



February 2017

# RESEARCH AND DEVELOPMENT

## DOE Activities and Costs to Oversee Investments

# GAO Highlights

Highlights of [GAO-17-261](#), a report to congressional requesters

## Why GAO Did This Study

In fiscal year 2015, five DOE program offices and ARPA-E invested \$7.36 billion for civilian R&D in DOE national laboratories as well as in universities, industry, and other entities. These civilian R&D investments (investments not related to nuclear security) supported diverse science and energy research areas, including energy efficiency, renewable energy, and nuclear energy. The five program offices and ARPA-E also obligated funds for staff to oversee these R&D investments—referred to as staff costs in this report—and include federal staff salaries and benefits, travel, support services, and other costs.

GAO was asked to review DOE's oversight of its civilian R&D investments. This report discusses (1) the activities selected DOE offices use to oversee investments in civilian R&D, and (2) staffing levels and costs associated with DOE oversight of civilian R&D.

GAO obtained staffing and obligations data from the five DOE program offices and ARPA-E that funded civilian R&D for fiscal years 2011-2015, the most recent years for which data was available; examined DOE policies, plans, and guidance; and interviewed DOE officials. GAO selected three of the five program offices for detailed review because they oversee nearly 90 percent of DOE's civilian R&D investments and 12 of the 13 national laboratories that primarily conduct civilian R&D. GAO used a broad definition of oversight, including any activity that directly or indirectly supported DOE's R&D mission. In commenting on a draft of this report, DOE generally agreed with GAO's findings.

View [GAO-17-261](#). For more information, contact John Neumann at (202) 512-3841 or [neumannj@gao.gov](mailto:neumannj@gao.gov).

February 2017

## RESEARCH AND DEVELOPMENT

### DOE Activities and Costs to Oversee Investments

## What GAO Found

Three Department of Energy (DOE) program offices that GAO selected for detailed review—the offices of Energy Efficiency and Renewable Energy, Nuclear Energy, and Science—use various activities to oversee civilian research and development (R&D) investments.

- **Activities to identify research priorities.** The program offices obtain input from multiple sources to help determine the areas in which DOE invests in research at its national laboratories, as well as in universities and industry. For example, the Office of Nuclear Energy sponsored workshops in 2015 that sought to identify ideas for advancing nuclear energy technologies.
- **Activities to oversee investments at national laboratories.** The program offices require that the laboratories they oversee develop strategic plans to help ensure DOE investments in these laboratories support national R&D priorities. They also monitor and review individual laboratory R&D projects. For example, in fiscal year 2015, the Office of Science oversaw over 1,600 new or ongoing laboratory projects that received \$3.67 billion in obligations. Finally, the program offices annually assess each laboratory contractor's scientific, technological, managerial, and operational performance.
- **Activities to oversee investments in universities, industry, and other entities.** To help determine where DOE invests in civilian R&D, the program offices review R&D proposals from universities, industry, and other entities. According to data provided by DOE, in fiscal year 2015 the three program offices conducted or managed more than 5,600 proposal reviews—with each review including as many as 3 to 4 individual reviewers—and selected 1,490 proposals for new financial assistance awards. The program offices then monitored and periodically reviewed the awarded proposals.

Staffing levels for oversight of civilian R&D decreased by 11.0 percent from fiscal year 2011 to fiscal year 2015 in five DOE program offices—those noted above, plus two others that oversee a smaller percentage of DOE's civilian R&D investments—and in the Advanced Research Projects Agency-Energy (ARPA-E). At the same time, obligations for staff costs and civilian R&D investments increased by 2.4 percent and 3.8 percent, respectively, without adjusting for inflation (obligations declined slightly when adjusted for inflation). Staffing levels and costs changed to varying degrees among the offices and ARPA-E. For example, staff costs increased in three of the offices and ARPA-E but decreased in the other two offices. Obligations for staff costs made up 7.6 percent of total obligations (R&D and non-R&D obligations) in fiscal year 2015; they also varied among program offices and ARPA-E, ranging from 3.6 percent to 21.4 percent.

**DOE Staffing Levels and Obligations for Staff Costs and Civilian R&D, Fiscal Years 2011 and 2015 (Obligations are not adjusted for inflation)**

	Fiscal Year 2011	Fiscal Year 2015	Percentage Change
Full-time equivalent staff	2,937	2,613	▼ 11.0 percent
Obligations for staff costs	\$632.9 million	\$647.9 million	▲ 2.4 percent
Obligations for civilian R&D	\$7.09 billion	\$7.36 billion	▲ 3.8 percent

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

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## Abbreviations

ARPA-E	Advanced Research Projects Agency-Energy
ARRA	American Recovery and Reinvestment Act of 2009
DCI	data collection instrument
DOE	Department of Energy
M&O	management and operating
NNSA	National Nuclear Security Administration
SBIR	Small Business Innovation Research
STTR	Small Business Technology Transfer
R&D	research and development

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February 14, 2017

The Honorable Lamar Smith  
Chairman  
Committee on Science, Space, and Technology  
House of Representatives

The Honorable Randy Weber  
Chairman  
Subcommittee on Energy  
Committee on Science, Space, and Technology  
House of Representatives

In fiscal year 2015, the Department of Energy (DOE) obligated \$7.36 billion for civilian research and development (R&D) in diverse science and energy research areas, including fundamental scientific research on energy, energy efficiency, renewable energy, nuclear energy technologies, fossil energy, energy security, and electricity infrastructure.<sup>1</sup> Of this \$7.36 billion, \$5.14 billion was obligated to 17 national laboratories to conduct R&D and manage scientific facilities. DOE obligated the remaining \$2.22 billion in contracts, research grants and other forms of financial assistance for R&D conducted by universities, industry, and other entities, such as nonprofit organizations and state governments.<sup>2</sup>

To ensure appropriate management of R&D at laboratories, universities, and industry, DOE employs federal staff who oversee its investments. These staff provide strategic direction on research priorities; solicit, review, and award research proposals; monitor and evaluate research projects; work to ensure that DOE laboratories and their scientific facilities are managed appropriately by the laboratory contractors; monitor the construction of scientific facilities; and administer contracts for laboratories and financial assistance for universities, industry, and other entities.

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<sup>1</sup>The scope of this report is limited to civilian R&D—that is, R&D not related to nuclear security. This report therefore does not address R&D investments by DOE’s National Nuclear Security Administration (NNSA), a separately organized agency within DOE that is responsible for the management and security of nuclear weapons programs.

<sup>2</sup>DOE provided all obligations data in this report.

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You asked us to review DOE's oversight of its civilian R&D investments. This report identifies (1) the activities that selected DOE offices use to oversee civilian R&D investments, and (2) the staffing levels and costs associated with DOE oversight of civilian R&D investments.

The scope of our review included the five DOE program offices within the Office of the Under Secretary for Science and Energy that fund and oversee civilian R&D, as well as the Advanced Research Projects Agency-Energy (ARPA-E), a separate DOE agency that also funds and oversees civilian R&D.<sup>3</sup> The five program offices are:

- the Office of Electricity Delivery and Energy Reliability,
- the Office of Energy Efficiency and Renewable Energy,
- the Office of Fossil Energy,
- the Office of Nuclear Energy, and
- the Office of Science.

For the purpose of identifying the oversight activities that these program offices and ARPA-E use, and the associated staffing levels and costs, we defined oversight broadly to include all activities that support the program offices' R&D missions. These included direct oversight activities, such as oversight of individual R&D projects, as well as activities that indirectly support DOE's management of R&D, such as contract and financial management and intellectual property legal counsel.

To identify activities that DOE program offices and ARPA-E use to oversee civilian R&D investments, we reviewed documentation and interviewed officials from all five program offices and ARPA-E. In particular, we reviewed broad planning documents, such as DOE's 2016 Science and Energy Plan, as well as documents specific to individual program offices, such as Office of Science guidance for laboratory plans and the Office of Energy Efficiency and Renewable Energy's guidance for funding university and industry projects. In addition, we selected three of the program offices—the offices of Science, Energy Efficiency and Renewable Energy, and Nuclear Energy—for detailed review because they represent diverse energy and science research programs as well as

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<sup>3</sup>ARPA-E is a separate agency within DOE that was authorized by Congress in August 2007 in the America Competes Act. 42 U.S.C. § 16538 (2007). The act granted special authorities to ARPA-E for budget, hiring, and management that the five DOE program offices do not have.

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a range in the technological maturity of the R&D that the offices support. These three program offices oversee 12 of the 13 national laboratories that primarily support civilian R&D,<sup>4</sup> and they provide financial assistance to universities and industry. In fiscal year 2015, these three offices oversaw R&D that accounted for \$6.58 billion, or about 90 percent, of the total \$7.36 billion in obligations for civilian R&D from the five program offices and ARPA-E. For the three program offices we selected for detailed review, we reviewed relevant regulations, orders, guidance documents, and budget documents covering fiscal year 2011 to fiscal year 2015. We cannot generalize the results of our detailed review of these three program offices to ARPA-E, the Office of Electricity Delivery and Energy Reliability, or the Office of Fossil Energy because the latter three offices make much smaller investments in R&D, have significantly fewer staff, or have a different management structure. To gain additional context about DOE oversight activities at the national laboratories, we visited a nongeneralizable sample of 4 of the 14 DOE site offices collocated with national laboratories—specifically the Argonne and Fermi site offices in Illinois; the Thomas Jefferson site office in Virginia; and the Office of Science’s Integrated Support Center, which is collocated with the Argonne National Laboratory in Illinois. Additionally, we interviewed DOE site office officials and the contractors that manage the selected laboratories. In particular, we obtained information from the officials about the site offices’ role and primary responsibilities with respect to the national laboratories, the practices the offices use to oversee contractors, and the types of staff employed at the site offices. We selected the site offices to obtain information representing a range in the sizes of laboratories overseen by the offices. We also interviewed DOE officials or otherwise obtained information from three site offices that we did not visit: the National Renewable Energy Laboratory in Colorado; the Idaho National Laboratory; and the National Energy Technology Laboratory, which has locations in Oregon, Pennsylvania, and West Virginia.

To identify the staffing levels and costs associated with DOE oversight of civilian R&D investments, we developed a data collection instrument (DCI)—a structured set of data requests and related questions—that we

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<sup>4</sup>DOE oversees and obligates funds to 17 national laboratories. The five DOE program offices that we included in our review oversee 13 national laboratories that primarily conduct civilian R&D. The scope of our review did not include NNSA, which oversees 3 DOE national laboratories that generally conduct R&D related to nuclear security. In addition, our review did not include DOE’s Office of Environmental Management, which oversees 1 laboratory that allocated less than 1 percent of its fiscal year 2014 budget on R&D, according to a Secretary of the Energy Advisory Board report.



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provided to the five program offices that oversee civilian R&D and to ARPA-E. The DCI included data requests and questions for the research offices within the five program offices and ARPA-E and for the 14 site offices collocated with DOE national laboratories. Before distributing the DCI, we met with officials from each program office and ARPA-E to discuss the clarity of our questions and the availability of the data we requested, and we modified the DCI based on officials' comments. In requesting data from DOE, we defined oversight broadly to include any DOE activities that support its R&D mission and that help ensure that DOE's R&D investments are efficient, effective, and appropriately managed. The DCI requested information for fiscal year 2011 to fiscal year 2015 on staffing levels and obligations for staff costs,<sup>5</sup> as well as information on investments in R&D. We also requested more detailed information for fiscal year 2015 because that was the most recent year with complete data; this information included details about the types of staff employed in the offices at the end of the fiscal year, and on laboratory work and financial assistance awarded during the fiscal year. We assessed the reliability of the data we obtained from the DCI by checking for obvious errors in accuracy and completeness and by comparing the data with other sources of information, such as DOE budget documents. We resolved data inconsistencies we found through e-mail and phone communications with officials from the program offices and ARPA-E. We determined that the data were sufficiently reliable for reporting on DOE staffing levels and costs.

