

Research Infrastructure in the President's 2014 Budget

A Report to Congress on Federal Investments in Research Facilities Construction and Major
Research Instrumentation

May 2013

Office of Science and Technology Policy

Executive Office of the President

(This report is submitted in fulfillment of Section 1007 of the America COMPETES Act (Public Law 110-69) to accompany the President's Fiscal Year (FY) 2014 Budget)

Summary

The President's 2014 Budget proposes to invest \$3.2 billion in research infrastructure, defined as support for research and development (R&D) facilities construction, renovation, and the purchase of major capital equipment for R&D. The Committee on Science of the National Science and Technology Council is monitoring the progress of research facilities construction and maintenance as well as procurement of major instrumentation. The Committee's work is informed by the results of the National Science Foundation's survey of science and engineering facilities at academic institutions, last conducted in fiscal year (FY) 2011 and released in early 2013, which provides a comprehensive national assessment of academic research infrastructure. The Committee's work will also be informed by ongoing dialogue between Federal agencies on the state of research infrastructure in Federal intramural and contractor-operated facilities.

Federal Investments in Research Infrastructure

As part of the annual Federal budget, Federal agencies are required to report their investments in R&D to the Office of Management and Budget (OMB) according to the guidelines and definitions established in OMB Circular A-11 Schedule C. Within agencies' R&D portfolios, OMB Circular A-11 requires agencies to distinguish between conduct of R&D (further divided into basic research, applied research, and development), research and development facilities, and major equipment for R&D based on the definitions in Appendix 1. While there is some inconsistency in how agencies interpret A-11 guidelines, these data do not necessarily include investments in support infrastructure and facilities that are necessary for the conduct of research and development, including at National laboratories, such as office buildings or other non-customized research support facilities.

These agency-reported data are published annually as part of the Budget of the U.S. Government. For the 2014 Budget, these data appear in the Analytical Perspectives volume of the *Budget of the U.S. Government Fiscal Year 2014* in Chapter 21, Research and Development. (The Budget data are presented in Table 21-1; R&D facilities and major equipment for R&D are combined into a Facilities and Equipment category in the Table.) Table 1 of this report reproduces the data for Fiscal Years 2012 and 2014 on Facilities and Equipment from the Research and Development chapter. Tables 2 and 3 subdivide the data in Table 1 into its components. Table 2 of this report presents data on R&D Facilities Construction by Federal agency for Fiscal Years 2012 and 2014; Table 3 of this report presents data on Major Capital Equipment for R&D by Federal agency for Fiscal Years 2012 and 2014. (Although the Circular A-11 provides standard definitions for the various categories of R&D, there are minor inconsistencies among Federal agencies in how they classify programs as conduct of R&D, major equipment for R&D, and R&D facilities construction. Some of these inconsistencies are noted in this report.)

Table 1. R&D Facilities Construction and Major Capital Equipment by Agency
(budget authority in millions of dollars)

	FY 2012 Actual	FY 2014 Budget	Change FY 12-14	
			Amount	Percent
R&D Facilities Construction and Major Capital Equipment for R&D				
Defense (military)	105	56	-49	-46.7%
Health and Human Services	168	169	1	0.6%
<i>Nat'l Institutes of Health</i>	133	134	1	0.8%
NASA	140	169	29	20.7%
Energy	869	867	-2	-0.2%
<i>Office of Science</i>	624	691	67	10.7%
<i>Defense Programs</i>	211	151	-60	-28.4%
<i>Energy Programs</i>	34	25	-9	-26.5%
Nat'l Science Foundation	535	548	13	2.4%
Agriculture	89	254	165	185.4%
Commerce	231	259	28	12.1%
<i>NOAA</i>	140	163	23	16.4%
<i>NIST</i>	91	96	5	5.5%
Interior	3	5	2	66.7%
Transportation	25	39	14	56.0%
Environ. Protection Agency	5	5	0	0.0%
Homeland Security	97	778	681	702.1%
Smithsonian	43	36	-7	-16.3%
Total R&D Facils. & Capital Equip.	2,310	3,185	875	37.9%
Defense	316	207	-109	-34.5%
Nondefense	1,994	2,978	984	49.3%

The data in Tables 1 through 3 show that the Federal government makes substantial investments in the construction and major upgrade of the Nation's scientific facilities and the Nation's stock of major research instrumentation. Agency proposals in the 2014 Budget include \$3.2 billion for R&D facilities and R&D major equipment within a \$142.8 billion Federal R&D portfolio. The \$3.2 billion total in the 2014 Budget is up (by \$875 million) from the \$2.3 billion 2012 enacted funding level, primarily because of proposed infrastructure investments in the Department of Homeland Security (DHS) and the U.S. Department of Agriculture (USDA).

