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Federal Research and Development (R&D) Funding: FY2024

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Technology Policy

Federal Research and Development (R&D) Funding: FY2024

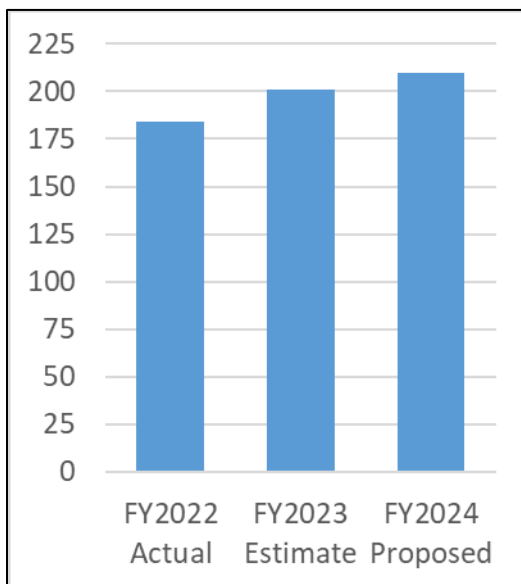
The U.S. government supports a broad range of scientific and engineering research and development (R&D). Its purposes include addressing national defense, health, safety, the environment, and energy security; advancing knowledge generally; developing the U.S. scientific and engineering workforce; strengthening the capacity of U.S. institutions and firms to conduct cutting-edge scientific research and develop innovative technologies; and enhancing the competitiveness of the United States in the global economy. Most of the R&D funded by the federal government is performed in support of the unique missions of individual funding agencies.

President Biden’s budget proposal for FY2024 includes approximately \$209.7 billion for R&D, \$8.9 billion (4.4%) above the FY2023 estimated level of \$200.8 billion. Adjusted for inflation to FY2024 dollars, the President’s FY2024 R&D proposal represents a constant-dollar increase of 2.4% above the FY2023 actual level.

Funding for R&D is concentrated in a few federal departments and agencies. In FY2023, six agencies received nearly 95% of total federal R&D funding, with the Department of Defense (DOD, 46.2%) and the Department of Health and Human Services (HHS, 24.0%) combined accounting for more than 70% of all federal R&D funding. In the FY2024 proposal, the top six R&D agencies would account for nearly 95%, with DOD accounting for 45.8% and HHS for 24.3%.

Federal Research and Development Funding, FY2022-FY2024

In billions of dollars



Source: CRS analysis of data from the Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2023.

Under the President’s FY2024 budget proposal, most agencies would see their R&D funding increase relative to FY2023. The only exceptions in FY2024 are the Department of Commerce (DOC), which would decrease by \$726 million (14.2%) to \$4.4 billion, the Department of Education (ED), which would decrease by \$19 million (5.4%) to \$330 million, and the Department of Homeland Security (DHS), which would decrease by \$9 million (1.4%) to \$625 million. The largest dollar increases in R&D funding would be for DOD (up \$3.1 billion, 3.4%), HHS (up \$2.8 billion, 5.8%), the National Science Foundation (NSF, up \$1.3 billion, 16.6%), and the Department of Energy (up \$1.0 billion, 4.3%). The largest percentage increases in R&D funding would be at the Department of the Interior (up 16.9%), NSF (up 16.6%), and the Department of Transportation (up 10.3%).

The President’s FY2024 budget proposal would increase funding for basic research by \$1.0 billion (2.2%), applied research by \$2.5 billion (5.0%), and development by \$5.9 billion (6.2%), and decrease R&D facilities and equipment by \$547 million (7.5%).

Several multiagency R&D initiatives continue under the President’s FY2024 budget proposal. Some activities supporting these initiatives are discussed in agency budget justifications. However, comprehensive aggregate

budget information on these initiatives will likely not be available until budget supplements for each are released later in the year.

The request represents the President's R&D priorities. Congress may opt to agree with none, part, or all of the request, and it may express different priorities through the appropriations process. Congress provides annual R&D appropriations through 9 of the 12 regular appropriations bills.

In recent years, Congress has completed the annual appropriations process after the start of the fiscal year. Completing the process after the start of the fiscal year and the accompanying use of continuing resolutions can affect agencies' execution of their R&D budgets, including the delay or cancellation of planned R&D activities and acquisition of R&D-related equipment.

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Introduction

The 118th Congress is engaged in a range of legislative activities focused on the U.S. research and development (R&D) enterprise, in particular federal R&D programs and policies, including authorizations, appropriations, and oversight. The federal government has played an important role in supporting R&D efforts that have led to scientific breakthroughs and new technologies, from jet aircraft and the internet to communications satellites, shale gas extraction, and defenses against disease. Beyond agency mission objectives and policies to promote the competitiveness of the United States in the global economy, executive and legislative branch decisions about the prioritization of R&D have recently been driven by federal budget caps, both in the context of the entire federal budget as well as among competing needs within the federal R&D portfolio.

The U.S. government supports a broad range of scientific and engineering R&D. Its purposes include addressing national defense, health, safety, the environment, and energy security; advancing knowledge generally; developing the U.S. scientific and engineering workforce; and strengthening the capacity of U.S. institutions and firms to conduct cutting-edge scientific research and develop innovative technologies; and enhancing the global competitiveness of U.S. institutions and firms. Most of the R&D funded by the federal government is performed in support of the unique missions of individual funding agencies.

The federal R&D budget is an aggregation of the R&D activities of these agencies. There is no single, centralized source of R&D funds. Agency R&D budgets are developed internally as part of each agency's overall budget development process. R&D funding may be included either in appropriations accounts that are entirely devoted to R&D or in accounts that also include funding for non-R&D activities. Agency budgets are subjected to review, revision, and approval by the Office of Management and Budget (OMB) and become part of the President's annual budget submission to Congress. The federal R&D budget is then calculated by aggregating the R&D activities of all federal agencies.

Congress plays a central role in defining the nation's R&D priorities as it makes decisions about the level and allocation of R&D funding—overall, within agencies, and for specific programs. As Congress acts to complete the fiscal year (FY) 2024 appropriations process, it faces two overarching issues: the amount of the federal budget to be spent on federal R&D and the prioritization and allocation of the available funding.

This report begins with a discussion of the overall funding level of R&D in President Biden's FY2024 budget request, followed by analyses of requested R&D funding in selected agency and department budgets and for selected multiagency initiatives; these include analyses of the budget by agency; by character of R&D work; and by a combination of the two perspectives. The remainder of the report discusses and analyzes the R&D budget requests of selected federal departments and agencies that collectively account for approximately 99% of total federal R&D funding.

Selected terms associated with federal R&D funding are defined in the text box on the next page. The **Appendix** lists the primary CRS experts on R&D funding for the agencies covered in this report.

Definitions Associated with Federal Research and Development Funding

Two key sources of definitions associated with federal research and development (R&D) funding are the White House Office of Management and Budget (OMB) and the National Science Foundation (NSF).

Office of Management and Budget. OMB provides definitions of R&D-related terms in OMB Circular No. A-11, “Preparation, Submission, and Execution of the Budget.”¹ This document provides guidance to agencies in the preparation of the President’s annual budget and instructions on budget execution. Though boundaries separating one type of R&D activity from another may not always be clear or seem relevant in practice, where such lines are drawn and how various R&D activities are categorized directly informs the budget process. OMB Circular No. A-11 provides definitions for R&D activities to be used in the identification and collection of federal R&D spending across federal agencies and departments. Importantly, these definitions have varied over time. For example, as of FY2017, OMB replaced the R&D category “development” with a subset referred to as “experimental development” to, according to OMB, better align its data with that collected by NSF and to be consistent with international standards. OMB thus omits “non-experimental development” funding (which the Department of Defense (DOD) categorizes under budget activities 6.7 and 6.8) from the calculation of DOD and total federal R&D funding levels. Though OMB also temporarily omitted DOD budget activity 6.6, characterizing it as “non-investment activity,” between FY2017-FY2022, it resumed its inclusion of budget activity 6.6 funding in FY2023 to fully capture DOD’s contribution to total federal research and development funding.² OMB Circular No. A-11 provides the following definitions:

Conduct of R&D. Research and experimental development activities are defined as creative and systematic work undertaken in order to increase the stock of knowledge—including knowledge of people, culture, and society—and to devise new applications using available knowledge.

Basic Research. Basic research is defined as experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts. Basic research may include activities with broad or general applications in mind, such as the study of how plant genomes change, but excludes research directed towards a specific application or requirement, such as the optimization of the genome of a specific crop species.

Applied Research. Applied research is defined as original investigation undertaken in order to acquire new knowledge. Applied research is, however, directed primarily towards a specific practical aim or objective.

Experimental Development. Experimental development is defined as creative and systematic work, drawing on knowledge gained from research and practical experience, which is directed at producing new products or processes or improving existing products or processes. Like research, experimental development will result in gaining additional knowledge.

R&D Equipment. R&D equipment includes amounts for major equipment for research and development. It includes acquisition, design, or production of major movable equipment, such as mass spectrometers, research vessels, DNA sequencers, and other major movable instruments for use in R&D activities. It includes programs of \$1 million or more that are devoted to the purchase or construction of major R&D equipment.

R&D Facilities. R&D facilities includes amounts for the construction of facilities that are necessary for the execution of an R&D program. This may include land, major fixed equipment, and supporting infrastructure such as a sewer line or housing at a remote location.

National Science Board and National Science Foundation. The National Science Board and NSF provide the following definitions of R&D-related terms in the report *The State of U.S. Science and Engineering 2022*.³

Research and Development: Research and experimental development comprise creative and systematic work undertaken to increase the stock of knowledge—including knowledge of humankind, culture, and society—and to devise new applications of available knowledge.

Basic Research: Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

Applied Research: Original investigation undertaken to acquire new knowledge—directed primarily toward a specific, practical aim or objective.

Development (or Experimental Development): Systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

¹ Executive Office of the President, Office of Management and Budget, Circular No. A-11, “Preparation, Submission, (continued...)”

The President's FY2024 Budget Proposal

On March 9, 2023, President Biden released his proposed FY2024 budget, which includes \$209.7 billion for R&D for FY2024, an increase of \$8.9 billion (4.4%) above the FY2023 enacted level of \$200.8 billion.⁴ Adjusted for inflation to FY2024 dollars, the President's FY2024 R&D proposal represents a constant-dollar increase of 2.4% above the FY2023 actual level.⁵

The President's proposal includes continued R&D funding for existing single-agency and multiagency programs and activities, as well as new initiatives. This report provides government-wide, multiagency, and individual agency analyses of the President's FY2024 proposal as it relates to R&D and related activities. The government-wide analysis in this report is based on data from OMB that includes advance appropriations (already enacted) for FY2024, as well as new funding requested for FY2024; with a few exceptions,⁶ the individual agency analyses that follow are based on agency budget justifications and do not include advance appropriations. More information will become available as the House and Senate act on the President's budget request through appropriations bills.

Factors Affecting Analysis of the FY2024 Budget Request

Several factors complicate the analysis of changes in R&D funding for FY2024, both in aggregate and for selected agencies:

- The government-wide analysis in this report is based on data from OMB that includes advance appropriations (already enacted) for FY2024, as well as new funding requested for FY2024; with the exception of the Department of the Interior analysis, the individual agency analyses that follow are based on agency budget justifications and do not include advance appropriations. Where information is available, supplemental appropriations provided under the Infrastructure Investment and Jobs Act (P.L. 117-58) and the Inflation Reduction Act (P.L. 117-169) are included as footnotes in agency budgets.
- Inconsistency among agencies in reporting R&D activities and the inclusion of R&D activities in accounts with non-R&D activities may result in different figures being reported by OMB and the White House Office of Science and Technology Policy (OSTP), including those shown in **Table I**, and those in agency budget analyses that appear later in this report.

Federal R&D Funding Perspectives

Federal R&D funding can be analyzed from a variety of perspectives that provide different insights. The following sections examine the data by agency, by the character of the work supported, and by a combination of these two perspectives.

and Execution of the Budget," August 2022, at <https://www.whitehouse.gov/wp-content/uploads/2018/06/a11.pdf>.

² Email communication and telephone conversation between CRS and OMB staff, most recently September 8, 2022.

³ National Science Board, National Science Foundation, *The State of U.S. Science and Engineering 2022*, "Research and Development: U.S. Trends and International Comparisons," April 28, 2022, at <https://ncses.nsf.gov/pubs/nsb20225/glossary>.

⁴ According to OMB, the President's FY2024 proposal presented in *Analytical Perspectives* that accompanies the President's FY2024 budget request includes advance appropriations provided to agencies for FY2024. (Email conversation between CRS and OMB, April 4, 2023.)

⁵ As calculated by CRS using the Gross Domestic Product (GDP) (chained) price index for FY2023-FY2024 in Table 10.1, "Gross Domestic Product and Deflators Used in the Historical Tables: 1940-2026," *Budget of the United States Government, Fiscal Year 2022*, at https://www.whitehouse.gov/wp-content/uploads/2021/05/hist10z1_fy22.xlsx.

⁶ In this report, advance appropriations are included in some agencies' FY2024 proposals. These include the Department of Veterans Affairs, the Department of the Interior, and the Department of Transportation.

Federal R&D by Agency

Congress makes decisions about R&D funding through the authorization and appropriations processes primarily from the perspective of individual agencies and programs. **Table 1** provides data on R&D funding by agency for FY2022 (actual), FY2023 (estimate), and FY2024 (request).⁷

Under the FY2024 request, eight federal agencies would receive approximately 97% of total federal R&D funding: the Department of Defense (DOD), 45.8%; Department of Health and Human Services (HHS), primarily the National Institutes of Health (NIH), 24.3%; Department of Energy (DOE), 11.5%; National Aeronautics and Space Administration (NASA), 6.7%; National Science Foundation (NSF), 4.4%; Department of Commerce (DOC), 2.1%; Department of Agriculture (USDA), 1.7%; and Department of Veterans Affairs (VA), 0.8%. This report provides an analysis of the R&D budget requests for these agencies, as well as for the Department of Homeland Security (DHS), Department of the Interior (DOI), Department of Transportation (DOT), and Environmental Protection Agency (EPA).

With the exception of the DOC, DHS, and the Department of Education (ED), all federal agencies would see their R&D funding increase under the President's FY2024 request compared with their FY2023 estimated levels. The agencies with the largest R&D funding increases (measured in dollars) in the FY2024 request compared with FY2023 estimated levels are DOD (up \$3.132 billion), HHS (up \$2.778 billion), NSF (up \$1.328 billion), and DOE (up \$1.002 billion). DOC R&D funding would decline by \$726 million (down 14.2%), ED by \$19 million (down 5.4%), and DHS by \$9 million (down 1.4%). See **Table 1**.

The agencies with the largest percentage increases in R&D funding in the FY2024 request compared with the FY2023 estimated level are DOI (up 16.9%), NSF (up 16.6%), and DOT (up 10.3%). See **Table 1**.

Table 1. Federal Research and Development Funding by Agency, FY2022-FY2024

(budget authority, dollar amounts in millions)

Department/Agency	FY2022 Actual	FY2023 Estimate	FY2024 Request	FY2023-FY2024	
				Dollar Change	Percentage Change
Department of Defense	78,642	92,854	95,986	3,132	3.4%
Dept. of Health and Human Services	45,318	48,118	50,896	2,778	5.8%
Department of Energy	22,562	23,218	24,220	1,002	4.3%
NASA	12,479	13,105	14,022	917	7.0%
National Science Foundation	7,126	7,992	9,320	1,328	16.6%
Department of Commerce	7,214	5,114	4,388	-726	-14.2%
Department of Agriculture	3,748	3,615	3,670	55	1.5%
Department of Veterans Affairs	1,588	1,624	1,690	66	4.1%
Department of Transportation	1,675	1,388	1,531	143	10.3%
Department of the Interior	1,140	1,264	1,478	214	16.9%

⁷ Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2024, at <https://www.whitehouse.gov/omb/budget/analytical-perspectives/>.

Department/Agency	FY2022 Actual	FY2023 Estimate	FY2024 Request	FY2023-FY2024	
				Dollar Change	Percentage Change
Department of Homeland Security	830	634	625	-9	-1.4%
Environmental Protection Agency	527	568	614	46	8.1%
Smithsonian Institution	330	341	364	23	6.7%
Department of Education	390	349	330	-19	-5.4%
Other	554	626	589	-37	-5.9%
Total	184,123	200,810	209,723	8,913	4.4%

Source: CRS analysis of data from Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2023 at <https://www.whitehouse.gov/omb/budget/analytical-perspectives/>.

Notes: Components may not sum to totals due to rounding. FY2024 data includes advance appropriations and new appropriations proposed by the President.

Federal R&D by Character of Work, Facilities, and Equipment

Federal R&D funding can also be examined by the character of work it supports—basic research, applied research, or development—and by funding provided for construction of R&D facilities and acquisition of major R&D equipment. (See **Table 2**.) President Biden’s FY2024 request includes \$48.607 billion for basic research, an increase of \$1.032 billion (2.2%) above the FY2023 estimated level; \$52.672 billion for applied research, an increase of \$2.516 billion (5.0%); \$101.697 billion for experimental development, an increase of \$5.912 billion (6.2%); and \$6.747 billion for R&D facilities and equipment, a decrease of \$547 million (-7.5%).

Table 2. Federal R&D Funding by Character of Work and Facilities and Equipment, FY2022-FY2024

(budget authority, dollar amounts in millions)

Character of Work, Facilities, and Equipment	FY2022 Actual	FY2023 Estimated	FY2024 Request	Change, FY2023-FY2024	
				Dollar Change	Percentage Change
Basic research	45,388	47,575	48,607	1,032	2.2%
Applied research	47,154	50,156	52,672	2,516	5.0%
Development	84,965	95,785	101,697	5,912	6.2%
Facilities and Equipment	6,616	7,294	6,747	-547	-7.5%
Total	184,123	200,810	209,723	8,913	4.4%

Source: CRS analysis of data from Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2024 at <https://www.whitehouse.gov/omb/budget/analytical-perspectives/>.

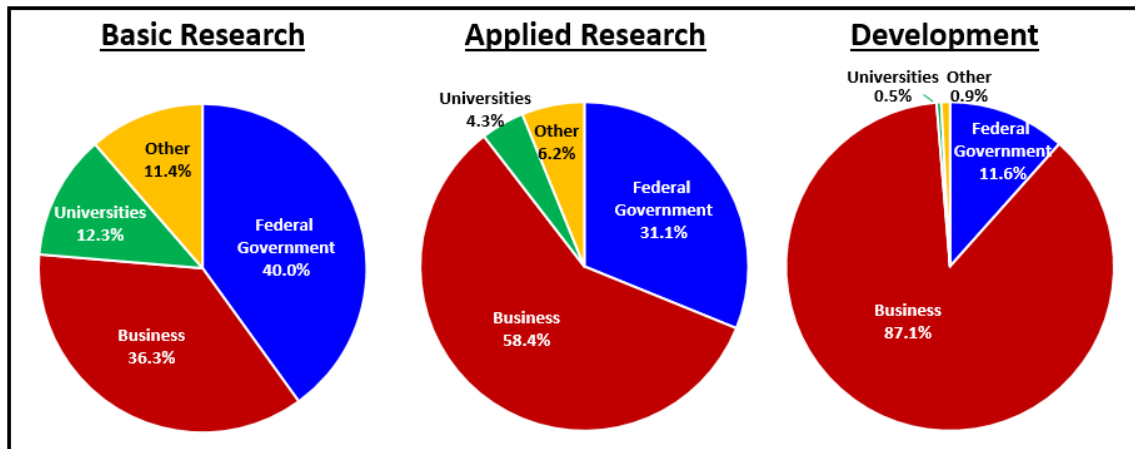
Note: Components may not sum to totals due to rounding. FY2024 data includes both advance appropriations and new appropriations proposed by the President.

Federal Role in U.S. R&D by Character of Work

A primary policy justification for public investments in basic research and incentives for private sector research (e.g., tax credits) is the view that, absent such policies, the private sector tends to underinvest in basic research from a societal perspective. The usual argument for this view, which is widely held by economists, is that the social returns (i.e., the benefits to society at large) exceed the private returns (i.e., the benefits accruing to the private investor, such as increased revenues or higher stock value). Other factors that may inhibit corporate investment in basic research include long time horizons for achieving commercial applications (diminishing the potential returns due to the time value of money), high levels of technical risk and uncertainty, shareholder demands for shorter-term returns, and asymmetric and imperfect information.

