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Energy and Water Development: FY2019 Appropriations

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SUMMARY

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Energy and Water Development: FY2019 Appropriations

The Energy and Water Development appropriations bill provides funding for civil works projects of the Army Corps of Engineers (Corps); the Department of the Interior's Bureau of Reclamation (Reclamation) and Central Utah Project (CUP); the Department of Energy (DOE); the Nuclear Regulatory Commission (NRC); and several other independent agencies. DOE typically accounts for about 80% of the bill's total funding.

President Trump submitted his FY2019 budget proposal to Congress on February 12, 2018. The President's budget requests for agencies included in the Energy and Water Development appropriations bill totaled $36.341 billion—$6.871 billion (15.9%) below the FY2018 appropriation. A $375 million increase (3.5%) was proposed for DOE nuclear weapons activities. In contrast, the two versions of the FY2019 Energy and Water Development appropriations bill passed by the House and Senate (Division A of H.R. 5895, H.Rept. 115-697, S.Rept. 115-258) provided for total appropriations above the FY2018 level. The enacted FY2019 Energy and Water Development Appropriations Act, which was signed into law September 21, 2018 (Division A of P.L. 115-244), increased total funding to $44.660 billion (up 3.3%). FY2018 Energy and Water Development funding was included in the Consolidated Appropriations Act, 2018 (P.L. 115-141).

Major Energy and Water Development funding issues for FY2019 include the following:

- *Water Agency Funding Reductions*. The Trump Administration requested reductions of 29.9% for the Corps and 28.6% for Reclamation for FY2019. Those cuts were largely not followed by the House and Senate or the enacted FY2019 appropriations measure (P.L. 115-244).
- *Termination of Energy Efficiency Grants*. DOE's Weatherization Assistance Program and State Energy Program would have been terminated under the FY2019 budget request. Congress did not eliminate the grants for FY2018 and the proposed cuts were not included in the FY2019 House and Senate bills or the enacted appropriation.
- *Reductions in Energy Research and Development*. Under the FY2019 budget request, DOE research and development appropriations would have been reduced for energy efficiency and renewable energy (EERE) by 65.5%, nuclear energy by 37.2%, and fossil energy by 30.9%. The House and Senate bills largely did not include the proposed reductions. P.L. 115-244 increased R&D funding for fossil energy by 1.8% from the FY2018 level, energy efficiency and renewable energy by 2.5%, and nuclear energy by 10.0%.
- *Nuclear Waste Repository.* The Administration's budget request would have provided new funding for the first time since FY2010 for a proposed nuclear waste repository at Yucca Mountain, NV. DOE would have received $110 million to seek an NRC license for the repository, and NRC was to receive $47.7 million to consider DOE's application. DOE would also have received $10 million to develop interim nuclear waste storage facilities. The House bill included an additional $100 million for DOE above the request for Yucca Mountain licensing. The Senate bill provided no Yucca Mountain funds, nor did the enacted FY2019 appropriations measure. A similar Administration funding request for FY2018 also was not enacted.
- *Elimination of Advanced Research Projects Agency—Energy (ARPA-E)*. The Trump Administration proposed to eliminate funds for new research projects by ARPA-E in FY2019, and called for terminating the program after currently funded projects were completed. The House approved an 8.0% cut and the Senate voted for a 6.1% increase. The enacted FY2019 appropriations measure boosted ARPA-E funding by 3.6%. A similar proposal to terminate ARPA-E in FY2018 was also not enacted.

- *Low-Yield Warhead*. DOE's FY2019 budget documents proposed a low-yield version of the W76 LEP nuclear warhead. DOE's initial FY2019 budget request did not include any funding specifically allocated to this modification, but the White House requested $65 million for it in a budget amendment package submitted to Congress on April 13, 2018. The House- and Senate-passed bills both included the requested funding for the low-yield warhead, as does the enacted FY2019 appropriations measure.
- *Plutonium Disposition Plant Termination.* The Administration proposed in FY2018 and FY2019 to terminate construction of the Mixed-Oxide Fuel Fabrication Facility (MFFF), which would make fuel for nuclear reactors out of surplus weapons plutonium. The FY2018 Consolidated Appropriations Act conformed to provisions in the National Defense Authorization Act, 2018 (P.L. 115-91) that allow DOE to pursue an alternative plutonium disposal program if sufficient cost savings are projected. The enacted FY2019 Energy and Water Development Appropriations Act also conformed to the Defense Authorization provisions and provided $220 million, the same as the request, to begin shutting down the South Carolina project. The Administration certified under P.L. 115-91 on May 10, 2018, that the cost-saving requirement for termination of MFFF would be met, although the certification has been challenged in court.

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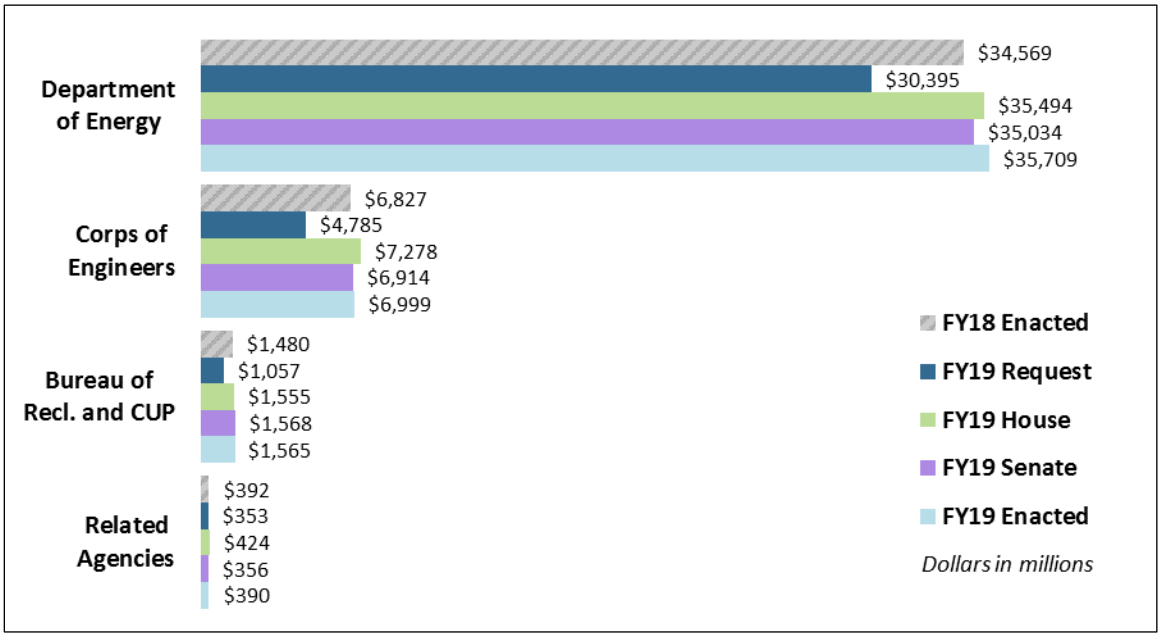
Introduction and Overview

The Energy and Water Development appropriations bill includes funding for civil works projects of the U.S. Army Corps of Engineers (Corps), the Department of the Interior's Central Utah Project (CUP) and Bureau of Reclamation (Reclamation), the Department of Energy (DOE), and a number of independent agencies, including the Nuclear Regulatory Commission (NRC) and the Appalachian Regional Commission (ARC). **Figure 1** compares the major components of the FY2019 Energy and Water Development bill at each stage of consideration, along with the FY2018 enacted levels.

Figure 1. Major Components of Energy and Water Development Appropriations Bill



Sources: Explanatory statement for Energy and Water Development and Related Agencies Appropriations Act, 2019 (Division A of H.R. 5895). Includes some adjustments; see tables 4-7 for details.

President Trump submitted his FY2019 budget proposal to Congress on February 12, 2018. The budget requests for agencies included in the Energy and Water Development appropriations bill totaled $36.341 billion—$6.878 billion (16%) below the FY2018 appropriation. (See **Table 3**.) A $375 million increase (3.5%) was proposed for DOE nuclear weapons activities. In contrast to the Administration proposal, the House and Senate versions of the FY2019 Energy and Water Development appropriations bill (Divison A of H.R. 5895, H.Rept. 115-697, S.Rept. 115-258) provided total appropriations above the FY2018 level. The conference agreement on H.R. 5895 (H.Rept. 115-929) provided total Energy and Water Development appropriations of $44.66 billion—3% above the FY2018 level, excluding supplemental funding.[1] It was signed by the President on September 21, 2018 (P.L. 115-244).

FY2018 Energy and Water Development funding was included in the Consolidated Appropriations Act, 2018 (P.L. 115-141), signed by the President on March 23, 2018. FY2018 emergency supplemental appropriations totaling $17.419 billion were provided to the Corps and DOE for hurricane response by the Bipartisan Budget Act of 2018 (P.L. 115-123), signed

[1] For details, see Joint Explanatory Statement of the Committee of Conference on H.R. 5895, Division A—Energy and Water Development and Related Agencies Appropriations Act, 2019.

February 9, 2018. For more details, see CRS Report R44895, *Energy and Water Development: FY2018 Appropriations*, by Mark Holt and Corrie E. Clark, and CRS Report R45326, *Army Corps of Engineers Annual and Supplemental Appropriations: Issues for Congress*, by Nicole T. Carter.

The FY2019 budget request proposed substantial reductions from the FY2018 level for DOE energy research and development (R&D) programs, including a cut of $1.320 billion (65.5%) in energy efficiency and renewable energy, $224.7 million (30.9%) in fossil fuels, and $448.0 million (37.2%) in nuclear energy. DOE science programs would have been cut by $868.9 million (13.9%). Programs targeted by the budget for elimination or phaseout included energy efficiency grants, the Advanced Research Projects Agency—Energy (ARPA-E), loan guarantee programs, and ARC. Funding would have been reduced for the Corps by $2.042 billion (29.9%), and Reclamation and CUP by $423.0 million (28.6%).