We conducted this performance audit from September 2015 to February 2017 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

DOE invests in a wide range of civilian R&D programs that are managed by five program offices within the Office of the Under Secretary for Science and Energy, or by ARPA-E, which reports directly to the Secretary of Energy. These offices have the goal of enhancing U.S.

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<sup>5</sup>In this report, the term "staff costs" refers to federal staff salaries and benefits, travel, support services, and other costs. In its annual budget request, DOE uses the term "program direction" to refer to these costs.

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security and economic growth through transformative scientific and technological innovation, and through market solutions to overcome science, energy, and environmental challenges that the United States faces. These program offices and ARPA-E fund R&D that is conducted by DOE national laboratories, universities, industry, nonprofit organizations, state governments, and other federal laboratories. Each program office and ARPA-E may fund R&D at any of the national laboratories. For example, the Office of Science funds civilian R&D at all 17 of DOE's national laboratories, including the national laboratories sponsored by the National Nuclear Security Administration (NNSA). Similarly, national laboratories may receive funding from any of the program offices and ARPA-E, as well as from other governmental agencies and nongovernmental entities.<sup>6</sup> The five program offices and ARPA-E fund and oversee civilian R&D that aligns with their missions, as described below:

- The Office of Electricity Delivery and Energy Reliability's mission is to strengthen, transform, and improve U.S. electricity infrastructure and to provide leadership to ensure that U.S. energy delivery systems are secure, resilient, and reliable. The office does not oversee a national laboratory but it is supported by staff located at the Office of Fossil Energy's National Energy Technology Laboratory.
- The Office of Energy Efficiency and Renewable Energy's mission is to create and sustain American leadership in the transition to a global clean energy economy. The office oversees the National Renewable Energy Laboratory in Colorado.
- The Office of Fossil Energy's primary mission is to ensure reliable fossil energy resources for clean, secure, and affordable energy while enhancing environmental protection. The office oversees the National Energy Technology Laboratory—with locations in Oregon, Pennsylvania, and West Virginia—which is the only DOE national laboratory operated by the government rather than a contractor.
- The Office of Nuclear Energy's primary mission is to advance nuclear power as a resource capable of meeting the nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers. The office oversees the Idaho National Laboratory.

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<sup>6</sup>For further information on work performed at DOE's national laboratories for non-DOE entities, see GAO, *National Laboratories: DOE Needs to Improve Oversight of Work Performed for Non-DOE Entities*, [GAO-14-78](#) (Washington, D.C.: Oct. 25, 2013).

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- The Office of Science’s mission is to deliver scientific discoveries and major tools that transform our understanding of nature and advance the energy, economic, and national security in the United States. This office is the nation’s single largest funding source for basic research in the physical sciences, and supports research in energy sciences, advanced scientific computing and other fields. The office oversees 10 of DOE’s national laboratories.
  - ARPA-E’s mission is to sponsor high-potential, high-impact energy technologies that are considered too early for private-sector investment. ARPA-E does not oversee a national laboratory.

Of the five program offices noted above, four consist of several types of offices that manage and oversee DOE’s R&D investments; these four are the offices of Energy Efficiency and Renewable Energy, Fossil Energy, Nuclear Energy, and Science. First, each of these program offices has a headquarters office in the Washington, D.C. area that includes senior leadership and that may include offices that provide support across the program office, such as policy development and oversight, budget, public relations and congressional outreach, and technical assistance programs as well as other administrative and support units. According to DOE officials, the extent to which staff functions are centralized in headquarters offices varies across program offices. Second, the program offices include research offices, generally collocated with headquarters offices, that manage particular scientific areas and research portfolios and provide strategic direction for these areas. For example, the Office of Science includes six research offices that steward different scientific areas.<sup>7</sup> Third, the program offices have site offices—collocated with each national laboratory—that manage the laboratory contracts, oversee federal facilities at the laboratories and, in some cases, manage financial assistance awards to universities and industry, as well as other contracts.<sup>8</sup>

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<sup>7</sup>For the purposes of this report, we refer to offices that manage large scientific areas as research offices. Program offices within DOE may refer to research offices differently. For example, the Office of Energy Efficiency and Renewable Energy refers to them as sectors, with each sector including multiple technology offices.

<sup>8</sup>Site offices collocated with national laboratories may also be referred to as a field or operations office. The Office of Science also considers its Integrated Support Center, with offices collocated with the Argonne and Oak Ridge national laboratories, to be a single site office. The Integrated Support Center provides matrixed support in a variety of areas to the site offices and research offices within the Office of Science.

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ARPA-E and the other program office—the Office of Electricity Delivery and Energy Reliability—make smaller R&D investments, have significantly fewer staff, and do not oversee a national laboratory. As a result, they are organized differently from the other four program offices. According to an ARPA-E official, all ARPA-E staff are located at a central office, and research projects are organized around individual program directors. In the case of the Office of Electricity Delivery and Energy Reliability, the office has one suboffice that is dedicated to research and development; other suboffices are dedicated to regulatory or coordination functions.

Figure 1 lists ARPA-E and the five program offices we reviewed, along with research offices and site offices within those program offices.

**Figure 1: DOE Offices That Oversee Civilian R&D Investments**

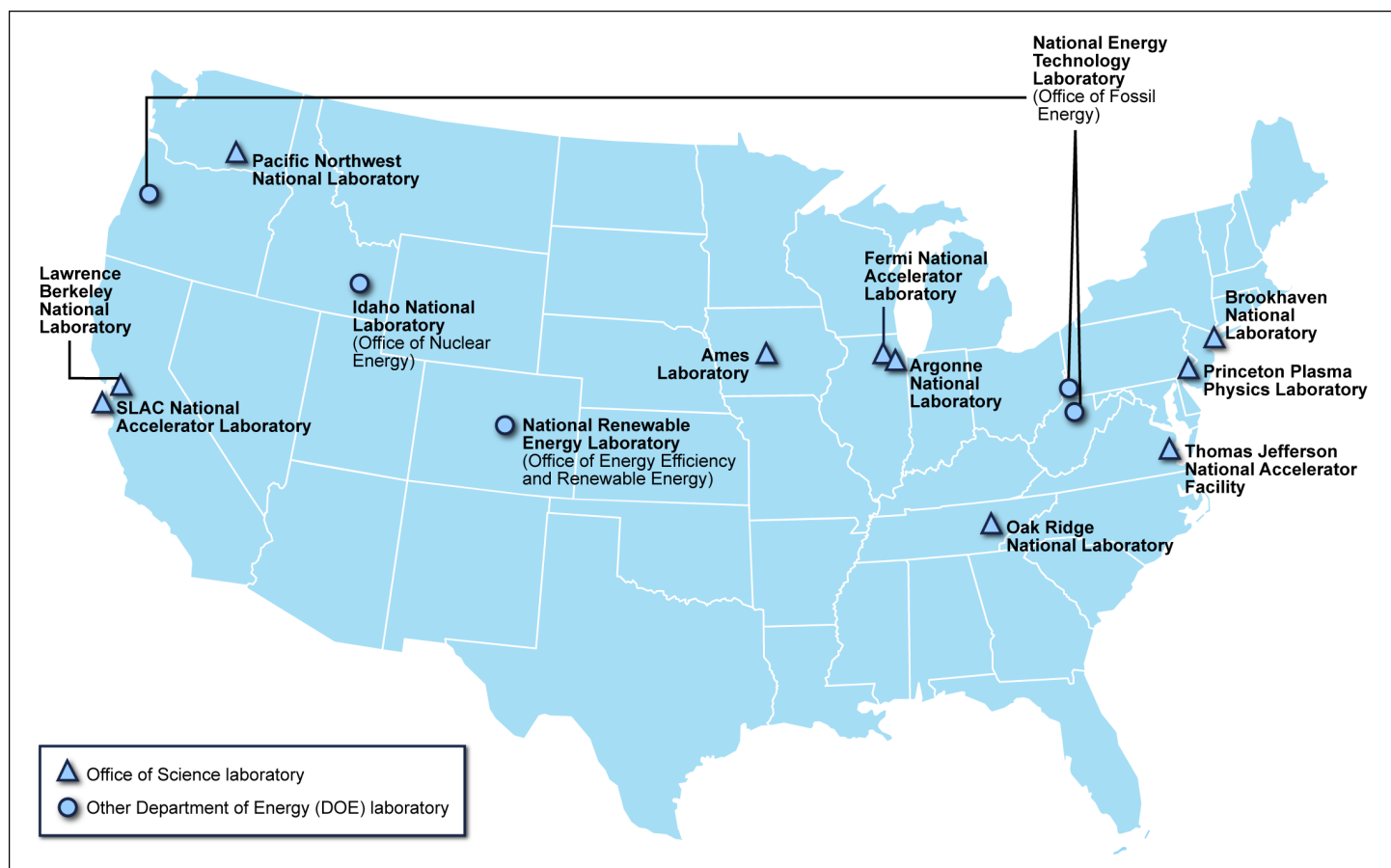
Headquarters Office	Research Offices	Site Offices
Advanced Research Projects Agency - Energy (ARPA-E)	Not applicable	Not applicable
Office of Electricity Delivery and Energy Reliability	Power Systems Engineering R&D	Not applicable
Office of Energy Efficiency and Renewable Energy	Energy Efficiency Renewable Power Sustainable Transportation	Golden Field Office, CO
Office of Fossil Energy	Clean Coal and Carbon Management Oil and Natural Gas	National Energy Technology Laboratory, OR, PA, WV
Office of Nuclear Energy	Fuel Cycle Technologies Nuclear Facility Operations Nuclear Reactor Technologies Science and Technology Innovation	Idaho Operations Office, ID
Office of Science	Advanced Scientific Computing Research Basic Energy Sciences Biological and Environmental Research Fusion Energy Sciences High Energy Physics Nuclear Physics	Ames, IA Oak Ridge, TN Argonne, IL Pacific Northwest, WA Berkeley, CA Princeton, NJ Brookhaven, NY SLAC, CA Fermi, IL Thomas Jefferson, VA Integrated Support Center, IL, TN

Source: Department of Energy. | GAO-17-261

Note: The Office of Energy Efficiency and Renewable Energy and the Office of Electricity Delivery and Energy Reliability are also supported by staff located at the National Energy Technology Laboratory site office.

Figure 2 shows the locations of the 13 national laboratories that primarily conduct civilian R&D under the oversight of the program offices we reviewed. This figure does not include the 4 other DOE national laboratories that may also conduct civilian R&D for the offices we reviewed.

**Figure 2: DOE National Laboratories That Primarily Conduct Civilian R&D**



Sources: DOE; Map Resources (map). | GAO-17-261

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Of the 13 national laboratories that primarily focus on civilian R&D for DOE, 12 are owned by the federal government and are operated by management and operating (M&O) contractors.<sup>9</sup> The R&D funded by DOE is carried out under the department's direction and is managed by scientists, engineers, and others employed by the laboratory contractor. The remaining national laboratory—the National Energy Technology Laboratory—is operated by DOE. Therefore, the scientists and engineers who conduct the R&D at this laboratory are primarily federal employees.