The federal government is the nation's largest supporter of basic research, funding 40.0% of U.S. basic research in 2021 (the most recent year for which comprehensive data are available). Business funded 36.3% of U.S. basic research in 2021, with universities, state governments, and other nonprofit organizations funding the remaining 23.7%.⁸ For U.S. applied research, business is the primary funder, accounting for an estimated 58.4% in 2021, while the federal government accounted for an estimated 31.1%. State governments, universities, and other nonprofit organizations funded the remaining 10.5%. Business also provides the vast majority of U.S. funding for development. Business accounted for 87.1% of development funding in 2021, while the federal government provided 11.6%. State governments, universities, and other nonprofit organizations funded the remaining 1.3% (see **Figure 1**).⁹

Figure 1. Composition of U.S. Basic Research, Applied Research, and Development by Funding Sector, 2021



Source: CRS analysis of National Science Foundation, *National Patterns of R&D Resources: 2020-2021 Data Update*, NSF 23-321, Tables 7-9, January 4, 2023.

Notes: Components may not add to total due to rounding. Data are preliminary and may be revised.

⁸ Percentages may not sum to 100% due to rounding.

⁹ CRS analysis of National Science Foundation, *National Patterns of R&D Resources: 2020-2021 Data Update*, NSF 23-321, Tables 7-9, January 4, 2023. Data are preliminary and may be revised. Components may not add to total due to rounding.

Federal R&D by Agency and Character of Work Combined

Federal R&D funding can also be viewed from the combined perspective of each agency's contribution to basic research, applied research, development, and facilities and equipment. **Table 3** lists the three agencies with the most funding in each of these categories as proposed in the President's FY2024 budget. The overall federal R&D budget reflects a wide range of national priorities, including supporting advances in spaceflight, developing new and affordable sources of energy, and understanding and deterring adversaries. These priorities and the mission of each individual agency contribute to the composition of that agency's R&D spending (i.e., the allocation of R&D funding among basic research, applied research, development, and facilities and equipment).

In President Biden's FY2024 budget request, the Department of Health and Human Services, primarily NIH, would account for more than half (47.7%) of all federal funding for basic research. HHS would also be the largest federal funder of applied research, accounting for about 51.7% of all federally funded applied research in the President's FY2024 budget request. DOD would be the primary federal funder of experimental development, accounting for 85.5% of total federal development funding in the President's FY2024 budget request. DOE would be the primary federal funder of R&D facilities and equipment, accounting for 64.0% of total federal R&D facilities and equipment funding in the President's FY2024 budget request.¹⁰

Table 3. Selected R&D Funding Agencies by Character of Work, Facilities, and Equipment, FY2022 Actual, FY2023 Estimated, and FY2024 Request

(budget authority, dollar amounts in millions)

Character of Work/Agency	FY2022 Actual	FY2023 Estimate ^a	FY2024 Request	Change, FY2023-FY2024	
				Dollars	Percentage
Basic Research					
Health and Human Services	21,991	23,377	23,207	-170	-0.7%
NSF	5,649	6,150	7,068	918	14.9%
Energy	6,483	6,605	7,014	409	6.2%
Applied Research					
Health and Human Services	22,979	24,257	27,209	2,952	12.2%
Energy	6,462	6,685	7,155	470	7.0%
Defense	6,928	8,102	6,237	-1,865	-23.0%
Experimental Development					
Defense	69,013	81,780	86,978	5,198	6.4%
Energy	4,807	5,046	5,730	684	13.6%
NASA	4,234	4,886	5,490	604	12.4%
Facilities and Equipment^b					
Energy	4,810	4,882	4,321	-561	-11.5%

¹⁰ CRS analysis of data from EOP, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2024, at <https://www.whitehouse.gov/omb/budget/analytical-perspectives/>.

Character of Work/Agency	FY2022 Actual	FY2023 Estimate ^a	FY2024 Request	Change, FY2023-FY2024	
				Dollars	Percentage
NSF	594	554	679	125	22.6%
Commerce	395	859	648	-211	-24.6

Source: CRS analysis of data from Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2024 at <https://www.whitehouse.gov/omb/budget/analytical-perspectives/>.

Note: This table shows only the top three funding agencies in each category, based on the FY2024 request. FY2024 data includes advance appropriations and new appropriations proposed by the President.

- a. According to OMB, the FY2023 estimate column applies includes all 2023 enacted appropriations.
- b. According to OMB, the decline in Facilities and Equipment spending in 2024 is due in some cases to the completion of large construction projects and increased funding levels in the previous two years associated with the Inflation Reduction Act of 2022 (P.L. 117-169) and the Infrastructure Investment and Jobs Act (P.L. 117-58).

Multiagency R&D Initiatives

For many years, presidential budgets have reported on multiagency R&D initiatives. Often, they have also provided details of agency funding for these initiatives. Some of these efforts have a statutory basis—for example, the Networking and Information Technology Research and Development (NITRD) program, the National Nanotechnology Initiative (NNI), and the U.S. Global Change Research Program (USGCRP). These programs generally produce annual budget supplements identifying objectives, activities, funding levels, and other information, usually published shortly after the presidential budget release.¹¹ Other multiagency R&D initiatives have operated at the discretion of the President, without a specific statutory mandate, and may be eliminated at the discretion of the President. President Biden’s FY2024 budget is largely silent on funding levels for these efforts and whether any, or all, of the nonstatutory initiatives will continue. Some activities related to these initiatives are discussed in agency budget justifications and may be addressed in the agency analyses later in this report. This section provides available multiagency information on these initiatives and will be updated as additional information becomes available.

Networking and Information Technology Research and Development Program¹²

Established by the High-Performance Computing Act of 1991 (P.L. 102-194), the Networking and Information Technology Research and Development Program coordinates unclassified federal networking and information technology R&D investments in areas such as supercomputing, high-speed networking, artificial intelligence (AI), cybersecurity, software engineering, and information management. The NITRD National Coordination Office (NCO) coordinates the information technology R&D activities of 24 federal agency members and more than 45 other

¹¹ See, for example, discussion of national coordination offices’ operations and budgets in CRS Report R47410, *The Office of Science and Technology Policy (OSTP): Overview and Issues for Congress*, by Emily G. Blevins.

¹² For additional information on the Networking and Information Technology Research and Development program, please contact Patricia Moloney Figliola, Specialist in Internet and Telecommunications Policy.

participating agencies with program interests and activities in IT R&D. NITRD efforts are further coordinated by the National Science and Technology Council (NSTC) NITRD Subcommittee.¹³

P.L. 102-194, as reauthorized by the American Innovation and Competitiveness Act of 2017 (P.L. 114-329), requires the director of the NITRD NCO to prepare an annual report to be delivered to Congress along with the President’s budget request. This annual report, often referred to as a budget supplement, is to include, among other things, detailed information on the program’s budget for the current and previous fiscal years and the proposed budget for the next fiscal year. The latest annual report was published in November 2022 and related to the FY2023 budget request.

The President’s FY2023 budget request for federal agencies’ NITRD-related R&D was \$9.6 billion, up \$7.8 billion (23.1% from the FY2022 request level). The increase of \$1.8 billion was a result of DOD, including DARPA, reporting numbers in AI for this reporting cycle. Additionally, DARPA reported numbers in Electronics for Networking and Information Technology (ENIT) for FY2023 that were not reported for FY2022.

Additional information on the NITRD Program can be obtained at <https://www.nitrd.gov>.

Table 4. Networking and Information Technology Research and Development Program Funding, FY2021-FY2024

(budget authority, in millions of current dollars)

	FY2021 Actual	FY2022 Estimated	FY2023 Request	FY2024 Request
Total, NITRD	8,197.2 ^a	8,575.3 ^b	9,615.7	n/a

Source: Executive Office of the President, National Science and Technology Council, *The Networking & Information Technology R&D Program and the National Artificial Intelligence Initiative Office, Supplement to the President’s FY 2023 Budget*, November 2022 at <https://www.nitrd.gov/pubs/FY2023-NITRD-NAIIO-Supplement.pdf>. Funding for activities that contribute to NITRD has been appropriated to more than 20 federal departments and agencies in the past. Almost all of the funding is spent directly by agencies on research and related activities; a small percentage is spent for interagency coordination and communications in the NITRD program office.

- a. Congress appropriated an additional \$151.3 million in supplemental appropriations for FY2021.
- b. Congress appropriated an additional \$186.3 million in supplemental appropriations for FY2022.

¹³ The NSTC was established by Executive Order 12881 in 1993. According to the White House, “This Cabinet-level Council is the principal means within the Executive Branch to coordinate science and technology policy across the diverse entities that make up the Federal research and development enterprise. Chaired by the President, the membership of the NSTC is made up of the Vice President, Cabinet Secretaries and Agency Heads with significant science and technology responsibilities, and other White House officials. In practice, the Assistant to the President for Science and Technology Policy oversees the NSTC’s ongoing activities.” (Source: Executive Office of the President, Office of Science and Technology Policy, “NSTC,” at <https://www.whitehouse.gov/ostp/nstc/>.) For more information on the NSTC, see CRS Report R47410, *The Office of Science and Technology Policy (OSTP): Overview and Issues for Congress*, by Emily G. Blevins.

Climate Change-Related Research and Development¹⁴

The President’s budget proposes “a total climate innovation investment” of \$16.5 billion for FY2024. *Analytical Perspectives*, which accompanies the President’s budget, includes proposals for climate science (the U.S. Global Change Research Program); clean energy and climate technology and infrastructure; CHIPS Act climate priorities; and nature-based solutions. While *Analytical Perspectives* identifies activities and funding proposals for certain components of the request, the itemization is limited. The majority of proposed funding would be for clean energy technology R&D totaling \$11.3 billion; in past years, most of the clean energy and climate technology R&D has been appropriated to DOE. The climate-related proposal associated with the CHIPS Act includes more than \$2.5 billion for DOE for nuclear energy, in the Office of Science and the Office of Nuclear Energy.¹⁵

U.S. Global Change Research Program (USGCRP)

The U.S. Global Change Research Program coordinates and integrates federal research and applications to understand, assess, predict, and respond to human-induced and natural processes of global change. The program seeks to advance global climate change science and to “empower the nation and the world to anticipate and respond to urgent risks of climate and global change by creating and providing accessible, usable knowledge.”¹⁶ In FY2022, 10 departments and agencies received appropriations for their USGCRP participation.¹⁷ USGCRP efforts are coordinated by the NSTC Subcommittee on Global Change Research. Each agency develops and carries out its activities as its contribution to the USGCRP, and funds are appropriated to each agency for those activities; those activities may or may not be identified as associated with the USGCRP in agency budget justifications or other program materials available publicly. Complementing USGCRP activities are many federal climate change or global change-related activities with programmatic missions, not predominantly scientific. These are reported separately in budget justifications.

The Global Change Research Act of 1990 (GCRA, P.L. 101-606) requires each federal agency or department involved in global change research to report annually to Congress on each element of its proposed global change research activities, as well as the portion of its budget request allocated to each element of the program.¹⁸ The President is also required to identify those activities and the annual global change research budget in the President’s annual budget request. The President’s budget requests for years later than FY2017 do not report these budget data required by the GCRA, although some agencies report their contributions in their budget justifications to Congress.

In addition, in most of the 20 years prior to FY2018, language in appropriations laws required the President to submit a comprehensive report to the appropriations committees “describing in detail

¹⁴ For additional information on climate change-related R&D and the U.S. Global Change Research Program, please contact Jane A. Leggett, Specialist in Energy and Environmental Policy.

¹⁵ It is unclear whether this funding is a part of the President’s \$16.5 billion proposed “total climate innovation investment.”

¹⁶ U.S. Global Change Research Program website, <http://www.globalchange.gov/about/mission-vision-strategic-plan>.

¹⁷ U.S. Global Change Research Program, *Our Changing Planet: The U.S. Global Change Research Program for Fiscal Year 2023*, 2023, at <https://www.globalchange.gov/browse/reports/our-changing-planet-FY-2023>.

¹⁸ Directives to report annually to Congress on budget requests and spending occur in several sections of P.L. 101-606, including Sections 105(b) and (c) on Budget Coordination, and Section 107, Annual Report.

all Federal agency funding, domestic and international, for climate change programs, projects, and activities ... including an accounting of funding by agency.”¹⁹ The USGCRP reports, pursuant to the Global Change Research Act, enacted and proposed budgets by agency each fiscal year, along with agency descriptions of major programs and initiatives, in a publication entitled *Our Changing Planet*.

For additional information on the earlier climate change budget cross-cuts, see CRS Report R43227, *Federal Climate Change Funding from FY2008 to FY2014*, by Jane A. Leggett, Richard K. Lattanzio, and Emily Bruner. Additional USGCRP information can be obtained at <http://www.globalchange.gov>.

Table 5. U.S. Global Change Research Program Funding, FY2021-FY2024

(budget authority, in millions of current dollars)

	FY2021 Enacted	FY2022 Request	FY2023 Request	FY2024 Request
Total, USGCRP	3,401	3,754	5,139	n/a

Source: USGCRP, *Our Changing Planet: The U.S. Global Change Research Program for Fiscal Year 2023*, March 2023.

Notes: n/a = not available. Funding for activities that contribute to the USGCRP has been appropriated to more than a dozen federal departments and agencies in the past, and some of its spending is transferred or coordinated through interagency agreements. Almost all of the funding is spent directly by agencies on research and related activities; a small percentage is spent for interagency coordination and communications in the USGCRP program office.

National Nanotechnology Initiative²⁰

Launched in FY2001, the National Nanotechnology Initiative is a multiagency R&D initiative to advance understanding and control of matter at the nanoscale, where the physical, chemical, and biological properties of materials differ in fundamental and sometimes useful ways from the properties of individual atoms or bulk matter.²¹ In 2003, Congress enacted the 21st Century Nanotechnology Research and Development Act (P.L. 108-153), providing a legislative foundation for some of the activities of the NNI. NNI efforts are coordinated by the NSTC Subcommittee on Nanoscale Science, Engineering, and Technology (NSET). For FY2022, the President’s request included NNI funding for 18 federal departments and independent agencies and commissions with budgets dedicated to nanotechnology R&D. The NSET includes other federal departments and independent agencies and commissions with responsibilities for health, safety, and environmental regulation; trade; education; intellectual property; international relations; and other areas that might affect or be affected by nanotechnology.

P.L. 108-153 requires the NSTC to prepare an annual report to be delivered to Congress at the time the President’s budget request is sent to Congress. This annual report, often referred to as a budget supplement, is to include detailed information on the program’s budget for the current fiscal year and the program’s proposed budget for the next fiscal year, as well as additional information and data related to the performance of the program. The latest annual report was published in February 2023 and related to the FY2023 budget request. President Biden requested

¹⁹ See, most recently, P.L. 115-31, Consolidated Appropriations Act, 2017, Section 416.

²⁰ For additional information on the National Nanotechnology Initiative, please contact John F. Sargent Jr., Specialist in Science and Technology Policy.

²¹ In the context of the NNI and nanotechnology, the nanoscale refers to lengths of 1 to 100 nanometers. A nanometer is one-billionth of a meter, or about the width of 10 hydrogen atoms arranged side by side in a line.

\$1.989 billion for NNI research in FY2023, a decrease of \$374 million (15.8%) from the estimated FY2022 level.²²

For additional information on the NNI, see CRS Report RL34401, *The National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues*, by John F. Sargent Jr. Additional NNI information can be obtained at <http://www.nano.gov>.

Table 6. National Nanotechnology Initiative Funding, FY2021-FY2024

(budget authority, in millions of current dollars)

	FY2021 Actual	FY2022 Estimated	FY2023 Request	FY2024 Request
Total, NNI	3,776.9	2,362.7	1,988.8	n/a

Source: Executive Office of the President (EOP), NSTC, *The National Nanotechnology Initiative: Supplement to the President's 2023 Budget*, February 2023.

Notes: Funding for activities that contribute to the NNI has been appropriated to more than a dozen federal departments and agencies in the past. Almost all of the funding is spent directly by agencies on research and related activities; a small percentage is spent for interagency coordination and communications in the National Nanotechnology Coordination Office (NNCO).

FY2024 Appropriations Status

The remainder of this report provides a more in-depth analysis of R&D in 12 federal departments and agencies that, in aggregate, receive nearly 99% of total federal R&D funding. Agencies are presented in order of the size of their FY2024 R&D budget requests, with the largest presented first.

Annual appropriations for these agencies are provided through 9 of the 12 regular appropriations bills. For each agency covered in this report, **Table 7** shows the corresponding regular appropriations bill that provides primary funding for the agency, including its R&D activities.

Because of the way that agencies report budget data to Congress, it can be difficult to identify the portion that is R&D. Consequently, R&D data presented in the agency analyses in this report may differ from R&D data in the President's budget or otherwise provided by OMB.

Funding for R&D is often included in appropriations line items that also include non-R&D activities; therefore, in such cases, it may not be possible to identify precisely how much of the funding provided in appropriations laws is allocated to R&D specifically. In general, R&D funding levels are known only after departments and agencies allocate their appropriations to specific activities and report those figures.

As of the date of this report, neither the House nor Senate has acted on any of the nine appropriations bills that provide R&D funding.

In addition to this report, CRS produces individual reports on each of the appropriations bills and for a number of federal agencies. These reports can be accessed via the CRS website at <http://www.crs.gov/iap/appropriations>. Also, the status of each appropriations bill is available on the CRS web page "Appropriations Status Table," available at <http://www.crs.gov/AppropriationsStatusTable/Index>.

²² Executive Office of the President, NSTC, *The National Nanotechnology Initiative: Supplement to the President's 2023 Budget*, February 2023.

Table 7. Alignment of Agency R&D Funding and Regular Appropriations Bills

Department/Agency	Regular Appropriations Bill
Department of Defense	Department of Defense Appropriations Act
Department of Health and Human Services - National Institutes of Health	(1) Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act (2) Department of the Interior, Environment, and Related Agencies Appropriations Act
Department of Energy	Energy and Water Development and Related Agencies Appropriations Act
National Aeronautics and Space Administration	Commerce, Justice, Science, and Related Agencies Appropriations Act
National Science Foundation	Commerce, Justice, Science, and Related Agencies Appropriations Act
Department of Agriculture	Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act
Department of Commerce - National Institute of Standards and Technology - National Oceanic and Atmospheric Administration	Commerce, Justice, Science, and Related Agencies Appropriations Act
Department of Veterans Affairs	Military Construction and Veterans Affairs, and Related Agencies Appropriations Act
Department of the Interior	Department of the Interior, Environment, and Related Agencies Appropriations Act
Department of Transportation	Transportation, Housing and Urban Development, and Related Agencies Appropriations Act
Department of Homeland Security	Department of Homeland Security Appropriations Act
Environmental Protection Agency	Department of the Interior, Environment, and Related Agencies Appropriations Act

Source: CRS Report R40858, *Locate an Agency or Program Within Appropriations Bills*, by Justin Murray.

Department of Defense²³

The mission of the Department of Defense is to provide “the military forces needed to deter war and ensure our nation’s security.”²⁴ Congress supports DOD R&D activities through the department’s Research, Development, Test, and Evaluation (RDT&E) funding. These funds support the development of the nation’s future military hardware and software and the science and technology base on which those products rely.

Most of what DOD spends on RDT&E is appropriated in Title IV (Research, Development, Test, and Evaluation) of the annual defense appropriations bill. Title IV RDT&E funds support activities such as R&D performed by academic institutions, DOD laboratories, and companies, as well as test and evaluation activities at specialized DOD facilities.

²³ This section was written by Marcy E. Gallo, Analyst in Science and Technology Policy, CRS Resources, Science, and Industry Division.

²⁴ U.S. Department of Defense, “About,” at <https://www.defense.gov/About/>.

