical community already leaning in his direction. However, the elitist approach to scientific and technical advice is disfunctional for both the country and the scientific and technical community. Therefore, we should be weaned away from it as soon as possible.

There is a large community of competent, dedicated talent in this country. Government should stimulate the involvement of as much of this talent as possible. To do this requires the personal goodwill of the President in challenging and welcoming all who have relevant expertise and a concern for public welfare. While this goodwill occasionally should be expressed personally, it may obtain continual expression through a staff which seeks out and coordinates the involvement of relevant persons (including the in-house capability of government)--not a staff which speaks for scientists and engineers, but one which listens to them.

Biographical Sketch of:

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Dr. Wolek was born in Brooklyn, New York (1935) and currently resides, with his wife and four children, in the Philadelphia area. He was a petroleum geologist trained at the Colorado School of Mines (1957) before entering Harvard Business School where he received his Masters and Doctorate in the management of science and technology (1962, 1967). He has taught at the Wharton School of the University of Pennsylvania since 1965 and is currently Adjunct Associate Professor. His primary employment is in research through his position as Manager of Programs on R&D Strategy at the University City Science Center in Philadelphia.

Dr. Wolek has authored books: Administering Research and Development, Technology and Information Transfer, and Cooperation in R&D, and papers on the management of science and technology.