

# National Council for Science and the Environment

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**Testimony of the  
NATIONAL COUNCIL FOR SCIENCE AND THE ENVIRONMENT  
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**To the  
PRESIDENT'S COUNCIL OF ADVISORS ON SCIENCE AND TECHNOLOGY**

**Regarding  
PCAST DRAFT REPORT  
*ASSESSING THE U.S. R&D INVESTMENT***

**September 4, 2002**

## **Introduction**

The National Council for Science and the Environment (NCSE) appreciates the opportunity to comment on the draft report by the President's Council of Advisors on Science and Technology (PCAST) entitled *Assessing the U.S. R&D Investment* and the accompanying draft letter to President Bush.

NCSE commends PCAST for producing a report that will be transmitted in time to influence the President's budget request for FY 2004. Federal investments in R&D and science education are essential to the future well-being and prosperity of the nation and deserve the highest priority by the federal government. The long-term prosperity of the nation and the maintenance of our quality of life depend on a steady and growing commitment of federal resources to science and technology.

The National Council for Science and the Environment is a nonprofit, nonpartisan organization that has been working since 1990 to improve the scientific basis for environmental decision-making. NCSE's work has been endorsed by nearly 500 organizations, ranging from the U.S. Chamber of Commerce to the Sierra Club, including the National Association of Attorneys General, National Association of Counties, some 300 colleges and universities, and more than 80 scientific and professional societies. As a neutral, science-based organization, NCSE promotes science and its relationship with decisionmaking but does not take positions on environmental issues themselves.

## **Balance of the Federal R&D Portfolio**

The size and balance of the federal R&D portfolio has profound implications for the future well-being and prosperity of the nation. The balance of the federal R&D portfolio has shifted in recent years as a result of the doubling of the budget of the National Institutes of Health, among other factors. According to data compiled by the American Association for the Advancement of Science:

- NIH accounts for approximately 57 percent of federal funding for basic research and 50 percent of total research (basic and applied). NIH's budget for basic research is greater than the combined total of all other agencies, including DOD, NSF, NASA, DOE, EPA, USDA, NIST, NOAA, and USGS.
- NIH and DOD account for 74 percent of the federal R&D portfolio in the FY 2003 budget request. All other agencies – including NSF, NASA, DOE, EPA, USDA, NIST, NOAA, and USGS – collectively account for 26 percent of federal R&D spending.

The draft PCAST report addresses the need to restore the balance of the federal R&D portfolio. The report focuses on the balance between the physical sciences and the life sciences. For example, the report says, “Given the decreases in the physical sciences over the past decade, the focus must be to achieve a rebalance by increasing these disciplines and not by decreasing the life sciences.” The draft PCAST report recommends “the R&D budget be adjusted upward for the physical sciences and engineering, bringing them collectively to parity with the life sciences over the next 5 budget cycles.”

Rather than focusing on a dichotomy between the physical sciences and the life sciences, NCSE recommends taking a broader view of the balance of the federal R&D portfolio. References to “physical sciences” could have negative consequences for other non-biomedical sciences, such as the environmental sciences, geosciences, non-biomedical life sciences, social sciences and interdisciplinary science. As discussed below, these fields of science offer great promise for achieving important national goals. NCSE recommends revising the PCAST report to focus on the need to restore balance between the biomedical sciences and all other fields of science and engineering.

The House Science Committee amended the NSF authorization act that recently passed the House of Representatives to emphasize the importance of the entire spectrum of non-biomedical sciences. As described in NCSE's testimony to PCAST on June 12, 2002:

- When the NSF authorization act (H.R. 4664) was introduced on May 7, the bill included language about the allocation of funding among “the physical sciences, mathematics, and engineering.” References to “physical sciences” as opposed to all fields of science could have negative consequences for the environmental sciences, geosciences, non-biomedical life sciences, social sciences and interdisciplinary science. On May 22, the House Science Committee passed an amendment to the NSF authorization act that replaced “physical sciences” with “sciences” and made related revisions.

- The Committee Report (House Report 107-488) on the NSF authorization act provides further guidance on the issue of balance in the federal R&D portfolio: “While the Committee is of the opinion that the mathematical, physical, and information sciences and engineering disciplines have been significantly underfunded, *the Committee also recognizes that greater science funding for other disciplines, including the non-biomedical life sciences and the social sciences is also necessary... the committee strongly believes that all disciplines for which NSF provides support should receive significant budget increases*” (emphasis added).

Rather than focusing on the dichotomy between the physical sciences and the life sciences, NCSE urges PCAST to revise its draft report to focus on the need to restore balance between the biomedical sciences and all other fields of science and engineering. This approach, which is consistent with the approach adopted by the House of Representatives, has positive implications for the environmental sciences, geosciences, non-biomedical life sciences, social sciences and interdisciplinary science.