RDT&E funds are also appropriated in other parts of the bill, including Title V (Revolving and Management Funds) and Title VI (Other Department of Defense Programs). For example:

- The Defense Health Program (DHP) supports the delivery of health care to DOD personnel and their families. DHP funds (including RDT&E funds) are requested through the Defense-wide Operations and Maintenance request. The program's RDT&E funds support congressionally directed research on breast, prostate, and ovarian cancer; traumatic brain injuries; orthotics and prosthetics; and other medical conditions. Congress appropriates funds for this program in Title VI.
- The Chemical Agents and Munitions Destruction Program supports activities to destroy the U.S. inventory of lethal chemical agents and munitions to avoid future risks and costs associated with storage. Funds for this program are requested through the Defense-wide Procurement request. Congress appropriates funds for this program in Title VI.
- The National Defense Sealift Fund supports procurement, operation and maintenance, and R&D associated with the nation's naval reserve fleet as well as a U.S.-flagged merchant fleet that can serve in times of need. In some fiscal years, RDT&E funding for this effort is requested in the Navy's Procurement request and appropriated in Title V.

For more than a decade, RDT&E funds were requested and appropriated as part of DOD's separate funding to support efforts in what the George W. Bush Administration termed the Global War on Terror (GWOT) and what the Obama and Trump Administrations referred to as Overseas Contingency Operations (OCO). In appropriations bills, the term Overseas Contingency Operations/Global War on Terror (OCO/GWOT) was used. Typically, the RDT&E funds appropriated for OCO activities were directed toward specified Program Elements (PEs) in Title IV. President Biden's FY2024 request does not include separate OCO/GWOT funding.

For FY2024, the Biden Administration is requesting \$145.0 billion for DOD's Title IV RDT&E program elements, \$5.3 billion (3.8%) above the FY2023 enacted level (excluding \$455.3 million in supplemental funding associated with the war in Ukraine). (See **Table 8**.) In addition, the FY2024 request includes \$931.8 million in RDT&E through the Defense Health Program (down \$2.1 billion, -69.4%, from FY2023), \$1.0 billion in RDT&E through the Chemical Agents and Munitions Destruction Program (up \$27.4 million, 2.8%, from FY2023), and \$3.4 million for the Inspector General for RDT&E-related activities (up \$1.5 million, 82.4%, from FY2023). The FY2024 budget includes no RDT&E funding via the National Defense Sealift Fund (the same as FY2023).

DOD RDT&E funding can be characterized organizationally (See **Table 8**). Each military department requests and receives its own RDT&E funding. So, too, do various DOD agencies (e.g., the Missile Defense Agency and the Defense Advanced Research Projects Agency); these are aggregated in the Defense-wide account.

DOD RDT&E funding can also be characterized by budget activity, i.e., the type of RDT&E supported. The budget activities designated as 6.1, 6.2, and 6.3 (basic research, applied research, and advanced technology development, respectively) constitute what is called DOD's Science and Technology (S&T) program and represent the more research-oriented part of the RDT&E program. Budget activities 6.4 and 6.5 focus on the development of specific weapon systems or components for which an operational need has been determined and an acquisition program established. Budget activity 6.6 provides management support, including support for test and evaluation facilities. Budget activity 6.7 supports the development of system improvements in existing operational systems. A new budget activity, 6.8, was added in the FY2021 budget and

supports software and digital technology pilot programs.²⁵ Note that OMB data on R&D funding exclude budget activities 6.7 and 6.8.

Many congressional policymakers are particularly interested in DOD S&T program funding, since these funds support the development of new technologies and the science that underlies them. Some in the defense community see ensuring adequate support for S&T activities as imperative to maintaining U.S. military superiority into the future. The knowledge generated at this stage of development may also contribute to advances in commercial technologies. The FY2024 request for Title IV S&T funding is \$17.8 billion, \$4.6 billion (-20.5%) below the FY2023 enacted level. The proposed FY2024 cuts in S&T are spread across a variety of program elements in the Army, Navy, Air Force, Space Force, and Defense-wide accounts. The Army would see the largest cut to its S&T budget in both percentage and dollars (-41.9%, \$2.1 billion) followed by the Space Force (-23.4%, \$241.5 million), Navy (-23.1%, \$805.1 million), Air Force (-15.8%, \$544.2 million) and Defense-wide (-9.7%, \$920.6 million).

Within the S&T program, basic research (6.1) receives special attention, particularly by the nation's universities, as over half of DOD's basic research budget is spent at universities. The Biden Administration is requesting \$2.5 billion for DOD basic research for FY2024, \$439.3 million (-15.0%) below the FY2023 enacted level. Among the proposed cuts to basic research in FY2024 are the University Research Initiatives program elements in the Army (\$31.5 million, -29.4%), Navy (\$51.0 million, -34.6%), Air Force (\$23.8 million, -11.6%) and Space Force (\$30.0 million, -100%).

While DOD is not the largest federal funder of basic research, it is a substantial source of federal funds for university R&D in certain fields, such as aerospace, aeronautical, and astronautical engineering (62%); electrical, electronic, and communications engineering (58%); industrial and manufacturing engineering (55%); mechanical engineering (48%); computer and information sciences (47%); materials science (43%); and metallurgical and materials engineering (41%).²⁶

Table 8. Department of Defense RDT&E

(total obligational authority, in millions of dollars)

Budget Account	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Enacted
Title IV—Research, Development, Test, and Evaluation (by Organization)					
Army	17,142.1 ^b	15,775.4			
Navy	26,003.7 ^c	26,922.2			
Air Force	44,914.0 ^d	46,565.4			
Space Force	16,616.0	19,199.3			
Defense-wide	34,536.4 ^e	36,185.8			
Director, Operational Test and Evaluation	446.1	331.5			
Total Title IV	139,658.3^f	144,979.6			
Title IV—Research, Development, Test, and Evaluation (by Budget Activity)					

²⁵ For additional information on the structure of Defense RDT&E, see CRS Report R44711, *Department of Defense Research, Development, Test, and Evaluation (RDT&E): Appropriations Structure*, by John F. Sargent Jr.

²⁶ CRS analysis of data from NSF, *Higher Education Research and Development Survey, Fiscal Year 2021*, Table 14, December 15, 2022, at <https://nces.nsf.gov/pubs/nsf23304>.

Budget Account	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Enacted
6.1 Basic Research	2,918.9	2,479.7			
6.2 Applied Research	7,800.9	6,017.7			
6.3 Advanced Technology Development	11,705.8	9,327.4			
<i>Subtotal Defense S&T (6.1-6.3)</i>	22,452.7	17,824.7			
6.4 Advanced Component Development and Prototypes ^g	35,598.9 ^h	40,430.0			
6.5 Systems Dev. and Demonstration	23,302.4	26,537.6			
6.6 Management Support ^f	9,908.4 ⁱ	9,168.2			
6.7 Operational Systems Development ^f	47,965.2 ^j	50,465.7			
6.8 Software and Digital Technology Pilot Projects ^f	457.6	553.4			
Total Title IV	139,658.3	144,979.6			
National Defense Sealift Fund	n/a	n/a			
Defense Health Program	3,041.4	931.8			
Chemical Agents and Munitions Destruction	975.2	1,002.6			
Inspector General	1.9	3.4			
Grand Total, RDT&E^k	143,676.8	146,917.4			

Source: CRS analysis of *Department of Defense Budget, Fiscal Year 2024, RDT&E Programs (R-1)*, March 2023; P.L. 117-328 and explanatory statements accompanying the bill at <https://www.congress.gov/bill/117th-congress/house-bill/2617>.

Notes: n/a = not available. Figures for the columns currently blank may become available as action is completed. Totals may differ from the sum of the components due to rounding. According to DOD, "Total Obligation Authority (TOA) is the sum of (1) all budget authority (BA) granted (or requested) from the Congress in a given year, (2) amounts authorized to be credited to a specific fund, (3) BA transferred from another appropriation, and (4) unobligated balances of BA from previous years which remain available for obligation. In practice, this term is used primarily in discussing the DOD budget, and most often refers to TOA as the 'direct program,' which equates to only (1) and (2) above." DOD defines "budget authority" as "the authority becoming available during the year to enter into obligations that result in immediate or future outlays of Government funds." See DOD 7000.14-R, "Department of Defense Financial Management Regulation" at <http://comptroller.defense.gov/fmr.aspx>.

- Figures in the FY2024 Request column do not include advance appropriations.
- The total does not include the \$9.1 million in supplemental funding provided in the Continuing Appropriations and Ukraine Supplemental Appropriation Act, 2023 (Division B of P.L. 117-180) and the Additional Ukraine Supplemental Appropriation Act, 2023 (Division M of P.L. 117-328).
- The total does not include the \$40.6 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.
- The total does not include the \$284.8 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.
- The total does not include the \$120.7 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.

- f. The total does not include the \$455.3 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.
- g. Includes funding for Classified Programs.
- h. The total does not include the \$7.3 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.
- i. The total does not include the \$0.6 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.
- j. The total does not include the \$447.4 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.
- k. The Grand Total, RDT&E amounts for FY2023 and FY2024 include funding for budget activities 6.7 and 6.8 that OMB no longer counts as R&D. For these and other reasons, these amounts do not align with the DOD totals in Table I. The Grand Total, RDT&E for FY2023 does not include the \$455.3 million in supplemental funding provided in Division B of P.L. 117-180 and Division M of P.L. 117-328.

Department of Health and Human Services

The mission of the Department of Health and Human Services is “to enhance and protect the health and well-being of all Americans ... by providing for effective health and human services and fostering advances in medicine, public health, and social services.”²⁷ This section focuses on HHS research and development funded through the National Institutes of Health, an HHS agency that accounts for nearly 97% of total HHS R&D funding.²⁸ Other HHS agencies that support R&D include the Centers for Disease Control and Prevention (CDC), Centers for Medicare and Medicaid Services (CMS), Food and Drug Administration (FDA), Agency for Healthcare Research and Quality (AHRQ), Health Resources and Services Administration (HRSA), and Administration for Children and Families (ACF); additional R&D funding is attributed to departmental management.²⁹

National Institutes of Health³⁰

NIH is the primary agency of the federal government charged with performing and supporting biomedical and behavioral research. It also has major roles in training biomedical researchers and disseminating health information. The NIH mission is “to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability.”³¹ The agency consists of the NIH Office of the Director (OD) and 27 institutes and centers (ICs). Of these, 24 ICs and OD manage research programs. Each IC plans and manages its own research programs in coordination with OD. FY2022 appropriations established a new entity that has been placed within NIH: the Advanced Research Projects Agency for Health (ARPA-H) as discussed further in this report.

According to NIH, about 10% of the NIH budget supports intramural research projects conducted by the nearly 6,000 NIH federal scientists, most of whom are located on the NIH campus in Bethesda, MD. All 25 research ICs have intramural research programs of varying sizes. More than 84% of NIH’s budget goes to the extramural research community in the form of grants,

²⁷ U.S. Department of Health and Human Services, “About,” <http://www.hhs.gov/about>.

²⁸ Unpublished data provided to CRS by the Office of Management and Budget. Email communication, May 28, 2021.

²⁹ Ibid.

³⁰ This section was written by Kavya Sekar, Analyst in Health Policy, CRS Domestic Social Policy Division, with support from John Gorman, Research Assistant, CRS Domestic Social Policy Division.

³¹ HHS, National Institutes of Health, “About NIH, What We Do, Mission and Goals,” <http://www.nih.gov/about-nih/what-we-do/mission-goals>.

contracts, and other awards.³² This funding supports research performed by more than 300,000 nonfederal scientists and technical personnel who work at more than 2,800 universities, hospitals, medical schools, and other research institutions.³³

Funding for NIH comes primarily from the annual Labor, HHS, and Education (LHHS) appropriations act, with an additional amount for Superfund-related activities at the National Institute of Environmental Health Sciences from the Interior/Environment appropriations act.³⁴ Those two appropriations acts provide NIH's discretionary budget authority. In addition, NIH has received mandatory funding of \$150 million annually that is provided in Public Health Service Act (PHSA) Section 330B, for the Special Diabetes Program for type 1 diabetes, most recently extended through FY2023 by the Consolidated Appropriations Act, 2021 (P.L. 116-260; Division BB, Title III). NIH also receives some funding under unique transfer authorities (the PHS Evaluation set-aside)³⁵ and budget enforcement rules (21st Century Cures Act Innovation account).³⁶

As shown in **Table 9**, separate appropriations are provided to 24 of the 27 ICs, as well as to OD, the Innovation Account (established by the 21st Century Cures Act in 2016, P.L. 114-255), and an intramural Buildings and Facilities account. The other three centers, which perform centralized support services, are funded through transfers from the other ICs.

President Biden's FY2024 budget request proposes an NIH total program level of \$48.598 billion, an increase of \$920 million (1.9%) from FY2023 enacted levels. The proposed FY2024 program level would provide (see **Table 9**):

- \$46.317 billion in discretionary LHHS budget authority (nontransfer);
- \$1.948 billion in PHS program evaluation transfers;
- \$83 million for the Superfund research program and related activities from Interior/Environment appropriations; and

³² NIH, "What We Do: Budget," at <https://www.nih.gov/about-nih/what-we-do/budget>.

³³ HHS, "Budget in Brief FY2024," p. 47, at <https://www.hhs.gov/sites/default/files/fy-2024-budget-in-brief.pdf>.

³⁴ The Superfund program was created to carry out the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA; P.L. 96-510), which authorized the federal government to prioritize contaminated sites in the United States for cleanup in coordination with the states in which the sites are located and to make the "potentially responsible parties" connected to those sites financially liable for the cleanup costs. The Superfund program is administered by the Environmental Protection Agency. For more information on the Superfund program, see CRS Report R41039, *Comprehensive Environmental Response, Compensation, and Liability Act: A Summary of Superfund Cleanup Authorities and Related Provisions of the Act*, by David M. Bearden.

³⁵ The PHS Evaluation Set-Aside, also known as the PHS Evaluation Tap transfer authority, under Section 241 of the PHS Act (42 U.S.C. §238j). This provision allows the Secretary of HHS, with the approval of appropriators, to redistribute a portion of eligible PHS agency appropriations across HHS for program evaluation purposes. Although the PHS Act limits the tap to no more than 1% of eligible appropriations, in recent years, annual LHHS appropriations acts have specified a higher amount (2.5% in FY2023, P.L. 117-328, Division H). Those acts also have typically directed specific amounts of funding from the tap for transfer to a number of HHS programs, including at NIH, particularly for the National Institute of General Medical Sciences (NIGMS). Funding amounts in this report show amounts "transferred in" to NIH under the PHS evaluation set-aside, but do not show amounts "transferred out" under the same authority.

³⁶ Appropriations to the NIH Innovation Account created by the 21st Century Cures Act ("the Cures Act," P.L. 114-255) fund programs authorized by that act. Appropriations of funds in this account are, in effect, not subject to discretionary spending limits. The NIH Director may transfer these amounts from the NIH Innovation Account to other NIH accounts but only for the purposes specified in the Cures Act. All amounts authorized by the Cures Act have been fully appropriated to the Innovation Account since FY2017, including \$1.085 billion for FY2023. For FY2024, \$407 million is proposed. See section on 21st Century Cures Act in CRS Report R41705, *The National Institutes of Health (NIH): Background and Congressional Issues*, by Judith A. Johnson and Kavya Sekar.

- \$250 million in proposed funding for the mandatory type 1 diabetes research program.³⁷

Under this request, almost all existing IC accounts would receive no changes in funding compared with FY2023 enacted levels (see **Table 9**), except for the National Cancer Institute (\$503 million increase; 6.9%), the National Institute of Neurological Disorders and Stroke (\$16 million increase; 0.6%), the National Institute of Environmental Health Sciences (\$25 million increase; 2.7%), the National Institute of Mental Health (\$200 million increase; 8.5%), and the Office of the Director (\$251 million increase; 9.5%). (The National Institute of General Medical Sciences would be flat-funded when taking into account proposed PHS evaluation tap transfers). The Innovation Account would receive the full amount authorized to be appropriated: \$407 million.³⁸

The FY2024 budget request also proposes \$2.5 billion for ARPA-H, an increase of \$1 billion from the FY2023 enacted level.³⁹ Accounting for the ARPA-H funding, the FY2024 request includes a total program level of \$51.098 billion for both NIH and ARPA-H, a proposed increase of \$1.92 billion (3.9%) from the FY2023 enacted level.

The budget request also proposes \$2.69 billion in new mandatory appropriations for pandemic preparedness, to be made available for five years. Accounting for this proposed mandatory funding, NIH and ARPA-H would receive a total FY2024 program level of \$53.788 billion, a \$4.610 billion (9.4%) increase from FY2023 enacted. (CRS follows conventions used in the budget request documents and treats the pandemic preparedness proposed funding as a non-add within the request.) The pandemic preparedness proposal generally did not designate specific amounts for NIH ICs, but describes a number of activities the new funding would support, including vaccine and therapeutic development, expanding laboratory capacity, and developing next-generation diagnostics.⁴⁰

The Administration estimates that the proposed FY2024 funding level would support 44,410 research project grants, an increase of 790 from FY2023 enacted, with a total of 10,414 new and competing grants.⁴¹ With respect to specific research areas and initiatives, some selected funding requests include:⁴²

- **Cancer Moonshot:** \$716 million total for the Cancer Moonshot initiative at the National Cancer Institute, an increase of \$500 million over FY2023 enacted. This research would support the President’s goal of reducing the cancer death rate by half within 25 years and improving the lives of people with cancer and cancer survivors.
- **“All of US” Precision Medicine Initiative and Brain Research Through Advancing Innovative Neurotechnologies (BRAIN):** An additional \$462 million to continue these two initiatives authorized by the 21st Century Cures Act.

³⁷ Under current law, funding for the type 1 diabetes research program expires at the end of FY2023. See Public Health Service Act Sec. 330B; 42 U.S.C. §254c-2.

³⁸ NIH, *Overview of FY 2024 President’s Budget Proposal*, p. 7, at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.

³⁹ NIH, *Overview of FY2024 President’s Budget Proposal*, p. 50, at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.

⁴⁰ NIH, *Overview of FY2024 President’s Budget Proposal*, p. 7, at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.

⁴¹ HHS, *Budget in Brief: FY2024*, p. 47, at <https://www.hhs.gov/sites/default/files/fy-2024-budget-in-brief.pdf>.

⁴² HHS, *Budget in Brief: FY2024*, pp. 47-51, at <https://www.hhs.gov/sites/default/files/fy-2024-budget-in-brief.pdf>.

- **Opioids, stimulant, and pain research:** \$1.8 billion within NIH, the same level as FY2023 enacted.
- **Impact of climate change on human health:** Increase of \$25 million.

Advanced Research Projects Agency for Health (ARPA-H)

President Biden’s FY2022 budget request to Congress proposed the creation of an Advanced Research Projects Agency for Health (ARPA-H) within the National Institutes of Health (NIH). The budget request proposed \$6.5 billion for ARPA-H “to build platforms and capabilities to deliver cures for cancer, Alzheimer’s disease, diabetes, and other diseases.” The agency was proposed to follow a Defense Advanced Research Projects Agency (DARPA) approach to funding research. Funding was requested for a period of three years.

The Consolidated Appropriations Act, 2022 (P.L. 117-103) provided \$1 billion to HHS to establish ARPA-H. The law created a new ARPA-H account at HHS, with funding available until September 30, 2024, and allowed the HHS Secretary to place the new agency anywhere within the department within 30 days of enactment. On March 30, 2022, HHS Secretary Xavier Becerra submitted a notice to the appropriations committees that ARPA-H was to reside within the NIH, while the ARPA-H Director is to report directly to the HHS Secretary.

The Consolidated Appropriations Act, 2023 (P.L. 117-328) provided additional funding of \$1.5 billion for ARPA-H, available until the end of FY2025, in a separate account under the HHS Office of the Secretary. The law also formally authorized the new agency as a part of the PREVENT Pandemics Act in Division FF, Title II, Section 2331. The new authorization places ARPA-H within NIH by statute.

For further information and analysis regarding ARPA-H, see CRS Report R47074, *Advanced Research Projects Agency for Health (ARPA-H): Congressional Action and Selected Policy Issues*, by Kavya Sekar and Marcy E. Gallo.

