

Chemical Sciences in the FY 2015 Budget

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HIGHLIGHTS

- The Obama Administration is proposing modest increases for chemistry R&D at the Department of Energy's (DOE) Office of Science and the National Institute of Standards and Technology (NIST).
- At the National Institutes of Health (NIH), the National Science Foundation (NSF), and the Environmental Protection Agency (EPA) support for R&D would hold steady, or decline once inflation is factored.
- Administration priorities in FY 2015 involving significant chemical research efforts include the Materials Genome Initiative, the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, climate change resilience, and clean energy. The Opportunity, Growth and Security Initiative (OGSI) would provide significant additional support for these areas.

INTRODUCTION

Chemistry is a fundamental science that underpins advances in areas as diverse as understanding disease pathways and designing new drugs, finding new materials and chemical processes to develop next-generation energy systems, and improving standards and measurement technologies to enhance American competitiveness. For FY 2015, the White House is emphasizing cutting-edge materials development, cultivating clean energy, understanding the human brain, and addressing global climate change and disaster resilience. Chemistry, as an enabling science, is well represented throughout the agencies participating in these cross-cutting Administration priorities. Federal funding also plays a crucial role in educating the next generation of chemical scientists and engineers and

Table 1. Selected Supporters of Chemistry Research in the Federal Budget (budget authority in millions of dollars)

	FY 2013 Actual	FY 2014 Estimate	FY 2015 Budget	Change Amount	FY 14-15 Percent
National Science Foundation	6,901	7,172	7,255	83	1.2%
<i>Math and Physical Sciences</i>	1,249	1,300	1,296	-4	-0.3%
<i>Chemistry</i>	229	236	237	1	0.6%
<i>Materials Research</i>	291	298	299	1	0.3%
Env Protection Agency					
<i>Science & Technology</i>	744	759	764	5	0.6%
Department of Energy					
<i>Office of Science</i>	4,681	5,066	5,111	45	0.9%
<i>Basic Energy Sciences</i>	1,551	1,712	1,807	95	5.5%
<i>Bio and Environ Research</i>	561	610	628	18	3.0%
ARPA-E	251	280	325	45	16.1%
National Institutes of Health	29,151	30,151	30,362	211	0.7%
<i>General Medical Sciences</i>	2,291	2,362	2,369	7	0.3%
NCATS	542	632	657	25	4.0%
<i>Biomed / Bioeng</i>	319	326	329	2	0.7%
NIST	765	850	900	50	5.9%

Source: Agency budget justifications and other budget documents.

All figures rounded to the nearest million. Changes calculated from unrounded figures

supporting the design and maintenance of state-of-the-art instruments and user facilities in the United States.

The Obama Administration proposal would largely flat-fund the chemical sciences in order to remain within the budgetary framework set out in the 2013 bipartisan budget agreement. However, the Administration emphasizes that more support for R&D is crucial to maintain U.S. competitiveness, and provides a template for additional funding through the OGSF.

Comparisons between the FY 2015 request and FY 2014 funding below are not adjusted for inflation.

NATIONAL SCIENCE FOUNDATION (NSF)

The NSF Chemistry Division (CHE), located within the Mathematical and Physical Sciences Directorate (MPS), funds about 50 percent of all chemical research at NSF. The remainder of chemical research support is split between the Division of Materials Research (DMR, also within MPS), the Engineering Directorate, the Geosciences Directorate, and the Office of International and Integrative Activities. For FY 2015, CHE

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would receive \$237 million under the Administration's proposal, an increase of 0.6 percent over FY 2014 funding. DMR funding would increase by less than \$1 million (0.3 percent) to \$299 million.

NSF has requested \$139 million for the Science, Engineering and Education for Sustainability (SEES) initiative for FY 2015, a decrease of about \$23 million. CHE would continue to participate in this NSF-wide effort through the Sustainable Chemistry, Engineering, and Materials (SusChEM) program, one of five programs within SEES.

MPS investments in Cyber-enabled Materials, Manufacturing, and Smart Systems (CEMMSS) are comprised of two components: Designing Materials to Revolutionize and Energize the Future (DMREF) and Advanced Manufacturing. DMREF is part of the national, multi-agency Materials Genome Initiative, and is a partnership between DMR and CHE. Investment in DMREF would decrease by 45 percent in FY 2015, from \$20 million to \$11 million. Advanced manufacturing would also see a funding decrease of 17.3 percent in FY 2015, dropping from \$45 million to \$37.2 million.

The FY 2015 proposed budget emphasizes an NSF-wide effort to reduce the cost of proposal processing and broaden the use of virtual review panels. CHE is a leader in this effort, having handled 92 percent of its review panels virtually in FY 2013.

The OGSF would provide funding for additional research traineeships, and for approximately 1,000 additional grants in priority areas across the Foundation.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Chemistry is fundamental to EPA's efforts to protect public health and the environment. EPA supports scientific research and environmental monitoring to better understand environmental health and safety issues, and to make effective regulatory decisions. The overall EPA budget would decline under the FY 2015 Administration request, continuing a downward trend for the agency's funding. The S&T budget of \$764 million represents a \$4.6 million (0.3 percent) increase from the FY 2014 enacted levels.

Most of EPA's chemistry research is supported through the Office of Research and Development (ORD). ORD's budget covers five strategic goals: Air, Climate, and Energy; Safe and Sustainable Water Resources;

Sustainable and Healthy Communities; Chemical Safety for Sustainability (CSS) and the Human Health Risk Assessment; and Homeland Security. While there are chemistry contributions from all divisions, the division with most relevance to the chemical enterprise is CSS, which would receive \$98.6 million in FY 2015, a \$7.8 million (8.6 percent) increase over the FY 2014 enacted level.