The House Appropriations Committee approved its version of the FY2019 Energy and Water Development appropriations bill (H.R. 5895) on May 16, 2018, by a vote of 29-20. H.R. 5895 was subsequently combined into a "minibus" with the FY2019 Legislative Branch and Military Construction and Veterans Affairs appropriations bills and passed the House 235-179 on June 8, 2018. The Energy and Water Development division of the House-passed bill (Division A) had total funding of $44.751 billion without scorekeeping adjustments—$1.533 billion above the FY2018 enacted level and $8.411 billion above the Administration request. The House-passed bill would have provided more than the Administration's proposed funding increase for DOE weapons activities, funding for Yucca Mountain, and continued funding for DOE's loan programs and energy efficiency grants. Most of the Administration's proposed reductions in R&D on energy efficiency and renewable, nuclear, and fossil energy were not agreed to by the House.

The Senate Appropriations Committee approved its version of the Energy and Water Development appropriations bill (S. 2975) on May 24, 2018. The Senate passed H.R. 5895 on June 25, 2018, after substituting the text of S. 2975 in Division A, with total funding of $43.872 billion—$653 million above FY2018 and $7.531 billion above the Administration request, before rescissions and offsets. The Senate-passed version of the bill would have increased funding for DOE's weapons activities, established a pilot interim storage facility for nuclear waste, provided nearly level funding for energy efficiency and renewable energy R&D, and continued the Title 17 Loan Guarantee program. The Senate bill did not eliminate ARPA-E, instead providing an increase from the FY2018 enacted level.

The final Energy and Water Development and Related Agencies Appropriations Act, 2019 (Division A of P.L. 115-244) increases Corps funding by $171.5 million (3%) over the FY2018 enacted level (excluding supplemental appropriations), Reclamation and CUP by $85 million (6%), and DOE by $1.139 billion (3%). The Administration's proposals to eliminate energy efficiency grants, ARPA-E, and loan guarantee programs were not adopted. The enacted measure did not provide funding for the Yucca Mountain nuclear waste project. Funding for DOE nuclear weapons activities was increased by $457.9 million (4.3%) over the FY2018 level.

Budgetary Limits

Congressional consideration of the annual Energy and Water Development appropriations bill is affected by certain procedural and statutory budget enforcement measures. The procedural budget enforcement is primarily through limits associated with the budget resolution on total discretionary spending and allocations of this amount that apply to spending under the jurisdiction of each appropriations subcommittee. Statutory budget enforcement is derived from the Budget Control Act of 2011 (BCA; P.L. 112-25).

The BCA established separate limits on defense and nondefense discretionary spending. These limits are in effect for each of the fiscal years from FY2012 through FY2021, and are primarily enforced by an automatic spending reduction process called sequestration, in which a breach of a spending limit would trigger across-the-board cuts of spending within that spending category.

The BCA's statutory discretionary spending limits were increased for FY2018 and FY2019 by the Bipartisan Budget Act of 2018 (BBA 2018; P.L. 115-123), enacted February 9, 2018. For FY2018, BBA 2018 increased the defense limit by $80 billion (to $629 billion) and increased the nondefense limit by $63 billion (to $579 billion); for FY2019 it increased the defense limit by $85 billion (to $647 billion) and increased the nondefense limit by $68 billion (to $597 billion).

The House and Senate Appropriations Committees allocated the FY2019 BBA discretionary spending limits among their 12 subcommittees in May 2018. For Energy and Water Development, the House Committee allocated $44.7 billion, up $1.5 billion (3.5%) from FY2018 (H.Rept. 115-710). The Senate Committee allocation for Energy and Water Development was $43.766 billion, an increase of $553.9 million (1.3%), found in S.Rept. 115-267. These allocations under Section 302(b) of the Congressional Budget Act provide ceilings for appropriations bills being brought to the floor.

(For more information, see CRS Report R44874, *The Budget Control Act: Frequently Asked Questions*, by Grant A. Driessen and Megan S. Lynch.)

Funding Issues and Initiatives

Several issues generated controversy during congressional consideration of Energy and Water Development appropriations for FY2019. The issues described in this section—listed approximately in the order the affected agencies appear in the Energy and Water Development bill—were selected based on the total funding involved and the percentage of proposed increases or decreases, the amount of congressional attention received, and potential impact on broader public policy considerations.

Corps and Reclamation Budgets

For the Corps, the Trump Administration requested $4.785 billion for FY2019, which is $2.042 billion (29.9%) below the FY2018 appropriation. The request included no funding for initiating new studies and construction projects (referred to as new starts). The President requested $872 million for Corps construction; the FY2018 appropriation was $2.09 billion. The House provided a 6.6% total increase in FY2019 for the Corps and a 4.8% increase for Reclamation over the FY2018 appropriation. The Senate approved a 1.3% increase for the Corps and a 5.7% boost for Reclamation from their FY2018 levels. The enacted FY2019 appropriations measure provided increases of 2.5% for the Corps and 5.5% for Reclamation over FY2018. For more details, see CRS In Focus IF10864, *Army Corps of Engineers: FY2019 Appropriations*, by Nicole T. Carter; CRS In Focus IF10841, *Bureau of Reclamation: FY2019 Appropriations*, by Charles V. Stern; and CRS Report R45326, *Army Corps of Engineers Annual and Supplemental Appropriations: Issues for Congress*, by Nicole T. Carter.

Corps Reorganization

The Trump Administration has proposed to move the civil works activities from the Department of Defense (DOD) to the Department of Transportation (DOT) and the Department of the Interior

(DOI) "to consolidate and align" the Corps' civil works missions with these agencies.[2] The conference report on the FY2019 Energy and Water Development Appropriations Act, H.Rept. 115-929, states the following:

> The conferees are opposed to the proposed reorganization as it could ultimately have detrimental impacts for implementation of the Civil Works program and for numerous non-federal entities that rely on the Corps' technical expertise, including in response to natural disasters.… Further, this type of proposal, as the Department of Defense and the Corps are well aware, will require enactment of legislation, which has neither been proposed nor requested to date. Therefore, no funds provided in the Act or any previous Act to any agency shall be used to implement this proposal.

The agency's central civil works responsibilities are to support coastal and inland commercial navigation, reduce riverine flood and coastal storm damage, and protect and restore aquatic ecosystems in U.S. states and territories. Additional project benefits also may be developed, including water supply, hydropower, recreation, fish and wildlife enhancement, etc. The Corps performs certain regulatory responsibilities that Congress has assigned to the Secretary of the Army; these include issuing permits for private actions that may affect navigation, wetlands, and other waters of the United States. As part of its military and civil responsibilities and under the National Response Framework, the Corps participates in emergency response activities.

Power Marketing Administration Reforms: Divestiture, Rate Reform, and Repeal of Borrowing Authority

DOE's FY2019 budget request included three mandatory proposals related to the Power Marketing Administrations (PMAs)—Bonneville Power Administration (BPA), Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA). PMAs sell the power generated by the dams operated by Reclamation and the Corps. The Administration proposed to divest the assets of the three PMAs that own transmission infrastructure: BPA, SWPA, and WAPA.[3] These assets consist of thousands of miles of high voltage transmission lines and hundreds of power substations. The budget request projected that mandatory savings from the sale of these assets would total approximately $5.8 billion over a 10-year period.

The budget also proposed eliminating the statutory requirement that PMAs limit rates to amounts necessary to recover only construction, operations, and maintenance costs; the budget proposed that the PMAs instead transition to a market-based approach to setting rates. The Administration estimated that this proposal would yield $1.9 billion in new revenues over 10 years. The Administration's budget also called for repealing $3.25 billion in borrowing authority provided to WAPA for transmission projects enacted under the American Recovery and Reinvestment Act of 2009 (P.L. 111-5). The proposal is estimated to save $640 million over 10 years.

All of these proposals would need to be enacted in authorizing legislation, and no congressional action has been taken on them to date. The proposals have been opposed by groups such as the American Public Power Association and the National Rural Electrical Cooperative Association,

[2] U.S. Executive Office of the President, Office of Management and Budget, *Delivering Government Solutions in the 21st Century: Reform Plan and Reorganization Recommendations*, June 21, 2018, p. 30, https://www.whitehouse.gov/omb/management/government-reform/.

[3] This proposal was also included in the Administration's *Delivering Government Solutions in the 21st Century: Reform Plan and Reorganization Recommendations*, June 21, 2018, pp. 66-67, https://www.whitehouse.gov/wp-content/uploads/2018/06/Government-Reform-and-Reorg-Plan.pdf. Total 10-year savings were estimated at $9.5 billion, possibly including the proposed cancellation of WAPA borrowing authority.

and they have been the subject of opposition letters to the Administration from several regionally based bipartisan groups of Members of Congress.

Termination of Energy Efficiency Grants

The FY2019 budget request proposed to terminate both the DOE Weatherization Assistance Program and the State Energy Program (SEP). The Weatherization Assistance Program provides formula grants to states to fund energy efficiency improvements for low-income households to reduce their energy bills and save energy. The SEP provides grants and technical assistance to states for planning and implementation of their energy programs. Both the weatherization and SEP programs are under DOE's Office of Energy Efficiency and Renewable Energy (EERE). The weatherization program received $251 million and SEP $55 million for FY2018. According to DOE, elimination of the grant programs is intended "to reduce Federal intervention in State-level energy policy and implementation and to focus funding on limited, early-stage applied energy research and development activities where the Federal role is stronger."[4] However, the proposed FY2019 cuts were not adopted by the House and Senate, and the enacted bill provided a small increase from the FY2018 level.