Table 9. National Institutes of Health Funding

(budget authority, in millions of dollars)

Institutes/Centers	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Final
Cancer Institute (NCI)	7,317	7,820			
Heart, Lung, and Blood Institute (NHLBI)	3,985	3,985			
Dental/Craniofacial Research (NIDCR)	520	520			
Diabetes/Digestive/Kidney (NIDDK) ^b	2,303	2,303			
Neurological Disorders/Stroke (NINDS)	2,809	2,825			
Allergy/Infectious Diseases (NIAID)	6,562	6,562			
General Medical Sciences (NIGMS) ^c	1,827	1,292			
Child Health/Human Development (NICHD)	1,748	1,748			
National Eye Institute (NEI)	896	896			
Environmental Health Sciences (NIEHS) ^d	914	939			
National Institute on Aging (NIA)	4,412	4,412			
Arthritis/Musculoskeletal/Skin Diseases (NIAMS)	688	688			
Deafness/Communication Disorders (NIDCD)	534	534			
Alcohol Abuse/Alcoholism (NIAAA)	597	597			
Nursing Research (NINR)	198	198			

Institutes/Centers	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Final
National Institute on Drug Abuse (NIDA)	1,663	1,663			
National Institute of Mental Health (NIMH)	2,342	2,542			
Human Genome Research Institute (NHGRI)	661	661			
Biomedical Imaging/Bioengineering (NIBIB)	441	441			
Complementary/Integrative Health (NCCIH)	170	170			
Minority Health/Health Disparities (NIMHD)	525	525			
Fogarty International Center (FIC)	95	95			
National Library of Medicine (NLM)	495	495			
Advancing Translational Sciences (NCATS)	923	923			
Office of Director (OD) ^e	2,647	2,898			
Innovation Account ^f	419	235			
Buildings and Facilities (B&F)	350	350			
Subtotal, NIH (LHHS Discretionary BA)	46,042	46,317			
PHS Program Evaluation (provided to NIGMS)	1,412	1,948			
Superfund (Interior approp. to NIEHS) ^g	83	83			
Mandatory type I diabetes funds (to NIDDK) ^h	141	250 ⁱ			
NIH Program Level	47,678	48,598			
Advanced Research Projects Agency for Health (ARPA-H) ^j	1,500	2,500			
NIH and ARPA-H Program Level	49,178	51,098			
Pandemic Preparedness (proposed mandatory) ^k	—	2,690			
Total with Pandemic Preparedness	49,178	53,788			

Sources: The FY2024 Request and FY2023 Enacted program levels are from NIH, *Congressional Justification: FY2024*, “Supplementary Tables,” March 9, 2023, pp. 100-102 at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Supplementary%20Tables.pdf>.

Notes: Totals may differ from the sum of the components due to rounding. Figures for the columns currently blank may become available as action is completed. Amounts in table may differ from actuals in many cases. By convention, budget tables such as **Table 9** do not subtract the amount of transfers to the evaluation tap from the agencies’ appropriation. In general, amounts provided to NIH for emergency requirements are excluded from these totals.

- Figures in the FY2024 Request column do not include advance appropriations.
- Amounts for the NIDDK do not include mandatory funding for type I diabetes research (see note i).
- Amounts for NIGMS do not include funds from PHS Evaluation Set-Aside (§241 of the PHS Act).
- Amounts for NIEHS do not include Interior/Environment Appropriations amount for Superfund research (see note g).

- e. Includes transfer from the Pediatric Research Initiative Fund (PRIF) as authorized by the Gabriella Miller Kids First Research Act (\$13.08 million in FY2023 enacted and \$12.98 for FY2024 proposed). See NIH, *Overview of FY2024 President's Budget*, March 9, 2023, p. 187 at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.
- f. The amount shown for the NIH Innovation Account in each column represents only a portion of the total appropriation to the account (\$1.085 billion for FY2023; \$407 million for FY2024 proposed). The remaining funds for this account are reflected, where applicable, in the totals for other ICs. For FY2023, this includes \$216 million to NCI for cancer research and \$225 million to each of NINDS and NIMH for the BRAIN Initiative (\$450 million total). For FY2024, this includes a total of \$172 to NINDS and NIMH for the BRAIN Initiative. NIH, *Overview of FY2024 President's Budget*, March 9, 2023, p. 56 at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.
- g. This is a separate account in the Interior/Environment appropriations for National Institute of Environmental Health Sciences (NIEHS) research activities related to Superfund research.
- h. Mandatory funds are available to NIDDK for type I diabetes research under PHSA Sec. 330B, which was most recently extended through FY2023 by the Consolidated Appropriations Act, 2021 (P.L. 116-260, Division BB, Title III).
- i. Proposed amount. The budget request proposes \$250 million in new mandatory funding for FY2024 under PHSA Sec. 330B (42 U.S.C. §254c-2). See NIH, *Overview of FY2024 President's Budget*, March 9, 2023, p. 11 at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.
- j. In FY2023, funding for ARPA-H was provided to a separate account under the HHS Office of the Secretary (P.L. 117-328; Division H). The budget request proposes ARPA-H funding to be included with the rest of NIH appropriations: NIH, *Overview of FY2024 President's Budget*, March 9, 2023, p. 50 at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.
- k. The FY2024 request proposes new mandatory funding for pandemic preparedness to be available for five years. The request proposes an HHS-wide total of \$20 billion for pandemic preparedness with \$2.69 billion of the total designated for NIH. This amount is shown as a non-add in the request. NIH, *Overview of FY2024 President's Budget*, March 9, 2023, p. 7 at <https://officeofbudget.od.nih.gov/pdfs/FY24/br/Overview%20of%20FY%202024%20Presidents%20Budget.pdf>.

Department of Energy⁴³

The Department of Energy was established in 1977 by the Department of Energy Organization Act (P.L. 95-91), which combined energy-related programs from a variety of agencies, particularly defense-related nuclear programs that dated back to the Manhattan Project. Today, DOE conducts basic scientific research in fields ranging from nuclear physics to the biological and environmental sciences; basic and applied R&D relating to energy production and use; and R&D on nuclear weapons, nuclear nonproliferation, and defense nuclear reactors. The department has a system of 17 national laboratories around the country, mostly operated by contractors, that together account for about 40% of all DOE expenditures.

The Administration's FY2024 budget request for DOE includes about \$22.252 billion for R&D and related activities, including programs in three broad categories: science, national security, and energy. This request is about 8.6% more than the comparable enacted FY2023 amount of \$20.489 billion. (See **Table 10** for details.)

The request for the DOE Office of Science is \$8.800 billion, an increase of 8.6% from the FY2023 appropriation of \$8.100 billion. Funding would increase for all of the office's major research programs. An increase of \$247 million (32.4%) for Fusion Energy Sciences would include an additional \$104 million for public-private partnerships and an additional \$91 million for materials research and fusion nuclear science. An increase of 58.1% for Isotope R&D and Production would aim to support domestic supply chains for critical isotopes.

⁴³ This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

The request for DOE national security R&D is \$6.074 billion, an increase of 2.0% from \$5.954 billion in FY2023. In the Weapons Activities account, the request for Stockpile Research, Technology, and Engineering includes an increase of \$190 million for Assessment Science (largely for construction of facilities at the Nevada National Security Site) and an increase of \$75 million for Studies and Assessments to assess future weapon concepts for the nuclear stockpile.

The request for DOE energy R&D is \$7.377 billion, an increase of 14.6% from \$6.434 billion in FY2023. Funding for energy efficiency and renewable energy R&D would increase overall by 32.3%, including increases in nearly all major research areas. Notably, wind energy R&D would almost triple (\$385 million requested, up from \$132 million in FY2023) and \$35 million would support assessment of options for the establishment of a new national laboratory, likely at a Historically Black College or University (HBCU), a Minority-Serving Institution (MSI), or a consortium of such institutions. Support for Nuclear Energy would decrease by 11.9%. The Advanced Research Projects Agency–Energy (ARPA-E), which is intended to advance high-impact energy technologies that have too much technical and financial uncertainty to attract near-term private-sector investment, would receive \$650 million (up 38.3%).

Table 10. Department of Energy R&D and Related Activities

(budget authority, in millions of dollars)

	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Enacted
Science	8,100	8,800			
Basic Energy Sciences	2,534	2,693			
High Energy Physics	1,166	1,226			
Biological and Environmental Research	909	932			
Nuclear Physics	805	811			
Advanced Scientific Computing Research	1,068	1,126			
Fusion Energy Sciences	763	1,010			
Isotope R&D and Production	109	173			
Accelerator R&D and Production	27	34			
Other	718	794			
National Security	5,954	6,074			
Weapons Activities Stockpile RT&E ^b	3,062	3,349			
Naval Reactors	2,081	1,964			
Defense Nuclear Nonproliferation R&D	768	728			
Def. Environmental Cleanup Tech. Dev.	43	33			
Energy	6,434	7,377			
Energy Efficiency and Renewable Energy ^c	2,891	3,826			
Fossil Energy and Carbon Management	890	905			
Nuclear Energy ^d	1,773	1,563			
Electricity ^e	285	297			

	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Enacted
CESER Risk Mgmt. Tools and Technologies	125	135			
Advanced Research Projects Agency–Energy	470	650			
DOE, Total	20,489	22,252			

Sources: FY2023 enacted from P.L. 117-328 and explanatory statement, *Congressional Record*, December 20, 2022. FY2024 request from DOE FY2024 congressional budget justification at <https://www.energy.gov/cfo/articles/fy-2024-budget-justification>.

Notes: Totals may differ from the sum of the components due to rounding. RT&E = Research, Technology, and Engineering. CESER = Cybersecurity, Energy Security, and Emergency Response. Figures for the columns currently blank may become available as action is completed.

- a. Figures in the FY2024 Request column do not include advance appropriations.
- b. The FY2024 request includes Academic Programs and Community Support, requested separately.
- c. The FY2023 enacted amount omits State and Community Energy Programs, Manufacturing and Energy Supply Chains, and Federal Energy Management Program, which are requested separately in the FY2024 request.
- d. The FY2023 enacted amount includes \$300 million from the Continuing Appropriations and Ukraine Supplemental Appropriations Act, 2023 (P.L. 117-180).
- e. The FY2023 enacted amount omits Grid Deployment Office, which is requested separately in the FY2024 request.

National Aeronautics and Space Administration⁴⁴

The National Aeronautics and Space Administration (NASA) was created in 1958 by the National Aeronautics and Space Act (P.L. 85-568) to conduct civilian space and aeronautics activities. NASA has research programs in planetary science, Earth science, astrophysics, heliophysics, the biological and physical sciences, aeronautics, and astronaut health and performance, as well as development programs for future human spacecraft and for multipurpose space technology such as advanced propulsion systems. In addition, NASA operates the International Space Station (ISS) as a facility for R&D and other purposes.

The Administration is requesting \$27.185 billion for NASA in FY2024. This would be 6.3% more than the FY2023 level of \$25.573 billion.⁴⁵ For a breakdown of these amounts, see **Table 11**. About half of NASA funding supports R&D. Some accounts (such as Science and Space Technology) fund R&D almost exclusively, while others (such as Exploration and Space Operations) fund a mix of R&D, testing and demonstration, operations, and other activities. The table indicates the estimated R&D share of each account, based on OMB data for the FY2024 request. Those shares may be different for FY2023 and for FY2024 appropriations provided by Congress.

The FY2024 request for Science is \$8.261 billion, an increase of 6.0% from \$7.795 billion in FY2023. A requested 12.7% increase for Earth Science includes \$323 million to initiate a system of four satellites known as the Earth System Observatory, based on recommendations from the 2018 National Academies decadal survey of Earth science.⁴⁶ A requested increase of 5.7% for

⁴⁴ This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

⁴⁵ This FY2023 amount includes a supplemental appropriation of \$556 million, of which \$189 million was to repair hurricane damage at NASA facilities.

⁴⁶ Here and elsewhere in this section, where comparable FY2023 amounts are not stated, they were not specified by (continued...)

Planetary Science includes \$210 million for Near-Earth Object (NEO) Surveyor (up from \$90 million in FY2023) and \$949 million for Mars Sample Return (up from \$822 million in FY2023).

The FY2024 request for Aeronautics is \$996 million, an increase of 6.5% from \$935 million in FY2023. The bulk of the proposed increase would be for Advanced Air Vehicles, supporting additional R&D on sustainable aviation fuels, composite aircraft manufacturing, and other topics.

The FY2024 request for Space Technology is \$1.392 billion, an increase of 16.0% from \$1.200 billion in FY2023. In the Technology Demonstration program, the request proposes \$120 million for space nuclear technologies, including \$35 million for nuclear propulsion (versus \$110 million for nuclear thermal propulsion and \$15 million for nuclear electric propulsion in FY2023).

The FY2024 request for Deep Space Exploration Systems (currently Exploration) is \$7.971 billion, an increase of 6.7% from \$7.469 billion in FY2023. Within this account, the request for Common Exploration Systems Development includes \$1.225 billion for the Orion crew capsule (down from \$1.339 billion in FY2023) and \$2.506 billion for the Space Launch System heavy-lift rocket (SLS, down from \$2.600 billion in FY2023). As the Orion and SLS programs mature, they are focusing more on testing and production of flight hardware, with less R&D content than in previous years. The proposed 24.4% increase for Artemis Campaign Development would support continued development of the Gateway platform in lunar orbit (\$914 million) and the lunar Human Landing System (\$1.881 billion, up from \$1.486 billion in FY2023).

In the Space Operations account, requests for R&D-related activities include \$1.303 billion for the ISS; \$101 million for the Commercial Crew program (in Space Transportation); \$154 million for the Human Research Program (in Space and Flight Support); and \$228 million for Commercial Low Earth Orbit (LEO) Development (up from \$224 million in FY2023). Commercial crew transport activities have largely transitioned from development to operations (which is funded separately, but also in Space Transportation). SpaceX launched its first post-certification crewed flight to the ISS in November 2020; a crewed test flight of Boeing’s competing crew transport system is planned for July 2023.

Table 11. National Aeronautics and Space Administration R&D
(budget authority, in millions of dollars)

	Est. R&D Share	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Enacted
Science	99%	\$7,795	\$8,261			
Earth Science		2,195	2,473			
Planetary Science		3,200	3,383			
Astrophysics		1,510	1,557			
Heliophysics		805	751			
Biological and Physical Sciences		85	97			
Aeronautics	84%	935	996			
Space Technology	97%	1,200	1,392			
Exploration / Deep Space Exploration Systems	26%	7,469	7,971			

^a Congress in the FY2023 appropriations act or explanatory statement. NASA’s spending plan for FY2023 was not yet available when NASA released its FY2024 budget request.

	Est. R&D Share	FY2023 Enacted	FY2024 Request ^a	FY2024 House	FY2024 Senate	FY2024 Enacted
Common Exploration Systems Development		4,738	4,525			
Artemis Campaign Development		2,600	3,235			
Human Exploration Requirements and Architecture		n/s	49			
Mars Campaign Development		n/s	162			
Space Operations	29%	4,250	4,535			
International Space Station		n/s	1,303			
Space Transportation		n/s	1,957			
Space and Flight Support		n/s	1,047			
Commercial LEO Development		224	228			
STEM Engagement	0%	144	158			
Safety, Security, and Mission Services	0%	3,129	3,369			
Construction and Environmental C&R	9%	604^b	454			
Inspector General	0%	48	50			
NASA, Total	51%	25,573^b	27,185			

Sources: Estimated R&D share calculated by CRS based on OMB data for R&D and R&D-related facilities and equipment funding in the FY2024 request. FY2023 enacted from P.L. 117-328 and explanatory statement, *Congressional Record*, December 20, 2022, pp. S7945-S7950. FY2024 request from NASA FY2024 congressional budget justification at <http://www.nasa.gov/news/budget/>.

Notes: Totals may differ from the sum of the components due to rounding. n/s = not specified. LEO = Low Earth Orbit. C&R = Compliance and Remediation. Figures for the columns currently blank may become available as action is completed.

a. Figures in the FY2024 Request column do not include advance appropriations.

b. Includes \$556.4 million in emergency supplemental funding provided in Division N of P.L. 117-328.

National Science Foundation⁴⁷

The National Science Foundation supports basic research and education in the nonmedical sciences and engineering. Congress established the foundation as an independent federal agency in 1950 to “promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes.”⁴⁸ The NSF is a major source of federal support for U.S. university research, especially in the social sciences, mathematics, and computer science. It is also responsible for significant shares of the federal science, technology, engineering, and mathematics (STEM) education program portfolio and federal STEM student aid and support.

⁴⁷ This section was written by Laurie Harris, Analyst in Science and Technology Policy, CRS Resources, Science, and Industry Division.

⁴⁸ The National Science Foundation Act of 1950 (P.L. 81-507).

NSF has six appropriations accounts: Research and Related Activities (RRA, the main research account), STEM Education (EDU, the main education account),⁴⁹ Major Research Equipment and Facilities Construction (MREFC), Agency Operations and Award Management (AOAM), the National Science Board (NSB), and the Office of Inspector General (OIG). Appropriations are generally provided at the account level, while program-specific direction may be included in appropriations acts, or accompanying conference reports or explanatory statements.

Funding for R&D is included in the RRA, EDU, and MREFC accounts. (The RRA and EDU accounts also include non-R&D funding.) Together, these three accounts comprise over 95% of the total requested funding for NSF. Actual and estimated R&D obligations for each account are known after NSF allocates funding appropriations to specific activities and reports those figures.⁵⁰ The budget request specifies R&D funding for the conduct of research, including basic and applied research, and for physical assets, including R&D facilities and major equipment. Funding amounts for FY2022 actual, FY2023 estimated, and FY2024 requested levels are reported by account, including amounts for R&D conduct and physical assets where applicable, in **Table 12**.

Funding for NSF for FY2023 was enacted on December 29, 2022.⁵¹ Additionally, NSF received \$1.04 billion in supplemental appropriations through Division N (Disaster Relief Supplemental Appropriations Act, 2023) of the Consolidated Appropriations Act, 2023 (P.L. 117-328). Within supplemental amounts, \$821 million was specified for RRA and \$217 million for EDU.⁵² Total FY2023 estimated amounts reported by NSF include supplemental appropriations.⁵³ In this analysis, FY2023 estimated amounts⁵⁴ are compared with FY2024 requested amounts, which are reported by account and for R&D conduct and facilities and equipment in **Table 12**.

Overall. The Administration is requesting \$11.3 billion for the NSF in FY2024, \$1.44 billion (15%) more than the FY2023 estimated amount. The request would increase budget authority in each of the three R&D accounts relative to the FY2023 estimated level: RRA by \$1.20 billion (15%), EDU by \$73.2 million (5.3%), and MREFC by \$117 million (63%). Overall, NSF estimates that, under the FY2024 request, agency-wide funding rates for competitive awards (i.e.,

⁴⁹ In the FY2023 budget request, NSF proposed changing the name of the Directorate for Education and Human Resources to the Directorate for STEM Education. The name for the corresponding appropriations account is now STEM Education (EDU), rather than Education and Human Resources (EHR).

⁵⁰ R&D actual (FY2022), estimated (FY2023), and requested (FY2024) amounts are reported in the “Quantitative Data Tables” section of NSF, *FY2024 Budget Request to Congress*, March 13, 2023, pp. QDT-1 – QDT-8 (hereinafter, the “NSF FY2024 Budget Request”).

⁵¹ The Consolidated Appropriations Act, 2023 (P.L. 117-328); H.Rept. 117-395; and “Explanatory Statement submitted by Mr. Leahy, Chair of the Senate Committee on Appropriations, Regarding H.R. 2617, Consolidated Appropriations Act, 2023,” Senate, *Congressional Record*, daily edition, vol. 168, no. 198, part No. 1 (December 20, 2022), pp. S7950-S7952.

⁵² Of the \$818 million in supplemental funding for RRA, \$2.5 million is for “necessary expenses related to damage to research facilities and scientific equipment in calendar year 2022, including related to the consequences of wildfires,” and \$210 million “shall be to implement the Research and Development, Competition, and Innovation Act (division B of P.L. 117-167 [the CHIPS and Science Act]).” Of the \$217 million in supplemental appropriations for EDU, \$125 million is for implementing Division B of P.L. 117-167.

⁵³ Breakouts for FY2023 estimated amounts (shown in NSF’s budget request) vary from total FY2023 enacted amounts (shown in the President’s budget request) because NSF shifted some funding among appropriations accounts.