### **Double the Budget of the National Science Foundation**

The draft PCAST report does not endorse ongoing efforts to double the budget of the National Science Foundation over the next five years. Congress is considering bipartisan legislation to achieve this goal:

- By an overwhelming vote of 397 to 25, the U.S. House of Representatives passed a bill (H.R. 4664) that authorizes a \$2.5 billion increase in the National Science Foundation budget over the next three years. The bill, which passed the House on June 5, 2002, would put NSF on track to double its budget in five years.
- Legislation to double the budget of the National Science Foundation was introduced in the United States Senate on July 29, 2002. The National Science Foundation Doubling Act (S. 2817) would authorize an increase of \$5.0 billion (105 percent) in NSF’s annual budget, to be phased in over the next five years (Table 1). In order to achieve this goal, the bill would authorize an increase in NSF’s budget of approximately 15.5 percent per year through FY 2007. NSF’s total budget would increase from \$4.8 billion in FY 2002 to \$9.8 billion in FY 2007.

NCSE urges PCAST to revise its draft report to provide explicit support for doubling the budget of the National Science Foundation over the next five years. Support from PCAST would facilitate enactment of this bipartisan legislation.

**Table 1. Senate Authorization Bill for National Science Foundation**

(budget authority in millions of dollars)

| Program                         | Budget Authority<br>(Millions) |              |              |              |              |              | Change from FY 2002<br>to FY 2007 |               |
|---------------------------------|--------------------------------|--------------|--------------|--------------|--------------|--------------|-----------------------------------|---------------|
|                                 | FY 2002                        | FY 2003      | FY 2004      | FY 2005      | FY 2006      | FY 2007      | Amount                            | Percent       |
|                                 | Enacted                        | Authorized   | Authorized   | Authorized   | Authorized   | Authorized   | (\$ Millions)                     | (%)           |
| Research and Related Activities | 3,599                          | 4,175        | 4,843        | 5,618        | 6,516        | 7,559        | 3,960                             | 110.1%        |
| Education and Human Resources   | 875                            | 1,006        | 1,157        | 1,331        | 1,530        | 1,760        | 885                               | 101.1%        |
| Major Research Equipment        | 139                            | 153          | 168          | 185          | 204          | 224          | 85                                | 61.4%         |
| Salaries and Expenses           | 176                            | 195          | 214          | 236          | 259          | 285          | 109                               | 61.6%         |
| Office of Inspector General     | 7                              | 8            | 8            | 9            | 10           | 11           | 4                                 | 56.3%         |
| <b>TOTAL</b>                    | <b>4,796</b>                   | <b>5,536</b> | <b>6,391</b> | <b>7,378</b> | <b>8,520</b> | <b>9,839</b> | <b>5,043</b>                      | <b>105.2%</b> |

Source: NCSE analysis of *National Science Foundation Doubling Act (S. 2817)* and *National Science Foundation: Summary of FY 2003 Budget Request to Congress*.

## Environmental R&D

Environmental R&D is a critical component of the nation’s R&D portfolio and deserves greater attention in the PCAST report. As highlighted at the recent World Summit on Sustainable Development, environmental R&D is essential to achieving a future in which economic prosperity goes hand in hand with environmental quality. The importance of environmental R&D to key national goals is addressed in a report by the National Science Board (NSB):

“The environment is a critical element of the knowledge base we need to live in a safe and prosperous world.”

“New discoveries have highlighted unappreciated linkages between the environment and human health, prosperity, and well-being.”

“Within the broad portfolio of science and engineering for the new century, the environment is emerging as a vigorous, essential, and central focus.”

“The environmental challenges facing the Nation and the world have emerged relatively recently and rapidly...The current level of effort and existing conceptual approaches are proving to be insufficient” (NSB, 2000, *Environmental Science and Engineering for the 21<sup>st</sup> Century: The Role of the National Science Foundation*).

Because PCAST has the ability to guide science toward the national goals of a more prosperous, healthy and secure world, NCSE believes that a positive statement about environmental R&D in the PCAST report would be a productive action at this time.

### **Implementation of National Science Board Report on *Environmental Science and Engineering for the 21<sup>st</sup> Century***

NCSE encourages PCAST to strongly support full and effective implementation of the National Science Board (NSB) report, *Environmental Science and Engineering for the 21<sup>st</sup> Century: The Role of the National Science Foundation*, within the context of a doubling of the budget for the NSF. As described in NCSE's testimony to PCAST on March 5, 2002:

- The NSB report sets out a bold, ambitious set of recommendations that could dramatically improve the scientific basis for environmental decisionmaking. The first keystone recommendation is as follows:

“Environmental research, education, and scientific assessment should be one of NSF's highest priorities. The current environmental portfolio represents an expenditure of approximately \$600 million per year. *In view of the overwhelming importance of, and exciting opportunities for, progress in the environmental arena, and because existing resources are fully and appropriately utilized, new funding will be required.* We recommend that support for environmental research, education, and scientific assessment at NSF be increased by an additional \$1 billion, phased in over the next 5 years, to reach an annual expenditure of approximately \$1.6 billion” (emphasis added).