Proposed Restructuring of Electricity Delivery and Energy Reliability

The FY2019 budget request proposed to split the DOE Electricity Delivery and Energy Reliability appropriation into two appropriations: Electricity Delivery (OE), and Cybersecurity, Energy Security, and Energy Reliability (CESER). The request states that proposing a separate account for CESER "supports the Administration's commitment to protecting energy infrastructure security." The Trump Administration's combined request for these offices was $157 million—roughly a 37% reduction from the FY2018 enacted level of $248 million.

According to H.Rept. 115-712, the House approved DOE's proposal to split the appropriations accounts into two—OE and CESER—and would have provided a combined appropriation of $323 million ($176 million for OE and $147 million for CESER). However, according to S.Rept. 115-258, the Senate replaced the Electricity Delivery and Energy Reliability appropriation account with the CESER account, which included programs that the Administration had proposed to be in a separate OE account.[5] S. 2975 and the Senate-passed H.R. 5895 would have provided funding for the combined CESER account at $260 million. The enacted FY2019 appropriations measure includes $120 million for CESER and $156 million for OE, for a total of $276 million.

For further background, see CRS In Focus IF10874, *DOE Office of Electricity Delivery and Energy Reliability: Organization and FY2019 Budget Request*, by Corrie E. Clark.

Proposed Cuts in Energy R&D

Appropriations for DOE R&D on energy efficiency, renewable energy, nuclear energy, and fossil energy would have been cut from $3.948 billion in FY2018 to $1.955 billion (-50.5%) under the Administration's FY2019 budget request. Major proposed reductions included coal programs (-28.7%), nuclear fuel cycle R&D (-76.9%), sustainable transportation (-75.6%), renewable

[4] DOE, *FY2019 Congressional Budget Justification*, vol. 3, part 2, p. 213, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf.

[5] S.Rept. 115-258, pp. 116-117.

energy (-66.3%), advanced manufacturing (-75.4%), and building technologies (-74.2%).[6] The proposed reductions within building technologies included limiting rulemaking and enforcement for equipment and buildings standards to "the minimum required to maintain compliance with statute."[7] The request also stated that the equipment and buildings standards program would rely on "reimbursable funding from the Environmental Protection Agency" for costs related to test procedure development and performance verification of ENERGY STAR products.[8]

The House-passed bill included substantially smaller reductions in sustainable transportation (-9.2%) and renewable energy (-15.7%) than proposed by the Administration. An increase over the FY2018 enacted level was included for coal R&D (10.7%). The Senate also would have provided more funding for energy R&D than requested by the Administration. The Senate bill included small decreases for sustainable transportation (-1%) and renewable energy (-1.9%), and a reduction in coal R&D programs (-3.8%). The enacted FY2019 appropriations measure provided increases from the FY2018 levels for R&D on fossil energy (1.8%), energy efficiency and renewable energy (2.5% with increases of 6.4% and 1.5% for sustainable transportation and renewable energy, respectively), and nuclear energy (10.0%). For more information, see CRS In Focus IF10589, *FY2019 Funding for CCS and Other DOE Fossil Energy R&D*, by Peter Folger.

Energy R&D Policy and Reorganization

The Administration's FY2019 budget justification included numerous proposals to terminate late-stage technology development and commercialization activities "to focus on early stage R&D."[9] According to DOE, "The Federal role in supporting advanced technologies is strongest in the early stages of research and development."[10] A Statement of Administration Policy issued before the House floor debate criticized the House Energy and Water appropriations bill for providing "excessive funding for the Department's applied energy programs" and called for "Congress to restrain funding levels in these programs and focus resources on early-stage R&D across the applied energy technology spectrum rather than late stage or near commercial ready technology."[11]

However, the conferees rejected that view, ordering DOE to implement activities in all stages of energy technology development:

> The Department is directed throughout all of its programs to maintain a diverse portfolio of early-, mid-, and late-stage research, development, and market transformation activities. The Department is further directed to fully execute the funds appropriated in a timely manner and to keep the Committees on Appropriations of both Houses of Congress apprised of progress in implementing funded programs, projects, and activities.[12]

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[6] H.Rept. 115-697, pp. 124-129.

[7] DOE, FY2019 Congressional Budget Justification, vol. 3, part 2, p. 210, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf.

[8] Ibid. For more information about the ENERGY STAR program, see CRS In Focus IF10753, *ENERGY STAR Program*, by Corrie E. Clark.

[9] For example, see DOE, *FY 2019 Congressional Budget Justification*, vol. 3, part 2, DOE/CF-0141, March 2018, p. 56, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf.

[10] Ibid., p. 441.

[11] Statement of Administration Policy, H.R. 5895—Energy and Water, Legislative Branch, and Military Construction and Veterans Affairs Appropriations Act, 2019, June 5, 2018, https://www.whitehouse.gov/wp-content/uploads/2018/06/saphr5895hr_20180605.pdf.

[12] Joint Explanatory Statement, H.Rept. 115-929, p. 31.

The Administration also issued a government reorganization plan that included a proposal to consolidate DOE's applied energy R&D offices—focusing on fossil fuels, nuclear, renewables, and energy efficiency—into a single Office of Energy Innovation. The proposal's objective is to "reduce a practice of picking energy technology winners and losers and pitting fuel types against one another for government funding and attention." Instead of "presupposing the fraction of the budget necessary for certain energy technologies or sources," the proposed office would require all R&D activities "to compete for resources in the new environment."[13] However, the enacted FY2019 appropriations measure continued to include separate R&D funding for each fuel category.

Nuclear Waste Management

The Administration's FY2019 budget request would have provided new funding for the first time since FY2010 for a proposed nuclear waste repository at Yucca Mountain, NV; a similar funding request for FY2018 was not agreed to by Congress. Under the FY2019 request, DOE was to receive $120 million to seek an NRC license for the repository and to develop interim nuclear waste storage capacity. NRC would have received $47.7 million to consider DOE's application. DOE's total of $120 million in nuclear waste funding would have come from two appropriations accounts: $90 million from Nuclear Waste Disposal and $30 million from Defense Nuclear Waste Disposal (to pay for defense-related nuclear waste that would be disposed of in Yucca Mountain).

DOE submitted a license application for the Yucca Mountain repository in 2008, but NRC suspended consideration in 2011 for lack of funding. The Obama Administration had declared the Yucca Mountain site "unworkable" because of opposition from the State of Nevada. The House voted to provide the Yucca Mountain funding requested for FY2018 and a $100 million increase for FY2019, but the Senate Appropriations Committee did not include it for FY2018, and it was not included in the Senate-passed bill for FY2019. Also as in FY2018, the FY2019 Senate bill included an authorization for a pilot program to develop an interim nuclear waste storage facility at a voluntary site (§304). The enacted FY2019 appropriations measure did not include the House-passed funding for Yucca Mountain or the Senate's nuclear waste pilot program provisions. For more background, see CRS Report RL33461, *Civilian Nuclear Waste Disposal*, by Mark Holt.

Elimination of Energy Loans and Loan Guarantees

The FY2019 budget request would have halted further loans and loan guarantees under DOE's Advanced Technology Vehicles Manufacturing Loan Program and the Title 17 Innovative Technology Loan Guarantee Program. A similar proposal to eliminate the programs in FY2018 was not enacted. Under the FY2019 budget proposal, DOE was to continue to administer its existing portfolio of loans and loan guarantees. Unused prior-year authority, or ceiling levels, for loan guarantee commitments would have been rescinded. Neither the House- nor Senate-passed bills would have eliminated the two programs, nor does the enacted FY2019 appropriations measure. The conference report directed that DOE "shall not use funds to plan, develop, implement, or pursue the elimination of the Title 17 Innovative Technology Loan Guarantee Program."

[13] U.S. Executive Office of the President, Office of Management and Budget, *Delivering Government Solutions in the 21st Century: Reform Plan and Reorganization Recommendations*, June 21, 2018, p. 63, https://www.whitehouse.gov/omb/management/government-reform/.

International Thermonuclear Experimental Reactor

The International Thermonuclear Experimental Reactor (ITER), under construction in France by a multinational consortium, continues to draw congressional concerns about management, schedule, and cost. "ITER will be the first fusion device to maintain fusion for long periods of time" and is to lay the technical foundation "for the commercial production of fusion-based electricity," according to the consortium's website.[14] The United States is to pay 9.09% of the project's construction costs, including contributions of components, cash, and personnel. Other collaborators in the project include the European Union, Russia, Japan, India, South Korea, and China. The total U.S. share of the cost was estimated in 2015 at between $4.0 billion and $6.5 billion, up from $1.45 billion to $2.2 billion in 2008. The Consolidated Appropriations Act for FY2018 provided $122 million for the project. The FY2019 budget request was $75 million, but the House approved $163 million and the Senate voted to provide $122 million—the same as the FY2018 appropriation. In its report on the FY2019 bill, the House Appropriations Committee said, "The Committee continues to believe the ITER project represents an important step forward for energy sciences and has the potential to revolutionize the current understanding of fusion energy." The enacted FY2019 appropriations measure includes $132 million for ITER—a $10 million increase from the FY2018 amount.

Elimination of Advanced Research Projects Agency—Energy

The Trump Administration's FY2019 budget would have eliminated the Advanced Research Projects Agency—Energy (ARPA-E), which funds research on technologies that are determined to have potential to transform energy production, storage, and use.[15] The Administration also proposed to terminate ARPA-E in its FY2018 budget request, but Congress instead increased the program's funding by 15.5%—to $353.3 million. The FY2018 request contended that ARPA-E should end because "the private sector is better positioned to finance disruptive energy research and development and to commercialize innovative technologies."[16]

Because ARPA-E provides advance funding for projects for up to three years, oversight and management of the program would still be required during a phaseout period. The FY2018 budget justification called for $20 million in new appropriations to be supplemented by $45 million in previous funding provided for research projects, which would have been reallocated for closing out the program. The FY2019 budget request proposed to carry out the same termination plan described in the FY2018 request. The House-passed FY2019 funding bill would have reduced ARPA-E funding by $28.3 million from the FY2018 enacted level, while the Senate approved a $22 million increase over FY2018, to $375 million. "The Committee definitively rejects the short-sighted proposal to terminate ARPA-E," according to the Senate Appropriations Committee report.