⁵⁴ As noted in NSF’s budget request summary table, the FY2023 estimated funding amounts used in comparisons with the FY2024 requested amounts include supplemental appropriations from Division B and Division N in P.L. 117-328. The CHIPS and Science Act (P.L. 117-167) also provides NSF with \$200 million in appropriated funding over five years for microelectronics workforce development activities. This funding is not included in FY2023 or FY2024 amounts because “the Foundation is in the process of reviewing the requirements of the legislation and developing a spend plan for FY 2023 through FY 2027.” See NSF FY2024 Budget Request, p. Summary Tables-3 and p. Emerging Industries-5.

the percentage of submitted proposals that are successfully awarded funding after competitive review) would increase slightly from 27% to 28%, with an estimated 12,900 awards.

For FY2024, \$9.32 billion is requested for R&D activities, a \$1.34 billion (17%) increase from FY2023 estimated funding for R&D. R&D activities account for approximately 82% of NSF's total funding. The total request for R&D activities includes \$8.64 billion (93%) for the conduct of R&D, and \$679 million (7%) for R&D facilities and major equipment. Of funding requested for the conduct of R&D, 82% is requested for basic research, and 18% for applied research. Overall funding for R&D facilities and major equipment supports not only the construction and acquisition phases, funded through MREFC (\$305 million requested), but also planning, design, and post-construction operations and maintenance, funded through RRA (\$374 million requested).

Research. The Administration seeks \$9.03 billion for RRA in FY2024, a \$1.20 billion (15%) increase compared with the FY2023 estimated funding. Within the RRA account, the FY2024 request includes \$8.28 billion for R&D, an increase of \$1.10 billion (15%) compared with the FY2023 estimated amount. Of this amount, the majority (\$7.90 billion, 95%) is requested for the conduct of research, including \$6.78 billion for basic research and \$1.12 billion for applied research.

Compared with the FY2023 estimated amounts, the FY2024 request includes funding increases for all 11 RRA subaccounts. This includes a request of \$1.84 billion for the newly created Directorate for Technology, Innovation, and Partnerships (TIP), meant to “advance use-inspired, solutions-oriented research and innovation in key technology focus areas”; accelerate the translation of research to market; and catalyze partnerships across academia, industry, government, investors, and civil society.⁵⁵ The FY2024 request also includes \$281 million for the Established Program to Stimulate Competitive Research (EPSCoR), a \$25.7 million (10.1%) increase compared with FY2023 estimated funding.

Education. The FY2024 request for the EDU account is \$1.44 billion, \$73.2 million (5.3%) more than the FY2023 estimated amount. By program division, in terms of percent, the Division of Equity for Excellence in STEM (EES) would receive the largest increase, \$68.6 million (26.6%) over FY2023; in terms of dollars, the Division of Graduate Education (DGE) would receive the largest increase, \$78.1 million (16.1%) over FY2023.⁵⁶ The Division of Undergraduate Education would receive a decrease of \$19.3 million (-6.9%) from FY2023.

Within EDU, requested funding for R&D is \$718 million, which is \$119 million (20%) more than the FY2023 estimated funding amount and accounts for approximately 8% of the agency's total R&D request. All of the requested funding would support the conduct of R&D, including \$270 million for basic research and \$448 million for applied research.

Construction. The MREFC account supports large construction projects and larger mid-scale research infrastructure, with all of the funding supporting R&D facilities. The construction phases of such large-scale projects tend to span multiple years; therefore, NSF provides out-year estimates of funding for major facilities for the duration of the anticipated timeline, which are updated annually. This section of the analysis includes comparisons with FY2024 requested funding for specific projects, based on these projections. The Administration is seeking \$305 million for MREFC in FY2024, \$117 million (63%) more than the FY2023 estimated amount.

⁵⁵ For more information on the TIP Directorate, see NSF FY2024 Budget Request, pp. TIP-1 – TIP-8, at https://nsf.gov/resources.nsf.gov/2023-03/76_fy2024.pdf.

⁵⁶ The EES division was formerly named the Division of Human Resource Development (HRD); NSF proposed to change the name in the FY2023 budget request.

Requested MREFC funding would support continued construction on three ongoing major facility projects:

- the Antarctic Infrastructure Recapitalization program (AIR; \$60.0 million requested, equal to the FY2023 estimated amount)⁵⁷;
- upgrades to the High Luminosity-Large Hadron Collider (HL-LHC; \$38.0 million requested, up \$5 million (15%) from the FY2023 estimated amount)⁵⁸; and
- the Vera C. Rubin Observatory (\$7.61 million requested for the final year of construction, down \$7.39 million (-49%) from the FY2023 estimated amount).⁵⁹

NSF is requesting \$93 million to initiate construction of a Leadership-Class Computing Facility (LCCF), which is currently in the final design phase. The LCCF is “envisioned as a distributed facility that will provide unique computational and data analytics capabilities, as well as critical software and services, for the nation’s science and engineering research community.”⁶⁰ The anticipated funding amount and construction timeline is \$520 million to \$620 million from FY2024 through FY2027.⁶¹

Additionally, \$105 million is requested for Mid-scale Research Infrastructure Track 2 projects (those projects with funding amounts in the \$20 million to \$100 million range), an increase of \$28.8 million (38%) from the FY2023 estimated amount.⁶²

Other Initiatives. The FY2024 NSF budget request includes funding for multiple agency-wide investments, including cross-cutting research topics, as well as multiagency initiatives.⁶³ This funding is included in multiple NSF appropriations accounts, and R&D amounts are not separately provided.

⁵⁷ The AIR program is “a portfolio of investments in facilities and infrastructure across U.S. Antarctic Program (USAP) stations and gateways.” AIR includes the re-baselined Antarctic Infrastructure Modernization for Science (AIMS) program, which encountered significant disruptions and delays due to COVID-19 restrictions as field work and on-ice construction work was in the early stages; NSF FY2024 Budget Request, p. Research Infrastructure-11.

⁵⁸ NSF’s HL-LHC upgrade program represents about 7% of the global high luminosity upgrade effort at the LHC, which is being supported by 45 funding agencies internationally, including the U.S. Department of Energy. The FY2024 requested amount includes \$18 million in previously authorized total project costs and \$20 million in “preliminary estimates of future COVID-19 impacts” to address the direct and indirect impacts on the project from COVID-19, historically high inflation, supply-chain delays, and the Russian attack on Ukraine (both Russia and Ukraine participate in LHC research and detector upgrade activities). The project will undergo re-baselining, planned for spring 2023; see NSF FY2024 Budget Request, p. Research Infrastructure-19.

⁵⁹ The Rubin Observatory is a joint program between NSF and DOE. FY2024 represents the 10th year construction, originally planned to last 99 months. This project is currently being re-baselined to account for impacts of the COVID-19 pandemic, which have shifted expectations for completion to FY2024. See NSF FY2024 Budget Request, pp. Research Infrastructure-40-42.

⁶⁰ NSF FY2024 Budget Request, p. Research Infrastructure-28.

⁶¹ As noted by the agency, “Internal NSF cost analysis indicates the Total Project Cost would range from \$520.0 million to \$620.0 million depending on the acquisition strategy used for the data center. The acquisition strategy will be determined during the Final Design Phase and prior to award, if authorized. Future budget requests will be modified accordingly.” See NSF FY2024 Budget Request, p. Research Infrastructure-28.

⁶² Mid-scale Research Infrastructure Track 2 was a new funding line-item in the MREFC account as of FY2020, meant to manage support for upgrades to major facilities and stand-alone projects in this range as a portfolio.

⁶³ Prior versions of this CRS report included funding requests for NSF’s Big Ideas investments. As the budget request notes, “NSF’s Big Ideas, first put forth in FY 2017, ended as a unifying concept in FY 2023 as planned. Investments in these forward-looking research categories across the [RRA], EDU, and MREFC accounts provided the groundwork for many new successes. Most of the Big Ideas will continue as core research programs or be superseded by new but related efforts.” See NSF FY2024 Budget Request, p. Cross-Theme Topics-15.

For FY2024, NSF requests funding for various administration priority areas and cross-cutting research topics. Requested funding amounts for each research area compared with the FY2023 estimated amounts include the following:⁶⁴

- Advanced Manufacturing: \$454 million requested, up \$99.5 million (28%) from FY2023.
- Advanced Wireless: \$179 million requested, up \$25.2 million (16%) from FY2023.
- Artificial Intelligence (AI): \$796 million requested, up \$133 million (20%) from FY2023.
- Biotechnology: \$470 million requested, up \$85.3 million (22%) from FY2023.
- Quantum Information Science (QIS): \$333 million requested, up \$65.9 million (25%) from FY2023.
- Microelectronics and Semiconductors: \$210 million requested, up \$57.4 million (38%) from FY2023.
- Clean Energy Technology: \$551 million requested, up \$78.6 million (17%) from FY2023.

The budget request also includes funding for multi-agency initiatives. The National Nanotechnology Initiative would receive \$428 million, \$46.7 million (12%) more than the FY2023 estimated amount. The Networking and Information Technology Research and Development program would receive \$2.28 billion, an increase of \$396 million (21%). The U.S. Global Change Research Program would receive \$1.05 billion, \$203 million (24%) more than the FY2023 estimated amount.

Table 12. National Science Foundation Funding

(budget authority, in millions of dollars)

Account	FY2022 Actual ^a	FY2023 Estimated ^b	FY2024 Request ^c	FY2024 House	FY2024 Senate	FY2024 Enacted
Research and Related Activities (RRA)	6,964.7	7,826.8	9,029.9			
R&D, RRA Total	6,372.4	7,173.5	8,278.3			
Conduct of R&D	6,050.2	6,805.0	7,904.4			
R&D Facilities and Major Equipment	322.3	368.5	373.9			
STEM Education (EDU)	1,146.7	1,371.0	1,444.2			
R&D, EDU Total	487.6	599.4	718.2			
Conduct of R&D	487.6	599.4	718.2			
R&D Facilities and Major Equipment	0.0	0.0	0.0			
Major Research Equipment and Facilities Construction (MREFC)	120.6	187.2	304.7			
R&D, MREFC Total	120.6	187.2	304.7			

⁶⁴ For additional details on funding amounts by account, see NSF FY2024 Budget Request, pp. Summary Tables-8 – Summary Tables-9.

Account	FY2022 Actual ^a	FY2023 Estimated ^b	FY2024 Request ^c	FY2024 House	FY2024 Senate	FY2024 Enacted
Conduct of R&D	0.0	0.0	0.0			
R&D Facilities and Major Equipment	120.6	187.2	304.7			
Agency Operations and Award Management (AOAM)^d	420.2	463.0	503.9			
Office of the Inspector General (OIG)^d	18.9	23.4	26.8			
National Science Board (NSB)^d	4.5	5.1	5.3			
NSF, Total Discretionary^e	8,675.6	9,876.5	11,314.7			
R&D, NSF Total ^f	6,980.7	7,978.2	9,318.1			
Total, Conduct of R&D ^f	6,537.8	7,422.4	8,639.5			
Total, R&D Physical Assets	442.9	555.7	678.6			

Sources: Data in the columns titled “FY2022 Actual,” “FY2023 Estimated,” and “FY2024 Request” are from P.L. 117-328; and the NSF FY2024 Budget Request to Congress.

Notes: n/a = not available. Appropriations accounts are in bold. NSF total may differ from the sum of the accounts due to rounding. Nonbold R&D funding amounts are a subset of funding for the specified accounts. Figures for the columns currently blank may become available as action is completed.

- FY2022 actual funding amounts are as reported in the NSF FY2024 Budget Request to Congress; these amounts exclude \$360.65 million in supplemental appropriations as enacted in the American Rescue Plan Act of 2021 (P.L. 117-2), which provided \$600 million in two-year appropriations for NSF “to fund or extend new and existing research grants, cooperative agreements, scholarships, fellowships, and apprenticeships, and related administrative expenses to prevent, prepare for, and respond to coronavirus.”
- FY2023 estimated funding amounts include supplemental appropriations from Division B and Division N in P.L. 117-328.
- Figures in the FY2024 Request column do not include advance appropriations.
- The AOAM, NSB, and OIG accounts have no reported R&D funding.
- In addition to discretionary funding, NSF reports mandatory funding from H-1B visa and donation sources, which are not included in this total.
- Totals for the conduct of R&D include amounts for an additional category—“Creating Helpful Incentives to Produce Semiconductors (CHIPS) for American Workforce and Education”—not included in the appropriations account breakouts (\$18 million for FY2023, and \$17 million for FY2024); see p. QDT-8 of the NSF FY2024 budget request. For this reason, total amounts for NSF R&D and conduct of R&D for FY2023 and FY2024 are more than the sum of the individual accounts.

Department of Agriculture⁶⁵

The U.S. Department of Agriculture (USDA) was created in 1862 to support agricultural research in an expanding, agriculturally dependent country. Today, USDA conducts intramural research at federal facilities with federally employed scientists, and supports extramural research at universities and other facilities through competitive grants and capacity (formula-based) funding. The breadth of contemporary USDA research spans traditional agricultural production practices, as well as organic and sustainable agriculture, bioenergy, nutritional needs and food composition,

⁶⁵ This section was written by Lisa Benson, Analyst in Agricultural Policy, CRS Resources, Science, and Industry Division.

food safety, animal and plant health, pest and disease management, economic decisionmaking, and other social sciences affecting consumers, farmers, and rural communities.

The four agencies of USDA's Research, Education, and Economics (REE) mission area carry out the Department's research and education activities.⁶⁶ These agencies are the Agricultural Research Service (ARS), the principal intramural research agency; the National Institute of Food and Agriculture (NIFA), the principal extramural research agency; the National Agricultural Statistics Service (NASS), which undertakes a variety of surveys to capture relevant data; and the Economic Research Service (ERS), which applies economic analysis to a wide range of topics related to food and agriculture. In addition to the four REE agencies, the Office of the Chief Scientist (OCS), a staff office within the Office of the Under Secretary for REE, coordinates science activities across the department.

USDA's FY2023 enacted discretionary appropriations and the Administration's FY2024 budget request for the four REE agencies and OCS are discussed below, with funding amounts presented in **Table 13**. In annual agriculture appropriations acts, Title I (Agricultural Programs) provides regular discretionary appropriations for USDA, including the REE agencies and OCS. REE agencies and programs receive additional funding from sources other than this title, including discretionary funding from Title VII (General Provisions) of annual agriculture appropriations acts, mandatory funding authorized by the 2018 farm bill (P.L. 115-334 nonfederal matching contributions, and private donations and grants.⁶⁷ Funding from these other sources is discussed separately in the text, and is not presented in **Table 13**.

FY2023 enacted appropriations (P.L. 117-328, Consolidated Appropriations Act, 2023) provide a total of \$3,825.7 million in discretionary spending for the REE activities through Division A (Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2022), Title I.⁶⁸ Title VII (General Provisions) of P.L. 117-328 provides an additional \$9.4 million. The Administration is requesting a total of \$4,195.7 million for REE activities in FY2024, a 9.7% increase (\$370.0 million), including increases of 6% to 14% for each agency.

Agricultural Research Service

ARS is USDA's in-house basic and applied research agency, and has major responsibilities for conducting and leading the national agricultural research effort. ARS operates approximately 90 laboratories, with about 5,400 permanent employees, including approximately 2,000 research scientists.⁶⁹ ARS laboratories include a focus on efficient and sustainable food and fiber production, development of new products and uses for agricultural commodities, development of effective controls for pest management, and support of USDA regulatory and technical assistance programs. ARS also operates the National Agricultural Library (NAL). NAL is the world's largest

⁶⁶ For additional information, see CRS Report R40819, *Agricultural Research: Background and Issues*, by Lisa S. Benson.

⁶⁷ *Ibid.*

⁶⁸ FY2023 enacted appropriations and related congressional directives presented in this section derive from P.L. 117-328 and the accompanying Explanatory Statement, Division A—Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2023 from the Congressional Record on December 2, 2022, pp. S7819-S7824.

⁶⁹ Table ARS-6 of the 2024 USDA Explanatory Notes for the Agricultural Research Service state that in 2022 the Agricultural Research Service had a total of 5,465 permanent positions, including 755 located in Washington, DC, and 4,710 located in field offices.

agricultural research library, and is a primary information repository for food, agriculture, and natural resource sciences.

For FY2023, P.L. 117-328 provides \$1,744.3 million for ARS salaries and expenses, and \$74.3 million for buildings and facilities. For FY2024, the Administration is requesting \$1,938.3 million for ARS salaries and expenses, an increase of \$194.0 million (11.1%) above the FY2023 discretionary appropriation. This request includes increases of \$215.5 million for high priority program initiatives, including \$88.5 million for climate science research, and \$83.0 million for clean energy research. The FY2024 request for buildings and facilities is \$41.4 million, a decrease of \$32.9 million (44.3%) from the FY2023 appropriation.

ARS continues to coordinate with the Department of Homeland Security (DHS) on the new National Bio and Agro-Defense Facility (NBAF), which DHS is constructing to replace the outdated Plum Island Animal Disease Center (PIADC).⁷⁰ In January 2019, USDA and DHS signed a Memorandum of Agreement to govern the transition of NBAF from DHS to USDA, with ownership to transfer upon its completion and commissioning.⁷¹ USDA projects the transfer of the operations from PIADC to NBAF will be completed by December 2023, a date delayed from earlier projections, including delays resulting most recently from the COVID-19 pandemic.⁷² For FY2024, the Administration is requesting a total of \$13.0 million for NBAF within ARS salaries and expenses, and \$10.6 million for NBAF within ARS buildings and facilities.

National Institute of Food and Agriculture

NIFA is USDA's principal extramural research agency. It provides federal funding for research, education, and extension projects conducted in partnership with land-grant colleges and universities (LGUs), State Agricultural Experiment Stations, the Cooperative Extension System, other research and education institutions, private organizations, and individuals. NIFA partnerships include the three types of LGUs—1862 (original) Institutions, 1890 (historically Black) Institutions, and 1994 (tribal) Institutions—as well as other higher education institutions.⁷³ Federal funds awarded through NIFA capacity (formula-based) and competitive grants enhance research capacity at these institutions.⁷⁴ While NIFA is headquartered in Washington, DC, USDA relocated the majority of NIFA staff positions to Kansas City, MO, in 2019.⁷⁵

For FY2023, P.L. 117-328 provides \$1,701.0 million in discretionary funds for NIFA activities. For FY2024, the Administration requests \$1,868.5 million, an increase of \$167.5 million (9.8%).

⁷⁰ For additional information, see CRS In Focus IF11492, *National Bio and Agro-Defense Facility: Purpose and Status*, by Genevieve K. Croft. Congressional readers may contact CRS Analyst Lisa S. Benson for follow-up.

⁷¹ USDA and DHS, *Memorandum of Agreement Between the U.S. Department of Agriculture Marketing and Regulatory Programs, the U.S. Department of Agriculture Research, Education, and Economics, and the Department of Homeland Security Science and Technology Directorate*, June 20, 2019, at <https://www.usda.gov/sites/default/files/documents/usda-dhs-moa.pdf>.

⁷² USDA, “USDA and DHS S&T Revise NBAF Project Timeline,” press release, December 15, 2020, at <https://www.usda.gov/nbaf/media/press-releases/2020/usda-dhs-st-revise-nbaf-project-timeline>.

⁷³ 1862, 1890, and 1994 refer to the years of enactment of the laws that created these institutional classifications. For more information on LGUs and other NIFA-funded institutions, see CRS Report R45897, *The U.S. Land-Grant University System: Overview and Role in Agricultural Research*, by Lisa S. Benson; CRS In Focus IF11847, *1890 Land-Grant Universities: Background and Selected Issues*, by Lisa S. Benson; and CRS In Focus IF12009, *1994 Land-Grant Universities: Background and Selected Issues*, by Lisa S. Benson.

⁷⁴ The National Agricultural Research, Extension, and Teaching Policy Act of 1977 (P.L. 95-113) designated USDA as the lead federal agency for higher education in the food and agricultural sciences.

⁷⁵ For further information, see CRS In Focus IF11527, *Relocation of the USDA Research Agencies: NIFA and ERS*, by Genevieve K. Croft. Congressional readers may contact CRS Analyst Lisa S. Benson for follow-up.