In addition to M&O contracts that DOE enters into for the operation of the national laboratories, DOE program offices and ARPA-E provide financial assistance—primarily grants and cooperative agreements—to support R&D at universities, industry, and other entities.<sup>10</sup> Under the Federal Grant and Cooperative Agreement Act, an agency is to use a grant agreement when the principal purpose of the relationship is to transfer a thing of value to the recipient to carry out a public purpose authorized by law, and substantial involvement by the agency is not expected.<sup>11</sup> For grants, an agency's involvement is essentially administrative, and includes standard federal stewardship responsibilities such as reviewing performance to ensure that the objectives, terms, and conditions of the grant are met. In contrast, cooperative agreements differ from grants in that an agency expects to be substantially involved in the project through tasks such as reviewing and approving one stage of a project before work can begin on a subsequent stage.<sup>12</sup>

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<sup>9</sup>M&O contracts are agreements under which the government contracts for the operation, maintenance, or support, on its behalf, of a government-owned or -controlled research, development, special production, or testing establishment wholly or principally devoted to one or more of the major programs of the contracting federal agency. Federal Acquisition Regulation § 17.601. For further information on the use of M&O contracts at DOE, see GAO, *Department of Energy: Actions Needed to Strengthen Acquisition Planning for Management and Operating Contracts*, [GAO-16-529](#) (Washington, D.C.: Aug. 9, 2016).

<sup>10</sup>According to DOE officials, ARPA-E uses cooperative agreements almost exclusively.

<sup>11</sup>31 U.S.C. § 6304.

<sup>12</sup>Specifically, under federal regulations, when it is anticipated that substantial involvement will be necessary between DOE and an award recipient, the award instrument shall be a cooperative agreement rather than a grant. 10 C.F.R. § 600.5.

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## DOE Uses Various Activities to Oversee Investments in Civilian R&D at National Laboratories, Universities, and Industry

The three program offices we selected for detailed review—the offices of Energy Efficiency and Renewable Energy, Nuclear Energy, and Science—use various activities to oversee DOE civilian R&D investments in national laboratories, universities, industry, and other entities: these investments totaled \$7.36 billion in obligations in fiscal year 2015.<sup>13</sup> The activities these three offices used included activities to:

- identify research priorities and help determine where to invest in R&D,
- help ensure that national laboratories conduct R&D in alignment with DOE priorities and that M&O contractors manage the research and federally owned properties at the laboratories safely and efficiently, and
- help ensure that universities, industry, and other entities are meeting research goals as defined in financial assistance agreements.

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## DOE Activities to Identify Research Priorities and Help Inform Investment Decisions

For all investments, including those in DOE’s national laboratories, universities, industry, and other entities, the three selected program offices engage in activities to obtain input from multiple sources to identify research priorities and to help inform where DOE invests in R&D.

To help identify specific research priorities, these three program offices review objectives established in the DOE strategic plan<sup>14</sup> and other DOE documents, such as the Quadrennial Energy Review and the Quadrennial Technology Review. These DOE documents are in turn influenced by national policies such as the *President’s Climate Action Plan* of 2013. For example, one of the objectives of DOE’s strategic plan is to advance sustainable hydropower technologies in order to help double renewable energy generation in the United States between 2012 and 2020, a goal of the *President’s Climate Action Plan*.

Additionally, the program offices hold scientific and technical workshops with the scientific community—scientists and researchers in universities, industry, and government—to help identify priority research areas that, if supported, could contribute to overcoming barriers to advancing particular energy technologies. For example, the Office of Nuclear Energy

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<sup>13</sup>In fiscal year 2015, of this \$7.36 billion, the offices of Energy Efficiency and Renewable Energy, Nuclear Energy, and Science obligated \$6.58 billion, and the other R&D program offices and ARPA-E obligated \$0.78 billion.

<sup>14</sup>Department of Energy, *2014-2018 Strategic Plan* (March 2014).



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sponsored a series of workshops in 2015 that sought to identify ideas for advancing nuclear energy technologies.

Furthermore, the program offices have established federal advisory committees that provide expert input on particular knowledge gaps or infrastructure needs at the national laboratories. For example, in 2014 a panel of the federal advisory committee for the High Energy Physics research office issued a long-term plan for supporting particle physics, including recommending upgrades at a number of accelerator facilities, such as at the Fermi National Accelerator Laboratory.<sup>15</sup>

DOE program offices also engage in other activities to help develop research priorities, such as attending conferences, regularly reviewing published literature, regularly meeting with national laboratory staff, and engaging with interagency working groups. In addition, according to DOE officials, new ideas often come from the scientific community in the form of proposals submitted in response to solicitations from the program offices.

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## DOE Oversight Activities for R&D Investments in National Laboratories

To help ensure that DOE civilian R&D investments in national laboratories (\$5.14 billion in obligations in fiscal year 2015) align with DOE priorities, and that M&O contractors manage research and federally owned properties safely and efficiently, the offices of Energy Efficiency and Renewable Energy, Nuclear Energy, and Science carry out three broad types of activities for their respective national laboratories. We identified these activities through reviews of DOE documents and interviews with officials from DOE's program offices and site offices.

First, the three program offices conduct planning activities to help ensure that DOE investments in the laboratories support national R&D priorities. For example, the program offices require that each M&O contractor that operates a national laboratory develop a long-term strategic plan for its laboratory. The DOE program offices and the relevant site office staff review the plans and provide feedback to the laboratory contractor. These plans can identify the laboratory's vision for the future, core capabilities, major initiatives, and laboratory infrastructure needs, among other things.

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<sup>15</sup>Particle Physics Project Prioritization Panel, *Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context* (May 2014).

### Designated User Facilities at National Laboratories



Advanced Photon Source, Argonne National Laboratory

As of the beginning of fiscal year 2016, the offices of Energy Efficiency and Renewable Energy, Nuclear Energy, and Science supported and oversaw 32 designated user facilities that were primarily located at national laboratories. A designated user facility is a federally sponsored research facility available for external use to advance science or technology. These facilities are open to researchers and scientists without regard to nation of origin or institutional affiliation. Potential users may be allocated time in the facilities after a merit review of the proposed work. Users of the facilities are not charged a fee if they publish research results in open literature; for proprietary work that is not disclosed publicly, the user is charged full cost recovery.

Each of these designated user facilities represents a significant investment of federal funds. For example, according to DOE documents, the Advanced Photon Source, one of four designated user facilities at the Argonne National Laboratory in fiscal year 2015, was completed in 1995 at a cost of \$812 million. Since then, DOE has funded more than \$100 million in upgrades. The facility produces x-rays that allow scientists to conduct research on the structure and function of materials—for example, to aid in the development of new pharmaceuticals.

Sources: [www.anl.gov](http://www.anl.gov) (photo); Department of Energy-provided information. | GAO-17-261

The three program offices conduct this process with their laboratories on an annual basis. Complementary to this, program offices may also develop their own strategic planning documents. For example, within the Office of Energy Efficiency and Renewable Energy, research offices develop strategic “roadmaps” that establish a vision with broad and long-range goals to provide overall program direction. Some offices also develop multi-year program plans, which are operational guides for how research offices will manage their activities.

Second, research offices and site offices conduct various oversight activities of the new and ongoing R&D projects and scientific facilities that DOE invests in at the national laboratories.

- **Research offices solicit research proposals from national laboratories.** This proposal solicitation helps the offices determine where to invest DOE funds. The national laboratories submit work proposals for new and ongoing projects, and research office staff review these proposals and hold merit reviews—often with outside experts—to help determine which laboratory projects to invest in. According to information provided by the Office of Science, research offices conduct in-depth merit reviews for new laboratory work proposals, and most research offices review about one-third of ongoing laboratory projects each fiscal year; these reviews generally consist of three or more individual peer reviewers. For example, according to the Basic Energy Sciences research office, which is one of the Office of Science’s six research offices, in fiscal year 2015 research office staff reviewed approximately 132 of 395 ongoing laboratory projects, in addition to 64 new work proposals.<sup>16</sup>
- **Research office staff monitor project performance.** These staff conduct this monitoring through other periodic reviews, site visits, and regular meetings or phone calls with laboratory management and project staff, according to DOE officials. DOE officials told us that a significant portion of research office activities involved overseeing the large number of ongoing projects at the national laboratories. For example, according to information provided by the Office of Science, in fiscal year 2015, its research office staff oversaw more than 1,600 new or ongoing projects that received \$3.67 billion in obligations that fiscal year. Project size, risk, technological maturity, and other factors

<sup>16</sup>In addition to reviewing individual projects, research offices in the Office of Science reported that they also review scientific facilities at the laboratories, typically every 3 years.

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can influence how often research office staff review these laboratory projects or meet with project staff. For example, according to officials in the Office of Nuclear Energy, contractors must submit quarterly project reports, and the office holds formal monthly reviews in which laboratory projects are evaluated against performance metrics. Likewise, for Office of Science construction projects, research offices collaborate with site office staff and review projects to ensure they meet their technical, cost, scope and schedule milestones, according to DOE officials.

- **Site offices ensure that laboratory M&O contractors meet contract requirements.** For example, one such requirement is that the contractor have a contractor assurance system to oversee its performance and to self-identify and correct potential problems.<sup>17</sup> Each M&O contractor must establish a contractor assurance system that includes management systems and processes to generate the information needed to manage and improve the contractors own performance. Site office staff are responsible for reviewing, monitoring, and assessing the effectiveness of the system to ensure it is working and meets contract requirements. A contractor assurance system also allows site office staff to monitor the contractors own internal assessments and reviews, thereby reducing the number of reviews that the site office otherwise might conduct. For example, Argonne site office officials told us that the Argonne National Laboratory M&O contractor self-identified and corrected a radiation inventory problem at a laboratory building and kept site office staff informed of laboratory actions.<sup>18</sup>
- **Site office staff conduct independent and joint reviews.** These staff conduct their own independent reviews, as well as joint reviews with contractor staff, of laboratory facilities to ensure federal properties are being managed safely and efficiently. For example, according to information provided by the Golden Field Office, in fiscal year 2015, site office staff conducted 366 safety and health reviews at the National Renewable Energy Laboratory. Examples of these reviews include construction project safety inspections; laboratory inspections, readiness verifications, compliance visits, and risk

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<sup>17</sup>For further information, see Department of Energy, *Implementation of Department of Energy Oversight Policy*, Order (O) 226.1B (Apr. 25, 2011). We previously reported on NNSA's use of the contractor assurance system at its national laboratories. See GAO, *NNSA: Actions Needed to Clarify Use of Contractor Assurance Systems for Oversight and Performance Evaluation*, [GAO-15-216](#) (Washington, D.C.: May 22, 2015).

<sup>18</sup>According to DOE officials, this was Argonne National Laboratory building 205.

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assessments of the laboratory safety and health programs; and assessment of lab performance. Site office staff also conducted hundreds of other reviews in areas such as environmental oversight, physical and cyber-security, and financial oversight.

- **Site offices are responsible for administering the M&O contracts.** This responsibility includes taking actions such as modifying the contract to add funding for laboratory work or to incorporate new applicable directives from DOE and the Office of Management and Budget. According to site office staff we interviewed, the incorporation of new directives into an M&O contract is an ongoing effort that requires coordination with the contractor and often negotiation about the terms added to the contract. For example, according to officials at one site office, to address a new DOE order that called for particular safety management procedures at DOE facilities,<sup>19</sup> officials tailored the contract so that the new contract language would apply to only the scientific user facility with the highest risk at the laboratory—this action reduced the number of safety management procedures required of the contractor while complying with the new order.
- **Site offices must have specific staff to oversee construction and upgrades.** These staff—referred to as federal project directors—oversee the construction of any new scientific facilities or upgrades to existing facilities. These federal project directors also may be assigned from a site office or from the Office of Science’s Integrated Support Center to a project site other than a national laboratory. For example, according to DOE officials, a federal project director at the Integrated Support Center is responsible for overseeing construction of the Facility for Rare Isotope Beams at Michigan State University, a \$730 million project.
- **Site offices may conduct other activities to provide centralized support to other site offices and the larger program office.** Areas of support include intellectual property and other legal services, procurement, human resources, information technology, and safety and security. Within the Office of Science, many of these activities are provided by the Integrated Support Center.<sup>20</sup> The Idaho Operations Office and the Golden Field Office provide many of these services to

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<sup>19</sup>DOE Order 422.1, Conduct of Operations.