The enacted FY2019 appropriations measure increased ARPA-E funding by 3.6%, to $366 million. The conference report directed that DOE "shall not use any appropriated funds to plan or execute the termination of ARPA-E."

[14] ITER website, https://www.iter.org/.

[15] DOE, "About ARPA-E," https://arpa-e.energy.gov/?q=arpa-e-site-page/about.

[16] Office of Management and Budget, The White House, *America First: A Budget Blueprint to Make America Great Again*, March 2017, p. 19, https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/fy2018/2018_blueprint.pdf.

Low-Yield Nuclear Warhead

DOE's FY2019 budget documents called for a low-yield version of the W76 LEP (Life Extension Program) nuclear warhead. The FY2019 budget justification notes that "the 2018 Nuclear Posture Review states that the United States will modify a small quantity of existing SLBM [submarine-launched ballistic missile] warheads to provide a low-yield option in the near-term."[17] This proposed warhead has been referred to as the W76-2.

Nuclear warhead development is conducted by the National Nuclear Security Administration (NNSA), an agency within DOE. The initial FY2019 budget request for NNSA did not request any funding specifically allocated to this modification but said, "As the Nuclear Weapons Council translates policy into military requirements, the Administration will work with Congress for appropriate authorizations and appropriations to develop options that support the modification." The White House included $65 million for this modification in a budget amendment package submitted to Congress on April 13, 2018. This document stated that the amendment would "authorize the production of low-yield ballistic missiles to replace higher-yield weapons currently deployed, maintaining the overall number of deployed U.S. ballistic missile warheads." It said a delay in the program past FY2019 "would require a restart of the W76 production line, increase costs, and delay delivery to the Department of Defense."[18] The House- and Senate-passed bills both included the requested funding for the low-yield warhead, as did the enacted FY2019 appropriations measure. For more information, see CRS Report R44442, *Energy and Water Development Appropriations: Nuclear Weapons Activities*, by Amy F. Woolf.

Surplus Plutonium Disposition

The Mixed-Oxide (MOX) Fuel Fabrication Facility (MFFF), which would make fuel for nuclear reactors out of surplus weapons plutonium, has faced sharply escalating construction and operation cost estimates. Because of the rising costs and schedule delays, the Obama Administration proposed terminating MFFF in FY2015, FY2016, and FY2017 and pursuing alternative ways to dispose of surplus plutonium. However, Congress continued to appropriate construction funds for MFFF, located in South Carolina, including $335 million for FY2017. For FY2018, the Trump Administration also proposed to end the MFFF project, requesting $220 million to begin the termination process. The Trump Administration requested $59 million to begin a new Surplus Plutonium Disposition Project that would dilute surplus plutonium for disposal in a deep repository.[19] The Obama Administration had also recommended the dilute-and-dispose option.

The National Defense Authorization Act for FY2018 (P.L. 115-91, §3121) authorized DOE to pursue an alternative plutonium disposal option if its total costs were determined to be "less than approximately half of the estimated remaining lifecycle cost of the mixed-oxide fuel program." The Consolidated Appropriations Act for FY2018 (§309) continued MFFF funding at $335 million but allowed DOE to pursue an alternative disposal method using the procedure in the defense authorization act. Energy Secretary Rick Perry sent a letter to Congress May 10, 2018,

[17] DOE, *FY 2019 Congressional Budget Justification*, vol. 1, p. 86, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-1.pdf.

[18] Aaron Mehta, "Trump Administration Repurposes $65 Million for New Nuclear Warhead Design," *Defense News*, April 17, 2018, https://www.defensenews.com/smr/nuclear-triad/2018/04/17/trump-administration-repurposes-65-million-for-new-nuclear-warhead-design/.

[19] DOE, *FY 2018 Congressional Budget Justification*, vol. 1, p. 548, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume1_1.pdf.

certifying that the cost-saving requirement for termination of MFFF would be met. However, South Carolina filed a lawsuit to prevent DOE from terminating MFFF construction, and a federal district court issued a preliminary injunction against DOE on June 7, 2018.[20]

For FY2019, the House-passed Energy and Water Development appropriations bill included a similar provision to the FY2018 enacted appropriations measure, allowing DOE to terminate MFFF with a cost certification. The Senate version of the bill provided funding for halting MFFF, "consistent with the budget request and the Secretary's waiver to terminate the project." The John S. McCain National Defense Authorization Act for Fiscal Year 2019 (P.L. 115-232) continued the waiver authority established by the FY2018 defense authorization. The enacted FY2019 Energy and Water Development Appropriations Act provided $220 million, the same as the request, to begin shutting down the project. It did not include the $59 million requested for construction of an alternative disposition project but provided $25 million for design of the dilute and dispose option. The Joint Explanatory Statement by the appropriations conferees said the funding was consistent with the Defense Authorization language.

Supporters of MFFF contend that the project is needed to satisfy an agreement with Russia on disposition of surplus weapons plutonium and promises to the State of South Carolina, where MFFF is located (at DOE's Savannah River Site). For more information, see CRS Report R43125, *Mixed-Oxide Fuel Fabrication Plant and Plutonium Disposition: Management and Policy Issues*, by Mark Holt and Mary Beth D. Nikitin.

Cleanup of Former Nuclear Sites

DOE's Office of Environmental Management (EM) is responsible for environmental cleanup and waste management at the department's nuclear facilities. The total FY2019 appropriations request for EM activities was $6.601 billion, a decrease of $525 million (-7.4%) from the FY2018 enacted appropriation. The three EM appropriations accounts are Defense Environmental Cleanup, which the Administration proposed to reduce by $358 million (-6.0%) from FY2018; Non-Defense Environmental Cleanup, down $80 million (-26.8%); and the Uranium Enrichment Decontamination and Decommissioning (D&D) Fund, down $87 million (-10.4%). The House voted to provide $6.869 billion for EM, a decrease of $257 million (-3.6%). The Senate approved $7.182 for EM, an increase of $56 million (0.8%). The enacted FY2019 appropriations measure included $7.175 billion for EM, a 0.7% increase over the FY2018 funding level.

Although the Administration's FY2019 request generally called for continued funding for ongoing cleanup and waste management projects across the complex of sites (with some decreases for specific projects), DOE noted that it may seek to negotiate with federal and state regulators to modify the "milestones" for certain projects.[21] Milestones establish schedules for the completion of specific work under enforceable compliance agreements. Renegotiation of milestones was also called for in the Trump Administration's FY2018 budget request. Previous Administrations have also pursued such a strategy, contending that some established milestones had become infeasible to attain due to resource constraints or technical challenges.

[20] U.S. District Court for the District of South Carolina, Aiken Division, *State of South Carolina v. United States*, Civil Action No.: 1:18-cv-01431-JMC, preliminary injunction order, June 7, 2018.

[21] DOE, *FY 2019 Congressional Budget Justification*, vol. 5, p. 9, March 2018, https://www.energy.gov/sites/prod/files/2018/03/f49/DOE-FY2019-Budget-Volume-5_0.pdf.

Bill Status and Recent Funding History

Table 1 indicates the steps taken during consideration of FY2019 Energy and Water Development appropriations. (For more details, see the CRS Appropriations Status Table at http://www.crs.gov/AppropriationsStatusTable/Index.)

Table 1. Status of Energy and Water Development Appropriations, FY2019

Subcommittee Markup							Final Approval		
House	Senate	House Comm.	House Passed	Senate Comm.	Senate Passed	Conf. Report	House	Senate	Public Law
5/7/18	5/22/18	5/16/18	6/8/18	5/24/18	6/25/18	9/10/18	9/13/18	9/12/18	9/21/18

Source: CRS Appropriations Status Table.

Note: The FY2019 Energy and Water Development appropriations bill (H.R. 5895) was combined with appropriations for the Legislative Branch and for Military Construction and Veterans Affairs as enacted (P.L. 115-244).

Table 2 includes budget totals for energy and water development appropriations enacted for FY2010 through FY2019.

Table 2. Energy and Water Development Appropriations, FY2010-FY2019

(budget authority in billions of current dollars)

FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019
33.4	31.7	32.7[a]	30.7[b]	34.1	34.8	37.3	38.5[c]	43.2[d]	44.7

Source: Compiled by CRS from totals provided by congressional budget documents.

Notes: Figures exclude permanent budget authorities and reflect rescissions.

a. Amount does not include $1.7 billion in emergency funding for the Corps of Engineers.

b. Amount does not include $5.4 billion in funding for the Corps of Engineers ($3.46 billion was additional funding and $1,889 was emergency funding).

c. Amount does not includes $1.0 billion in emergency funding for the Army Corps of Engineers.

d. Amount does not include $17.4 billion in emergency funding for the Corps of Engineers ($17.4 billion) and Department of Energy programs ($22 million).

Description of Major Energy and Water Programs

The annual Energy and Water Development appropriations bill includes four titles: Title I—Corps of Engineers—Civil; Title II—Department of the Interior (Central Utah Project and Bureau of Reclamation); Title III—Department of Energy; and Title IV—Independent Agencies, as shown in **Table 3**. Major programs in the bill are described in this section in the approximate order they appear in the bill. Previous appropriations and recommendations for FY2019 are shown in the accompanying tables, and additional details about many of these programs are provided in separate CRS reports as indicated. For a discussion of current funding issues related to these programs, see "Funding Issues and Initiatives," above.