In the explanatory notes for NIFA, the Administration proposes a change in appropriations language that would combine three separate NIFA funding accounts—for research and education, extension, and integrated activities—into one agency account that includes all programs.⁷⁶ The Administration argues that the existing three NIFA accounts are artifacts of the 1994 consolidation of two separate USDA agencies into the single agency now known as NIFA, and the subsequent establishment of an integrated activities program in 1998.⁷⁷ The Administration argues that consolidating the accounts would “mirror the organization as a National Institute with a unified mission and offer opportunities to streamline administration of funds.”⁷⁸

Research and Education. The Hatch Act and Evans-Allen Act funds support capacity grants for research and education activities at 1862 and 1890 Institutions, respectively. For Hatch Act programs, the enacted P.L. 117-328 provides \$265.0 million, and the Administration requests the same funding level for FY2024. For Evans-Allen programs, the FY2023 appropriation provides \$89.0 million, and for FY2024 the Administration is requesting \$98.0 million, a 10.1% increase. The McIntire-Stennis program funds capacity building for forestry research. For FY2023, P.L. 117-328 provides \$38.0 million for this program, and the Administration requests the same funding level for FY2024.

The Agriculture and Food Research Initiative (AFRI) is USDA’s flagship competitive research grants program, and currently represents about 26.2% of NIFA’s total discretionary budget. The FY2023 enacted bill provides \$445.0 million for AFRI, and the Administration is requesting \$550.0 million for FY2024, a 23.6% increase. NIFA also funds the Sustainable Agriculture Research and Education (SARE) program. For FY2023, P.L. 117-328 provides \$50.0 million for SARE, and the Administration is requesting \$60.0 million for FY2024, a 20.0% increase.

Extension. Smith-Lever subsections 3(b) and 3(c) authorize capacity grants to 1862 Institutions to support cooperative extension. The FY2023 enacted appropriation provides \$325.0 million for these programs, and the Administration requests the same funding level for FY2024. For extension capacity grants for 1890 Institutions, FY2023 appropriations include \$72.0 million, and the Administration requests \$76.0 million for FY2024, a 5.6% increase.

Smith-Lever Act 3(d) programs provide for competitive grants to LGUs to support cooperative extension. These programs include grants for food and nutrition education; new technologies for agricultural extension; federally recognized tribes; children, youth, and families at risk; and farm safety education. For FY2023, P.L. 117-328 appropriates \$91.3 million for Smith-Lever 3(d) programs. For FY2024, the Administration is requesting \$114.1 million. Of this total, \$90.0 million would support the Expanded Food and Nutrition Education Program (EFNEP), and \$7.7 million would support the Federally-Recognized Tribes Extension Program.

Integrated Activities. Integrated activities are those activities that include some combination of teaching, education, and research. For FY2023, P.L. 117-328 provides \$41.5 million for integrated activities, and the Administration requests the same funding level for FY2024.

Other appropriations. In addition to the sums discussed above, Title VII (General Provisions) of the enacted FY2023 agriculture appropriations bill includes \$9.0 million for certain NIFA programs and activities. These include appropriations for continuation of a pilot program to enhance farming and ranching activities for military veterans (\$5.0 million), and a provision

⁷⁶ Similar consolidations in NIFA have been proposed in seven of the past eight President’s Budget Requests but were not adopted by Congress.

⁷⁷ USDA, “National Institute of Food and Agriculture,” *2024 USDA Budget Explanatory Notes for Committee on Appropriations*, 2023, pp. 22-32.

⁷⁸ *Ibid.*

providing \$4.0 million for Farming Opportunities Training and Outreach (FOTO), of which half is for NIFA and half is for the USDA Office of Partnerships and Public Engagement. The Administration did not propose appropriations language in the General Provisions for FOTO or the pilot program for military veterans.

National Agricultural Statistics Service

The National Agricultural Statistics Service (NASS) conducts the Census of Agriculture every five years and provides official statistics on agricultural production and farm sector indicators. It is one of the 13 principal statistical agencies of the U.S. Federal Statistical System.

For FY2023, P.L. 117-328 provides \$211.1 million for NASS, of which up to \$66.4 million is reserved to support the Census of Agriculture. The Administration is requesting \$241.1 million for NASS in FY2024, of which up to \$80.9 million is for the Census of Agriculture, a 14.2% increase. The Administration's request for FY2024 proposes increases for some programs, including an additional \$8.0 million to support climate science activities through NASS's existing geospatial program.

Economic Research Service

The Economic Research Service supports economic and social science analysis about agriculture, rural development, food, commodity markets, and the environment. It also collects and disseminates data concerning USDA programs and policies. Like NASS, ERS is one of the principal statistical agencies of the U.S. Federal Statistical System. While ERS is headquartered in Washington, DC, USDA relocated the majority of ERS staff positions to Kansas City, MO, in 2019.⁷⁹

For FY2023, P.L. 117-328 provides \$92.6 million for ERS activities. The Administration is requesting \$98.5 million for FY2024, a 6.4% increase. This includes a proposed increase of \$6.3 million for climate science research.

Office of the REE Under Secretary and Office of the Chief Scientist

Congress created the Office of the Chief Scientist (OCS) in 2008 when it established the dual role of the Under Secretary for REE as the USDA Chief Scientist (7 U.S.C. §6971). OCS coordinates research programs and activities across USDA. Administratively, it is a component of the Office of the Under Secretary for REE.

In recent years, congressional appropriations for the Office of the Under Secretary for REE have included funds for the Under Secretary and a partial staff.⁸⁰ Congress has not provided direct appropriations for OCS staff since its establishment. As such, OCS has been funded via interagency agreement among the REE agencies. FY2023 appropriations provide \$2.4 million for the Office of the Under Secretary for REE, which does not include direct funding for OCS staff. Of the \$2.4 million, \$1.0 million is for the Office of the Chief Scientist. In addition to those funds provided through Title I (Agricultural Programs) of P.L. 117-328, Title VII (General Provisions) provides \$400,000 for pollinator research coordination within OCS. The President's budget

⁷⁹ See CRS In Focus IF11527, *Relocation of the USDA Research Agencies: NIFA and ERS*, by Genevieve K. Croft. Congressional readers may contact CRS Analyst Lisa S. Benson for follow-up.

⁸⁰ For example, Table OSEC-5 of USDA's FY2024 explanatory notes estimated \$1.4 million and five staff years for the Office of the Under Secretary for REE in FY2023. USDA, "Office of the Secretary," *2024 USDA Budget Explanatory Notes for Committee on Appropriations*, 2023, p. 10.

request for FY2024 includes \$7.9 million for the Office of the Under Secretary for REE, of which \$5.5 million is for OCS.

Table 13. U.S. Department of Agriculture R&D
(budget authority, in millions of dollars)

Agency or Major Program	FY2023	FY2024	FY2024	FY2024	FY2024
	Enacted P.L. 117-328	Request ^a	House	Senate	Enacted
Agricultural Research Service (ARS)					
Salaries and Expenses	1,744.3	1,938.3			
Buildings and Facilities	74.3	41.4			
Subtotal, ARS	1,818.6	1,979.7			
National Institute of Food and Agriculture (NIFA)					
Research and Education					
AFRI (competitive grants)	445.0	550.0			
Hatch Act (1862 Institutions)	265.0	265.0			
Evans-Allen (1890 Institutions)	89.0	98.0			
McIntire-Stennis (forestry)	38.0	38.0			
Other	257.1	264.1			
Subtotal, Research and Education	1,094.1	1,215.1			
Extension					
Smith-Lever 3(b) and 3(c)	325.0	325.0			
Smith-Lever 3(d)	91.3	114.1			
1890 Extension Activities	72.0	76.0			
1994 Extension Activities	11.0	21.0			
Other	66.1	75.8			
Subtotal, Extension	565.4	611.9			
Integrated Activities	41.5	41.5			
Subtotal, NIFA	1,701.0	1,868.5			
National Agricultural Statistics Service (NASS)	211.1	241.1			
Economic Research Service (ERS)	92.6	98.5			
Office of the Under Secretary for REE					
Office of the Chief Scientist	1.0	5.5			
Total, USDA Research, Education, and Economics Appropriations	3,825.7	4,195.7			

Sources: CRS, compiled from P.L. 117-328 *Consolidated Appropriations Act, 2023, FY2023 Explanatory Statement, Division A*; and *FY2024 USDA Budget Justification Notes*.

Notes: Totals may differ from the sum of the components due to rounding. Figures for the columns currently blank may become available as action is completed. FY2023 enacted amounts do not include \$9.4 million in discretionary appropriations for NIFA activities and the OCS pollinator research coordinator position allocated via P.L. 117-328, Division A, Title VII (General Provisions).

a. Figures in the FY2024 Request column do not include advance appropriations.

Department of Commerce

Two agencies of the Department of Commerce have major R&D programs: the National Institute of Standards and Technology (NIST) and the National Oceanic and Atmospheric Administration (NOAA).

National Institute of Standards and Technology⁸¹

The mission of the National Institute of Standards and Technology is “to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.”⁸² NIST research provides measurement, calibration, and quality assurance methods and techniques that support U.S. commerce, technological progress, product reliability, manufacturing processes, and public safety. NIST’s responsibilities include the development, maintenance, and custodial retention of the national standards of measurement; providing the means and methods for making measurements consistent with those standards; and ensuring the compatibility of U.S. national measurement standards with those of other nations.⁸³

Regular appropriations for NIST are provided through the annual Commerce, Justice, Science, and Related Agencies Appropriations Act (CJS Act). President Biden is requesting \$1,632.0 million for NIST in FY2024, an increase of \$4.7 million (0.3%) from the FY2023 enacted appropriation of \$1,627.3 million.⁸⁴ (See **Table 14**.)

NIST discretionary funding is provided through three accounts: Scientific and Technical Research and Services (STRS), Industrial Technology Services (ITS), and Construction of Research Facilities (CRF).

The President’s FY2024 request includes \$994.9 million for laboratory R&D programs, corporate services, and standards coordination and special programs in the STRS account, an increase of \$41.9 million (4.4%) from the FY2023 enacted level. Program increases include

- Advancing Research in Critical and Emerging Technologies (CET) (up \$20 million), for CET research, measurements and data to drive advances in artificial intelligence (AI), quantum information science and engineering, biotechnology, and advanced communications.
- Cybersecurity and Privacy (up \$20 million), for cybersecurity and privacy-related standards, guidelines, and other resources in areas of national importance.
- Trustworthy and Resilient Domestic Supply Chains (up \$8 million), for supply chain tools to ensure cybersecurity and trust, verify authenticity of high-tech components, and identify approaches that reduce the need for critical minerals.

⁸¹ This section was written by John Sargent, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

⁸² NIST website, “General Information,” http://nist.gov/public_affairs/general_information.cfm.

⁸³ 15 U.S.C. §272.

⁸⁴ The FY2024 request is up \$337.0 million (26.0%) from the FY2032 enacted levels when the congressionally directed spending totals are removed. CRS analysis of data from U.S. Department of Commerce, *National Institute of Standards and Technology, National Institute of Standards and Technology/National Technical Information Service, Fiscal Year 2024 Budget Submission to Congress*, March 2023, at <https://www.commerce.gov/sites/default/files/2023-03/NIST-NTIS-FY2024-Congressional-Budget-Submission.pdf>.

- Climate Change and Environmental Sustainability (up \$5.5 million), for CO₂ removal research efforts and developing greenhouse gas measurement tools and standards to ensure accuracy and trustworthiness of carbon data.
- Measurement Science Modernization (up \$5 million), for accelerating the transition to digital measurement services delivery and to provide infrastructure for preparation and packaging of reference materials.
- National Construction Safety Team Act Implementation (up \$5 million), for expanding NIST's ability to support investigations under the National Construction Safety Team Act of 2002 that can contribute to improvements in standards and codes.
- Advanced Neutron Research Instrumentation (up \$3 million), for development and operation of advanced neutron measurement instrumentation to support NIST's Center for Neutron Research user facility.
- NIST Diversity, Equity, Inclusion, and Accessibility Initiatives (up \$2.2 million), for supporting strategic STEM partnerships with minority serving institutions and targeted STEM recruitment and retention strategies.

The FY2024 request would provide \$374.9 million for the ITS account, up \$162.9 million (76.8%) from the FY2023 enacted level. Within the ITS account, the request would provide \$277.2 million for the Manufacturing Extension Partnership (MEP) program, an increase of \$102.2 million (58.4%) from the FY2023 enacted level, and \$97.7 million for Manufacturing USA, up \$60.7 million (164.1%) from the FY2023 enacted level of \$37.0 million.

According to NIST, the funding requested for MEP would enable, among other things, new investments to narrow the workforce gap, mitigate supply chain vulnerabilities, and leverage technology.

Manufacturing USA funding would support creation and operation of testbeds at Manufacturing USA institutes and support emerging priority areas, such as manufacturing technology development, transfer of technology to manufacturers, and engagement of underserved communities in the network's technology and education and workforce development program.

The President is requesting \$262.1 million for the CRF account for FY2024, down \$200.2 million (41.5%) from the FY2022 enacted level. The FY2024 request represents an increase of \$132.1 million (101.6%) over FY2023 enacted levels when congressionally directed spending projects are removed from the FY2023 CRF appropriation. This funding would support repair and revitalization of facilities to address NIST's major utility infrastructure maintenance backlog and to modernize its information technology networking infrastructure.⁸⁵

⁸⁵ U.S. Department of Commerce, National Institute of Standards and Technology, *National Institute of Standards and Technology/National Technical Information Service, Fiscal Year 2024 Budget Submission to Congress*, March 2023, at <https://www.commerce.gov/sites/default/files/2023-03/NIST-NTIS-FY2024-Congressional-Budget-Submission.pdf>.

Table 14. National Institute of Standards and Technology Funding
(budget authority, in millions of dollars)

	FY2023 Enacted	FY2024 Request ^c	FY2024 House	FY2024 Senate	FY2024 Enacted
Scientific and Technical Research and Services	953.0	994.9			
Laboratory Programs	763.3	859.7			
Corporate Services	17.5	19.1			
Standards Coordination and Special Programs	109.7	116.2			
Congressionally-Directed External Projects	62.5	0.0			
Industrial Technology Services	212.0	374.9			
Manufacturing Extension Partnership	175.0 ^a	277.2			
Manufacturing USA	37.0 ^b	97.7			
Construction of Research Facilities	462.3	262.1			
Construction and Major Renovations	0.0	262.1			
Safety, Capacity, Maintenance, and Major Repairs	130.0	0.0			
Congressionally-Directed Extramural Construction	332.3	0.0			
NIST, Total	1,627.3	1,632.0			

Source: U.S. Department of Commerce, National Institute of Standards and Technology, *National Institute of Standards and Technology/National Technical Information Service, Fiscal Year 2024 Budget Submission to Congress*, March 2023 at <https://www.commerce.gov/sites/default/files/2023-03/NIST-NTIS-FY2024-Congressional-Budget-Submission.pdf>.

Notes: Totals may differ from the sum of the components due to rounding. Figures for the columns currently blank may become available as action is completed.

- Does not include enacted amount of \$13 million from the Disaster Relief Supplemental Appropriations Act, 2023.
- Does not include enacted amount of \$14 million from the Disaster Relief Supplemental Appropriations Act, 2023.
- Figures in the FY2024 Request column do not include advance appropriations.

NIST CHIPS Act of 2022 Funding

In addition to regular appropriations, in July 2022, Congress passed the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act (P.L. 117-167) which, among other things, included the CHIPS Act of 2022 as Division A. The CHIPS Act of 2022 provided mandatory funding for FY2022-FY2026 and amended NIST authorities established under the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 (2021 NDAA, P.L. 116-283). These funds are not included in **Table 14**.

The CHIPS Act of 2022 provides authorizations and appropriations to the Secretary of Commerce for a “CHIPS for America Fund” for the purpose of carrying out the provisions specified in Sections 9902 and 9906 of P.L. 116-283. These provisions seek to expand U.S. domestic semiconductor manufacturing fabrication capacity by offering financial incentives—direct financial assistance (i.e., grants, loans, loan guarantees) and tax deductions—and to help ensure U.S. technological and industrial leadership in semiconductor technology through R&D and the

formation of public-private joint research activities. Of the \$39 billion appropriated for execution of this section, \$2.0 billion is provided “to incentivize investment in facilities and equipment in the United States for the fabrication, assembly, testing, or packaging of semiconductors at mature technology.”¹⁹ NIST is authorized to use up to \$6 billion of these funds to support loans and loan guarantees in support of the goals of Section 9902.

Section 9902 of P.L. 116-283 authorizes the Secretary of Commerce to provide financial assistance to “covered entities” to incentivize investment in facilities and equipment in the United States for semiconductor fabrication, assembly, testing, advanced packaging, or research and development of semiconductors.⁸⁶

Section 9906(c) of P.L. 116-283 directs the Secretary of Commerce, in collaboration with the Secretary of Defense, to establish a National Semiconductor Technology Center to conduct research and prototyping of advanced semiconductor technology to strengthen the economic competitiveness and security of the domestic supply chain. The center is to be operated as a consortium, with participation from the private sector, the Department of Energy, and the National Science Foundation. The center’s work is to emphasize advanced testing, assembly, and packaging capability in the domestic semiconductor ecosystem; materials characterization, instrumentation, and testing for next-generation microelectronics; virtualization and automation of maintenance of semiconductor machinery; and metrology for security and supply chain verification.²²

Section 9906(d) of P.L. 116-283 directs the Secretary of Commerce to establish a National Advanced Packaging Manufacturing Program, led by the NIST Director, to strengthen semiconductor advanced testing, assembly, and packaging capability in the United States, and to coordinate its efforts with the National Semiconductor Technology Center, authorized by Section 9906(c), and the Manufacturing USA institute, authorized by Section 9906(f) (discussed below).²³

Section 9906(e) of P.L. 116-283 authorizes the NIST Director to conduct an R&D program to enable advances and breakthroughs in measurement science, standards, material characterization, instrumentation, testing, and manufacturing capabilities for next-generation microelectronics metrology, and to ensure U.S. competitiveness and leadership in microelectronics.²⁴

Section 9906(f) authorizes the establishment of up to three Manufacturing USA institutes to pursue research in support of the virtualization and automation of maintenance of semiconductor machinery; the development of new advanced testing, assembly, and packaging capabilities; and the development and deployment of educational and skills training curricula needed to support the industry sector and to ensure the United States can build and maintain a trusted and predictable talent pipeline.²⁵

The CHIPS Act of 2022 provides the following appropriations to support the activities authorized in P.L. 116-283:

- \$39.0 billion for the semiconductor incentives authorized by Section 9902, including \$19.0 billion for FY2022 and \$5.0 billion for fiscal years 2023-2026;
- \$2.0 billion in FY2022 for the establishment of the National Semiconductor Technology Center authorized by Section 9906(c);

⁸⁶ By statute, covered entities include “a nonprofit entity, a private entity, a consortium of private entities, or a consortium of public and private entities with a demonstrated ability to substantially finance, construct, expand, or modernize a facility relating to fabrication, assembly, testing, advanced packaging, or research and development [R&D] of semiconductors.” (15 U.S.C. 4651(2))

- \$2.5 billion in FY2022 for the National Advanced Packaging Manufacturing Program authorized by Section 9906(d); and
- \$500.0 million in FY2022 for NIST microelectronics research authorized by Section 9906(e) and the semiconductor research-focused Manufacturing USA institute authorized by Section 9906(f).

The act also provides additional funding for activities authorized by Section 9906(c), (d), (e), and (f), in aggregate, for FY2023 (\$2.0 billion), FY2024 (\$1.3 billion), FY2025 (\$1.1 billion), and FY2026 (\$1.6 billion).

National Oceanic and Atmospheric Administration⁸⁷

The National Oceanic and Atmospheric Administration (NOAA) conducts scientific research in areas such as ecosystems, atmosphere, global climate change, weather, and oceans; collects and disseminates data on the oceans and atmosphere; and manages coastal and marine species and environments. NOAA was created in 1970 by Reorganization Plan No. 4.⁸⁸

NOAA is organized into six line offices: the National Environmental Satellite, Data, and Information Service (NESDIS); National Marine Fisheries Service (NMFS); National Ocean Service (NOS); National Weather Service (NWS); Office of Oceanic and Atmospheric Research (OAR); and the Office of Marine and Aviation Operations (OMAO). The line offices are supported by an additional office, Mission Support, which provides cross-cutting administrative functions related to education, planning, information technology, human resources, and infrastructure. Congress provides most of the discretionary funding for the line offices and Mission Support through two accounts: (1) Operations, Research, and Facilities, and (2) Procurement, Acquisition, and Construction.