<sup>20</sup>The Integrated Support Center includes experts that are used across the Office of Science’s 10 site offices. For example, according to DOE officials, the Integrated Support Center provides experts that assist site offices with reviews of laboratory cybersecurity systems required under each laboratory’s contractor assurance system.

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the Office of Nuclear Energy and the Office of Energy Efficiency and Renewable Energy, respectively.

Third, at the end of each fiscal year, program offices use a performance evaluation and measurement plan to assess each laboratory contractor's scientific, technological, managerial, and operational performance. The plan is developed collaboratively by the responsible program office, including the site office, and the laboratory M&O contractor before each fiscal year, and it helps form the basis for the evaluation of the laboratory contractor at the end of the year.<sup>21</sup> Research office staff are responsible for evaluating laboratory mission-related areas of the plan, including the contractor's ability to deliver science and technology to meet DOE missions. Site office staff evaluate the contractor's operations at the laboratory, including the use of the contractor assurance system, according to DOE documents and officials. Results from this performance evaluation inform the contractor's award fee determination as well as the possibility of earning additional years on the contract through an award term extension.<sup>22</sup>

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## DOE Oversight Activities for R&D Investments in Universities, Industry, and Other Entities

The offices of Energy Efficiency and Renewable Energy, Nuclear Energy, and Science use various processes to help oversee DOE's civilian R&D investments in universities, industry, and other entities (\$2.22 billion in obligations in fiscal year 2015). Research office staff in these three program offices develop solicitations—also referred to as funding opportunity announcements—for R&D proposals from universities, industry, and other entities.<sup>23</sup> They then conduct or manage merit reviews of submitted proposals, an activity that generally includes independent reviews from technical, subject matter experts. Research office staff identify and recruit teams of experts for these merit reviews. According to DOE officials, program managers take these expert reviews into

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<sup>21</sup>Other program offices and entities that obligate more than \$1 million to a laboratory may also contribute to the performance plan and the evaluation of the contractor at the end of the fiscal year.

<sup>22</sup>DOE's M&O contracts with laboratories are usually for a 5-year base period. These contracts may also contain provisions for "award term incentives," by which a laboratory may extend the contract if its performance meets specific, defined criteria.

<sup>23</sup>According to DOE officials, most M&O laboratory funding is provided through the M&O contract, through contract modifications in response to work proposals, but laboratories may also apply directly to funding opportunity announcements or laboratory-specific funding announcements. Laboratories also may apply for funding as part of a team or consortium responding to a funding opportunity announcement.

consideration, along with factors such as portfolio balance and available funds, before making funding recommendations to DOE leadership. According to data provided by DOE, research office staff in the five program offices and ARPA-E conducted or managed more than 6,600 proposal reviews—with reviews consisting of as many as 3 or 4 individual reviewers—to select 1,691 new financial assistance awards in fiscal year 2015.

In addition to overseeing new proposals from universities and industry, research office staff oversee thousands of projects that were awarded in previous years, also known as continuing awards. As shown in table 1 below, in fiscal year 2015, DOE research offices oversaw 4,921 continuing awards (projects).

**Table 1: DOE Program Office Management of New and Continuing Financial Assistance Awards to Universities, Industry and Other Entities, Fiscal Year 2015**

<b>Program office</b>	<b>New awards</b>	<b>Continuing awards</b>	<b>Total awards</b>
Advanced Research Projects Agency-Energy (ARPA-E)	75	267	<b>342</b>
Electricity Delivery & Energy Reliability	9	6	<b>15</b>
Energy Efficiency & Renewable Energy	347	2,105	<b>2,452</b>
Fossil Energy	117	342	<b>459</b>
Nuclear Energy	72	9	<b>81</b>
Science	1,071	2,192	<b>3,263</b>
<b>Total</b>	<b>1,691</b>	<b>4,921</b>	<b>6,612</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Research offices may oversee projects differently, depending on factors such as the maturity of the science or technology, the size and complexity of the work, the size and makeup of the awardees (single institution vs. multi-institution), and the risk of the project, according to DOE officials. Research office staff tailor the level of oversight to the size, scope, and complexity of the project to ensure awardees are meeting research goals as defined in the proposal award agreement. Office of Science officials told us they generally receive annual reports from awardees and have annual project reviews for small financial assistance awards. These officials told us that for larger and more complex grants and cooperative agreements, there may be significantly more oversight, such as through a greater frequency of meetings and progress reports. The Office of Energy

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Efficiency and Renewable Energy and the Office of Nuclear Energy, which primarily invest in applied research and development projects, typically use cooperative agreements instead of grants, as cooperative agreements allow substantial federal involvement in the projects to help ensure that projects meet specific program office technology goals. These program offices may use a range of oversight activities to help ensure projects succeed. For example, according to Office of Energy Efficiency and Renewable Energy officials, program and project managers follow guidance that requires quarterly project reviews, annual site visits, frequent in-person meetings, and bi-annual peer reviews of the entire project portfolio—a more active management and oversight level than required for small grants. In addition, all financial assistance projects in the Office of Energy Efficiency and Renewable Energy are required to meet certain milestones, and projects that do not meet these milestones could lose funding.<sup>24</sup>

To complement project oversight by research office staff, site office staff provide administrative support for financial assistance awards. Specifically, the Golden Field Office in the Office of Energy Efficiency and Renewable Energy, the Idaho Operations Office in the Office of Nuclear Energy, and the Integrated Support Center in the Office of Science administer awards through activities such as preparing solicitations, negotiating award terms with recipient institutions, and closing out awards, among other things.<sup>25,26</sup> According to information provided by these program offices, in fiscal year 2015, the offices managed \$1.82 billion in obligations for thousands of new and continuing financial assistance awards. DOE officials indicated that financial assistance awards that did not receive obligations also required support. For example, according to information provided by the Office of Energy Efficiency and Renewable Energy, in addition to managing obligations for new and continuing financial assistance awards in fiscal year 2015, the Golden Field Office administered another 1,625 awards that had

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<sup>24</sup>According to Office of Energy Efficiency and Renewable Energy officials we spoke to, the program office cannot unilaterally terminate awards, except for noncompliance or cause. However, as part of the financial agreement between DOE and the awardees, awardees agree to terminate projects if certain milestones are not met.

<sup>25</sup>Staff located at the Office of Fossil Energy's National Energy Technology Laboratory site office also administer financial assistance awards for the Office of Energy Efficiency and Renewable Energy.

<sup>26</sup>According to DOE officials, research office staff may also play a supporting role in the management and processing of financial assistance awards.

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previously received obligations as well as awards that were completed and were in the process of closing out.<sup>27</sup>

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## DOE Staffing Levels to Oversee Civilian R&D Investments Declined from Fiscal Year 2011 to Fiscal Year 2015, and Staff Costs Increased Slightly

From fiscal year 2011 to fiscal year 2015, DOE staffing levels for oversight of civilian R&D investments declined by 11.0 percent, while obligations for the civilian R&D that the staff oversaw increased by 3.8 percent.<sup>28</sup> The obligations for staff costs of DOE oversight of civilian R&D increased by 2.4 percent overall from fiscal year 2011 to fiscal year 2015, and these costs varied among the five program offices and ARPA-E. DOE obligations for staff costs decreased 4.0 percent over this period when adjusted for inflation.

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## Staffing Levels for DOE Oversight of Civilian R&D Declined from Fiscal Year 2011 to Fiscal Year 2015 as Obligations for Such R&D Increased

From fiscal year 2011 to fiscal year 2015, DOE staffing levels for oversight of civilian R&D—including staff in the five DOE program offices and ARPA-E—declined from 2,937 to 2,613 full-time equivalent employees, a decrease of 11.0 percent.<sup>29</sup> Four of the five DOE program offices accounted for the entire decline in staffing levels. In contrast, ARPA-E staffing levels increased over this period as the agency expanded (see fig. 3 below). Appendixes I and II present further data on staffing levels in the five program offices and ARPA-E, as well as data on staff costs and R&D obligations.

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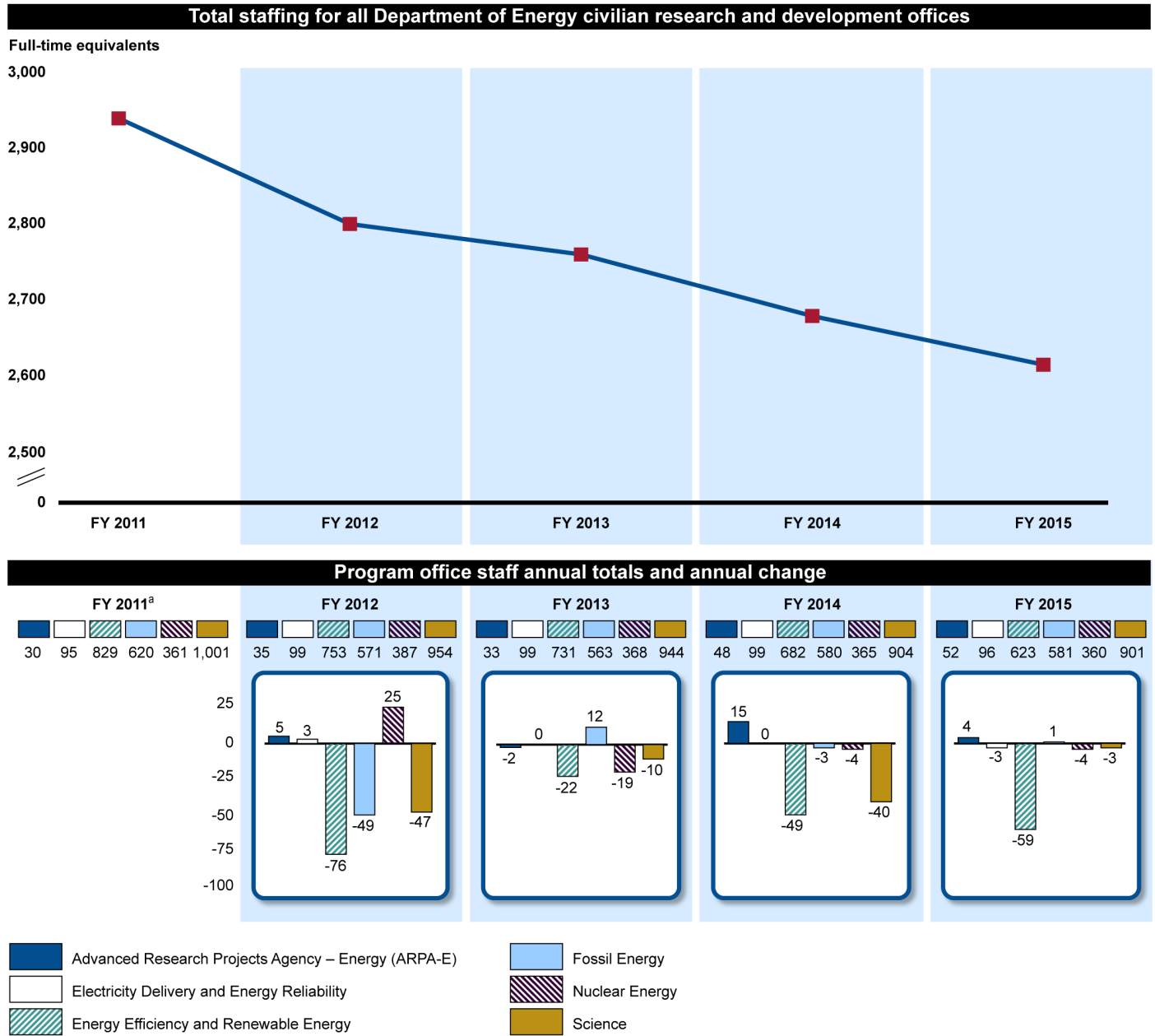
<sup>27</sup>This includes data from the Golden Field Office, as well as from the National Energy Technology Laboratory site office, which includes staff who support the Office of Energy Efficiency and Renewable Energy.

