TESTIMONY
ON
THE PRESIDENT’S FY 2005 BUDGET REQUEST
FOR
THE PHYSICAL SCIENCES, MATHEMATICS AND ENGINEERING
SUBMITTED
TO
THE HOUSE SCIENCE COMMITTEE
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Mr. Chairman, Mr. Gordon and members of the Science Committee, we thank you for the opportunity to submit this testimony. We also wish to express our appreciation for the strong support this committee has shown for science and technology over the course of several decades. The legislative actions this committee has taken during the last few years have raised the visibility of science and engineering substantially within Congress, we believe, to the great benefit of American society.

Sadly, we cannot provide such praiseworthy comments about the President’s FY 2005 budget request for the physical sciences, mathematics and engineering. After a decade during which federal investments in these disciplinary research programs stagnated, with a consequential loss in purchasing power of 20 percent or more, the Administration’s FY 2005 budget request does little to address the problem. Should Congress endorse the President’s overall set of budgetary priorities and adopt the President’s proposed funding levels for science, math and engineering, the decade-long decline will accelerate. It will place in even greater jeopardy America’s science and technology leadership, already under increasing challenge by nations in Europe and Asia.

Discovery and innovation have been key to America’s economic growth for more than half a century, accounting for more than half the increase in the GDP since World War II, according to economists. The impact of science and technology on our standard of living has become even more pronounced in recent years. As the Chairman of this committee noted last week, "We need to remember that the decade of unprecedented economic growth that began in 1992 and that lasted into this new century was a result of previous investments we had made in science and technology, particularly in areas such as information technology and the health sciences. If the current recovery is to be sustained, we need to invest now in R&D. A healthy investment in R&D is the only way to ensure that our economy will continue to create jobs over the long term.”

We would add to this several other observations. First, we can no longer take for granted the supremacy of American science and technology on the world stage that has served our nation so well for more than half a century. For a number of years, Europe and Asia have been investing heavily in their scientific infrastructure and their science education programs, and they are now challenging our nation’s S&T leadership. Second, for several decades, we have relied heavily on a pipeline of foreign talent to bolster our scientific and engineering workforce. Heightened security policies in the aftermath of 9/11 combined with growing R&D opportunities elsewhere in the world are now causing many foreign scientists and engineers to rethink their choice of the United States for pursuing their education and career goals.

We believe that the President’s budget request for the physical sciences, mathematics and engineering place the future of our nation at great risk, economically and militarily. The constriction in these federal accounts come at time when our nation faces significant R&D challenges. Sustaining real economic growth, as we have noted, requires continued investments in science that lead to discovery and innovation, according to many economists, among them Michael Boskin, Alan Greenspan and Robert Solow. In a risk averse, competitive global environment, where corporate time horizons are measured in months, rather than years, the federal government must be the dominant investor in long-term research.
The federal government also has the responsibility for keeping our nation secure. Science and technology are key to maintaining our military capabilities and keeping our homeland safe. The Defense Department increasingly looks toward civilian research programs for discoveries and innovations that can be translated into military hardware. The Department of Homeland Security also relies on the federal investments in long-term civilian research for advances that will lead to technologies needed in the war against terrorism on American soil.

The R&D enterprise also faces the challenge of making America energy self-sufficient. That challenge was captured in the Hydrogen Initiative proposed by the President last year. The elusive goal of weaning our nation off foreign sources of oil will be achieved only through scientific discovery and innovation. Such investments must be made across the energy arena in the physical sciences and engineering, since it is impossible to predict where breakthroughs will occur.

Providing our nation with a high-tech workforce of world-class quality represents still another challenge for our nation’s R&D enterprise. It is an essential component for keeping America competitive globally. As we already suggested, our nation is failing in that challenge. For more than a decade, we have witnessed a decline in the number of Americans seeking advanced degrees in the physical sciences, mathematics and engineering. To meet the shortfall, we have become reliant on a pool of foreign talent. We have reaped great benefits from the flow of scientists, mathematicians and engineers from other countries, but in the process, we have exposed our nation to the adverse consequences when the flow slows or stops.

Data on foreign applications to our institutions of higher learning suggest that the flow is indeed slowing. Entry into the United States has become more difficult, and nations, such as China and India, have invested in their scientific infrastructure, making it possible for many students to receive their training at home. Today, China and India also offer substantial career opportunities for scientists, mathematicians and engineers, opportunities that did not exist even half a decade ago. As Great Britain and Australia have increased their science and engineering recruitment efforts, they, too, have become significant destinations for young researchers from around the world. America’s dominance of the science and engineering playing field is being seriously challenged.