Table 3. Energy and Water Development Appropriations Summary

(budget authority in millions of current dollars)

Title	FY2016 Approp.	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Title I: Corps of Engineers	5,989	6,038	6,827	4,785	7,278	6,914	6,999
Title II: CUP and Reclamation	1,275	1,317	1,480	1,057	1,555	1,568	1,565
Title III: Department of Energy	29,744	31,182	34,569	30,395	35,494	35,034	35,709
Title IV: Independent Agencies	342	349	392	353	424	356	390
Subtotal	37,350	38,886	43,268	36,589	44,751	43,872	44,684
Rescissions and Scorekeeping Adjustments[a]	-27	-436	-49	-249			-24
E&W Total	**37,323**[b]	**38,450**	**43,218**	**36,341**	**44,751**	**43,872**	**44,660**

Sources: H.Rept. 115-929; S.Rept. 115-258; P.L. 115-31 and explanatory statement; S.Rept. 114-236; H.Rept. 114-532; Administration budget requests; H.Rept. 113-486; S.Rept. 114-54; H.R. 2029 explanatory statement, https://www.congress.gov/crec/2015/12/17/CREC-2015-12-17-bk2.pdf; H.R. 1625 explanatory statement, https://www.congress.gov/crec/2018/03/22/CREC-2018-03-22-bk2.pdf. Subtotals may include other adjustments.

a. Budget "scorekeeping" refers to official determinations of spending amounts for congressional budget enforcement purposes. These scorekeeping adjustments may include offsetting revenues from various sources and rescissions.

b. The energy and water development total in the Explanatory Statement includes $26.9 million in rescissions but excludes $111.1 million in additional scorekeeping adjustments that would reduce the grand total to $37.185 billion, the subcommittee allocation shown in S.Rept. 114-197. See Senate Committee on Appropriations, Comparative Statement of New Budget Authority FY2016, January 12, 2016, p. 11.

Agency Budget Justifications

FY2019 budget justifications for the largest agencies funded by the annual Energy and Water Development appropriations bill can be found on the following websites:

- Title I, Army Corps of Engineers, Civil Works, http://www.usace.army.mil/Missions/CivilWorks/Budget.aspx
- Title II
  - Bureau of Reclamation, https://www.usbr.gov/budget/
  - Central Utah Project, https://www.doi.gov/sites/doi.gov/files/uploads/fy2019_cupca_budget_justification.pdf
- Title III, Department of Energy, https://www.energy.gov/cfo/downloads/fy-2019-budget-justification
- Title IV, Independent Agencies
  - Nuclear Regulatory Commission, https://www.nrc.gov/docs/ML1802/ML18023B460.pdf
  - Defense Nuclear Facilities Safety Board, https://www.dnfsb.gov/about/congressional-budget-requests

- Nuclear Waste Technical Review Board, http://www.nwtrb.gov/about-us/plans

Army Corps of Engineers

The U.S. Army Corps of Engineers is an agency in the Department of Defense with both military and civilian responsibilities. Under its civil works program, which is funded by the Energy and Water appropriations bill, the Corps plans, builds, operates, and in some cases maintains water resources facilities for coastal and inland navigation, riverine and coastal flood risk reduction, and aquatic ecosystem restoration. In recent decades, Congress has generally authorized Corps studies, construction projects, and other activities in omnibus water authorization bills, typically titled Water Resources Development Acts (WRDA), prior to funding them through appropriations legislation. Congress enacted omnibus water resources authorization acts in June 2014, the Water Resources Reform and Development Act of 2014 (WRRDA, P.L. 113-121), and in December 2016, the Water Resources Development Act of 2016 (Title I of P.L. 114-322, the Water Infrastructure Improvements for the Nation Act [WIIN]). These acts authorized new Corps projects and altered numerous Corps policies and procedures.[22]

Unlike highways and municipal water infrastructure programs, federal funds for the Corps are not distributed to states or projects based on a formula or delivered via competitive grants. Instead, the Corps generally is directly involved in the planning, design, and construction of projects that are cost-shared with nonfederal project sponsors.

In addition to site-specific project funding included in the President's annual budget request for the Corps, Congress has identified many additional Corps projects to receive funding during the discretionary appropriations process or adjusted the funding levels for the projects identified in the President's request.[23] In the 112th Congress, site-specific project line items added by Congress (i.e., earmarks) became subject to House and Senate earmark moratorium policies. As a result, Congress generally has not added funding at the project level since FY2010. In lieu of the traditional project-based increases, Congress has included "additional funding" for select categories of Corps projects and provided direction and limitations on the use of these funds. For more information, see CRS In Focus IF10864, *Army Corps of Engineers: FY2019 Appropriations*, by Nicole T. Carter. Previous appropriations and recommendations for FY2019 are shown in **Table 4**.

[22] For more information on Corps authorization legislation, see CRS Report R45185, *Army Corps of Engineers: Water Resource Authorization and Project Delivery Processes*, by Nicole T. Carter.

[23] While congressional earmarks make up a relatively small percentage of most agency budgets, a significant number of Corps projects historically received additional funding from Congress for construction or operational expenditures. In recent years, Congress has provided the Corps funding above the President's request in appropriations legislation and provided guidance to the agency on how to distribute the additional funding for several broad categories of projects in accompanying reports or explanatory text. Generally, Congress has instructed the Corps to make additional project level allocations in a "work plan" and report back to Congress. Some of the categories to be funded in the work plan were designated by Congress as only being available for projects which were not included in the Administration's budget request. Recent work plan allocations are available at http://www.usace.army.mil/Missions/CivilWorks/Budget.aspx. For more information, see CRS Report R45326, *Army Corps of Engineers Annual and Supplemental Appropriations: Issues for Congress*, by Nicole T. Carter.

Table 4. Army Corps of Engineers

(budget authority in millions of current dollars)

Program	FY2016 Approp.	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Investigations and Planning	121.0	121.0	123.0	82.0	129.2	123.0	125.0
Construction	1,862.3	1,876.0	2,085.0	910.0[a]	2,323.0	2,148.0	2,183.0
Mississippi River and Tributaries (MR&T)	345.0	362.0	425.0	249.9[b]	430.0	350.0	368.0
Operation and Maintenance (O&M)	3,137.0	3,149.0	3,630.0	3,003.7[c]	3,821.0	3,740.0	3,739.5
Regulatory	200.0	200.0	200.0	200.0	200.0	200.0	200.0
General Expenses	179.0	181.0	185.0	187.0	184.8	193.0	193.0
FUSRAP[d]	112.0	112.0	139.0	120.0	150.0	120.0	150.0
Flood Control and Coastal Emergencies (FCCE)	28.0	32.0	35.0	27.0	35.0	35.0	35.0
Office of the Asst. Secretary of the Army	4.8	4.8	5.0	5.0	5.0	5.0	5.0
Total Title I	**5,989.0**	**6,037.8**	**6,827.0**	**4,784.6**	**7,278.0**	**6,914.0**	**6,998.5**

Sources: H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; P.L. 115-31 and explanatory statement; S.Rept. 114-236; H.Rept. 114-532; FY2016 budget request and Work Plans for FY2013, FY2014, and FY2015; S.Rept. 114-54; P.L. 113-2; H.R. 2029 explanatory statement; H.R. 1625 explanatory statement, https://www.congress.gov/crec/2018/03/22/CREC-2018-03-22-bk2.pdf. FY2019 request numbers can be found at https://www.usace.army.mil/Missions/Civil-Works/Budget/.

a. Amount includes $5.3 million for inland waterway construction that the Administration requested be derived directly from the Inland Waterway Trust Fund, and $33 million for harbor-related construction activities that the Administration requested be derived directly from the Harbor Maintenance Trust Fund.

b. Amount includes $5.2 million for harbor maintenance that the Administration requested be derived directly from the Harbor Maintenance Trust Fund.

c. Amount includes $927 million for harbor-related operations and maintenance activities that the Administration requested be derived directly from the Harbor Maintenance Trust Fund.

d. Formerly Utilized Sites Remedial Action Program.

Bureau of Reclamation and CUP

Most of the large dams and water diversion structures in the West were built by, or with the assistance of, the Bureau of Reclamation. While the Corps of Engineers built hundreds of flood control and navigation projects, Reclamation's original mission was to develop water supplies, primarily for irrigation to reclaim arid lands in the West for farming and ranching. Reclamation has evolved into an agency that assists in meeting the water demands in the West while working to protect the environment and the public's investment in Reclamation infrastructure. The agency's municipal and industrial water deliveries have more than doubled since 1970.

Today, Reclamation manages hundreds of dams and diversion projects, including more than 300 storage reservoirs, in 17 western states. These projects provide water to approximately 10 million acres of farmland and a population of 31 million. Reclamation is the largest wholesale supplier of water in the 17 western states and the second-largest hydroelectric power producer in the nation. Reclamation facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Operations of Reclamation facilities are often controversial, particularly for their effect on fish and wildlife species and because of conflicts among competing water users during drought conditions.

As with the Corps of Engineers, the Reclamation budget is made up largely of individual project funding lines, rather than general programs that would not be covered by congressional earmark requirements. Therefore, as with the Corps, these Reclamation projects have often been subject to earmark disclosure rules. The current moratorium on earmarks restricts congressional steering of money directly toward specific Reclamation projects.

Reclamation's single largest account, Water and Related Resources, encompasses the agency's traditional programs and projects, including construction, operations and maintenance, dam safety, and ecosystem restoration, among others.[24] Reclamation also typically requests funds in a number of smaller accounts, and has proposed additional accounts in recent years.

Implementation and oversight of the Central Utah Project (CUP), also funded by Title II, is conducted by a separate office within the Department of the Interior.[25]

For more information, see CRS In Focus IF10841, *Bureau of Reclamation: FY2019 Appropriations*, by Charles V. Stern. Previous appropriations and recommendations for FY2018 are shown in **Table 5**.