NOAA has released several documents and guidance that describe its R&D mission and focus areas. The most recent NOAA R&D plan was published in June 2020, and identifies R&D priorities within three vision areas: (1) reducing societal impacts from hazardous weather and other environmental phenomena, (2) sustainable use and stewardship of ocean and coastal resources, and (3) a robust and effective research, development, and transition enterprise.⁸⁹ In addition, NOAA issued an agency administrative order (NAO) focused on R&D in June 2022.⁹⁰ The NAO “establishes the principles, policies, and responsibilities by which [R&D] throughout NOAA can be continually reviewed, evaluated and rebalanced in light of evolving mission needs.”⁹¹ The handbook accompanying the NAO provides information on the planning, monitoring, evaluation, and reporting of NOAA R&D.⁹²

For FY2024, President Biden has requested \$1.3 billion for NOAA R&D funding, including R&D-related equipment and facilities. The President’s requested amount for FY2024 is \$449.1

⁸⁷ This section was written by Eva Lipiec, Analyst in Natural Resources Policy, CRS Resources, Science, and Industry Division.

⁸⁸ “Reorganization Plan No. 4 of 1970,” 35 *Federal Register* 15627-15630, October 6, 1970.

⁸⁹ NOAA, *NOAA Research and Development Vision Areas: 2020-2026*, June 2020, p. 2, at <https://sciencecouncil.noaa.gov/LinkClick.aspx?fileticket=Mo2PSTqzuJk%3D&portalid=0>.

⁹⁰ NOAA, “NAO 216-115B: Research and Development in NOAA,” issued June 7, 2022, at <https://www.noaa.gov/organization/administration/nao-216-115b-research-and-development-in-noaa>.

⁹¹ NOAA, *Procedural Handbook for NOAA Administrative Order (NAO) 216-115B: Research and Development in NOAA*, January 2023, p. 3, at https://www.noaa.gov/sites/default/files/2023-01/handbook_NAO-216-115B.pdf.

⁹² *Ibid.*, pp. 3-4.

million (-25.8%) below the FY2023 enacted level of \$1.7 billion.⁹³ The President's FY2024 request for NOAA R&D is 17.9% of the requested FY2024 NOAA total direct obligations of \$7.2 billion.⁹⁴ According to OMB, direct obligations include annual appropriations, transfers, and recoveries from prior-year obligations.⁹⁵ The FY2024 request includes \$798.8 million for research (61.9% of the total requested for NOAA R&D), \$181.4 million for development (14.1%), and \$309.6 million (24.0%) for R&D equipment and facilities.⁹⁶ **Table 15** provides R&D amounts enacted in FY2023 and requested by the Administration for FY2024.

OAR accounts for the majority of NOAA R&D requests and enacted amounts in most years, including FY2024. The Administration requested \$745.1 million for OAR R&D in FY2024, which is \$39.8 million (-5.0%) below the FY2023 enacted funding level of \$784.9 million.⁹⁷ OAR conducts research in three major areas: (1) climate; (2) weather and air chemistry; and (3) oceans, coasts, and the Great Lakes. A portion of these efforts is implemented through OAR's laboratories and cooperative research institutes. The President requested \$242.4 million for OAR labs and cooperative institutes in FY2024, \$5.6 million (2.4%) more than the FY2023 enacted amount of \$236.8 million.⁹⁸

Another OAR program, the National Sea Grant College Program (NSGCP), is composed of 33 university-based state programs and supports scientific research and stakeholder engagement to identify and solve problems faced by coastal communities. For FY2024, the Administration has requested \$94.8 million for NSGCP, an increase of \$14.8 million (18.6%) from the FY2023 enacted amount of \$80.0 million, and \$14.1 million for its related Aquaculture Research program, an increase of \$0.13 million (0.9%) from the FY2023 enacted amount of \$14.0 million.⁹⁹

⁹³ Email correspondence with the NOAA Budget Office, April 4, 2023, and April 10, 2023. R&D funding amounts in the annual agency appropriations bill are estimated by NOAA because neither the legislative text nor the explanatory statement provide a breakout of R&D funding and only include discretionary direct obligations (telephone conversation with NOAA Budget Office, September 3, 2020). The FY2023 R&D enacted amount includes the FY2023 annual direct obligations from P.L. 117-328, Division B, and supplemental appropriations from P.L. 117-328, Division N and P.L. 117-58 (email correspondence with the NOAA Budget Office, April 4, 2023, and April 10, 2023).

⁹⁴ NOAA, *Budget Estimates Fiscal Year 2024*, 2023, p. Control Table-15, at https://www.noaa.gov/sites/default/files/2023-04/NOAA_FY24_CJ.pdf. Hereinafter NOAA, *Budget Estimates Fiscal Year 2024*.

⁹⁵ Congressional documents sometimes refer to direct obligations as program levels. (For example, see "Regarding the House Amendment to the Senate Amendment to H.R. 2471, Consolidated Appropriations Act, 2022," Explanatory Statement Submitted by Ms. DeLauro, Chair of the House Committee on Appropriations, *Congressional Record*, vol. 168 (March 9, 2022), pp. H1775 and H1781. Hereinafter FY2022 Explanatory Statement). For further descriptions of what types of obligations are direct versus reimbursable, see Office of Management and Budget, *Circular No. A-11, Preparation, Submission, and Execution of the Budget*, July 2016, p. 3 of Section 83, at https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/a11_current_year/a11_2016.pdf.

⁹⁶ Email correspondence with the NOAA Budget Office, April 4, 2023, and April 10, 2023.

⁹⁷ Email correspondence with the NOAA Budget Office, April 4, 2023, and April 10, 2023.

⁹⁸ NOAA, *Budget Estimates Fiscal Year 2024*, p. Control Table-3.

⁹⁹ *Ibid.*

Table 15. National Oceanic and Atmospheric Administration R&D
(in millions of dollars)

	FY2023 Enacted^a	FY2024 Request^b	FY2024 House	FY2024 Senate	FY2024 Enacted
National Environmental Satellite, Data, and Information Service (NESDIS)	61.7	62.5			
National Marine Fisheries Service (NMFS)	78.6	75.9			
National Ocean Service (NOS)	134.8	127.8			
National Weather Service (NWS)	49.3	41.9			
Office of Marine and Aviation Operations (OMAO)	602.5	236.6			
Office of Oceanic and Atmospheric Research (OAR)	784.9	745.1			
Mission Support	27.0	0			
Total R&D	1,738.9	1,289.8			
NOAA Total Direct Obligations, Total R&D and Non-R&D	6,754.0	7,214.7			

Sources: National Oceanic and Atmospheric Administration (NOAA) Budget Office via email correspondence on April 4, 2023, and April 10, 2023; and NOAA, *Budget Estimates Fiscal Year 2024, 2023*, p. Control Table-15, at https://www.noaa.gov/sites/default/files/2023-04/NOAA_FY24_CJ.pdf.

Notes: Totals may differ from the sum of the components due to rounding. Figures for the columns currently blank may become available as action is completed. Direct obligations include annual appropriations, transfers, and recoveries from prior-year obligations. Congress and NOAA use several different budgetary terms, such as direct obligations, program levels, budget authority, and appropriations. For more information, see CRS In Focus IF12156, *National Oceanic and Atmospheric Administration (NOAA) FY2023 Budget Request and Appropriations*, by Eva Lipiec.

- a. According to NOAA, the FY2023 enacted amounts include annual direct obligations and supplemental appropriations.
- b. Figures in the FY2024 Request column do not include advance appropriations.

Department of Veterans Affairs¹⁰⁰

The Department of Veterans Affairs (VA) provides health care and health-related services to eligible veterans through the Veterans Health Administration (VHA). VHA's primary mission is to provide health care services to eligible veterans and some family members.¹⁰¹ The VHA is also statutorily required to conduct medical research into the special healthcare needs of veterans.¹⁰²

¹⁰⁰ This section was written by Jared S. Sussman, Analyst in Health Policy, CRS Domestic Social Policy Division.

¹⁰¹ 38 U.S.C. §7301.

¹⁰² 38 U.S.C. §7303(a)(3).

The President is requesting \$1.820 billion for VA R&D in FY2024, an increase of \$124 million (7.3%) from FY2023 enacted levels. (See **Table 16.**) According to the President's request, FY2024 strategic priorities for VA R&D include increasing veterans' access to clinical trials; increasing real-world impact of VA research; the effective use of VA data for veterans; promoting diversity, equity, and inclusion within the VA sphere of influence; and building community through VA research.¹⁰³ In addition, the VA plans to increase funding for research on environmental exposures, traumatic brain injury/brain health, cancer and precision oncology, and implementation of the Commander John Scott Hannon Mental Health Care Improvement Act (P.L. 116-171).¹⁰⁴

VA R&D is generally funded through two major funding streams—the Medical and Prosthetic Research account and Medical Support.¹⁰⁵ The funding that will be allocated from Medical Support to support R&D is generally unclear unless Congress provides funding at the precise level of the request. In general, R&D funding levels from Medical Support are known only after the VA allocates its appropriations to specific activities and reports those figures. Medical Support appropriations fund a range of activities across VHA; R&D is one of those activities.

The FY2024 request includes \$938 million for VA's Medical and Prosthetic Research account, an increase of \$22 million (2.4%) compared to FY2023 enacted levels. The request includes \$836.4 million in funding for research supported by the agency's Medical Care Support account, an increase of \$58.5 million (7.5%) compared with FY2023. The Medical Care Support account provides administrative and other support for VA researchers and R&D projects, including infrastructure maintenance.

The Honoring our PACT Act of 2022 (P.L. 117-168) established the Cost of War Toxic Exposure Fund (TEF) to be administered by the VA Secretary.¹⁰⁶ Among other purposes, funding from this mandatory account could be used for investment in medical and other research relating to exposure to environmental hazards. Beginning with FY2023, funds from TEF are included in VA's R&D budget. The President's budget request includes \$46 million for the TEF in FY2024, an increase of \$43.5 million from FY2023 enacted levels.

The Medical and Prosthetics R&D program is an intramural program. In general, each Principal Investigator (PI) and any Co-Principal Investigator (Co-PI) must be VA employees with at least a five-eighths appointment (25 hours per week) in the VA.¹⁰⁷ The R&D program is managed by the VHA Office of Research and Development (ORD) and conducted at VA Medical Centers and VA-approved sites nationwide. According to ORD, the mission of VA R&D includes “improv[ing] Veterans' health and well-being via basic, translational, clinical, health services, and rehabilitative

¹⁰³ Department of Veterans Affairs, *Volume II: Medical Programs, Congressional Submission, FY2024*, pp. VHA-569.

¹⁰⁴ *Ibid.*, p. VHA-572. For a summary of research initiatives required by P.L. 116-171, see CRS Report R46848, *Commander John Scott Hannon Veterans Mental Health Care Improvement Act of 2019 (P.L. 116-171) and Veterans COMPACT Act of 2020 (P.L. 116-214)*.

¹⁰⁵ The funding for Medical Care Support is derived from the Medical Services, Medical Support and Compliance, and Medical Facilities appropriations accounts. For more information, see CRS Report R47423, *Department of Veterans Affairs FY2023 Appropriations*, by Sidath Viranga Panangala and Jared S. Sussman.

¹⁰⁶ 38 U.S.C. §324. For more information on TEF, see CRS Report R47423, *Department of Veterans Affairs FY2023 Appropriations*, by Sidath Viranga Panangala and Jared S. Sussman.

¹⁰⁷ Department of Veterans Affairs, Veterans Health Administration, *Department of Veterans Affairs Office of Research & Development Program Guide 1200.15: Eligibility for VA Research Support*, July 13, 2018, p. 1.

research and apply[ing] scientific knowledge to develop effective individualized care solutions for Veterans.”¹⁰⁸ ORD consists of four main research services, each headed by a director:

- Biomedical Laboratory R&D conducts preclinical research to understand life processes at the molecular, genomic, and physiological levels.
- Clinical Science R&D supports clinical trials and other human subjects research to determine the feasibility and effectiveness of new treatments such as drugs, therapies, or devices; compare existing therapies; and improve clinical care and practice.
- Health Services R&D conducts studies to identify and promote effective and efficient strategies to improve the quality and accessibility of the VA health system and patient outcomes, and to minimize health care costs.
- Rehabilitation R&D conducts research and develops novel approaches to improving the quality of life of impaired and disabled veterans.

In addition to intramural support, VA researchers are eligible to obtain funding for their research from extramural sources, including other federal agencies, private foundations and health organizations, and commercial entities. According to the President’s FY2024 budget request, these additional R&D resources are estimated at \$540 million in FY2024.

Table 16 summarizes R&D program funding for VA in the Medical and Prosthetic Research and the Medical Care Support accounts. **Table 17** details amounts to be spent in Designated Research Areas (DRAs), which VA describes as “areas of importance to our veteran patient population.”¹⁰⁹ Funding for research projects that span multiple areas may be included in several DRAs; thus, the amounts in **Table 17** total to more than the appropriation or request for VA R&D.

Table 16. Department of Veterans Affairs R&D
(budget authority, in millions of dollars)

Account	FY2023 Enacted	FY2024 Request	FY2024 House	FY2024 Senate
Medical and Prosthetic Research	916.0	938.0		
Toxic Exposure Fund	2.5	46.0		
Medical Care Support ^a	777.9	836.4		
Veterans Affairs, Total R&D	\$1,696.4	\$1,820.4		

Source: Department of Veterans Affairs, *Volume II: Medical Programs, Congressional Submission, FY2024*, p. VHA-567, at <https://www.va.gov/budget/docs/summary/fy2024-va-budget-volume-ii-medical-programs.pdf>.

Notes: Totals may differ from the sum of the components due to rounding. Figures for the columns currently blank may become available as action is completed. VA researchers also receive grants from other federal and nonfederal resources, including the National Institutes of Health, the Department of Defense, and the Centers for Disease Control and Prevention; these resources are estimated at \$540 million in FY2023 and \$540 million in FY2024. In addition, the VA estimates reimbursements associated with agency R&D at \$61 million in FY2023 and \$61 million in FY2024, increasing the total amount of R&D performed at VA to \$2.26 billion in FY2022 and \$2.30 billion in the FY2023 request.

- The funding for Medical Care Support is derived from the Medical Services, Medical Support and Compliance, and Medical Facilities appropriations accounts. These three accounts received advance

¹⁰⁸ Department of Veterans Affairs, “Office of Research and Development,” at <https://www.research.va.gov/about/default.cfm>.

¹⁰⁹ Department of Veterans Affairs, *Volume II: Medical Programs, Congressional Submission, FY2024*, p. VHA-633, at <https://www.va.gov/budget/docs/summary/fy2024-va-budget-volume-ii-medical-programs.pdf>.

appropriations for FY2024. Therefore, the FY2024 request includes funds appropriated in the Military Construction, Veterans Affairs, and Related Agencies Appropriations Act, 2022 (Division J of P.L. 117-103).

Table 17. Department of Veterans Affairs R&D by Designated Research Area
(in millions of dollars)

Designated Research Area	FY2023 Estimate	FY2024 Request
Acute and Traumatic Injury	26.2	27.0
Aging	151.3	156.0
Autoimmune, Allergic, and Hematopoietic Disorders	39.6	40.8
Cancer	81.3	93.8
Central Nervous System Injury and Associated Disorders	140.8	160.2
Degenerative Diseases of Bones and Joints	41.6	43.7
Dementia and Neuronal Degeneration	42.3	42.3
Diabetes and Major Complications	47.7	49.2
Digestive Diseases	26.3	27.1
Emerging Pathogens/Bio-Terrorism	2.8	2.9
Gulf War Veterans Illness	15.2	15.7
Health Systems	71.1	73.3
Heart Disease/Cardiovascular Health	73.0	75.2
Infectious Disease	58.2	60.0
Kidney Disorders	18.2	18.8
Lung Disorders	28.2	28.2
Mental Illness	130.1	138.9
Military Occupations and Environmental Exposures	51.4	68.0
Other Chronic Diseases	7.5	7.7
Prosthetics	25.6	26.4
Sensory Loss	23.4	24.1
Special Populations	43.3	44.6
Substance Abuse	30.1	31.0

Source: Department of Veterans Affairs, *Volume II: Medical Programs, Congressional Submission, FY2024*, p. VHA-633, at <https://www.va.gov/budget/docs/summary/fy2024-va-budget-volume-ii-medical-programs.pdf>.

Notes: Projects that span multiple areas may be included in several Designated Research Areas (DRAs); therefore, the amounts depicted in this table total to more than the FY2023 amount and the FY2024 request for Medical and Prosthetic Research. Columns for “FY2023 House,” “FY2023 Senate,” and “FY2023 Enacted” are not included in this table as these figures will only be available after Congress completes the appropriations process and VA determines how much of the appropriated funds will be allocated to each DRA.

Department of Transportation¹¹⁰

The Department of Transportation was established by the Department of Transportation Act (P.L. 89-670) on October 15, 1966. The primary purposes of DOT research and development activities as defined by Congress¹¹¹ are improving mobility of people and goods; reducing congestion; promoting safety; improving the durability and extending the life of transportation infrastructure; preserving the environment; and preserving the existing transportation system.

Funding for DOT R&D is generally included in appropriations line items that also include non-R&D activities. The amount of funding provided by appropriations legislation that is allocated to R&D is unclear unless funding is provided at the precise level of the request. In general, R&D funding levels are known only after DOT agencies allocate their final appropriations to specific activities and report those figures.

For FY2024, the Administration is requesting a total of \$1.5 billion (an increase of 8.9% over FY2023) for DOT R&D activities and facilities in the Federal Aviation Administration (FAA), the Federal Highway Administration (FHWA), the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), the Federal Transit Administration (FTA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the Office of the Secretary (OST), and the Federal Motor Carrier Safety Administration (FMCSA) (see **Table 18**). The bulk of DOT R&D funding goes to FAA and FHWA.

Federal Aviation Administration

The President's FY2024 request of \$521.7 million for R&D activities and facilities at FAA would be a decrease of 1.8% (-\$9.8 million) from the FY2023 enacted amount; the reduction is in the NextGen Research and Development Account, from \$90.4 million (FY2023) to \$74.9 million (FY2024). The request includes \$255.1 million for the agency's Research, Engineering, and Development (RE&D) account, essentially flat from FY2023. Funding within the RE&D account seeks to improve aircraft safety through research in fields such as fire safety, advanced materials, propulsion systems, aircraft icing, and continued airworthiness, in addition to safety research related to unmanned aircraft systems and the integration of commercial space operations into the national airspace. The RE&D account also supports research to reduce the environmental impacts of aviation (i.e., noise and emissions).

Federal Highway Administration

According to the President's budget request,

FHWA's contributions to researching and implementing transformative innovations and technologies are changing the way roads, bridges, and other facilities are planned, designed, built, managed, and maintained across the country to be more responsive to current and future needs.¹¹²

The President's request of \$519 million for R&D activities and facilities at FHWA would be an increase of 12.7% (\$58.7 million) from the FY2023 enacted amount. The request includes \$147

¹¹⁰ This section was written by D. Randy Peterman, Analyst in Transportation Policy, CRS Resources, Science, and Industry Division.

¹¹¹ 49 U.S.C. §6501, Note, "Findings."

¹¹² Department of Transportation, Federal Highway Administration, *FHWA FY2024 Budget*, p. III-131, at https://www.transportation.gov/sites/dot.gov/files/2023-03/FHWA_FY_2024_President_Budget_508.pdf.

million for FHWA's Highway Research and Development program, which seeks to improve safety, foster innovation, accelerate projects, enhance the design and construction of transportation infrastructure, provide data and analysis for decisionmaking, and reduce congestion. The request also includes \$110 million for the deployment of technology to enhance the safety, efficiency, and convenience of surface transportation under the agency's Intelligent Transportation Systems program.

National Highway Traffic Safety Administration

The President is requesting \$201.2 million in R&D and R&D facilities funding for FY2024 for NHTSA, 2.1% (\$4.2 million) above the FY2023 enacted amount. NHTSA R&D focuses on automation and the study of human machine interfaces, advanced vehicle safety technology, improving vehicle crashworthiness and crash avoidance, and reducing unsafe driving behaviors.

Federal Motor Carrier Safety Administration

The President is requesting \$38.1 million in research, development, and technology funding for FY2024 for FMCSA, 170% (\$24.0 million) above the \$14.1 million enacted for FY2023.

