SCIENCE POLICY

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U.S. Congress Speedily Approves NNI Legislation; Bush Signs Bill into Law

On November 20, 2003, Congress approved the Nanotechnology Research and Development Act (H.R. 776 in the House, S. 189 in the Senate), which seeks to put the president's National Nanotechnology Initiative (NNI) into law and authorizes $3.7 billion over the next four years for the program. President Bush signed the bill on December 3.

The House version of the bill was introduced last spring by House Science Committee Chair Sherwood Boehlert (R-N.Y.) and Rep. Mike Honda (D-Calif.) and quickly passed before moving on to the Senate. After negotiating a final version with the House Science Committee, the Senate approved it as well, passing it back to the House for the final vote. The bill sets spending parameters for five government departments or agencies over the next four fiscal years. Under its provisions, the National Science Foundation (NSF) would receive $1.734 million, or 47% of the total funds, while the Department of Energy would receive $1.459 million, or 40% of the total funds allocated. The National Institute of Standards and Technology would receive 8%, with the National Aeronautics and Space Administration receiving 4% and the Environmental Protection Agency receiving 1%.

In addition to funding increases, the bill requires the creation of research centers, education and training programs, research into the societal and ethical consequences of nanotechnology, and efforts to transfer technology into the marketplace. It also includes a series of coordination offices, advisory committees, and regular program reviews to ensure that taxpayer money is being spent wisely and efficiently.

The NSF has estimated that nanotechnology applications may be worth more than $1 trillion in the global economy in a little more than a decade.

"Experts agree that investing in innovation is the key to a vibrant U.S. manufacturing base and continued generation of new jobs," said Honda in a statement released immediately following the bill's approval. "Nanotechnology is one of the areas of innovation most worthy of investment, as it has the potential to create entirely new industries and radically transform the basis of competition in others." Many were quick to praise Congress's relatively swift passage of the bill.

"When one looks at the next 100 years of human development and the growth of the global economy, no vote taken by Congress in the past decade will have a greater effect than today's passage of the nanotechnology bill," said F. Mark Modzelewski, executive director of the NanoBusiness Alliance, one of numerous organizations that endorsed the legislation early on. Others include the National Association of American Universities, the Alliance for Science and Technology, the Semiconductor Industry Association, the Association of American Universities, the Alliance for Science and Technology Research in America (ASTRA), the Institute of Electronics and Electrical Engineers, and the Materials Research Society. Major corporations such as IBM, Intel, and Hewlett Packard are also strong proponents of the bill.

Mihail Roco, who heads NNI, sees the new legislation as an important recognition of nanotechnology as a key factor in the development of science, engineering, and the U.S. economy in the first half of the new century. He said it will also help refocus the existing activities of NNI that began in 2000.

"From a materials standpoint, the bill certainly underlines the fact that control of matter at the nanoscale is a key foundation for NNI," he said.

Among other impacts, Roco said that the funding increases provided by S. 189 will barely keep pace with the rapid expansion of nanotechnology. Nanotechnology-related research has moved far beyond discovery and innovation in advanced materials, electronics, pharmaceuticals, and catalysts, expanding into new areas such as nanomedicine, energy conversion, food and agriculture, environmental remediation, and the design of molecular architectures for manufacturing applications. He said that nanotechnology is also bringing engineering computer simulation and modeling down to nanoscale accuracy.

"Many people have the impression that this bill solves the problem completely," said Roco. "But it's a very difficult task to set priorities when there are so many good ideas in fields of relevance." He is looking to develop partnerships with industry and state governments to further increase financial support for nanotechnology.

Mary Good, chair of ASTRA and dean of the Donaghey College of Information Science and Systems Engineering at the University of Arkansas at Little Rock, reports that more than a decade of underfunding scientific research in specific disciplines—including the physical and mathematical sciences and engineering—has created a severe imbalance in the country's basic research portfolio, and she views the passage of S. 189 as one of several essential steps needed to reverse the situation.

"Ultimately, the nanotechnology products and processes produced through NNI should benefit our society by improving productivity, perhaps the only way we can hope to compete in a globalized labor market," she said.

ASTRA executive director Robert Boege acknowledged that the passage of S. 189 does not automatically translate into the release of funds for research, particularly given the current tight budgetary climate.

"The running joke is, you can authorize a ham sandwich, but only appropriations committees of jurisdiction can legally direct the money one way or another," said Boege. For instance, despite approving the NSF doubling bill earlier this year, the agency received only a 4.7% budget increase for FY2004 instead of the anticipated 15%. "We certainly have strong bipartisan support on the Hill for funding increases, but the question is, how ardent is that support given the many competing priorities?" he said. "Generally speaking, the physical sciences are still getting short shrift, although the downward trend has at least been arrested."

Roco, however, is optimistic that scientists will see real funds and that the requested investment will be made—perhaps even surpassed. As evidence, he points to the first two years of funding under NNI. In the first year, Congress initially approved $422 million, while NNI ultimately spent $465 million. And in the second year, Congress approved $604 million; NNI spent $697 million. The signs are encouraging: The Bush administration requested $849 million for nanotechnology research in its FY2004 budget request, spread across about 16 government agencies participating in NNI, and a reportedly record $123 billion for federal research and development spending overall (including substantial increases for military and homeland security projects). NSF will receive $254 million for nanoscale science and engineering in FY2004, $385 million in FY2005, and $476 million in FY2007.

"It is exactly in times of economic constraint that we need to develop new jobs in industry, more efficient manufacturing methods, and more efficient medical procedures," said Roco of why such funding increases are finding strong support in Congress. "I think nanotechnology will grow because it is not just a science-driven initiative; it also has strong relevance to society."

