Expired Competitiveness Bill Remains Influential

Although the 109th Congress was unable to pass fiscal year 2007 appropriations bills for science agencies, it did introduce some materials-friendly legislation that will likely lay the groundwork for the 110th Congress' appropriations. In particular, members of the Senate introduced the National Competitiveness Investment Act of 2006, which clearly supported the recommendations in the National Academies' *Rising Above the Gathering Storm* report and was widely supported in the Senate.

The three main priorities of the National Competitiveness Investment Act of 2006 (NCIA) were increasing investments in research, innovation, and science education. "I am one of the most fiscally conservative members of the Senate," said Senator John Ensign (R-Nev.), a supporter of the bill. "But every dollar we spend on basic research is a dollar that will come back to us in spades in terms of stimulating economic activity and helping to keep the United States at the forefront of global innovation."

The NCIA would have authorized increased funding for the National Science Foundation from approximately $5.6 billion in FY 2006 to $11.2 billion in FY 2011. In addition, it would have positioned the Department of Energy's Office of Science to double in funding over the next 10 years by increasing its budget from $3.6 billion in FY 2006 to over $5.2 billion in FY 2011. The bill also included the creation of a program to direct federal agencies investing in science and technology to use approximately 8% of their budget to support cutting-edge, high-risk projects.

The NCIA did not name the specific areas of research that would benefit from the new funding, but it clearly identified innovative, multidisciplinary areas of research as high priority, especially those with the potential to improve the U.S. economy and draw global interest. Energy research, nanotechnology, biotechnology, and basic communications research are some examples of high priority research that fits into these categories.

In addition, research on alternative energy sources, nanoscale materials characterizations, and computers and communication were all recurring priorities in President Bush's American Competitiveness Initiative, the National Academies' *Rising Above the Gathering Storm* report (RAGS), the Council on Competitiveness' *Innovate America* report, and the resulting competitiveness discussions. These areas stand to benefit greatly from the passing of a bill like the NCIA.

Along with supporting basic research and innovation through longer grant periods, higher grant amounts, and the funding of new projects, the NCIA would have increased the amount of attention and funding spent on improving the quality of science, technology, engineering, math, and foreign language education for the next-generation workforce. The bill would have enabled significant new investments in teacher training, K–12 and higher science education, and statewide math and science specialty schools, among other programs.

The NCIA was presented to Congress in late September 2006 and was backed by more than 35 senators from a wide range of states. The bill was cosponsored by 2006 Senate Majority Leader Bill Frist (R-Tenn.) and 2006 Minority Leader Harry Reid (D-Nev.). "There are not very many things this year in this Congress that have been introduced by our distinguished two leaders," said Senator Lamar Alexander (R-Tenn.) upon the bill's introduction. "But they have decided that in this case, this issue is so important that they wanted to send a signal to our country, to the rest of us in the Senate, to the Members of the House of Representatives, to all of us."

U.S. science policy in 2006 was dominated by talk of investing in competitiveness after President Bush announced the American Competitiveness Initiative in his State of the Union Address in January. His efforts reflected, in large part, the concerns raised by the National Academies' RAGS report, which discussed ways to help the United States maintain its competitive edge in the global economy.

"The National Academy of Sciences told us what we need to do," said Senator Pete Domenici (R-N.M.), "and it is up to us on Capitol Hill to do it." Like Domenici, many senators thought that the NCIA was a significant first step toward following the Academies' recommendations and ensuring U.S. competitiveness.

"We cannot just tinker at the margins and expect to master our own destiny in the global economy," said Senator Edward Kennedy (D-Mass.) in September 2006. "We have a responsibility to make the investments that are necessary to our progress—a responsibility to our families, to our economy, to our Nation, and to our national security."

Despite this sense of responsibility, the 109th Congress did not pass the NCIA or any of the science agency appropriations bills, and in late 2006 a continuing resolution for all of the agencies covered unsigned bills until February 2007 was passed. The NCIA expired when the 109th Congress came to an end, but it will hopefully provide guidance to the 110th Congress as it tackles science funding for the remainder of fiscal year 2007 and beyond during this current session.

KENDRA RAND

National Survey Reveals Increased R&D Activities in Singapore

The Agency for Science, Technology and Research (A*STAR) in Singapore announced highlights of the National Survey of R&D in Singapore for 2005 that was released last December. The survey shows a particular increase in research and development activities in the private sector, driven by companies in the electronics sector. In terms of employment, researchers with PhD degrees showed the highest percentage increase in the private sector and, in the public sector, continued to make up the largest category of researchers—excluding the full-time postgraduate research students—in the Higher Education and Public Research Institute sectors.

Reported expenditure on R&D grew more quickly in the private sector than in the public sector in 2005. Companies in the manufacturing sector accounted for the majority of private sector expenditure on R&D at 65.1% ($1,974 million), of which companies in the electronics sector contributed 59.8% ($1,181 million). In the electronics sector, companies in the semiconductor and "infocomm" and consumer electronics sectors were the largest contributors to its expenditure on R&D at 50.6% ($597.2 million) for the semiconductor sector and 18.5% ($218.8 million) for the infocomm and consumer electronics sector. Computer peripherals ($175.8 million), data storage ($127.7 million), and other electronics modules and components ($61.7 million) contributed the remaining 30.9%.

Although the biomedical sciences manufacturing sector accounted for only 4.6% of the manufacturing sector's expenditure on R&D, it had grown rapidly, by 62.8%, from $55 million in 2004 to $90 million in 2005.

The reported number of patent awards in the private sector increased 67.7% from 433 in 2004 to 726 in 2005, accounting for 82.8% of all patent awards to R&D performers in Singapore in 2005. The electronics sector accounted for 76.7% (626) of the patent applications and 83.8% (500) of the patent awards in the manufacturing sector.