FMCSA's research and technology programs focus on research on driver, vehicle, and carrier issues impacting commercial motor vehicle safety, and cross-cutting research related to safety data collection and information sharing to improve the effectiveness of commercial vehicle inspections. The increased funding requested is primarily to support agency research efforts investigating the overall business, economic, and technical trends in the commercial motor vehicle industry, and identifying and evaluating new and refined methods for collecting, analyzing, and disseminating safety-related information.

Other DOT Components

R&D activities are also supported by several other DOT components or agencies (see **Table 18**). The President's FY2024 request includes DOT R&D activities and facilities funding for

- the Federal Railroad Administration, totaling \$59.0 million, 34.1% (\$15.0 million) above the FY2023 enacted level of \$44.0 million;
- the Federal Transit Administration, totaling \$68.6 million, 53.8% (\$24.0 million) above the FY2023 enacted level of \$44.6 million;
- the Pipeline and Hazardous Materials Safety Administration, totaling \$24.8 million, 11.2% (\$2.5 million) above the FY2023 enacted level of \$22.3 million; and
- the Office of the Secretary, totaling \$91.5 million, 7.0% (\$6.0 million) above the FY2023 enacted level of \$85.5 million.

Table 18. Department of Transportation R&D Activities and Facilities
(budget authority, in millions of dollars)

	FY2023 Enacted	FY2024 Request	FY2024 House	FY2024 Senate	FY2024 Enacted
Federal Aviation Administration	\$531.5	\$521.7			
<i>Research, Engineering, and Development</i>	255.0	255.1			
Federal Highway Administration	460.3	519.0			
<i>Highway Research and Development</i>	129.1	147.0			
<i>Intelligent Transportation Systems</i>	96.6	110.0			
National Highway Traffic Safety Administration	197.0	201.2			
Federal Railroad Administration	44.0	59.0			
Federal Transit Administration	44.6	68.6			
Pipeline and Hazardous Materials Safety Administration	22.3	24.8			
Office of the Secretary	85.5	91.5			
Federal Motor Carrier Safety Administration	14.1	38.1			
DOT, R&D Total	\$1,399.3	\$1,523.9			

Source: U.S. Department of Transportation, *Fiscal Year 2024 Budget Estimate* for pertinent administrations, Exhibit IV-1 Research, Development and Technology Budget table at <https://www.transportation.gov/mission/budget/fiscal-year-2024-budget-estimates>.

Note: Figures reported here are the totals for each administration's research, development, and technology budget table, except for those administrations for which the budget tables listed administrative expenses separately; in those cases, the administrative expenses were subtracted from the totals reported here. Components may not add to total due to rounding. Lines in italics are components of the agency lines above them and are not counted separately in the total.

a. The FY2023 and FY2024 totals each include \$19 million in supplemental funding from P.L. 117-58, Division J.

Department of the Interior¹¹³

The Department of the Interior (DOI) is a federal executive department responsible for the conservation and use of approximately two-thirds of the estimated 640 million acres of federal land.¹¹⁴ DOI defines its mission as to protect and manage the nation's natural resources and cultural heritage for the benefit of the American people; to provide scientific and scholarly information about those resources and natural hazards; and to exercise the country's trust responsibilities and special commitments to American Indians, Alaska Natives, and island territories under U.S. administration.¹¹⁵ DOI has a wide range of responsibilities, including,

¹¹³ This section was written by Mark K. DeSantis, Analyst in Natural Resources Policy, CRS Resources, Science, and Industry Division.

¹¹⁴ For more information on the Department of the Interior, see CRS Report R45480, *U.S. Department of the Interior: An Overview*, by Mark K. DeSantis.

¹¹⁵ Department of the Interior, *Strategic Plan for Fiscal Years 2022-2026* and *Strategic Plan for Fiscal Years 2018-2022*, available at <https://www.doi.gov/performance/strategic-planning>.

among other things, mapping; geological, hydrological, and biological science; migratory bird, wildlife, and endangered species conservation; surface-mined lands protection and restoration; and historic preservation, as well as energy and mineral leasing on public lands.

The Administration is requesting \$1.48 billion for R&D in FY2024.¹¹⁶ This reflects an increase of \$214 million (16.9%) from the FY2023 estimated level of \$1.26 billion.¹¹⁷ Funding for DOI R&D is generally included in appropriations line items that also include non-R&D activities. How much of the funding provided in appropriations legislation is allocated to R&D specifically is unclear unless funding is provided at the precise level of the request. In general, R&D funding levels are known only after DOI components allocate their appropriations to specific activities and report those figures.

U.S. Geological Survey

The U.S. Geological Survey typically accounts for more than two-thirds of all DOI R&D funding. A single appropriations account, Surveys, Investigations, and Research (SIR), provides all USGS funding. USGS R&D is conducted under seven SIR activity/program areas: Ecosystems; Energy and Mineral Resources; Natural Hazards; Water Resources; Core Science Systems; Science Support; and Facilities.¹¹⁸ For FY2024, the Administration requested \$1.08 billion for R&D, an increase of \$190 million (21%) from the FY2023 estimated level of \$892 million.¹¹⁹

Other DOI Components

The President's FY2024 request also includes R&D funding for the following DOI components:

- Bureau of Reclamation (BOR): \$147 million for FY2024, up \$1 million (1%) from the FY2023 estimate.
- Bureau of Ocean Energy Management (BOEM): \$95 million for FY2024, up \$20 million (27%) from the FY2023 estimate.
- Fish and Wildlife Service (FWS): \$57 million for FY2024, equal to the FY2023 estimate.
- National Park Service (NPS): \$32 million for FY2023, up \$3 million (10%) from the FY2023 estimate.
- Bureau of Safety and Environmental Enforcement (BSEE): \$32 million for FY2024, equal to the FY2023 estimate.
- Bureau of Land Management (BLM): \$21 million for FY2024, equal to the FY2023 estimate.

¹¹⁶ Executive Office of the President, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, March 2023, p. 58. For reference, the Administration's request for total net discretionary funding for DOI in FY2024 is \$18.3 billion; however, these figures do not include supplemental funding provided under other laws.

¹¹⁷ FY2023 figures reflect all 2023 enacted appropriations.

¹¹⁸ In FY2023, Congress also included funding for Congressionally Directed Spending (CDS) items for the USGS under a "Special Initiatives" line item. For more information, see CRS In Focus IF12097, *The U.S. Geological Survey (USGS): Background and FY2023 Appropriations*, by Anna E. Normand, and CRS In Focus IF12358, *The U.S. Geological Survey (USGS): Background and FY2024 Appropriations*, by Anna E. Normand.

¹¹⁹ Data provided to CRS by OMB. Email communication, March 2023. For reference, the President's total FY2024 budget request for USGS is \$1.79 billion; however, this figure does not include supplemental funding provided under separate laws.

- Wildland Fire Management (WFM): \$6 million for FY2024, equal to the FY2023 estimate.
- Bureau of Indian Affairs (BIA): \$5 million for FY2024, equal to the FY2023 estimate.
- Office of Surface Mining Reclamation and Enforcement (OSMRE): \$1 million for FY2024, equal to the FY2023 estimate.

Table 19 summarizes FY2023 estimated R&D funding and the President’s FY2024 R&D funding request for DOI components.

Table 19. Department of the Interior R&D

(budget authority, in millions of dollars)

	FY2023 Estimate ^a	FY2024 Request ^b	FY2024 House	FY2024 Senate	FY2024 Enacted
U.S. Geological Survey (USGS)	892	1,082			
Bureau of Reclamation (BOR)	146	147			
Bureau of Ocean Energy Management (BOEM)	75	95			
Fish and Wildlife Service (FWS)	57	57			
National Park Service (NPS)	29	32			
Bureau of Safety and Environmental Enforcement (BSEE)	32	32			
Bureau of Land Management (BLM)	21	21			
Bureau of Indian Affairs (BIA)	5	5			
Wildland Fire Management (WFM)	6	6			
Office of Surface Mining Reclamation and Enforcement (OSMRE)	1	1			
Department of the Interior, R&D Total	1,264	1,478			

Sources: EOP, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2024, Research and Development*, p. 58; and data provided to CRS by OMB via email communications, March 2023.

Notes: Totals may differ from the sum of the components due to rounding. Figures for FY2024 House, FY2024 Senate, and FY2024 Enacted will be added as Congress completes each action.

- The 2023 Estimate column includes all 2023 enacted appropriations, including supplemental appropriations provided as part of the Inflation Reduction Act of 2022 (P.L. 117-169) and the Infrastructure Investment and Jobs Act (P.L. 117-58).
- According to communications with OMB, the FY2024 request includes funding requested as part of the annual appropriations process, as well as supplemental funding provided under separate laws.

Environmental Protection Agency¹²⁰

The U.S. Environmental Protection Agency (EPA) administers multiple environmental pollution control laws, many of which are carried out under a delegated framework with states and tribes

¹²⁰ This section was written by Angela C. Jones, Analyst in Environmental Policy, CRS Resources, Science, and (continued...)

(and local governments for certain authorities). To carry out this mission, EPA funds a broad range of R&D activities intended to provide scientific tools and knowledge that inform decisions relating to preventing, regulating, and abating environmental pollution. Since FY2006, Congress has funded EPA's discretionary budget through the Interior, Environment, and Related Agencies annual appropriations acts.

Appropriations for EPA R&D are generally included in programs and activities that also include non-R&D functions. Annual appropriations bills and the accompanying committee reports do not identify precisely how much funding is allocated to EPA R&D alone. EPA determines R&D funding levels for its operations by allocating the agency's appropriations for authorized activities and reporting those amounts.

The agency's Science and Technology (S&T) appropriations account funds much of EPA's scientific research activities,¹²¹ which include R&D conducted by the agency at its own laboratories and facilities, and R&D and related scientific research conducted by universities, foundations, and other nonfederal entities that receive EPA grants. The S&T account generally receives a base appropriation and a transfer from the Hazardous Substance Superfund (Superfund) account for research on more effective methods for remediating contaminated sites.¹²²

EPA's Office of Research and Development (ORD) is the primary manager of R&D at EPA headquarters and laboratories around the country, as well as EPA-supported R&D external to the agency. A large portion of the S&T account funds EPA R&D activities managed by ORD, including research grants. Programs implemented by other offices within EPA also may have a research component, but the research component is not necessarily the primary focus of each particular program.

Enacted on December 29, 2022, Division G of the Consolidated Appropriations Act, 2023 (P.L. 117-328) includes the Department of the Interior, Environment, and Related Agencies appropriations for FY2023. Division G, Title II of P.L. 117-328 provides \$833.9 million for EPA's S&T account, which includes a \$31.6 million transfer from the Superfund account.

For FY2024, the President requested a total of \$999.8 million for EPA's S&T account, including a \$31.9 million transfer from the Superfund account.¹²³ The FY2024 requested amount is \$165.9 million (19.9%) more than the FY2023 enacted amount for the S&T account, including transfers.

Table 20 presents a comparison of the FY2023 enacted appropriations and the President's FY2024 request for program areas and activities funded within EPA's S&T account. The program areas and activities listed in **Table 20** are only those identified in funding tables presented in explanatory statements accompanying annual appropriations bills that fund EPA. The explanatory statements include additional breakouts of funding and directive language for certain activities

Industry Division. For an overview of FY2023 EPA appropriations, see CRS In Focus IF12349, *U.S. Environmental Protection Agency FY2023 Appropriations*, by Angela C. Jones.

¹²¹ In 1995, Congress established eight statutory accounts for EPA, including the S&T account. The S&T account incorporates elements of the former EPA Research and Development account, as well as portions of the former Salaries and Expenses and Program Operations accounts, which were in place until FY1996. Currently, discretionary funding is annually appropriated to EPA among 10 statutory accounts established by Congress over time in annual appropriations acts. Because of the differences in the scope of the activities included in these accounts, a comparable breakout of funding for these same activities before FY1996 is not readily available.

¹²² See footnote 34 for more information on Superfund.

¹²³ EPA, *Fiscal Year 2024 Justification of Appropriation Estimates for the Committee on Appropriations*, EPA-190-R-23-001, March 2023, at <https://www.epa.gov/system/files/documents/2023-03/fy-2024-congressional-justification-all-tabs.pdf>.

within these broader program areas. EPA’s annual budget justification also identifies specific amounts of funding for various subprogram activities not listed in these explanatory statements.

Table 20. U.S. Environmental Protection Agency Science and Technology Account
(appropriations, in millions of dollars)

S&T Program Areas and Activities	FY2023 Enacted ^a	FY2024 Request ^b	FY2024 House	FY2024 Senate	FY2024 Enacted
Clean Air ^a	144.6	221.0			
<i>Atmospheric Protection Program^c</i>	8.8	10.7			
Enforcement	15.5	18.7			
Homeland Security	36.8	74.2			
Indoor Air and Radiation	5.8	7.4			
Information Technology/Data Management/Security	3.2	3.3			
Operations and Administration	67.5	72.0			
Pesticide Licensing	6.2	7.4			
Research: Air and Energy ^d	100.4	137.8			
Research: Chemical Safety and Sustainability	132.5	148.8			
<i>Research: Computational Toxicology</i>	21.6	23.1			
<i>Research: Endocrine Disruptors</i>	16.4	17.5			
Research: National Priorities ^e	30.8	0.0			
Research: Safe and Sustainable Water Resources	116.1	123.6			
Research: Sustainable and Healthy Communities	137.9	146.6			
Water: Human Health Protection ^f	5.1	7.0			
Subtotal Base S&T Account	802.3	967.8			
Transfer from Hazardous Substance Superfund Account to the S&T Account	31.6	31.9			
Total, S&T Account (Net Appropriations)	833.9	999.8			

Source: Prepared by CRS. Amounts in the table are generally as presented in P.L. 117-328; the explanatory statement accompanying H.R. 2617 as printed in the *Congressional Record*, vol. 168, no. 198—Book II (December 20, 2022), pp. S8834-S8842 (funding tables); EPA, *Fiscal Year 2024 Justification of Appropriation Estimates for the Committee on Appropriations*, EPA-190-R-23-001, March 2023, at <https://www.epa.gov/system/files/documents/2023-03/fy-2024-congressional-justification-all-tabs.pdf>, pp. 4 and 1306-1317 (pp. 24 and 1326-1337 of the PDF).

Notes: Totals may differ from the sum of the components due to rounding. Figures for the columns headed “FY2024 House,” “FY2024 Senate,” and “FY2024 Enacted” will be added, if available, as action is completed.

- a. EPA’s FY2024 budget justification refers to this program area as “Clean Air and Climate.”
- b. Figures in the FY2024 Request column do not include advance appropriations.
- c. EPA’s FY2024 budget justification refers to this program area as “Climate Protection.”
- d. EPA’s FY2024 budget justification refers to this program area as “Research: Air, Climate, and Energy.”
- e. The President’s annual budget request typically does not include funding for “Research: Congressional Priorities.” The House and Senate refer to this program area as “Research: National Priorities” for which the House or Senate allocates funding for specific research activities.
- f. EPA’s FY2024 budget justification refers to this program area as “Ensure Safe Water.”

Department of Homeland Security¹²⁴

The Department of Homeland Security has identified five core missions: to prevent terrorism and enhance security, to secure and manage the borders, to enforce and administer immigration laws, to safeguard and secure cyberspace, and to ensure resilience to disasters. New technology resulting from research and development can contribute to achieving all these goals. The Directorate of Science and Technology (S&T) has primary responsibility for establishing, administering, and coordinating DHS R&D activities. Other components, such as the Countering Weapons of Mass Destruction Office and the Transportation Security Administration, conduct R&D relating to their specific missions.

The President's FY2024 budget request for DHS includes \$542 million for activities identified as R&D. This would be a decrease of 6.2% from \$578 million in FY2023. The requested total includes \$437 million for the R&D account in the S&T Directorate and smaller amounts for five other DHS components. (See **Table 21**.)

The S&T Directorate performs R&D in several laboratories of its own and funds R&D performed by the DOE national laboratories, industry, universities, and others. It also conducts testing and other technology-related activities in support of acquisitions by other DHS components. The Administration's FY2024 request of \$437 million for the S&T Directorate R&D account would be a decrease of 5.3% from \$461 million in FY2023. Within the R&D account, the Research, Development, and Innovation budget line would decrease by \$22 million, including decreases for First Responder/Disaster Resilience (down \$27 million); (down \$5 million); Innovative Research and Foundational Tools (down \$3 million) and Counter Terrorist (down less than \$1 million); and increases for Border Security (up \$18 million); and Chemical, Biological, and Explosives Defense (up \$6 million). According to DHS, the proposed decreases for cybersecurity and resilience R&D reflect, at least in part, funding for those purposes that remains available from an emergency supplemental FY2022 appropriation of \$158 million, provided in the Infrastructure Investment and Jobs Act (IIJA, P.L. 117-58), which DHS has five years to spend. In the University Programs budget line, the request for Centers of Excellence is \$46 million, the same as FY2023, while the request for Minority Serving Institutions is \$5 million, down from \$8 million in FY2023.

In addition to its R&D account, the S&T Directorate receives funding for laboratory facilities and other R&D-related expenses through two other accounts (not shown in the table). The total request for the directorate is \$887 million, a decrease of 1.5% from \$901 million in FY2023. The directorate's Procurement, Construction, and Improvements account would receive \$79 million under the Administration's request (versus \$55 million in FY2023), including an increase of \$29 million for design and construction of a detection sciences facility at the Transportation Security Laboratory; a decrease of \$26 million for critical repairs and replacements at various S&T Directorate laboratories; and an increase of \$20 million to continue preparations for the closure of the Plum Island Animal Disease Center—which is being replaced by the National Bio and Agro-Defense Facility (NBAF)—and the sale of Plum Island itself.¹²⁵

¹²⁴ This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

¹²⁵ The S&T Directorate is building NBAF using previously appropriated funds and is to transfer the facility to the USDA once it becomes operational. For more information, see CRS In Focus IF11492, *National Bio and Agro-Defense Facility: Purpose and Status*, by Genevieve K. Croft. Congressional readers may contact CRS Analyst Lisa S. Benson for follow-up.

Table 21. Department of Homeland Security R&D Accounts
(budget authority, in millions of dollars)

	FY2023 Enacted	FY2024 Request^a	FY2024 House	FY2024 Senate	FY2024 Enacted
Science and Technology Directorate	461	437			
Countering Weapons of Mass Destruction Office	65	61			
Transportation Security Administration	34	29			
U.S. Coast Guard	7	7			
Cybersecurity and Infrastructure Security Agency	7	4			
U.S. Secret Service	4	4			
Total, DHS R&D	578	542			

Sources: FY2023 enacted from P.L. 117-328. FY2024 request from DHS congressional budget justification at <https://www.dhs.gov/publication/congressional-budget-justification-fiscal-year-fy-2024>.

Notes: Table includes accounts titled “Research and Development” in each DHS component. Some other accounts may also fund R&D-related activities. Some amounts may not add to totals due to rounding. Figures for the columns currently blank will be added as Congress completes each action.

a. Figures in the FY2024 Request column do not include advance appropriations.

Appendix. CRS Contacts for Agency R&D

The following table lists the primary CRS experts on R&D funding for the agencies covered in this report.

Agency	CRS Contact
Department of Agriculture	Lisa S. Benson Analyst in Agricultural Policy
Department of Commerce	
National Institute of Standards and Technology	John F. Sargent Specialist in Science and Technology Policy Emily G. Blevins Analyst in Science and Technology Policy
National Oceanic and Atmospheric Administration	Eva Lipiec Analyst in Natural Resources Policy
Department of Defense	Marcy E. Gallo Analyst in Science and Technology Policy
Department of Energy	Daniel Morgan Specialist in Science and Technology Policy
Department of Health and Human Services	Kavya Sekar Analyst in Health Policy
National Institutes of Health	
Department of Homeland Security	Daniel Morgan Specialist in Science and Technology Policy
Department of the Interior	Mark K. DeSantis Analyst in Natural Resources Policy
Department of Transportation	David Randall Peterman Analyst in Transportation Policy
Department of Veterans Affairs	Jared S. Sussman Analyst in Health Policy
Environmental Protection Agency	Angela C. Jones Analyst in Environmental Policy
National Aeronautics and Space Administration	Daniel Morgan Specialist in Science and Technology Policy
National Science Foundation	Laurie A. Harris Analyst in Science and Technology Policy

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