DEPARTMENT OF ENERGY (DOE)

DOE's Office of Science is the largest federal supporter of research in the physical sciences, driving advances in energy production, efficiency, conservation, and alternative energy sources. Within the Office of Science, chemistry research is primarily supported through two programs: Basic Energy Sciences (BES) and Biological and Environmental Research (BER).

Over half of the BES budget supports state-of-the-art user facilities. The remainder is allocated to research opportunities in catalysis, materials science, high-speed computing, solar and bioenergy, and other areas vital to solving global energy and environmental challenges. BES funds research at more than 300 academic institutions in 50 states through individual awards, as well as the larger, multi-disciplinary Energy Frontier Research Centers (EFRCs) and Energy Innovation Hubs.

The overall BES budget would increase by 5.5 percent, from \$1.7 billion in FY 2014 to \$1.8 billion in FY 2015. Most of this gain would support scientific user facilities. Funding for the Chemical Sciences, Geosciences and Biosciences Division would remain flat, while Materials Science and Engineering would receive a 6.6 percent boost from a new computational materials science initiative.

The FY 2015 budget would support the Energy Frontier Research Centers (EFRCs) and two Energy Innovation Hubs at FY 2014 levels. The 46 existing EFRCs are currently undergoing re-competition, and this round of awards will bring an increased focus on the chemical sciences.

The BER program supports leading-edge research in systems biology, medical imaging, climate change and predictive modeling, pollution prevention and clean-up, and bioenergy. BER funds three Bioenergy Research Centers, the Joint Genome Institute, and the Environmental Molecular Sciences Laboratory. The FY 2015 request for BER is \$628 million, a 3.0 percent increase over FY 2014 funding of \$610 million.

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In addition to vital research within the Office of Science, DOE's FY 2015 request would provide \$325 million for the Advanced Research Projects Agency–Energy (ARPA-E), a 16.1 percent increase from FY 2014 funding of \$280 million. This high-risk, high-reward energy research program is designed to support transformational energy research using a flexible framework modeled on the Defense Advanced Research Projects Agency (DARPA).

NATIONAL INSTITUTES OF HEALTH (NIH)

NIH is the largest supporter of biomedical research in the world. Its cutting-edge, peer-reviewed research helps achieve longer, healthier lives through prevention strategies, early detection, and more effective treatment of diseases. The FY 2015 NIH budget request represents an increase of just 0.7 percent, continuing a negative trend for the NIH budget: after adjusting for inflation, the agency's total budget has decreased 15.5 percent since FY 2004, or 24.1 percent when adjusted for scientific purchasing power using the Biomedical Research and Development Price Index. The Administrations OIGSI would add funding in FY 2015 for an additional 650 NIH grants, as well as for a DARPA-inspired program and the BRAIN Initiative.

Much of the basic chemistry research that underpins biomedical progress takes place within the National Institute of General Medical Sciences (NIGMS), the National Institute of Biomedical Imaging and Bioengineering (NIBIB), and the National Center for Advancing Translational Sciences (NCATS).

NIGMS is the largest single funder of chemistry research within NIH, supporting non-disease-specific basic research that lays the foundation for an array of advances in prevention, diagnosis, and treatment. The NIGMS budget would increase by 0.3 percent, from \$2.36 billion in FY 2014 to \$2.37 billion in the FY 2015 request. Two key NIGMS divisions for chemistry R&D, Cell Biology and Biophysics (CBB) and Pharmacology, Physiology, and Biological Chemistry (PPBC), are each targeted with slight increases of 0.4 and 0.5 percent, respectively. CBB would receive \$546 million and PPBC \$369 million. The FY 2015 budget also bolsters funding for investigator-initiated research by \$24.5 million, or 1.8 percent, to a total of \$1.4 billion. This increase is offset by a \$25.4 million (5.6 percent) decrease in research center grants.

NIBIB supports basic research, biomedical career development, and cutting-edge technologies. Its budget would increase by 0.7 percent to \$329 million in the FY 2015 request.

NCATS provides tools for and catalyzes partnerships between NIH-funded researchers, advocacy groups, and drug companies in order to more efficiently move from scientific discoveries to disease treatment. Much of NCATS' pre-clinical research has a strong chemistry component, including the Probe Development and National Chemical Genomics Center and Tox21, an interagency chemical toxicity screening initiative. The FY 2015 request for NCATS is \$657 million, 4 percent growth over FY 2014.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST's mission is to promote U.S. private sector innovation and competitiveness through R&D to improve measurement methods and standards. By advancing accurate measurement technology, NIST enables universal quality-control technologies that undergird industrial productivity, efficiency improvements, and faster product development. NIST also plays a critical role in advancing public health and safety, environmental progress, and national security.

While chemical, materials, and chemical engineering research are found throughout NIST, the core of chemical support is funded by Scientific and Technical Research and Services (STRS), and specifically in the Material Measurement Laboratory (MML). The FY 2015 request would fund STRS at \$680 million, an increase of \$29 million over FY 2014.

NIST requests an increase of \$3.5 million for a total of \$11.1 million to Measurement Science and Standards for Forensic Science Infrastructure, an initiative to support reliable, accurate, interoperable and validated forensic analysis. Another focus area is the Advanced Materials program, part of NIST's key role in the Materials Genome Initiative, which involves the development of a data assessment and validation framework, data standards, and modeling and simulation tools. For FY 2015, NIST requests an additional \$5 million for Advanced Materials, for a total of \$18.8 million.

Under the FY 2015 OGS, NIST would receive \$2.4 billion to launch the National Network for Manufacturing Innovation. The FY 2015 budget request itself supports an NNMI coordinating office at \$5 million.