<sup>28</sup>Unless otherwise indicated, obligations in this report are reported in current dollar values—that is, not adjusted for inflation.

<sup>29</sup>In their responses to our data collection instrument, ARPA-E and the Office of Science provided the number of staff on hand rather than the number of full-time equivalent employees. DOE officials said that the number of staff on hand was nearly equivalent to the number of full-time equivalent employees for these two offices.



**Figure 3: Total Staffing for all Department of Energy (DOE) Civilian R&D Offices, and Staff Totals and Annual Change from Previous Fiscal Year, by DOE Program Office, Fiscal Years 2011-2015**



Source: GAO analysis of Department of Energy data. | GAO-17-261

Note: Full-time equivalent employment is measured by the total number of regular hours worked by employees divided by the number of compensable hours in each year. Full-time equivalent employment may therefore include decimals. For this reason, some numbers in the figure above may

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not sum to the total due to rounding. ARPA-E and the Office of Science provided the number of staff on hand rather than the number of full-time equivalent employees. According to DOE officials, the number of staff on hand was nearly equivalent to the number of full-time equivalent employees for these two offices.

<sup>a</sup>There is no annual change in fiscal year 2011 because that was the first year of data provided by DOE.

According to information provided by DOE, a number of factors contributed to staffing level declines. For example, according to information provided by the Office of Energy Efficiency and Renewable Energy, the completion of projects associated with the American Recovery and Reinvestment Act (ARRA) resulted in a reduction in staff brought on board to manage these projects.<sup>30</sup> Other offices attributed changes in staffing to causes such as budgetary pressures and voluntary separation programs. One site office we visited reported that as employees left or retired, the office did not fill open billets; instead, the office spread the responsibilities among remaining staff. Office reorganizations also contributed to staffing declines. For example, Office of Science officials reported to us that the office consolidated many of its support functions, including human resources and legal services, which resulted in a 10 percent reduction in staff over several years, with further reductions planned for fiscal year 2016.

As staff levels decreased overall, the five DOE program offices and ARPA-E were responsible for overseeing and implementing civilian R&D obligations that increased from \$7.09 billion in fiscal year 2011 to \$7.36 billion in fiscal year 2015, an increase of 3.8 percent.<sup>31</sup> Civilian R&D obligations from the program offices changed by varying degrees over this period, ranging from a decrease of 23.3 percent in the Office of Electricity Delivery and Energy Reliability (a decrease of 28.1 percent when adjusted for inflation) to an increase of 8.8 percent in the Office of

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<sup>30</sup>The American Recovery and Reinvestment Act of 2009 (Recovery Act) was enacted to (1) help preserve jobs and promote economic recovery from the current economic recession, (2) invest in technology to spur technological advances, and (3) invest in infrastructure to provide long-term economic benefits, among other things. The Office of Energy Efficiency and Renewable Energy used ARRA funds for projects intended to improve energy efficiency and help build the domestic renewable energy industry, among other goals. ARRA also mandated that agencies manage and expend such funds as quickly as possible consistent with prudent management to achieve these goals. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115.

<sup>31</sup>Obligations are reported in current dollars, meaning they do not include the effects of inflation. When adjusted for inflation, the \$7.09 billion in R&D civilian obligations in fiscal year 2011 equals \$7.57 billion in fiscal year 2015 dollars. This means that, when adjusted for inflation, obligations for civilian R&D decreased by 2.7 percent over this period.

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Nuclear Energy (an increase of 1.9 percent when adjusted for inflation). ARPA-E's civilian R&D obligations experienced a more than 100-fold increase because the agency, which was founded and initially funded in 2009, grew significantly during the period under review.

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Overall Obligations for Staff Costs of DOE Oversight of Civilian R&D Increased Slightly from Fiscal Year 2011 to 2015, and Varied among Program Offices and ARPA-E

Total obligations for staff costs to oversee DOE's civilian R&D investments increased from \$632.9 million in fiscal year 2011 to \$647.9 million in fiscal year 2015<sup>32</sup>—an increase of 2.4 percent during the period under review (a decrease of 4.0 percent when adjusted for inflation).<sup>33</sup> Staff costs include salaries and benefits, travel, support services, and other costs, such as contributions to DOE's working capital fund for common administrative services such as building occupancy and network and telephone services.<sup>34</sup> The extent of the change in staff costs varied among the five DOE program offices and ARPA-E from fiscal year 2011 to fiscal year 2015. Over this period, the change in obligations for staff costs in DOE's five program offices ranged from a decrease of about 8 percent each at the Offices of Nuclear Energy and Science (a decrease of about 14 percent when adjusted for inflation), to an increase of 16.0 percent at the Office of Electricity Delivery and Energy Reliability (an increase of 8.8 percent when adjusted for inflation). ARPA-E's obligations for staff costs more than doubled and staff levels increased.

The overall increase in obligations for staff costs would have been greater if DOE had received the full amount it requested in appropriations, according to DOE officials. According to these officials, while staff costs

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<sup>32</sup>For the purposes of this report, we defined oversight broadly to include all activities that support the program office R&D missions. Most of the staff costs reported by these program offices are for such oversight of R&D programs. However, some of these staff costs were to support programs not directly related to R&D. Specifically, according to DOE officials, the Office of Energy Efficiency and Renewable Energy obligated \$27.3 million in fiscal year 2015 on staff who perform functions such as managing grants to state and local governments for weatherization and clean energy programs. The Office of Electricity Delivery and Energy Reliability reported obligating \$18.2 million on staff who support initiatives related to emergency management and the coordination of infrastructure and cybersecurity. The offices of Fossil Energy and Nuclear Energy reported obligating \$1.8 million and \$6.6 million respectively on staff who provide regulatory support for new and emerging technologies. The Office of Science and ARPA-E reported that all staff costs were related to supporting R&D programs.

<sup>33</sup>When adjusted for inflation, the \$632.9 million in DOE staff costs in fiscal year 2011 equals \$675.3 million in fiscal year 2015 dollars.

<sup>34</sup>In fiscal year 2015, DOE salary and benefits accounted for about two-thirds of total staff costs.

are determined by DOE offices based on staffing plans and estimated staffing needs, the appropriations provided by Congress establish an upper limit to staff costs and may not represent DOE budget requests for the program offices and ARPA-E. For example, in fiscal year 2015, DOE requested \$189.4 million for staff costs for the Office of Science and was appropriated \$183.7 million.

Of the \$647.9 million that DOE obligated for staff costs in fiscal year 2015, \$179.9 million (27.8 percent) was for headquarters office staff, \$173.5 million (26.8 percent) was for research office staff, and \$294.6 million (45.5 percent) was for site office staff, as shown in table 2 below. For further information about the functions performed by these staff, see appendix I.

**Table 2: DOE Program Office Obligations for Staff Costs at Headquarters, Research, and Site Offices, Fiscal Year 2015**

Dollars in millions

Program Office	Headquarters Offices <sup>a</sup>	Research Offices	Site Offices	Total
ARPA-E	31.1	— <sup>b</sup>	— <sup>c</sup>	31.1
Electricity Delivery & Energy Reliability	15.7	6.2	6.8 <sup>c</sup>	28.7
Energy Efficiency & Renewable Energy	48.5	87.9	34.7 <sup>d</sup>	171.1
Fossil Energy	13.6	19.8	125.8 <sup>e</sup>	159.2
Nuclear Energy	26.7	19.3	29.4	75.4
Science	44.4	40.2	97.8 <sup>f</sup>	182.5
<b>Total</b>	<b>179.9</b>	<b>173.5</b>	<b>294.6</b>	<b>647.9</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Dollar figures include obligations for staff costs associated with non-R&D programs run by some of these offices.

<sup>a</sup>Obligations for headquarters offices include staff costs for senior leadership; public relations and liaison staff; budget, grants, and contract policy; and program operations support.

<sup>b</sup>ARPA-E is not divided into research offices as in the other program offices.

<sup>c</sup>ARPA-E and the Office of Electricity Delivery and Energy Reliability do not oversee a national laboratory and therefore do not have site offices. The Office of Electricity Delivery and Energy Reliability's obligations for site office staff costs are for staff located at the Office of Fossil Energy's National Energy Technology Laboratory.

<sup>d</sup>Site office staff costs in the Office of Energy Efficiency and Renewable Energy include obligations for the Golden Field Office and for staff located at the Office of Fossil Energy's National Energy Technology Laboratory site office.

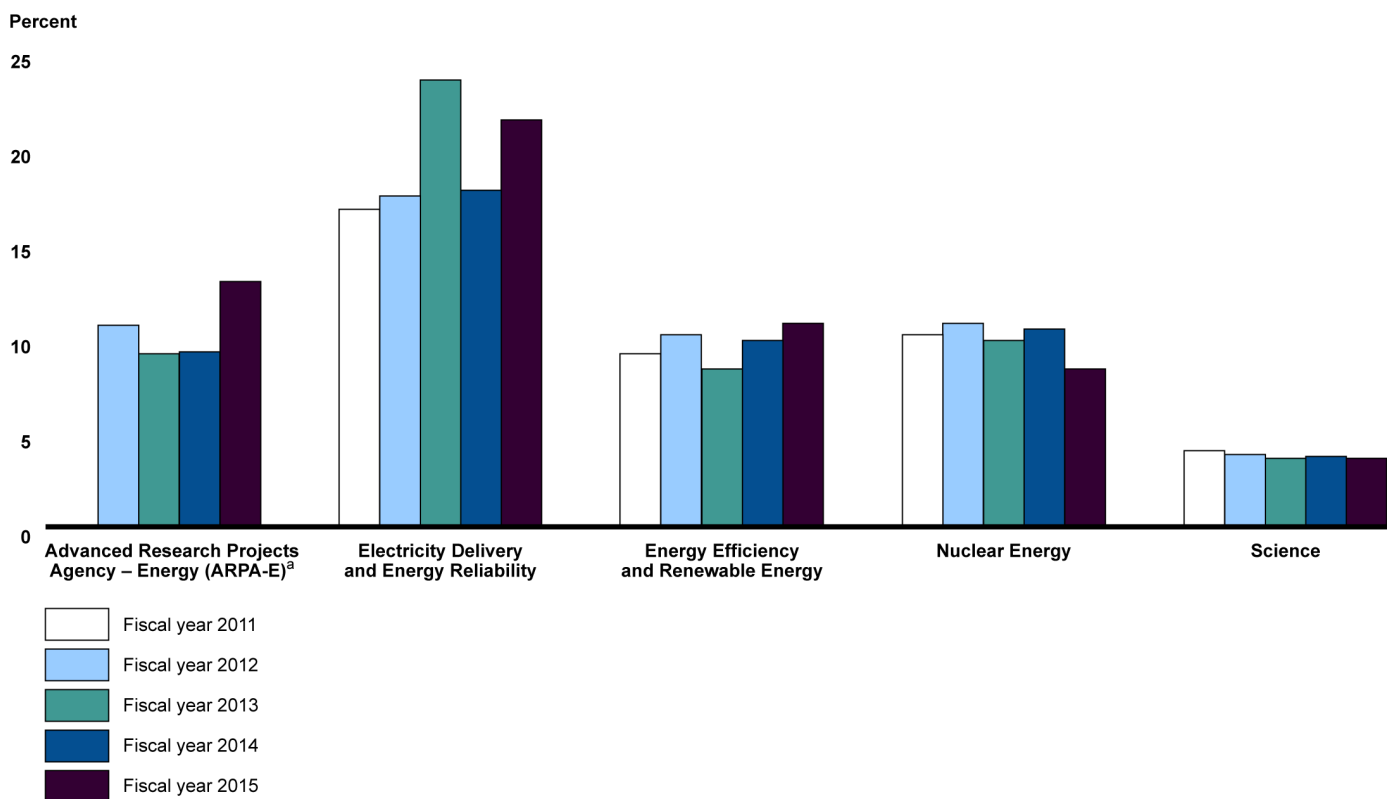
<sup>e</sup>Site office staff costs for the Office of Fossil Energy include researchers and staff at the office's National Energy Technology Laboratory. Because the laboratory is government-owned and operated, many of the laboratory's researchers and staff are federal employees, and the site office staff costs

for the Office of Fossil Energy include these employees. This is in contrast to the contractor-operated laboratories in the other program offices, where costs for researchers and scientists are included in civilian R&D obligations to each laboratory.