Table 5. Bureau of Reclamation and CUP

(budget authority in millions of current dollars)

Program	FY2016 Approp	FY2017 Approp	FY2018 Approp	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp
Water and Related Resources	1,119,0	1,155,9	1,332.1	891.0	1,382.0	1,395.0	1,392.0
Policy and Administration	59.5	59.0	59.0	61.0	61.0	61.0	61.0
CVP Restoration Fund (CVPRF)	49.5	55.6	41.4	62.0	62.0	62.0	62.0
Calif. Bay-Delta (CALFED)	37.0	36.0	37.0	35.0	35.0	35.0	35.0
Rescissions and offsets	0	0	0	0	0	0	0
Gross Current Reclamation Authority	**1,265.0**	**1,306.5**	**1,469.5**	**1,049.0**	**1,540.0**	**1,553.0**	**1,550.0**
Central Utah Project (CUP) Completion	10.0	10.5	10.5	8.0	15.0	15.0	15.0

[24] The Water and Related Resources Account is largely funded by the Reclamation Fund, which receives and distributes receipts related to a number of federal activities (including royalties received from oil and gas leasing on federal lands). For more on this fund and financing of selected Reclamation Projects, see CRS Report R41844, *The Reclamation Fund: A Primer*, by Charles V. Stern.

[25] The Central Utah Project moves water from the Colorado River basin in eastern Utah to the western slopes of the Wasatch Mountain range. It was authorized in 1956 under the Colorado River Storage Project Act (P.L. 84-485). For more information, see the CUP website at https://www.cupcao.gov/.

Program	FY2016 Approp	FY2017 Approp	FY2018 Approp	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp
Total, Title II Current Authority (CUP and Reclamation)	**1,275.0**	**1,317.0**	**1,480.0**	**1,057.0**	**1,555.0**	**1,568.0**	**1,565.0**

Sources: H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; P.L. 115-31 and explanatory statement; S.Rept. 114-236; H.Rept. 114-532; FY2018 and FY2017 budget requests; H.R. 83 Explanatory Statement; S.Rept. 114-54; H.R. 2029 explanatory statement; H.R. 1625 explanatory statement, https://www.congress.gov/crec/2018/03/22/CREC-2018-03-22-bk2.pdf. Excludes offsets and permanent appropriations.

Notes: The Senate Committee total for FY2019 includes a CVP offset. Totals may not add due to rounding. CVP = Central Valley Project.

Department of Energy

The Energy and Water Development bill has funded all DOE programs since FY2005. Major DOE activities include research and development (R&D) on renewable energy, energy efficiency, nuclear power, and fossil energy; the Strategic Petroleum Reserve; energy statistics; general science; environmental cleanup; and nuclear weapons and nonproliferation programs. **Table 6** provides the recent funding history for DOE programs, which are briefly described further below.

Table 6. Department of Energy

(budget authority in millions of current dollars)

	FY2016 Approp.	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
ENERGY PROGRAMS							
Energy Efficiency and Renewable Energy	2,069.2	2,090.2	2,321.8	695.6	2,081.6	2,322.0	2,379.0
Electricity Delivery and Energy Reliability	206.0	230.0	248.3				
Electricity Delivery				61.3	176.0		156.0
Cybersecurity, Energy Security, and Emerg. Resp.				95.8	147.0	260.0	120.0
Nuclear Energy	986.2	1,016.6	1,205.1	757.1	1,346.1	1,206.0	1,326.1
Fossil Energy R&D	632.0	668.0	726.8	502.1	785.0	727.0	740.0
Naval Petroleum and Oil Shale Reserves	17.5	15.0	4.9	10.0	10.0	10.0	10.0
Strategic Petroleum Reserve	212.0	223.0	260.4	-124.9	262.0	183.5	245.0
Northeast Home Heating Oil Reserve	7.6	6.5	6.5	10.0	10.0	10.0	10.0
Energy Information Administration	122.0	122.0	125.0	115.0	125.0	125.0	125.0
Non-Defense Environmental Cleanup	255.0	247.0	298.4	218.4	240.0	353.2	310.0

	FY2016 Approp.	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Uranium Enrichment Decontamination and Decommissioning Fund	673.7	768.0	840.0	752.7	870.0	840.8	841.1
Science	5,350.2	5,392.0	6,259.9	5,391.0	6,600.0	6,650.0	6,585.0
Advanced Research Projects Agency—Energy (ARPA-E)	291.0	306.0	353.3	0	325.0	375.0	366.0
Nuclear Waste Disposal	0	0	0	90.0	190.0	0	0
Departmental Admin. (net)	131.0	143.0	189.7	139.5	179.5	170.0	165.9
Office of Inspector General	46.4	44.4	49.0	51.3	51.3	51.3	51.3
Office of Indian Energy	0	0	0	0	0	18.0	18.0
Advanced Technology Vehicles Manufacturing Loans	6.0	5.0	5.0	1.0	5.0	5.0	5.0
Title 17 Loan Guarantee	17,0	7.0	23.0	-245.0	17.0	18.0	18.0
Tribal Indian Energy Loan Guarantee	0	0[a]	1.0	-8.5	1.0	1.0	1.0
TOTAL, ENERGY PROGRAMS	**11,026.6**	**11,283.7**	**12,918.0**	**8,512.5**	**13,421.6**	**13,325.9**	**13,472.4**
DEFENSE ACTIVITIES							
National Nuclear Security Administration (NNSA)							
Weapons Activities	8,846.9	9,245.6	10,642.1	11,017.1	11,224.0	10,850.0	11,100.0
Nuclear Nonproliferation	1,940.3	1,882.9	1,999.2	1,862.8	1,902.0	1,902.0	1,930.0
Naval Reactors	1,375.5	1,419.8	1,620.0	1,788.6	1,788.6	1,620.0	1,788.6
Office of Admin./Salaries and Expenses	363.8	390.0	407.6	422.5	398.5	408.0	410.0
Total, NNSA	**12,526.5**	**12,938.3**	**14,669.0**	**15,091.1**	**15,313.1**	**14,780.0**	**15,228.6**
Defense Environmental Cleanup	5,289.7	5,405.0	5,988.0	5,630.2	5,759.2	5,988.0	6,024.0
Defense Uranium Enrichment D&D[b]	0	563.0	0	0	0	0	0
Other Defense Activities	776.4	784.0	840.0	853.3	870.3	840.0	860.3
Defense Nuclear Waste Disposal	—	—	0	30.0	30.0	0	0
TOTAL, DEFENSE ACTIVITIES	**18,592.7**	**19,690.3**	**21,497.0**	**21,604.6**	**21,972.7**	**21,608.0**	**22,112.9**
POWER MARKETING ADMINISTRATION (PMAs)							
Southwestern	11.4	11.1	11.4	10.4	10.4	10.4	10.4

	FY2016 Approp.	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Western	93.4	95.6	93.4	89.4	89.4	89.4	89.4
Falcon and Amistad O&M	0.2	0.2	0.2	0.2	0.2	0.2	0.2
TOTAL, PMAs	**105.0**	**106.9**	**105.0**	**100.0**	**100.0**	**100.0**	**100.0**
Sale of Northeast Gas Reserve				-71.0			
DOE total appropriations	**29,744.2**	**31,181.8**	**34,569.0**	**30,394.6**	**35,494.3**	**35,033.9**	**35,708.9**
Offsets	**-26.9**	**-435.8**	**-49.0**	**-248.5**	**0**	**0**	**-23.6**
Total, DOE	**29,717.3**	**30.746.0**	**34,520.0**	**30,146.1**	**35,494.3**	**35,033.9**	**35,685.3**

Sources: H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; P.L. 115-31 and explanatory statement; S.Rept. 114-236; H.Rept. 114-532; FY2018 and FY2017 budget requests; H.R. 83 Explanatory Statement; FY2015 budget request; H.Rept. 113-486; S.Rept. 114-54; H.R. 2029 explanatory statement; H.R. 1625 explanatory statement, https://www.congress.gov/crec/2018/03/22/CREC-2018-03-22-bk2.pdf.

Notes: Columns may not add due to rounding.

a. Appropriation of $9.0 million entirely offset by rescission.

b. The amounts appropriated for Defense Uranium Enrichment Decontamination and Decommissioning (D&D) are transferred to the Uranium Enrichment Decontamination and Decommissioning Fund, and are treated as receipts that increase the balance of that fund available for appropriation in subsequent annual appropriations acts. Until appropriated from the fund, the amounts for Defense Uranium Enrichment D&D are not available to DOE for obligation to support D&D of federal uranium enrichment facilities.

Energy Efficiency and Renewable Energy

DOE's Office of Energy Efficiency and Renewable Energy (EERE) conducts research and development on transportation energy technology, energy efficiency in buildings and manufacturing processes, and the production of solar, wind, geothermal, and other renewable energy. EERE also administers formula grants to states for making energy efficiency improvements to low-income households and for state energy planning.

The Sustainable Transportation program area includes electric vehicles, vehicle efficiency, and alternative fuels. DOE's electric vehicle program aims to reduce the cost of electric vehicle batteries "by more than half to less than $100/kWh" (kilowatt-hour) by 2028.[26] Additional 2028 targets include increasing the driving range to 300 miles and decreasing charge time to less than 15 minutes.[27] The fuel cell program targets a cost of $40 per kilowatt (kw) and a durability of 5,000 hours (equivalent to 150,000 miles) for automotive systems by 2025.[28] For hydrogen production, the target is to bring the production cost below $2 per gasoline gallon-equivalent (gge)—less than $4/gge with delivery—by 2020.[29] Bioenergy goals include the development of

[26] DOE, *FY2019 Budget Justification*, vol. 3, p. 37, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf.

[27] Ibid.

[28] Ibid., p. 91.

[29] Ibid., p. 94.