Table 2. R&D Facilities Construction by Agency
(budget authority in millions of dollars)

	FY 2012	FY 2014	Change FY 12-14	
	Actual	Budget	Amount	Percent
Research and Development Facilities Construction				
Defense (military)	105	56	-49	-46.7%
Health and Human Services	139	140	1	0.7%
<i>Nat'l Institutes of Health</i>	133	134	1	0.8%
NASA	140	169	29	20.7%
Energy	361	365	4	1.1%
<i>Office of Science</i>	282	283	1	0.4%
<i>Defense Programs</i>	79	82	3	3.8%
<i>Energy Programs</i>	0	0	0	--
Nat'l Science Foundation	16	16	0	0.0%
Agriculture	53	209	156	294.3%
Commerce	55	60	5	9.1%
NOAA	0	0	0	--
NIST	55	60	5	9.1%
Interior	3	5	2	66.7%
Transportation	25	39	14	56.0%
Environ. Protection Agency	5	5	0	0.0%
Homeland Security	97	778	681	702.1%
Smithsonian	43	36	-7	-16.3%
Total R&D Facils. Construc.	1,042	1,878	836	80.2%
Defense	184	138	-46	-25.0%
Nondefense	858	1,740	882	102.8%

Federal agencies not listed do not report R&D facility construction spending.

Table 3. Major Capital Equipment for R&D by Agency
(budget authority in millions of dollars)

	FY 2012	FY 2014	Change FY 12-14	
	Actual	Budget	Amount	Percent
Major Capital Equipment for R&D				
Health and Human Services	29	29	0	0.0%
Energy	508	502	-6	-1.2%
<i>Office of Science</i>	342	408	66	19.3%
<i>Defense Programs</i>	132	69	-63	-47.7%
<i>Energy Programs</i>	34	25	-9	-26.5%
Nat'l Science Foundation	519	532	13	2.5%
Agriculture	36	45	9	25.0%
Commerce	176	199	23	13.1%
<i>NOAA</i>	140	163	23	16.4%
<i>NIST</i>	36	36	0	0.0%
Total Major Capital Equip.	1,268	1,307	39	3.1%
Defense	132	69	-63	-47.7%
Nondefense	1,136	1,238	102	9.0%

Federal agencies not listed do not report major R&D equipment spending.

Budget Proposals for Research and Development Facilities Construction in the President's 2014 Budget

The 2014 Budget proposes \$1.9 billion for R&D facilities construction as identified in the annual Federal agency survey of R&D investments in the Federal budget (See Table 2). This total is up \$836 million from the \$1.0 billion 2012 funding level.

Nearly all of the investments in Table 2 are for intramural or federally funded research and development center (FFRDC) facilities. R&D Facilities Construction funds in the Department of Defense (DOD), the U.S. Department of Agriculture (USDA), the National Institutes of Health (NIH), the Smithsonian Institution (SI), and the National Institute of Standards and Technology (NIST) will be devoted to Federal or FFRDC facilities. National Science Foundation (NSF) funds will support construction projects that are managed by the extramural research community. The Department of Energy (DOE) supports construction primarily at FFRDC facilities, though some DOE construction funding is also managed by the extramural research community.

The 2014 Budget includes \$155 million for the full cost of renovation and construction of a USDA poultry disease bio surveillance and research facility to reduce poultry diseases that could affect human health and the agricultural sector. The 2014 Budget also proposes \$714 million for the Department of Homeland Security (DHS) to construct the National Bio- and Agro-Defense Facility (NBAF), a state-of-the-art laboratory to study and develop countermeasures for

foreign animal, emerging, and zoonotic diseases that threaten human health and our agricultural industry.

Budget Proposals for Major Instrumentation Acquisitions in the President's 2014 Budget

In addition to investments in the construction of R&D facilities, the 2014 Budget proposes \$1.3 billion for major capital equipment for R&D (see Table 3). Nearly all of these investments are equipment purchases for intramural or FFRDC (federally owned, contractor operated) laboratories. Customarily, these equipment and instrumentation purchases are funded out of general program funds rather than separate programs for equipment and instrumentation. One exception is the National Science Foundation's Major Research Equipment and Facilities Construction (MREFC) account; the 2014 Budget proposes \$210 million for 5 projects to support the acquisition, construction and commissioning of major research facilities and equipment that provide unique capabilities at the frontiers of science and engineering. Other NSF support of major capital equipment for R&D is funded within the Research and Related Activities (R&RA) account.

Some Federal agencies support major capital equipment for R&D in the extramural research community through general program funds. There are also dedicated funds in the 2014 Budget to support major research instrumentation acquisitions in the extramural research community. Examples of such funding include the programs listed below:

National Science Foundation, Major Research Instrumentation, \$90 million

NSF's Major Research Instrumentation (MRI) program is an NSF-wide, crosscutting program that strengthens the U.S. scientific enterprise by investing in state-of-the-art research instrumentation at our Nation's institutions of higher education, research museums, and non-profit research organizations. The MRI program promotes the acquisition and development of instrumentation for shared use. MRI funds are awarded through a competitive, merit review process based on proposals. The 2014 Budget proposes \$90 million for the MRI program, the same as the 2012 enacted funding level.