High-tech American industry, which is global in character, has already recognized the opportunities that exist elsewhere and has begun to outsource some of its activities offshore. At the recent World Economic Forum held in Davos, Switzerland, John Chambers, Cisco Systems chief executive, made this point: “The jobs over time will go to the best educated places with the best infrastructure and the most supportive governments. How you create an environment where the jobs stay is going to be the key element.” We believe that strong federal investments in basic research and the science and engineering infrastructure are prerequisite to a secure future for a high-tech American workforce.

Since the end of World War II, federal science and technology policy makers have endorsed the concept of a multiplicity of agency support for long-term research. Today, the Department of Energy, NASA and the National Science Foundation dominate the federal civilian research portfolio in the physical sciences, mathematics and engineering. Collectively, these
agencies have seen their budgets flat lined for more than a decade, during a time when the GDP has increased substantially and our nation’s dependence on technology has grown commensurately. This investment approach contrasts sharply with the doubling of the budget of the National Institutes of Health that took place during the five years ending in FY 2003.

Congress recognized the policy imperative for addressing the portfolio imbalance and the shortfall in funding for the physical sciences, mathematics and engineering when it passed the NSF Authorization Act of 2002, which President Bush signed into law that December. The act authorizes the doubling of the NSF budget over five years. Both houses of Congress also agreed to authorize an effective doubling of the budget for DOE’s Office of Science and included such language in H.R. 6. And on October 16, 2002, the President’s Council of Advisors on Science and Technology (PCAST) strongly urged the White House to address the funding needs for the physical sciences.

Yet, the FY 2004 presidential budget request, which the President submitted last year, did not reflect any commitment to such an initiative. The FY 2005 request similarly ignores the policy recommendations and authorizations for the physical sciences, mathematics and engineering. The President’s budget would cut funding for the DOE’s Office of Science by 2.0 percent, and, once the Math and Science Partnership transfer is taken into account, it would only increase funding for the NSF’s Research and Related Activities account by 2.8 percent. Collectively, the NSF’s programs that cover the physical sciences, mathematics, computer science and engineering would increase by 2.2 percent, not enough to cover inflation. In the case of the DOE, the Presidential request provides no headroom for any congressional earmarks, which last year totaled almost $150 million, suggesting that overall spending on the Office of Science’s research activities could fall even further, unless Congress alters the President’s request.

Even at a time when the federal government faces large deficits, we believe that we must make the investments that safeguard the future of our nation. The President’s proposed budget for the physical sciences, mathematics and engineering falls short of the mark in almost all cases. The NASA budget offers one exception, but even there the news is not uniformly good.

While the Office of Space Science is slated to receive an increase of just over 4 percent – which we applaud – we note that some of the programs not directly tied to the President's new "Exploration" initiative will be delayed or reduced significantly. The new “Beyond Einstein” initiative, for example, will have two of its key missions, Constellation-X (an X-ray spectroscopy telescope mission) and LISA (a laser interferometer mission) deferred under the President's plan, and other missions designed to study the high-energy universe will experience budget cuts or be eliminated. Likewise, severe reductions in some solar research programs could have long-term adverse effects on Earth-based installations and orbiting satellites, as our ability to predict solar storms ceases to improve.

On the positive side, we note that the new budget line entitled Lunar Exploration will allow further study of the lunar environment and enable the development of a sample return mission from the lunar south pole, where we now suspect water ice exists. We also commend the Administration for its budgetary commitment to improving in-space propulsion through the
use of nuclear technology that will be needed if we are to explore the furthest reaches of the solar system.

Mr. Chairman, we conclude with a few comments about the context of the President’s budget request for the physical sciences, mathematics and engineering. The White House press releases and the budget briefings have made it clear that for FY 2005, the Administration considered only a few activities to be of such national importance that they merited increases above the 0.5 percent baseline. These are defense, homeland security, education and space. (We have already commented on the NASA budget and will not dwell on that any further.)

We now consider proposed research budgets in the context of the other three priority areas. The history of the past half-century bears ample testimony to the importance of the physical sciences, mathematics and engineering for our military capabilities and for our extraordinary successes in defending freedom throughout the world. We have no doubt that our future defense capabilities will also be so reliant, as will our ability to defend our homeland against terrorism. In the case of education, we strongly believe that our 21st century workforce will become increasingly oriented toward science and technology. Recent analysis shows an extraordinary correlation between federal support for research and the number of American students willing to pursue careers in the sciences, mathematics and engineering.

In light of these obvious connections, we find it very disturbing that the President’s budget request continues to under-fund research in the physical sciences, mathematics and engineering. We hope that the Science Committee concurs, and we urge you, Mr. Chairman, and members of this committee to communicate our testimony to other members of Congress. We hope that as the House of Representatives develops its budget plans for FY 2005 it will make the critical investments in physical science, mathematics and engineering research needed to foster our Nation’s continued leadership in economic and technological growth.