<sup>f</sup>Site office staff costs for the Office of Science also include the New Brunswick Laboratory, a government-owned and -operated laboratory collocated with the Argonne National Laboratory. New Brunswick Laboratory staff costs in fiscal year 2015 were approximately \$4.9 million.

The obligations for total staff costs as a percentage of total obligations (R&D and non-R&D obligations) varied among the program offices and ARPA-E (see fig. 4). For example, in fiscal year 2015, the percentage ranged from 3.6 percent in the Office of Science to 21.4 percent in the Office of Electricity Delivery and Energy Reliability. Staff costs as a percentage of total obligations across all the program offices and ARPA-E was 7.6 percent in fiscal year 2015.

**Figure 4: Total Department of Energy (DOE) Staff Costs as a Percentage of Total Obligations, by Program Office, Fiscal Years 2011-2015**



Source: GAO analysis of Department of Energy data. | GAO-17-261

Notes: The figure represents the ratio of total program office obligations for staff costs (those involved in oversight of R&D as well as those who are not) and total program obligations (R&D and non-R&D obligations).

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The Office of Fossil Energy is excluded from this figure because, as a government-owned and operated laboratory, many of the office's National Energy Technology Laboratory researchers and lab staff are federal employees, rather than employed by a laboratory contractor. As a result, staff costs for the Office of Fossil Energy include costs that for other DOE offices are reflected in obligations to the laboratory contractor.

<sup>a</sup>The ratio for ARPA-E in fiscal year 2011 (about 90%) is omitted in this chart for reasons of scale. In fiscal year 2011, ARPA-E was still being established, requiring obligations to expand staff before most R&D funds had been appropriated.

DOE officials did not identify discrete causes for variations in obligations for staff costs as a percentage of R&D obligations, but we identified several factors that can contribute to such variations through our discussions with DOE officials and a review of DOE documents. These factors include:

- **The extent to which an office uses cooperative agreements instead of grants.** As discussed above, cooperative agreements are to be used when an agency anticipates that substantial federal involvement in performance or project activities may be necessary. DOE officials said that cooperative agreements may incur higher staff costs than grants because of this increased involvement. According to DOE officials, program offices that invested primarily in applied R&D typically used cooperative agreements.
- **The extent to which an office supports non-R&D activities.** Obligations for non-R&D activities, such as regulatory support, come out of staff costs and may have limited or no corresponding R&D obligations, thus increasing staff costs' share of the total. For example, the Office of Electricity Delivery and Energy Reliability issues permits for construction of electrical transmission lines that cross national boundaries, and the office coordinates with the Department of Homeland Security on electrical grid issues in emergency planning. In fiscal year 2015, 64.5 percent of the office's total obligations were for R&D activities (\$86.5 million of \$134.1 million in total obligations); in contrast, 36.7 percent of obligations for staff costs was to oversee R&D (\$10.5 million of \$28.7 million obligated in staff costs).
- **Other factors unique to certain offices.** For example, ARPA-E obligations for staff costs in fiscal year 2015 included support for 52 federal staff as well as 49 support services contractors, a greater proportion of contractors than in the five program offices. In addition, fiscal year 2015 obligations for staff costs in the Office of Energy Efficiency and Renewable Energy supported ARRA projects, even though there were no R&D obligations for these projects during this

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period. In particular, program office staff continued to manage and close out ARRA awards until the end of fiscal year 2015.

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## Agency Comments and Our Evaluation

We provided a draft of this report to DOE for its review. DOE provided written comments, which we have reprinted in appendix III. DOE also provided technical comments, which we incorporated as appropriate throughout our report.

In its written comments, DOE stated that it generally agreed with the summarized statements in the draft report. In addition, DOE stated that its program offices and ARPA-E are structured differently to address their unique mission needs and oversight responsibilities, and that it is not appropriate to make staff comparisons across the different offices as staff functions vary. We believe that side-by-side analyses of the number of staff and staff functions across the DOE program offices and ARPA-E are appropriate as we requested similar data from all of the DOE program offices and ARPA-E. Moreover, where we did compare data, we did not draw conclusions from the comparisons, and we explained the differences in office structures to provide context. For further context, we added clarifications and details as suggested to us by DOE officials.

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As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the appropriate congressional committees, the Secretary of Energy, and other interested parties. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or [neumannj@gao.gov](mailto:neumannj@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



John Neumann  
Director, Natural Resources and Environment

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# Appendix I: Staff Oversight Functions in DOE Headquarters, Research, and Site Offices, Fiscal Year 2015

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## Headquarters Office Staffing and Functions

Program office and Advanced Research Projects Agency-Energy (ARPA-E) activities to oversee civilian research and development (R&D) investments were split among staff in headquarters offices, research offices, and site offices, where the staff performed various functions.

According to information provided by the Department of Energy (DOE), in fiscal year 2015 there were 553 staff in the six headquarters offices that provide leadership, management, and support for their respective headquarters, research, and site offices.<sup>1</sup> For example, the Project Management Coordination Office within the Office of Energy Efficiency and Renewable Energy develops policies and procedures for project and risk management and oversees audit resolution and internal controls compliance functions for the program office's three research offices. The Office of Science headquarters office also provides support to the other program offices. For example, 47 Office of Science headquarters staff work in the Office of Science and Technology Information, an organization that manages statutory requirements for making the results of DOE-funded research available to the public.<sup>2</sup> This Office of Science headquarters office also includes 4 staff who centrally solicit, award, and track the success of Small Business Innovation Research/Small Business

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<sup>1</sup>Because we defined oversight to include a broad range of activities, we have included headquarters offices in our analysis, as their activities directly or indirectly affect the program offices' R&D missions. Total headquarters staff in the program offices and ARPA-E, measured by full-time equivalent, is included in appendix II. We did not request a breakdown of headquarters staff by job category.

<sup>2</sup>Section 982 of the Energy Policy Act of 2005 states that the Secretary, through the Office of Scientific and Technical Information, shall maintain with the Department publicly available collections of scientific and technical information resulting from research, development, demonstration, and commercial applications activities supported by the Department. 42 U.S.C. § 16321 (2016)



Technology Transfer (SBIR/STTR) projects for most offices within the Department of Energy.<sup>3</sup>

For ARPA-E, all staff are located at a central headquarters office. Similar to the program offices, ARPA-E's headquarters office includes staff who provide office-wide leadership, management, and support. However, most ARPA-E staff are involved in direct oversight of supported R&D projects.

## Research Office Staffing and Functions

The role of research offices is to support and manage research areas, and staff in these offices primarily are program and project managers or other staff who directly oversee the actual R&D funded under their programs (see table 3). In many research offices, such as those in the Office of Science, program managers are scientists or engineers in the research fields in which they are overseeing R&D. Of 719 staff DOE identified as assigned to a research office in fiscal year 2015, 591 served as program or project managers involved in direct oversight of R&D, such as by providing strategic direction, developing solicitations for proposals, managing merit reviews of proposals, and monitoring and evaluating project performance.<sup>4</sup>

Program and project managers oversee research portfolios that vary in the number of projects and their annual obligations. According to DOE officials, differences in portfolio size do not necessarily reflect the scope of manager responsibilities. Instead, the scope of a manager's responsibilities more often is informed by the nature of the projects the

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<sup>3</sup>The SBIR and STTR programs are congressionally mandated programs that require all federal agencies to set aside a certain percentage of their appropriated R&D funds to support research and development projects at small businesses. In fiscal year 2015 this amount was 3.3 percent for the SBIR program. 15 U.S.C. §§ 1638(f), (o). Within DOE, all offices except ARPA-E transfer these appropriated funds to a central SBIR/STTR office managed by the Office of Science. This SBIR/STTR office solicits and selects awards in collaboration with the other program offices, and works with the Office of Science Integrated Support Center to obligate funds on behalf of the program offices. Once funds are obligated, staff from the program office that provided the funds oversee the SBIR/STTR projects as they do other awarded projects. For more on these programs, see *Small Business Research Programs: Agencies Have Improved Compliance with Spending and Reporting Requirements, but Challenges Remain*, [GAO-16-492](#) (Washington D.C.: May 26, 2016).

<sup>4</sup>When reporting on fiscal year 2015 staff by job category, DOE program offices reported the headcount of staff on hand as of September 30, 2015. Headcount for fiscal year 2015 may differ from full-time equivalent staff reported because these measures are calculated differently. We have included ARPA-E staff in these research office totals, as most ARPA-E staff are involved in direct oversight of R&D, similar to oversight activities associated with research offices.

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manager oversees. For example, according to information provided by the Biological and Environmental Research office within the Office of Science, in fiscal year 2015, one program manager was responsible for a portfolio with 33 financial assistance projects and about \$1.2 million in obligations, while a different manager oversaw a portfolio with 5 financial assistance and laboratory projects but more than \$75 million in obligations.

Research offices also include staff who do not directly oversee individual projects. These staff can include budget analysts to support financial planning and execution, program analysts, and administrative support staff who perform activities supporting the office in the accomplishment of its mission.

**Table 3: DOE Research Office Staff on Hand at the End of Fiscal Year 2015, by Program Office and Category**

Program office	Research office	Program and project management	Administrative and support	Planning, programming, budgeting, and execution	Other	Total
Advanced Research Projects Agency-Energy (ARPA-E)	ARPA-E	33	13	2	4	52
Electricity Delivery and Energy Reliability	Power Systems Engineering R&D	18	18	4	5	45
Energy Efficiency and Renewable Energy	Sustainable Transportation	72	2	2	0	76
	Renewable Power	57	2	1	0	60
	Energy Efficiency	138	2	2	0	142
<b>Office of Energy Efficiency and Renewable Energy Total</b>		267 <sup>a</sup>	6	5	0	278
Fossil Energy	Clean Coal and Carbon Management	25	7	0	0	32
	Oil and Natural Gas	22	4	1	0	27
<b>Office of Fossil Energy Total</b>		47	11	1	0	59
Nuclear Energy	Nuclear Facility Operations	8	1	0	4	13
	Science and Technology Innovation	10	2	3	0	15
	Fuel Cycle Technologies	36	2	3	1	42
	Nuclear Reactor Technologies	34	2	1	1	38
<b>Office of Nuclear Energy Total</b>		88	7	7	6	108

**Appendix I: Staff Oversight Functions in DOE Headquarters, Research, and Site Offices, Fiscal Year 2015**

Program office	Research office	Program and project management	Administrative and support	Planning, programming, budgeting, and execution	Other	Total
Science	Advanced Scientific Computing Research	16	4	1	0	21
	Biological and Environmental Research	27	1	0	3	31
	Basic Energy Sciences	47	7	2	3	59
	Fusion Energy Sciences	16	2	0	3	21
	High-Energy Physics	19	3	1	2	25
	Nuclear Physics	13	4	2	1	20
<b>Office of Science Total</b>		<b>138</b>	<b>21</b>	<b>6</b>	<b>12</b>	<b>177</b>
<b>Total for all Program Offices</b>		<b>591</b>	<b>76</b>	<b>25</b>	<b>27</b>	<b>719</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Program management includes individuals responsible for selecting, guiding, and overseeing research and development projects. Administrative and support staff are responsible for assisting with the day-to-day functions of the office as well as more specialized functions, such as information technology support. Planning, programming, budgeting, and execution staff are responsible for financial activities that may span multiple years or intersect with the budget planning process. "Other" includes individuals whose responsibilities do not fall into one of the above three categories, such as legal, human resources, information technology, and security.