Department of Defense, Defense University Research Instrumentation Program, \$52 million

The Department of Defense's (DOD) Defense University Research Instrumentation Program (DURIP) funds competitive grants for research instrumentation to enhance universities' capabilities to conduct world class research critical to DOD needs. DURIP generally funds equipment in the \$50 thousand to \$1 million range. DURIP is funded by the three services (Army, Navy, and Air Force) in each service's University Research Initiatives (URI) program. The 2014 Budget proposes \$52 million combined for DURIP (\$14 million Army, \$22 million Navy, \$16 million Air Force).

In addition to these dedicated programs, other Federal programs offer support for research instrumentation as part of general infrastructure support. The National Science Foundation's (NSF) Experimental Program to Stimulate Competitive Research (EPSCoR) program, for example, proposes \$122 million in the 2014 Budget for its Research Infrastructure

Improvement (RII) program of awards to strengthen academic research infrastructure to institutions in EPSCoR-eligible states. While the program does not generally fund research instrumentation exclusively, the program does support awards for instrumentation as part of complex, multifaceted statewide awards to develop research infrastructure. The Office of the Director (OD) within the National Institutes of Health (NIH) supports the Shared Instrumentation/High-End Instrumentation Grants programs. Although these programs are not typically included in the annual R&D budget survey of major capital equipment for R&D funding, these one-year awards help NIH-supported investigators acquire commercially available equipment, typically too costly to obtain through a research project grant.

National Coordination of Research Infrastructure

The Office of Science and Technology Policy (OSTP) and Federal agencies, in coordination with the Office of Management and Budget (OMB), are taking steps to provide national strategic coordination of research infrastructure through the National Science and Technology Council (NSTC). The Committee on Science of the NSTC is the primary mechanism for this interagency effort.

For extramural facilities, the Committee's work is informed by the results of the National Science Foundation's survey of science and engineering facilities at academic institutions, last conducted in FY 2011 and published in February 2013 as *Science & Engineering Research Facilities: Fiscal Year 2011*. The FY 2011 survey found that U.S. academic institutions had 203 million net assignable square feet of science and engineering research space, continuing a steady upward trend from previous years (for example, 196 million net assignable square feet in the FY 2009 survey). At that time, academic institutions estimated that the backlog (deferred plans) of renovation or replacement of facilities in their institutional plans totaled \$4.8 billion.

For government research facilities, including FFRDCs, the Committee's work will be informed by the Federal Real Property Profile (FRPP), an inventory of non-classified real property assets under the custody and control of Federal executive branch agencies that is maintained by the General Services Administration (GSA) in consultation with the OMB-chaired Federal Real Property Council (FRPC). The FRPP tracks information about Federal laboratories and Federal R&D facilities, including their size and location. The Committee's work will also be informed by ongoing dialogue with GSA, the FRPC, OMB, and Federal agencies on the state of research infrastructure in Federal laboratory and R&D facilities.

Conclusion

The President's 2014 Budget proposes a substantial Federal investment of \$3.2 billion in research infrastructure. The Committee on Science of the National Science and Technology Council will continue ongoing coordinated interagency assessments of the state of research infrastructure to assess its ability to support national research priorities and areas relevant to the specific mission requirements of Federal agencies.

Appendix 1.

Definitions of conduct of R&D, R&D facilities, and major equipment for research and development

(reproduced from the July 2012 edition of OMB Circular A-11):

Conduct of research and development in OMB Circular A-11:

Research and development (R&D) activities comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Include:

-Administrative expenses for R&D, including the operating costs of research facilities and equipment.

Exclude:

Physical assets for R&D such as R&D equipment and facilities.

Routine product testing, quality control, mapping, collection of general-purpose statistics, experimental production, routine monitoring and evaluation of an operational program, and the training of scientific and technical personnel.

Research and development facilities in OMB Circular A-11:

Amounts for the construction and rehabilitation of research and development facilities. Includes the acquisition, design, and construction of, or major repairs or alterations to, all physical facilities for use in R&D activities. Facilities include land, buildings, and fixed capital equipment, regardless of whether the facilities are to be used by the Government or by a private organization, and regardless of where title to the property may rest. Includes fixed facilities such as reactors, wind tunnels, and particle accelerators.

Major equipment for research and development in OMB Circular A-11:

Amounts for major equipment for research and development. Includes acquisition or design and production of movable equipment, such as spectrometers, research satellites, detectors, and other instruments. At a minimum, this line should include programs devoted to the purchase or construction of R&D equipment.

The R&D facilities category listed above is also known as “R&D facilities construction.” The Major equipment for R&D category listed above is also known as “major capital equipment for R&D” and includes major research instrumentation. In this report, the terms “major equipment for R&D” and “major research instrumentation” are used interchangeably. These two categories are commonly combined into one category known variously as “R&D plant” or “research infrastructure” or “R&D facilities and equipment” or “R&D Facilities Construction and Major Capital Equipment for R&D.”