JENNIFER OUELLETTE

EC Promotes PV Research

The European Commission (EC) has reported that the Photovoltaics Technology Research Advisory Council aims to develop a foresight report and a strategic research agenda to address barriers to maximizing the potential of photovoltaic

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(PV) technology as a clean energy source. The initiative of Loyola de Palacio, EC vice president in charge of energy and transport, and of EC Commissioner for Research Philippe Busquin involves 18 members representing the major players in this technology.

"I see the establishment of the Photovoltaics Technology Research Advisory Council as a catalyst for creating a common European vision and a strategic research agenda," said Busquin. "So far, electricity produced from photovoltaic technology represents only a very small part of the total electricity generated in the Union. This contribution will remain static unless more ambitious measures are taken. We need to consider how we can overcome the technical, legal, and socioeconomic obstacles to increase the uptake of this sustainable energy system, which will create a winning situation for Europe's industry, as well as for Europe's society."

Despite its advantages, PV technology is not yet fully competitive, as it is still expensive compared with other forms of electricity generation. The objective of the EC's white paper on the promotion of renewable energies is to increase the installed PV generating capacity in the Union to 3 GW by 2010. Technical developments, according to the Commission, should be accompanied by socioeconomic research related to wider public awareness and acceptance of the technology, training programs for installers, and harmonization of European codes and standards.

Europe is now the world's second largest manufacturer of photovoltaics, accounting for more than 24% of global production, behind Japan (44%) and ahead of the United States (22%). Current forecasts, the Commission reports, show large potential for solar electricity production, for which Europe has seen an average growth rate of 30% per year over the last decade. Nevertheless, photovoltaics are currently underutilized in the European Union, despite the active support of the EC for research, development, and demonstration projects in this area, with over €200 million in funding for almost 200 projects over the last 10 years.

South Korea Expands International Cooperation in Nuclear Energy Projects

South Korea and China held their fourth joint commission meeting in Beijing last November and discussed a number of cooperative projects that they want to pursue in the field of nuclear energy, the Korean Ministry of Science and Technology (MOST) reported. MOST Deputy Minister Kwon Oh-gab led the delegation from Korea to the conference co-chaired by Zhang Huazhu, head of the China Atomic Energy Authority (CAEA). Out of the meeting came an agreement to set up a joint Korea–China atomic/hydrogen energy research center at Tsinghua University in early 2004. At the conclusion of the meeting, Kwon toured a number of nuclear energy facilities, including the Nuclear Energy Emergency Control Center of the CAEA and the Nuclear Energy Institute at Tsinghua University.

Later in November, Roberto Hojman, president of the Chilean Nuclear Energy Commission, led a six-member delegation to meet with Cho Choung-won, chief of the MOST Atomic Energy Bureau, and the Korean delegation in Seoul. Their itinerary included a discussion on the utilization of a nuclear reactor for research, a feasibility study for the export of small nuclear reactors to Chile, and an exchange of atomic energy experts.

EC to Boost Participation of Acceding and Candidate Countries in EU Research

The European Commission (EC) reported last November that Commissioner for Research Philippe Busquin is concerned over the participation level of the 13 acceding and candidate countries in the Sixth Framework Programme for research 2002–2006 (FP6) of the European Union (EU). Out of more than 100,000 applications for participation in FP6, only 13,000 are from the acceding/candidate countries. Funding mostly supported nanotechnology, information society, and energy and transport projects. Last year, the EC launched €13 million worth of "specific support actions" to stimulate, encourage, and facilitate the participation in FP6 of the 13 acceding/candidate countries: Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey.

"Since the very beginning of the Sixth Framework Programme, acceding and candidate countries have participated in EU research schemes on an equal footing with EU member states," said Busquin. "The objective is to ensure the further integration of these countries in the European Research Area. As we can all benefit from the high-level scientific potential these countries have in many areas, we must ensure their participation in the Framework Programme reflects their real potential. There is still scope for improvement, and I am confident research players in EU member states, and in the acceding/candidate countries alike, will make an additional effort to meet this goal."

A meeting in Brussels was arranged last November with Busquin and ministers and other high-level representatives of the 13 acceding and candidate countries. A conference on the participation of acceding/candidate countries in FP6 will take place this month in Bucharest, on February 12–13.

South Korea, Germany to Open Joint R&D Research Institution

South Korea and Germany reached an agreement to set up a joint research and development (R&D) center in Seoul by 2005 and exchanged a letter of intent at a meeting held in Bonn, Germany, last November, according to the Korean Ministry of Commerce, Industry and Energy (MOCIE). MOCIE Deputy Assistant Minister Kim Jong-gab led the Korean delegation at the meeting. The joint institute, to be formed by the Korea–Germany Industrial Technology Center of Korea and the Fraunhofer Institute for Electron Beam and Plasma Technology of Germany, will bring together the advanced technologies of Germany and the production capabilities of Korea to maximize the achievement of its research efforts, particularly in the areas of nano- and bioengineering technologies, the ministry said.

European Science Foundation Appoints Director of Science and Strategy

The European Science Foundation (ESF) announced its appointment last October of John Marks as director of science and strategy. Marks will oversee the direction and coordination of all scientific and strategic development at ESF. He brings over 23 years of experience in science policy and management to the position. Recently, Marks was the director of earth and life sciences for The Netherlands Organization for Scientific Research (NWO). He has also worked for the science policy directorate in the Ministry of Education, Culture, and Science in The Netherlands, where he was responsible for a wide range of policy areas, including the establishment of a Foresight Process. Marks has a doctorate degree in physics from the University of Leiden, in The Netherlands, and speaks several languages, including Dutch, German, French, and English. □

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