American Recovery and Reinvestment Act of 2009 Funds Physical Science

On February 13, 2009, the House of Representatives and Senate approved the conference report for the American Recovery and Reinvestment Act of 2009 (ARRA), and on February 17, the president signed it into law. The key purpose of the legislation is to promote economic recovery. According to the House Committee on Science and Technology, the package relies on science and innovation as the keys to new U.S.-made technology and will advance important work on urgent national challenges such as energy independence and climate change.

"This package makes much-needed investments in science and technology as the path to ensuring our national economic competitiveness," said Representative Bart Gordon (D-Tenn.), chair of the Committee on Science and Technology.

ARRA includes $111 billion in funding for infrastructure and science and $43 billion in funding for energy. The bill also contains $288 billion of tax relief, including $15 billion for infrastructure and science and $22 billion for energy. The government has set up the Web site http://recovery.gov for the public to track the distribution of funding by federal agencies.

According to the House Science and Technology Committee, the funding for the Department of Energy (DOE) Office of Science will be invested to boost energy independence and to protect the environment by researching materials science, climate science, carbon sequestration, biofuels, advanced computing, fusion energy, high-energy physics, and nuclear physics. The investments will include much-needed laboratory and instrumentation upgrades to enable scientists and engineers to do world-class research necessary for making breakthroughs in energy. The package will fund renewable energy technology development, standards-setting and deployment of smart grid technologies, demonstration of carbon capture and storage, grants for companies producing advanced batteries, and loan guarantees for the deployment of existing clean technologies.

The package also includes $400 million to establish the Advanced Research Projects Agency for Energy (ARPA-E) at DOE. "I'm especially glad to see funding that will establish ARPA-E, 18 months after it was signed into law," said Gordon. "Besides pursuing the high-risk, high-reward research, I believe ARPA-E is uniquely positioned to be the bridge to the new energy economy—and, with it, the 'green' jobs we need, the same way DARPA [Defense Advanced Research Projects Agency] formed the underpinnings of the multi-billion dollar defense industry."

Photo courtesy of the U.S. Department of Energy

President Barack Obama visited the Department of Energy in early February, promoting the recovery plan. He and Energy Secretary Steven Chu discussed the Obama Administration's ambitious plans to create jobs, change the way the United States produces and uses energy, and address the climate crisis.

The U.S. Senate Committee on Energy and Natural Resources lauded the provision in ARRA that would establish a 30% investment tax credit to start to address problems faced by a stressed domestic renewable energy industry, a priority of the committee's chair, Jeff Bingaman (D-NM). The credit also is intended to help stimulate the U.S. economy by making the United States a more attractive location for manufacturers of solar, wind, and other green technologies.

Sen. Bingaman said, "Domestic demand for renewable energy technologies has grown rapidly over the past few years, and we anticipate even faster growth in the immediate future."

The Senate Energy and Natural Resources Committee also highlighted the three-year extension of the Production Tax Credit, noting that last year it took nine votes to enact a one-year extension of wind and two-year extension for other resources.

In the area of research and development, the committee noted the $2.5 billion stipulation for energy efficiency and renewable energy research and the $3.4 billion for fossil energy research and development.

Sen. Lisa Murkowski (R-Alaska), Ranking Member of the Senate Committee on Energy and Natural Resources, agreed that the development of renewable resources and more efficient use of energy are important. However, she expressed concerns over the ability of federal agencies to allocate the significant increases the Act calls for within a short time frame, to be possibly followed afterwards by a sharp decrease due to the federal deficit.

"Perhaps the best example is the Department of Energy," said Murkowski, "which is set to receive roughly $45 billion. DOE's total budget for fiscal year 2008 was $24 billion. Assuming the department receives similar funding through fiscal year 2009 appropriations…DOE will have received almost triple its historical level of funding in less than a month…. The Congressional Budget Office… determined that DOE would only be able to spend 24% of its funding before the two-year deadline. The Energy Department simply does not have time to gear up and properly spend so much money over so short a period."

Murkowski also said that ARRA fails to consider an increase in the domestic production of traditional resources such as oil and natural gas. "By focusing only on new technologies, and to the total exclusion of those tried and true, this bill creates a false dilemma. Clean energy is viewed as the only viable option for ener-

https://doi.org/10.1557/mrs2009.71 Published online by Cambridge University Press

gy development and job creation, when in fact it may not even be our most effective option," she said.

In addition to energy, Chairman Gordon highlighted funding for the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and the National Ocean Atmospheric Administration (NOAA). Funding priorities include Earth science climate research missions (NASA) and addressing critical gaps in climate modeling and establishing climate data records for continuing research into climate change (NOAA). NSF will receive funding that will go immediately to fund grants that have already been through the merit-review process, including new awards or increases for current grants. Other funding will support Science, Technology, Engineering, and Mathematics (STEM) education programs, and allow for much-needed equipment and facilities construction.

A total of $610 million is to go to the National Institute of Standards and Technology (NIST). This allotment includes $220 million for NIST's Scientific and Technical Research and Services (STRS) account for NIST laboratory research, competitive grants, additional research fellowships, and advanced research and measurement equipment and supplies and $360 million for Construction of Research Facilities (CRF). Of the latter, half ($180 million) is designated for NIST infrastructure, including construction projects that improve energy and operational efficiency and spur innovation by advancing NIST research through improved facilities. The other half ($180 million) is a competitive construction grant program for funding science research facilities outside of NIST. The agency will receive $10 million from DOE to support collaborative efforts with industry and federal agencies to develop a comprehensive framework for a nationwide, fully interoperable smart grid for the U.S. electric power system—a research project assigned to NIST under the Energy Independence and Security Act of 2007. See Table I for more details of selective programs.