"drop-in" fuels—fuels that would be largely compatible with existing energy infrastructure and vehicles.[30]

Renewable power programs focus on electricity generation from solar, wind, water, and geothermal sources. DOE's SunShot Initiative is aimed at making solar energy a low-cost electricity source, with a goal of achieving costs of 3 cents per kwh for unsubsidized, utility-scale photovoltaics (PV) by 2030.[31] For land-based windfarms, there is a cost target of 5.2 cents/kwh by 2020.[32] For offshore wind settings, the target is 14.9 cents/kwh by 2020.[33] The Water Power program has cost targets for several technologies, including 27 cents/kwh by 2030 for marine and hydrokinetic technologies.[34] The geothermal program aims to lower the risk of resource exploration and cut power production costs to 6 cents/kwh for newly developed technologies by 2030.[35]

In the energy efficiency program area, the advanced manufacturing program has a goal to improve manufacturing energy intensity by 17.5% by 2022 compared to a 2015 average technology-specific baseline.[36] The building technologies program has a goal of reducing building energy use intensity by 30% by 2030.[37] According to EERE, the program is "paving the way for high performing buildings that could use 50-70% less energy than typical buildings."[38]

For more details, see CRS Report R44980, *DOE's Office of Energy Efficiency and Renewable Energy (EERE): Appropriations Status*, by Corrie E. Clark.

Electricity Delivery, Cybersecurity, Energy Security, and Energy Reliability

On February 14, 2018, Energy Secretary Perry created the Office of Cybersecurity, Energy Security, and Emergency Response (CESER).[39] CESER was created from programs that were previously part of the Office of Electricity Delivery and Energy Reliability (OE). The programs that were not moved into CESER became part of the DOE Office of Electricity (OE).

Under the reorganization, OE is funded under the Electricity Delivery appropriations account. OE's mission is to support more economically competitive, environmentally responsible, secure, and resilient U.S. energy infrastructure. Funding for Electricity Delivery, which totaled $156 million for FY2019, includes resilient distribution systems, energy storage, and transformer resilience and advanced concepts. OE activities in those areas include research and development, demonstration projects, partnerships, facilitation, and modeling and analytics. The office also

[30] Ibid., p. 61.

[31] Ibid., p. 12.

[32] Ibid., p. 23.

[33] Ibid., p. 23.

[34] Ibid., p. 24.

[35] Ibid., p. 25.

[36] Ibid., p. 26.

[37] DOE, Office of Energy Efficiency and Renewable Energy, *Building Technologies Office Multi-Year Program Plan Fiscal Years 2016-2020*, p. 4, https://energy.gov/sites/prod/files/2016/02/f29/BTO%20Multi-Year%20Program%20Plan%20-%20Final.pdf.

[38] DOE, "Commercial Buildings Integration," July 12, 2017, https://energy.gov/eere/buildings/commercial-buildings-integration-0.

[39] DOE, "Secretary of Energy Rick Perry Forms New Office of Cybersecurity, Energy Security, and Emergency Response," press release, February 14, 2018, https://www.energy.gov/articles/secretary-energy-rick-perry-forms-new-office-cybersecurity-energy-security-and-emergency.

includes the DOE power marketing administrations, which are funded from separate appropriations accounts.

CESER is the federal government's lead entity for energy sector-specific responses to energy security emergencies—whether caused by physical infrastructure problems or by cybersecurity issues.

DOE's Multiyear Plan for Energy Sector Cybersecurity describes the department's strategy to "strengthen today's energy delivery systems by working with our partners to address growing threats and promote continuous improvement, and develop game-changing solutions that will create inherently secure, resilient, and self-defending energy systems for tomorrow."[40] DOE has established three goals as part of the strategy:

- strengthen energy sector cybersecurity preparedness;
- coordinate cyber incident response and recovery; and
- accelerate game-changing [research, development, and demonstration] of resilient energy delivery systems.[41]

For further information, see CRS In Focus IF10874, *DOE Office of Electricity Delivery and Energy Reliability: Organization and FY2019 Budget Request*, by Corrie E. Clark, and CRS Report R44357, *DOE's Office of Electricity Delivery and Energy Reliability (OE): A Primer, with Appropriations for FY2017*, by Corrie E. Clark.

Nuclear Energy

DOE's Office of Nuclear Energy (NE) "focuses on three major mission areas: the nation's existing nuclear fleet, the development of advanced nuclear reactor concepts, and fuel cycle technologies," according to DOE's FY2019 budget justification. It calls nuclear energy "a key element of United States energy independence, energy dominance, electricity grid resiliency, national security, and clean baseload power."[42]

The Reactor Concepts program area includes research on advanced reactors, including advanced small modular reactors, and research to enhance the "sustainability" of existing commercial light water reactors. Advanced reactor research focuses on "Generation IV" reactors, as opposed to the existing fleet of commercial light water reactors, which are generally classified as generations II and III. R&D under this program focuses on advanced coolants, fuels, materials, and other technology areas that could apply to a variety of advanced reactors. To help develop those technologies, the Reactor Concepts program is developing a Versatile Test Reactor that would allow fuels and materials to be tested in a fast neutron environment (in which neutrons would not be slowed by water, graphite, or other "moderators"). The program also is supporting NRC efforts to develop a new, "technology neutral" licensing framework for advanced reactors. Research on extending the life of existing commercial light water reactors beyond 60 years, the maximum operating period currently licensed by NRC, is being conducted by this program with industry

[40] DOE, *Multiyear Plan for Energy Sector Cybersecurity*, March 2018, p.5, https://www.energy.gov/sites/prod/files/2018/05/f51/DOE%20Multiyear%20Plan%20for%20Energy%20Sector%20Cybersecurity%20_0.pdf.

[41] DOE, *Grid Modernization Multi-Year Program Plan, November 2015*, http://energy.gov/sites/prod/files/2016/01/f28/Grid%20Modernization%20Multi-Year%20Program%20Plan.pdf.

[42] DOE, *FY 2019 Congressional Budget Justification*, vol. 3, part 2, March 2018, p. 273, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-3-Part-2.pdf.

cost-sharing. This program is also conducting research to understand the Fukushima disaster and to develop accident prevention and mitigation measures.[43]

NE completed a program in FY2017 that provided design and licensing funding for small modular reactors (SMRs), which range from about 40 to 300 megawatts of electrical capacity. Support under this subprogram was provided to the NuScale Power SMR, which has a generating capacity of 60 megawatts, and for licensing two potential SMR sites. Under the company's current concept, up to 12 reactors would be housed in a single pool of water, which would provide emergency cooling. A design certification application for the NuScale SMR was fully submitted to NRC on January 25, 2017. Funding for first-of-a-kind (FOAK) engineering and other support for next-generation reactors, including SMRs, has continued under the Advanced Reactor Technologies subprogram. DOE awarded NuScale a $40 million FOAK matching grant on April 27, 2018.[44]

The Fuel Cycle Research and Development program conducts generic research on nuclear waste management and disposal. One of the program's primary activities is the development of technologies to separate the radioactive constituents of spent fuel for reuse or to be bonded into stable waste forms. Other major research areas in the Fuel Cycle R&D program include the development of accident-tolerant fuels for existing commercial reactors, evaluation of fuel cycle options, and development of improved technologies to prevent diversion of nuclear materials for weapons. The program is also developing sources of high-assay low enriched uranium (HALEU), in which uranium is enriched to between 5% and 20% in the fissile isotope U-235, for potential use in advanced reactors.

Fossil Energy Research and Development

Much of DOE's Fossil Energy R&D Program focuses on carbon capture and storage for power plants fueled by coal and natural gas. Major activities include the following:

- Carbon Capture subprogram for separating CO_2 in both precombustion and postcombustion systems;
- Carbon Storage subprogram on long-term geologic storage of CO_2, including storage site characterization, brine extraction storage tests, and postinjection monitoring technologies;
- Advanced Energy Systems subprogram on advanced fossil energy systems integrated with CO_2 capture and sequestration; and
- Cross-Cutting Research and Analysis on innovative systems.

For more information, see CRS In Focus IF10589, *FY2019 Funding for CCS and Other DOE Fossil Energy R&D*, by Peter Folger; CRS In Focus IF10589, *FY2019 Funding for CCS and Other DOE Fossil Energy R&D*, by Peter Folger; and CRS Report R44472, *Funding for Carbon Capture and Sequestration (CCS) at DOE: In Brief*, by Peter Folger.

[43] The Fukushima nuclear disaster occurred on March 11, 2011, after an earthquake and tsunami struck Japan's Fukushima Daiichi nuclear power station, knocking out backup power systems, causing three of the reactors to undergo fuel melting, hydrogen explosions, and radioactive releases. For more information see CRS Report R41694, *Fukushima Nuclear Disaster*, by Mark Holt, Richard J. Campbell, and Mary Beth D. Nikitin.

[44] DOE, "Secretary of Energy Rick Perry Announces $60 Million for U.S. Industry Awards in Support of Advanced Nuclear Technology Development," news release, April 27, 2018, https://www.energy.gov/articles/secretary-energy-rick-perry-announces-60-million-us-industry-awards-support-advanced.

Strategic Petroleum Reserve

The Strategic Petroleum Reserve (SPR), authorized by the Energy Policy and Conservation Act (P.L. 94-163) in 1975, consists of caverns built within naturally occurring salt domes in Louisiana and Texas. The SPR provides strategic and economic security against foreign and domestic disruptions in U.S. oil supplies via an emergency stockpile of crude oil. The program fulfills U.S. obligations under the International Energy Program, which avails the United States of International Energy Agency (IEA) assistance through its coordinated energy emergency response plans, and provides a deterrent against energy supply disruptions. DOE has been conducting a major maintenance program to address aging infrastructure and a deferred maintenance backlog at SPR facilities.

By early 2010, the SPR's capacity reached 727 million barrels.[45] The federal government has not purchased oil for the SPR since 1994. Beginning in 2000, additions to the SPR were made with royalty-in-kind (RIK) oil acquired by DOE in lieu of cash royalties paid on production from federal offshore leases. In September 2009, the Secretary of the Interior announced a transitional phasing out of the RIK Program.

In the summer of 2011, President Obama ordered an SPR sale in coordination with an International Energy Administration sale under treaty obligation because of Libya's supply curtailment. The U.S. sale of 30.6 million barrels reduced the SPR inventory to 695.9 million barrels.