Researchers with a PhD degree showed the highest percentage increase in employment in the private sector, albeit from a small base, increasing 26.1% from 708 in 2004 to 893 in 2005. Researchers with a PhD, Master's, and Bachelor's degrees as the highest formal

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educational qualification comprised 6.3%, 21.1%, and 55.7% respectively of the researchers employed in the private sector in 2005.

In reference to the survey results, Ulf Schneider, vice president of the Development Centre at Infineon Technologies Asia Pacific Pte Ltd., said, "This shows that Singapore continues to be a conducive environment for private sector to invest in value creation activities in R&D and Intellectual property development and protection. The excellent site-factors enable us to develop, attract, and retain the best talents for sustainability."

The key contributors to public sector expenditure on R&D were the public research institute sector at 40.6% ($630 million), and the higher education sector at 30.8% ($478 million). The government sector contributed the remaining 28.6% ($443 million). The number of researchers in the public sector, excluding the full-time postgraduate research students, increased 12.3% from 5,197 in 2004 to 5,834 in 2005, with the largest growth reported by the public research institutes at 19.2% or an increase of 1,686 researchers in 2004 to 2,010 in 2005. The number of full-time postgraduate research students working in the public sector remained about constant, with a 0.4% increase from 3,705 in 2004 to 3,718 in 2005. For both the higher education and public research institute sectors, patenting activity in 2005 showed a decline from 2004 levels but remained substantially higher than the 2000–2003 levels.

Boon Swan Foo, managing director of A*STAR, said, "The survey results reflect the continued robust growth of R&D in Singapore. Government's strong commitment in R&D has created a conducive and vibrant environment for industry to conduct their R&D activities in Singapore. Companies are increasingly recognizing the importance of R&D as they engage in higher value activities to stay ahead of the competition. They have been able to leverage on the excellent public sector R&D capabilities, access to state-of-the-art R&D infrastructure, and the availability of R&D talent, as well as the well-developed regulatory and ethical frameworks, which have been put in place.

"This positive trend is expected to continue in the years to come as companies reap the fruits of their R&D efforts, and with sustained government investment in R&D in strategic areas such as biomedical sciences, environment and water technologies, and interactive and digital media."

With the gross domestic expenditure on R&D at 2.36% of gross domestic product in 2005, Singapore's R&D intensity is above the European Union average (1.90% in 2003) and the Organization for Economic Cooperation and Development average (2.26% in 2004), but continues to trail that of the United States (2.68% in 2004) and Japan (3.13% in 2004).

Relative to the small advanced countries, Singapore's R&D intensity is ahead of that of Ireland (1.20% in 2004) and the Netherlands (1.78% in 2004) and is approaching the current level of Denmark (2.48% in 2004), but it trails that of the world leaders: Israel (4.69% in 2005), Sweden (3.95% in 2003), Finland (3.51% in 2004), and Switzerland (2.94% in 2004).

Relative to the Newly Industrialized Economies, Singapore's R&D intensity continues to trail that of Taiwan (2.56% in 2004) and South Korea (2.85% in 2004).

Decisions at United Nations Climate Change Conference Support Developing Countries

The United Nations Climate Change Conference, held in Nairobi, concluded on November 17, 2006 with the adoption of a wide range of decisions designed to mitigate climate change and help countries adapt to the effects of global warming.

The conference was attended by ~6000 participants, among them more than 100 ministers, the Secretary-General of the United Nations, and two heads of state.

"The conference has delivered on its promise to support the needs of developing countries," said Conference President, Kenyan Minister for Natural Resources and the Environment Kivutha Kibwana. "The positive spirit of the conference has prevailed."

At the meeting, activities for the next few years under the "Nairobi Work Program on Impacts, Vulnerability and Adaptation" were agreed upon. These activities will help enhance decision-making on adaptation action and improved assessment of vulnerability and adaptation to climate change.

Another important outcome is the agreement on the management of the Adaptation Fund under the Kyoto Protocol. The Adaptation Fund draws on proceeds generated by the clean development mechanism (CDM) and is designed to support concrete adaptation activities in developing countries.

The CDM permits industrialized countries, which have emission targets under the Kyoto Protocol, to invest in sustainable development projects in developing countries that reduce greenhouse gas emission, and thereby generate tradable emission credits.

The Conference recognized the barriers that stand in the way of increased penetration of CDM projects in many countries, in particular in Africa.

Parties welcomed the "Nairobi Framework" announced by the United Nations Secretary-General Kofi Annan, which will provide additional support to developing countries to successfully develop projects for the CDM. "This mechanism is an outstanding example of a UN-led partnership linking government action to the private sector in the developing world," Kofi Annan said.

The agencies involved in the partnership are the United Nations Development Program (UNDP), the United Nations Environment Program (UNEP), the World Bank Group, the African Development Bank, and the United Nations Framework Convention on Climate Change (UNFCCC).

Rules were finalized for the Special Climate Change Fund. The fund is designed to finance projects in developing countries relating to adaptation, technology transfer, climate change mitigation, and economic diversification for countries highly dependent on income from fossil fuels.

"The 166 Parties to the Kyoto Protocol heard in Nairobi that global emissions of greenhouse gases have to be reduced to very low levels, well below half of levels in 2000, in order to avoid dangerous climate change," said Yvo de Boer, Executive Secretary of the United Nations Framework Convention on Climate Change (UNFCCC).

Brazil put forward a concrete proposal for an arrangement to provide positive incentives to reduce deforestation emissions in developing countries. This proposal will be discussed at a meeting in March 2007.

The next round of negotiations under the Kyoto Protocol and talks under the United Nations Climate Change Convention will be held in Bonn, Germany in May 2007. □

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