According to a timeline that appears on the administration's Recovery.gov Web site, on May 3, 2009, federal agencies are to make their performance plans publicly available and they are to begin reporting on their allocations for entitlement programs. On May 15, detailed agency financial reports are to become available, and on May 20, the agencies will begin reporting their competitive grants and contracts. Updated information on funding opportunities and grant applications can be accessed at http://grants.gov.

Table I. Selected Science Funding in HR 1, the American Recovery and Reinvestment Act House/Senate/Final Conference
(dollars in millions)

PROGRAMS	Original House bill	Original Senate bill	FINAL (Conference)
National Institute of Standards and Technology	**$ 520**	**$ 695**	**$ 600**
Scientific and Technical Research and Services	$ 100	$ 218	$ 220
Health Information Technology (transfer from Health and Human Services for standards development)	$ 20	$ 20	$ 20
Construction	$ 300	$ 357	$ 360
University construction competitive grants	$ 300	-	$ 180
Technology Innovation Program	$ 70	$ 0	$ 0
Manufacturing Extension Partnership	$ 30	$ 0	$ 0
National Science Foundation	**$ 3000**	**$ 1400**	**$ 3000**
Research (and related activities)	$ 2500	$ 1200	$ 2500
Major Research Instrumentation	$ 300	-	$ 300
Academic Research Facilities Modernization	$ 200	-	$ 200
Education (Education and Human Resources)	$ 100	$ 50	$ 100
Noyce	$ 60	-	$ 60
Math and Science Partnership	$ 40	-	$ 25
Professional Science Master's	-	-	$ 15
Major Research Equipment and Facilities Construction	$ 400	$ 150	$ 400
National Aeronautics and Space Administration	**$ 600**	**$ 1500**	**$ 1000**
Science	$ 400	$ 500	$ 400
Aeronautics	$ 150	$ 250	$ 150
Cross Agency Support	$ 50	$ 250	$ 50
Hurricane Relief	$ 50		Priority consideration
Exploration	$ 0	$ 500	$ 400
National Ocean Atmospheric Administration	**$ 1000**	**$ 1256**	**$ 1000**
Operations, Research and Facilities (habitat restoration)	$ 400	$ 427	$ 230
Procurement, Acquisition, and Construction	$ 600	$ 795	$ 600
Climate modeling	$ 140	-	$ 170
Department of Energy—COMPETES	**$ 2000**	**$ 430**	**$ 2000**
Office of Science	$ 1600	$ 430	$ 1600
Advanced computing	$ 100	$ 0	$ 0
Advanced Research Projects Agency for Energy	$ 400	$ 0	$ 400
Department of Energy—Energy Programs			
Energy Efficiency and Renewable Energy	$18,500	$14,398	$16,800
Renewable Research and Development	$ 2000	-	$ 2500
Biomass	$ 800	-	$ 800
Geothermal	$ 400	-	$ 400
Advanced Battery Grants	$ 1000	$ 2000	$ 2000
Electricity Delivery and Energy Reliability/Smart Grid and Energy Storage	$ 4500	$ 4500	$ 4500
Fossil Research and Development/Carbon Capture and Storage	$ 2400	$ 4600	$ 3400
Advanced Battery Loan Guarantee	$ 1000	$ 0	$ 0
Innovative Technology Loan Guarantees			
Renewable projects—proven technologies	$ 8000	$ 9500	$ 6000

Source: U.S. House of Representatives Committee on Science and Technology.

https://doi.org/10.1557/mrs2009.71 Published online by Cambridge University Press

Science and Technology Cooperation Develops between Finland and China

Finland and China have been developing close science and technology cooperation since 1986. In November 2008, high-level officials from both countries met in Helsinki to discuss mutual research and development (R&D) projects. In the future, R&D collaboration will focus on such topics as nanotechnology, information and communication technologies (ICT), and environmental technologies.

The Finnish side was chaired by Erkki Virtanen, Permanent Secretary of the Ministry of Employment and the Economy. The Chinese delegation was headed by Cao Jianlin, Vice Minister of the Ministry of Science and Technology (MOST).

The Finnish funding agency Tekes, the Ministry of Employment and the Economy, and MOST have created a new kind of public-private partnership model for research and development cooperation bringing together Chinese and Finnish research groups, companies, ministries, and funding agencies. One of the first cooperative programs under the new model is the Strategic Nanotechnology Collaboration Initiative (NAMI), which creates a platform for transnational projects between companies and research units from both countries.

Jianlin said, "Other fields of mutual cooperation between Finland and China are, for example, renewable energy, biotechnology, and environmental protection. I believe cooperation in the future will be promising."

With China's demand for new environmental technologies, Finnish and Chinese counterparts are currently discussing the idea of building a digital eco-city in China, a project that involves several ministries, research centers, and industrial partners.

Jaani Heinonen and Juho Rissanen, who are the heads of Tekes offices in China, said, "Also strategic collaboration in [the] ICT field will increase in the future." Finnish researchers and companies are already collaborating with partners in Tsinghua and Tongji universities, Shanghai Wireless Center, and Beijing University of Post and Telecommunications. □

https://doi.org/10.1557/mrs2009.71 Published online by Cambridge University Press