- In 1999, the President's Committee of Advisors on Science and Technology reviewed the interim NSB report and endorsed its recommendations:

“With regard to the NSB report overall, we applaud the Board's recommendation that environmental research be made one of NSF's highest priorities and agree that funding should be substantially augmented, particularly in five specific areas emphasized in the report: interdisciplinary research; environmental education; economic valuation of ecological goods and services; long-term, large-scale research; and improving environmental assessment capabilities. As you know, PCAST has recommended increasing the priority and funding of environmental science in several of our own reports.”

The National Council for Science and the Environment encourages PCAST to revise its draft report to include a statement that reaffirms its support for the National Science Board's report, *Environmental Science and Engineering for the 21<sup>st</sup> Century: The Role of the National Science Foundation*.

## **Homeland Security and Environmental R&D**

The National Council for Science and the Environment encourages PCAST to continue exploring the role of environmental R&D in homeland security and counterterrorism and to recommend actions that would improve the nation's capacity in this area. As noted in NCSE's previous testimony to PCAST:

- Environmental R&D is a critical component of homeland security.
- The significance of environmental research to homeland security is reflected by the fact that a U.S. Geological Survey report on "Source-Area Characteristics of Large Public Surface-Water Supplies in the Conterminous United States," has been withdrawn from approximately 300 federal depositories. FBI agents visited several libraries to ensure that the document was truly removed from circulation.
- Homeland defense will benefit from a robust and balanced research agenda that includes interdisciplinary environmental R&D. Consider for example, research on the explosion of a "dirty bomb" in an urban area. In addition to research related to the treatment of victims, protection of first responders, and emergency response plans, a balanced research agenda would include interdisciplinary studies on the fate, transport, and clean-up of radionuclides and toxins in air, water, and land.

Environmental scientists conduct research on chemical, isotopic and biological tracers on a broad range of length scales and time scales. They are well-positioned to contribute to homeland defense.

## **Interdisciplinary Science and Interdependent Science**

It is becoming increasingly clear that rapid advances in one field of science are dependent upon advances in other fields of science. Therefore, a balanced portfolio is necessary to promote advances all fields of science, including the biomedical sciences. Kenneth Shine, President of the Institute of Medicine, addressed this issue in a letter of June 23, 2000 to Senator Bond:

"While the Congress Science has been both generous and wise in its support of the NIH in recent years, it is important to note that advances in medicine are very dependent upon other fields of science...Science is interrelated, and so we need to have balance in this funding for medicine to move forward."

"The late Lewis Thomas, the former head of Yale Medical School and the Memorial Sloan-Kettering Cancer Center, once observed that the greatest advances in improving human health was the development of clean drinking water and sewage systems. So we owe our health as much to civil engineering as we do to biology."

Increasingly, the most important scientific problems are interdisciplinary in nature. The environmental sciences are strongly dependent upon interdisciplinary research. For example,

research on climate change involves collaboration among geologists, geochemists, geophysicists, paleontologists, oceanographers, atmospheric scientists, computer scientists, biologists, and social scientists.

A balanced R&D portfolio is especially important for nurturing progress on interdisciplinary scientific problems. Rather than focusing on the dichotomy between the physical sciences and the life sciences, NCSE recommends urges PCAST to revise its draft report to focus on the need to restore balance between the biomedical sciences and all other fields of science and engineering.

Thank you for the opportunity to comment on PCAST's draft report on *Assessing the U.S. R&D Investment*. Additional information about the federal R&D portfolio is available in NCSE's testimony to PCAST on March 5, 2002 and June 12, 2002.

### **Acronyms**

|       |   |
|-------|---|
| DOD   | Department of Defense                                     |
| DOE   | Department of Energy                                      |
| NASA  | National Aeronautics and Space Administration             |
| NCSE  | National Council for Science and the Environment          |
| NIH   | National Institutes of Health                             |
| NIST  | National Institute of Standards and Technology            |
| NOAA  | National Oceanic and Atmospheric Administration           |
| NSF   | National Science Foundation                               |
| PCAST | President's Council of Advisors on Science and Technology |
| USDA  | U.S. Department of Agriculture                            |
| USGS  | U.S. Geological Survey                                    |

### **Attachments**

1. Biographical sketch of Craig M. Schiffries

## **Biographical Sketch**

**Craig M. Schiffries** is Director of Science Policy and Senior Scientist at the National Council for Science and the Environment. He previously served as a Congressional Science Fellow on the staff of the United States Senate Judiciary Committee; Director of Government Affairs for the American Geological Institute; Director of the Board on Earth Sciences and Resources of the National Academy of Sciences / National Research Council; visiting faculty member at Yale University; and consultant with the Monitor Company. Dr. Schiffries simultaneously earned his B.S. and M.S. degrees from Yale University, where he was elected to *Phi Beta Kappa*, graduated *summa cum laude*, and double-majored in Geology and Geophysics and in Economics and Political Science. He was a Marshall Scholar at Oxford University, where he earned an honors B.A. in Philosophy, Politics, and Economics. He received a Ph.D. in Geology from Harvard University, where he held a fellowship from the Hertz Foundation.