<sup>a</sup>The Office of Energy Efficiency and Renewable Energy included in its reporting 68 research office staff involved in activities meant to promote the deployment of new technologies that have exited the research and development phase.

## Site Office Staffing and Functions

The role of the site offices is to manage the management and operating (M&O) contracts with laboratories and oversee federal facilities. The composition of site office staff varies depending on the characteristics of the laboratory and the responsibilities of the individual site office; this composition can range from contracting officers to federal project directors and environmental, health, and safety inspectors. For example, the Idaho Operations Office is responsible for 331 federal properties at the Idaho National Laboratory, including overseeing the safety and management of 17 nuclear facilities and the storage of nuclear materials. DOE guidelines require a risk determination for such facilities that in turn dictates the number of federal representatives who are assigned to conduct health and safety oversight at each facility. These factors contributed to the Idaho Operations Office having 44 environmental,

Appendix I: Staff Oversight Functions in DOE Headquarters, Research, and Site Offices, Fiscal Year 2015

health, safety, and quality staff, out of 188 total staff.<sup>5</sup> In contrast, the Office of Energy Efficiency and Renewable Energy reported that it had a similar number of total staff at the Golden Field Office and the National Energy Technology Laboratory but fewer environmental, health, safety, and quality staff.

In addition, site offices also include other staff who indirectly support oversight. For example, the Golden Field Office, the Idaho Operations Office, and the Integrated Support Center include significant numbers of staff who provide contract and finance support or information technology support, or who are intellectual property lawyers (see table 4).

**Table 4: DOE Site Office Staff on Hand at the End of Fiscal Year 2015, by Program Office and Category**

Program office	Site office	Program and project management	Contract and financial assistance	Environmental, health, safety, and quality	Other	Total
Energy Efficiency and Renewable Energy	Golden Field Office	32	84	16	60	192 <sup>a</sup>
Fossil Energy	National Energy Technology Lab	294	41	23	148	506 <sup>b</sup>
Nuclear Energy	Idaho Operations Office	34	20	44	90	188 <sup>c</sup>
Science	Ames	1	1	0 <sup>d</sup>	1	3
	Argonne	8	6	8	1	23
	Berkeley	7	3	4	3	17
	Brookhaven	10	4	6	4	24
	Fermi	7	3	4	1	15
	Integrated Support Center	14	81	29	212	336 <sup>e</sup>
	Oak Ridge	17	5	9	4	35
	Pacific Northwest	12	7	9	6	34
	Princeton	2	3	3	1	9
	SLAC	6	2	4	0	12
	Thomas Jefferson	4	2	3	2	11
<b>Office of Science Total</b>		<b>88</b>	<b>117</b>	<b>79</b>	<b>235</b>	<b>519</b>
<b>Total for all Program Offices</b>		<b>448</b>	<b>262</b>	<b>162</b>	<b>533</b>	<b>1405</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

<sup>5</sup>The Idaho Operations Office also includes federal employees who work for DOE's Office of Environmental Management. These employees do not oversee civilian R&D investments and are not included in the Idaho Operations Office data included in this report.

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Notes: Program and project management includes individuals responsible for the direction and administration of funds dedicated to the mission of the program office. Contract and financial assistance includes individuals responsible for the procurement and acquisition aspects of their office's activities, such as management and oversight of laboratory management and operating (M&O) contracts. Environmental, health, safety, and quality includes individuals responsible for oversight of specific compliance functions, including workplace safety laws; the prevention of radiological, chemical, and biological hazards; environmental safety regulations; and audits of laboratory functions to ensure they are consistently adhering to quality control processes. "Other" includes individuals with legal, human resources, information technology, and security responsibilities.

Site offices may also include DOE staff who are working on behalf of the research or headquarters offices. These staff totals are not included here.

<sup>a</sup>The 192 site office staff figure includes 48 staff located at the National Energy Technology Laboratory site office who support the Office of Energy Efficiency and Renewable Energy.

<sup>b</sup>The National Energy Technology Laboratory is a government-owned and -operated laboratory, and many of its researchers and staff are federal employees. This is in contrast to the other laboratories that are operated by contractors. Staff composition for this laboratory therefore includes staff who are not counted as federal staff in program offices that oversee national laboratories operated by M&O contractors. This figure includes 25 staff located at the National Energy Technology Laboratory site office who support the Office of Electricity Deliver and Energy Reliability.

<sup>c</sup>The Idaho Operations Office also includes federal employees from DOE's Office of Environmental Management. These employees do not oversee civilian R&D investments and are not included in the number of site office staff in the Office of Nuclear Energy.

<sup>d</sup>According to DOE officials, in October 2015, the Ames Site Office hired a full-time environmental, health, and safety expert to be located on site.

<sup>e</sup>The Integrated Support Center is a joint support center comprised of two offices within the Office of Science. One office is collocated with the Argonne National Laboratory and the other is collocated with the Oak Ridge National Laboratory.

# Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015

To learn about staffing levels and costs associated with Department of Energy's (DOE) offices that oversee research and development (R&D) investments, we developed a data collection instrument that we sent to the five program offices and the Advanced Research Projects Agency-Energy (ARPA-E). The data collection instrument asked for information on program office obligations for R&D, obligations for federal staff, and the composition of program office staffs. The DOE program offices provided the data in the tables below.

The tables below show data by program office and ARPA-E from fiscal year 2011 to fiscal year 2015, including obligations for R&D provided to (1) the national labs and (2) universities and private industry, as well as the number of full-time equivalent staff in each office<sup>1</sup> and staff costs.

## Advanced Research Projects Agency–Energy (ARPA-E)

**Table 5: Advanced Research Projects Agency–Energy (ARPA-E) Total Research and Development Obligations by Institution Type, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation					
	2011	2012	2013	2014	2015
National Laboratories	0.0	25.8	17.5	18.3	16.3
Universities and Private Industry	1.6	233.4	151.3	242.6	194.2
<b>Total</b>	<b>1.6</b>	<b>269.2</b>	<b>168.8</b>	<b>260.9</b>	<b>210.5</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Numbers may not sum to totals due to rounding.

**Table 6: Advanced Research Projects Agency–Energy (ARPA-E) Staff, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent					
	2011	2012	2013	2014	2015
ARPA-E	30	35	33	48	52

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

<sup>1</sup>Full-time equivalent employment is defined as the total number of regular hours (not including overtime or holiday hours) worked by employees divided by the number of compensable hours applicable to each year. Data for full-time equivalent staff and on-hand staff may not match because each measures staff differently.

**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

**Table 7: Advanced Research Projects Agency–Energy (ARPA-E) Obligations for Staff Costs, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
ARPA-E	13.4	30.8	16.9	26.6	31.1

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Notes: Staff costs include salaries and benefits, travel, support services, and other costs.

**Office of Electricity Delivery and Energy Reliability**

**Table 8: Office of Electricity Delivery and Energy Reliability Total Research and Development Obligations by Institution Type, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
National Laboratories	56.4	50.1	50.5	62.1	44.9
Universities and Private Industry	59.9	56.3	37.1	40.9	44.3
<b>Total</b>	<b>116.3</b>	<b>106.4</b>	<b>87.6</b>	<b>102.9</b>	<b>89.1</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Numbers may not sum to totals due to rounding.

**Table 9: Office of Electricity Delivery and Energy Reliability Staff by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent

	2011	2012	2013	2014	2015
Power Systems Engineering R&D Research Office	32.0	33.0	38.0	46.0	45.0
Site Office Staff (located at the National Energy Technology Laboratory)	32.1	32.5	29.8	27.5	24.7
Headquarters	31.0	33.0	31.0	25.0	26.0
<b>Total</b>	<b>95.1</b>	<b>98.5</b>	<b>98.8</b>	<b>98.5</b>	<b>95.7</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

**Table 10: Office of Electricity Delivery and Energy Reliability Obligations for Staff Costs by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
Power Systems Engineering R&D Research Office	5.0	4.0	4.8	5.5	6.2
Site Office Staff (located at the National Energy Technology Laboratory)	7.6	8.0	8.7	7.4	6.8
Headquarters	12.1	12.1	15.8	13.6	15.7
<b>Total</b>	<b>24.8</b>	<b>24.1</b>	<b>29.4</b>	<b>26.5</b>	<b>28.7</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Notes: Staff costs include salaries and benefits, travel, support services, and other costs. Numbers may not sum to totals due to rounding.

**Office of Energy Efficiency and Renewable Energy**

**Table 11: Office of Energy Efficiency and Renewable Energy Research and Development Obligations by Institution Type, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
National Laboratories	730.3	689.6	837.3	699.7	737.9
Universities and Private Industry	696.7	602.8	742.6	473.5	462.9
<b>Total</b>	<b>1,426.9</b>	<b>1,292.4</b>	<b>1,580.0</b>	<b>1,173.2</b>	<b>1,200.8</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Numbers may not sum to totals due to rounding.

**Table 12: Office of Energy Efficiency and Renewable Energy Staff by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent

	2011	2012	2013	2014	2015
Sustainable Transportation	87.1	90.4	87.6	83.0	74.3
Renewable Power	51.4	57.8	54.9	54.7	56.9
Energy Efficiency	199.8	218.6	194.6	163.0	147.3
<b>Research Office Total</b>	<b>338.3</b>	<b>366.9</b>	<b>337.2</b>	<b>300.7</b>	<b>278.6</b>



**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent					
	2011	2012	2013	2014	2015
Golden Field Office <sup>a</sup>	331.9	220.5	209.9	181.5	191.5
Headquarters	159.2	165.4	183.8	200.0	153.1
<b>Total</b>	<b>829.4</b>	<b>752.8</b>	<b>730.9</b>	<b>682.2</b>	<b>623.2</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

<sup>a</sup>Site office staff figures include staff located at the National Energy Technology Laboratory who conduct work for the Office of Energy Efficiency and Renewable Energy.

**Table 13: Office of Energy Efficiency and Renewable Energy Obligations for Staff Costs by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation					
	2011	2012	2013	2014	2015
Sustainable Transportation	17.6	19.7	19.6	19.8	23.5
Renewable Power	10.4	12.6	12.3	13.1	18.0
Energy Efficiency	40.3	47.7	43.6	38.9	46.5
Research Office Total	68.2	80.1	75.5	71.8	87.9
Golden Field Office <sup>a</sup>	64.9	41.9	40.5	31.4	34.7
Headquarters	32.2	36.0	41.2	47.9	48.5
<b>Total</b>	<b>165.3</b>	<b>158.0</b>	<b>157.2</b>	<b>151.1</b>	<b>171.1</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Notes: Staff costs include salaries and benefits, travel, support services, and other costs. Numbers may not sum to totals due to rounding.

<sup>a</sup>Site office staff costs includes staff located at the National Energy Technology Laboratory who conduct work for the Office of Energy Efficiency and Renewable Energy.

**Office of Fossil Energy**

**Table 14: Office of Fossil Energy Research and Development Obligations by Institution Type, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation					
	2011	2012	2013	2014	2015
National Laboratories	140.8	123.4	106.3	96.6	121.2
Universities and Private Industry	352.5	314.9	303.3	343.6	363.5
<b>Total</b>	<b>493.3</b>	<b>438.3</b>	<b>409.6</b>	<b>440.2</b>	<b>484.7</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

Note: Numbers may not sum to totals due to rounding.

**Table 15: Office of Fossil Energy Staff by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent					
	2011	2012	2013	2014	2015
Clean Coal and Carbon Management	37	35	32	30	32
Oil and Natural Gas	32	22	20	17	21
<b>Research Office Total</b>	<b>69</b>	<b>57</b>	<b>52</b>	<b>47</b>	<b>53</b>
National Energy Technology Lab Site Office <sup>a</sup>	512	470	490	484	482
Headquarters	39	44	41	49	46
<b>Total</b>	<b>620</b>	<b>571</b>	<b>583</b>	<b>580</b>	<b>581</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

<sup>a</sup>The Office of Fossil Energy's National Energy Technology Laboratory is owned and operated by the federal government. Figures in this row include government scientists and researchers at the laboratory.

**Table 16: Office Fossil Energy Obligations for Staff Costs by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation					
	2011	2012	2013	2014	2015
Clean Coal and Carbon Management	9.1	10.9	9.9	10.4	10.9
Oil and Natural Gas	7.9	6.8	6.1	5.7	7.1
<b>Research Office Total</b>	<b>17.0</b>	<b>17.7</b>	<b>16.0</b>	<b>16.1</b>	<b>18.0</b>
National Energy Technology Lab Site Office <sup>a</sup>	122.4	126.8	117.7	123.9	125.8
Headquarters	9.1	13.3	12.5	16.0	15.4
<b>Total</b>	<b>148.5</b>	<b>157.8</b>	<b>146.2</b>	<b>156.0</b>	<b>159.2</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Notes: Staff costs include salaries and benefits, travel, support services, and other costs.

Numbers may not sum to totals due to rounding.

<sup>a</sup>The Office of Fossil Energy's National Energy Technology Laboratory is owned and operated by the federal government. Figures in this row include obligations for government scientists and researchers at the laboratory.

Office of Nuclear Energy

**Table 17: Office of Nuclear Energy Research and Development Obligations by Institution Type, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
National Laboratories	609.8	528.1	481.3	569.8	613.2
Universities and Private Industry	39.4	57.1	33.0	87.4	92.8
<b>Total</b>	<b>649.1</b>	<b>585.2</b>	<b>514.3</b>	<b>657.2</b>	<b>706.0</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Numbers may not sum to totals due to rounding.

**Table 18: Office of Nuclear Energy Staff by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent

	2011	2012	2013	2014	2015
Nuclear Facility Operations	10.9	8.9	10.3	10.5	13.0
Science and Technology Innovation	4.0	15.3	14.1	13.4	14.7
Fuel Cycle Technologies	43.6	44.7	41.4	41.0	41.8
Nuclear Reactor Technologies	26.1	30.7	33.0	33.9	33.7
<b>Research Office Total</b>	<b>84.6</b>	<b>99.6</b>	<b>98.8</b>	<b>98.8</b>	<b>103.2</b>
Idaho Site Office	197.0	205.0	193.0	190.0	188.0 <sup>a</sup>
Headquarters	79.8	82.2	76.3	75.7	69.2
<b>Total</b>	<b>361.4</b>	<b>386.8</b>	<b>368.1</b>	<b>364.5</b>	<b>360.4</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

<sup>a</sup>The Idaho Operations Office also includes federal employees from DOE's Office of Environmental Management. These employees do not oversee civilian R&D investments and are not included in the number of site office staff in the Office of Nuclear Energy.

**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

**Table 19: Office of Nuclear Energy Obligations for Staff Costs by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
Nuclear Facility Operations	1.9	1.4	1.7	1.7	2.1
Science and Technology Innovation	0.8	2.4	1.9	2.3	2.6
Fuel Cycle Technologies	7.4	7.7	7.5	7.6	7.9
Nuclear Reactor Technologies	4.6	5.5	6.0	6.2	6.7
<b>Research Office Total</b>	<b>14.6</b>	<b>17.0</b>	<b>17.1</b>	<b>17.8</b>	<b>19.3</b>
Idaho Operations Office	39.1	37.2	35.1	42.8	29.4
Headquarters	28.3	29.3	23.9	33.6	26.7
<b>Total</b>	<b>82.1</b>	<b>83.5</b>	<b>76.1</b>	<b>94.2</b>	<b>75.4</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Notes: Staff costs include salaries and benefits, travel, support services, and other costs. Numbers may not sum to totals due to rounding.

**Office of Science**

**Table 20: Office of Science Research and Development Obligations by Institution Type, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
National Laboratories	3,406.4	3,454.0	3,311.0	3,563.0	3,604.6
Universities and Private Industry	998.1	1,009.9	936.1	1,082.1	1,065.8
<b>Total</b>	<b>4,404.5</b>	<b>4,463.9</b>	<b>4,247.1</b>	<b>4,645.1</b>	<b>4,670.3</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Note: Numbers may not sum to totals due to rounding.

**Table 21: Office of Science Staff by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent

	2011	2012	2013	2014	2015
Advanced Scientific Computing Research	26	24	24	25	21
Biological and Environmental Research	34	33	34	30	31
Basic Energy Sciences	59	58	58	57	59
Fusion Energy Sciences	25	25	25	23	21

**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

Number of staff measured by full-time equivalent					
	2011	2012	2013	2014	2015
High-Energy Physics	23	24	24	22	25
Nuclear Physics	19	20	18	20	20
<b>Research Office Total</b>	<b>186</b>	<b>184</b>	<b>183</b>	<b>177</b>	<b>177</b>
Ames Site Office	4	3	3	3	3
Argonne Site Office <sup>a</sup>	21	22	21	21	23
Berkley Site Office	23	22	21	18	17
Brookhaven Site Office	27	26	25	25	24
Fermi Site Office	15	14	15	14	15
Integrated Support Center	407	377	368	353	336
Oak Ridge Site Office	28	37	37	38	35
Pacific Northwest Site Office	35	34	34	33	34
Princeton Site Office	10	10	10	9	9
SLAC Site Office	15	13	13	12	12
Thomas Jefferson Site Office	13	11	11	11	11
<b>Site Office Total</b>	<b>627</b>	<b>599</b>	<b>587</b>	<b>561</b>	<b>537</b>
Headquarters	188	171	174	166	187
<b>Total for all offices</b>	<b>1001</b>	<b>954</b>	<b>944</b>	<b>904</b>	<b>901</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

<sup>a</sup>Figures for Argonne Site Office do not include employees at the New Brunswick Laboratory, a government-owned-and-operated facility at the Argonne National Laboratory.

**Table 22: Office of Science Obligations for Staff Costs by Research Office, Site Office, and Headquarters Office, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation					
	2011	2012	2013	2014	2015
Advanced Scientific Computing Research	5.4	5.1	4.5	5.6	5.2
Biological and Environmental Research	7.3	7.2	6.6	7.5	6.9
Basic Energy Sciences	12.1	12.5	11.5	13.0	13.1
Fusion Energy Sciences	5.0	5.3	4.9	5.6	5.0
High-Energy Physics	4.8	4.7	4.5	5.3	5.5
Nuclear Physics	4.7	4.3	3.9	4.5	4.6
<b>Research Office Total</b>	<b>39.1</b>	<b>39.1</b>	<b>35.9</b>	<b>41.5</b>	<b>40.2</b>
Ames Site Office	0.5	0.5	0.4	0.4	0.5
Argonne Site Office <sup>a</sup>	9.4	9.5	9.0	9.1	8.7
Berkley Site Office	4.3	4.0	4.1	3.9	3.5

**Appendix II: Data on R&D Obligations, Staff Totals, and Obligations for Staff Costs for DOE Offices, Fiscal Years 2011-2015**

Obligations are in millions of dollars and have not been adjusted for inflation

	2011	2012	2013	2014	2015
Brookhaven Site Office	4.9	4.9	5.0	4.7	4.9
Fermi Site Office	2.2	2.4	2.4	2.4	2.4
Oak Ridge Site Office	4.6	4.8	6.0	6.0	5.8
Pacific Northwest Site Office	5.3	5.1	4.8	4.8	4.7
Princeton Site Office	1.6	1.7	1.6	1.6	1.4
SLAC Site Office	2.7	2.6	2.5	2.4	2.5
Thomas Jefferson Site Office	2.0	1.9	1.7	1.8	1.9
Integrated Support Center	68.8	68.5	59.0	59.9	61.5
<b>Site Office Total</b>	<b>106.5</b>	<b>106.0</b>	<b>96.3</b>	<b>97.0</b>	<b>97.8</b>
Headquarters	53.3	40.5	38.1	51.1	44.4
<b>Total for all offices</b>	<b>198.9</b>	<b>185.6</b>	<b>170.3</b>	<b>189.6</b>	<b>182.5</b>

Source: GAO analysis of Department of Energy (DOE) data. | GAO-17-261

Notes: Staff costs include salaries and benefits, travel, support services, and other costs.

Numbers may not sum to totals due to rounding.

<sup>3</sup>Site office staff costs for the Office of Science include costs for the New Brunswick Laboratory (NBL) a government-owned-and-operated laboratory located at the Argonne National Laboratory. NBL's budget in fiscal year 2015 was approximately \$4.9 million.

# Appendix III: Comments from the Department of Energy



Department of Energy  
Office of Science  
Washington, DC 20585

Office of the Director

January 27, 2017

Mr. John Neumann  
Director, Natural Resources  
and Environment  
Government Accountability Office  
441 G Street  
Washington, DC 20548

Dear Mr. Neumann:

Thank you for the opportunity to comment on the draft Government Accountability Office (GAO) report entitled, "Research and Development: DOE Activities and Costs to Oversee Investments," (GAO-17-261). I am pleased to provide a response on behalf of Department of Energy (DOE).

We believe the GAO did a commendable job in reviewing the oversight activities of the five DOE program offices within the Office of the Under Secretary for Science and Energy and the Advanced Research Projects Agency-Energy (ARPA-E), all of whom fund and oversee DOE civilian research and development (R&D) investments. The draft report provides a balanced view of how these DOE offices identify research opportunities and solicit, award, and manage DOE awards at DOE national laboratories, universities, industry, and other entities.

We generally agree with the summarized statements in the draft report, however we believe that it is important the final report acknowledges that the DOE program offices and ARPA-E are structured differently to address their unique mission needs and oversight responsibilities. Because the GAO's data collection instruments requested detailed obligations and staffing data from only the research offices and the site offices (as applicable) for each DOE office, it is not appropriate to make staff comparisons across the offices as staff functions that are localized to a research office or site office vs. centralized within a program office vary across the DOE offices. Comparability of data is also impacted by the type of risk/reward projects supported by the various programs resulting in differing requirements of investment of Agency staff time and resources.

To improve the clarity and accuracy of the report, we also request GAO incorporate the General and Technical comments including:

- Corrections to information pertaining to new and continuing awards to universities, industry, and other entities
- Clarification that staff costs are determined by program offices based on staffing plans and estimated staffing needs
- The addition of information and footnotes to further explain and clarify the presentation of staffing and obligations over the review period

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**Appendix III: Comments from the Department  
of Energy**

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Thank you for the opportunity to provide comments on this draft report. Specific technical comments from the Department are provided in the attachment. If you have any questions or concerns, please call me at (202) 586-5430.

Sincerely,



J. Stephen Binkley  
Acting Director  
Office of Science



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# Appendix IV: GAO Contact and Staff Acknowledgments

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## GAO Contact

John Neumann, (202) 512-3841 or [neumannj@gao.gov](mailto:neumannj@gao.gov)

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## Staff Acknowledgments

In addition to the contact named above, Joseph Cook (Assistant Director), Matthew J. Ambrose, and David Messman made key contributions to this report. Also contributing to this report were Camilo Flores, Justin S. Fisher, Richard Johnson, Mae Liles, Cynthia Norris, and Dan C. Royer.

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