In March 2014, DOE's Office of Petroleum Reserves conducted a test sale that delivered 5.0 million barrels of crude oil over a 47-day period that netted $468.6 million in cash receipts to the U.S. government (SPR Petroleum Account).

In 2015, DOE purchased 4.2 million barrels of crude oil for the SPR using proceeds from the 2014 test sale. According to the FY2019 DOE budget justification, the SPR's drawdown capacity in FY2019 will be 4.13 million barrels per day (mbd), down from 4.4 mbd in FY2018. Currently, the SPR contains about 660 million barrels.[46]

The Bipartisan Budget Act of 2015 (P.L. 114-74) authorizes the sale of 58 million barrels of oil from the SPR. The authorized sales total 5 million barrels per fiscal year for 2018-2021, 8 million barrels in FY2022, and 10 million barrels per year in FY2023-FY2025. In addition, the Fixing America's Surface Transportation Act (P.L. 114-94) authorizes the sale of 66 million barrels of oil from the SPR. The authorized sales would total 16 million barrels in FY2023 and 25 million barrels in each of fiscal years 2024 and 2025.

For more information, see CRS Report R42460, *The Strategic Petroleum Reserve: Authorization, Operation, and Drawdown Policy*, by Robert Pirog, and CRS In Focus IF10869, *Reconsidering the Strategic Petroleum Reserve*, by Robert Pirog.

Science and ARPA-E

The DOE Office of Science conducts basic research in six program areas: advanced scientific computing research, basic energy sciences, biological and environmental research, fusion energy sciences, high-energy physics, and nuclear physics. According to DOE's FY2019 budget justification, the Office of Science "is the Nation's largest Federal sponsor of basic research in the

[45] For details on the SPR, see CRS Report R42460, *The Strategic Petroleum Reserve: Authorization, Operation, and Drawdown Policy*, by Robert Pirog.

[46] DOE, "Strategic Petroleum Reserve Inventory," https://www.spr.doe.gov/dir/dir.html, as of September 28, 2018.

physical sciences and the lead Federal agency supporting fundamental scientific research for our Nation's energy future."[47]

DOE's Advanced Scientific Computing Research (ASCR) program focuses on developing and maintaining computing and networking capabilities for science and research in applied mathematics, computer science, and advanced networking. The program plays a key role in the DOE-wide effort to advance the development of exascale computing, which seeks to build a computer that can solve scientific problems 1,000 times faster than today's best machines. DOE has asserted that the department is on a path to have a capable exascale machine by the early 2020s.

Basic Energy Sciences (BES), the largest program area in the Office of Science, focuses on understanding, predicting, and ultimately controlling matter and energy at the electronic, atomic, and molecular level. The program supports research in disciplines such as condensed matter and materials physics, chemistry, and geosciences. BES also provides funding for scientific user facilities (e.g., the National Synchrotron Light Source II, and the Linac Coherent Light Source-II), and certain DOE research centers and hubs (e.g., Energy Frontier Research Centers, as well as the Batteries and Energy Storage and Fuels from Sunlight Innovation Hubs).

Biological and Environmental Research (BER) seeks a predictive understanding of complex biological, climate, and environmental systems across a continuum from the small scale (e.g., genomic research) to the large (e.g., Earth systems and climate). Within BER, Biological Systems Science focuses on plant and microbial systems, while Biological and Environmental Research supports climate-relevant atmospheric and ecosystem modeling and research. BER facilities and centers include four Bioenergy Research Centers and the Environmental Molecular Science Laboratory at Pacific Northwest National Laboratory.

Fusion Energy Sciences (FES) seeks to increase understanding of the behavior of matter at very high temperatures and to establish the science needed to develop a fusion energy source. FES provides funding for the International Thermonuclear Experimental Reactor (ITER) project, a multinational effort to design and build an experimental fusion reactor. According to DOE, ITER "aims to provide access to burning plasmas with fusion power output approaching reactor levels of hundreds of megawatts, for hundreds of seconds."[48] However, many U.S. analysts have expressed concern about ITER's cost, schedule, and management, as well as the budgetary impact on domestic fusion research.

The High Energy Physics (HEP) program conducts research on the fundamental constituents of matter and energy, including studies of dark energy and the search for dark matter. Nuclear Physics supports research on the nature of matter, including its basic constituents and their interactions. A major project in the Nuclear Physics program is the construction of the Facility for Rare Isotope Beams at Michigan State University.

A separate DOE office, the Advanced Research Projects Agency—Energy (ARPA-E), was authorized by the America COMPETES Act (P.L. 110-69) to support transformational energy technology research projects. DOE budget documents describe ARPA-E's mission as overcoming long-term, high-risk technological barriers to the development of energy technologies.

For more details, see CRS Report R45150, *Federal Research and Development (R&D) Funding: FY2019*, coordinated by John F. Sargent Jr.

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[47] DOE, *FY 2019 Congressional Budget Justification*, vol. 4, March 2018, p, 7, https://www.energy.gov/sites/prod/files/2018/03/f49/DOE-FY2019-Budget-Volume-4_0.pdf.

[48] Ibid., p. 169.

Loan Guarantees and Direct Loans

DOE's Loan Programs Office provides loan guarantees for projects that deploy specified energy technologies, as authorized by Title 17 of the Energy Policy Act of 2005 (EPACT05, P.L. 109-58), and direct loans for advanced vehicle manufacturing technologies. Section 1703 of the act authorizes loan guarantees for advanced energy technologies that reduce greenhouse gas emissions, and Section 1705 established a temporary program for renewable energy and energy efficiency projects.

Title 17 allows DOE to provide loan guarantees for up to 80% of construction costs for eligible energy projects. Successful applicants must pay an up-front fee, or "subsidy cost," to cover potential losses under the loan guarantee program. Under the loan guarantee agreements, the federal government would repay all covered loans if the borrower defaulted. Such guarantees would reduce the risk to lenders and allow them to provide financing at below-market interest rates. The following is a summary of loan guarantee amounts that have been authorized (loan guarantee ceilings) for various technologies:

- $8.3 billion for nonnuclear technologies under Section 1703;
- $2.0 billion for unspecified projects from FY2007 under Section 1703;
- $18.5 billion for nuclear power plants ($8.3 billion committed);
- $4 billion for loan guarantees for uranium enrichment plants;
- $1.18 billion for renewable energy and energy efficiency projects under Section 1703, in addition to other ceiling amounts, which can include applications that were pending under Section 1705 before it expired; and
- In addition to the loan guarantee ceilings above, an appropriation of $161 million was provided for subsidy costs for renewable energy and energy efficiency loan guarantees under Section 1703. If the subsidy costs averaged 10% of the loan guarantees, this funding could leverage loan guarantees totaling about $1.6 billion.

The only loan guarantees under Section 1703 were $8.3 billion in guarantees provided to the consortium building two new reactors at the Vogtle plant in Georgia. DOE conditionally committed an additional $3.7 billion in loan guarantees for the Vogtle project on September 29, 2017.[49] Another nuclear loan guarantee is being sought by NuScale Power to build a small modular reactor in Idaho.[50]

Nuclear Weapons Activities

In the absence of explosive nuclear weapons testing, the United States has adopted a science-based program to maintain and sustain confidence in the reliability of the U.S. nuclear stockpile. Congress established the science-based Stockpile Stewardship Program in the National Defense Authorization Act for Fiscal Year 1994 (P.L. 103-160). The goal of the program, as amended by the National Defense Authorization Act for Fiscal Year 2010 (P.L. 111-84, §3111), is to ensure "that the nuclear weapons stockpile is safe, secure, and reliable without the use of underground

[49] DOE, "Secretary Perry Announces Conditional Commitment to Support Continued Construction of Vogtle Advanced Nuclear Energy Project," news release, September 29, 2017, https://www.energy.gov/articles/secretary-perry-announces-conditional-commitment-support-continued-construction-vogtle.

[50] NuScale Power, "NuScale Power, LLC Submits Part II of DOE Loan Guarantee Application," news release, September 6, 2017, http://newsroom.nuscalepower.com/press-release/nuscale-power-llc-submits-part-ii-doe-loan-guarantee-application.

nuclear weapons testing." The program is operated by the National Nuclear Security Administration (NNSA), a semiautonomous agency within DOE that Congress established in the National Defense Authorization Act for Fiscal Year 2000 (P.L. 106-65, Title XXXII). NNSA implements the Stockpile Stewardship Program through the activities funded by the Weapons Activities account in the NNSA budget.

Most of NNSA's weapons activities take place at the nuclear weapons complex, which consists of three laboratories (Los Alamos National Laboratory, NM; Lawrence Livermore National Laboratory, CA; and Sandia National Laboratories, NM and CA); four production sites (Kansas City National Security Campus, MO; Pantex Plant, TX; Savannah River Site, SC; and Y-12 National Security Complex, TN); and the Nevada National Security Site (formerly Nevada Test Site). NNSA manages and sets policy for the weapons complex; contractors to NNSA operate the eight sites. Radiological activities at these sites are subject to oversight and recommendations by the independent Defense Nuclear Facilities Safety Board, funded by Title IV of the annual Energy and Water Development appropriations bill.

The President's budget requested $11.017 billion for the Weapons Activities account in FY2019. The House approved $11.224 billion, while the Senate recommended $10.850 billion, and the enacted appropriation was $11.100 billion. All would provide increases from the FY2018 enacted level for Weapons Activities of $10.642 billion.

There are three major program areas in the Weapons Activities account.

Directed Stockpile Work involves work directly on nuclear weapons in the stockpile, such as monitoring their condition; maintaining them through repairs, refurbishment, life extension, and modifications; conducting R&D in support of specific warheads; and dismantlement. The number of warheads has fallen sharply since the end of the Cold War, and continues to decline. As a result, a major activity of Directed Stockpile Work is interim storage of warheads to be dismantled; dismantlement; and disposition (i.e., storing or eliminating warhead components and materials).

Research, Development, Test, and Evaluation (RDT&E) includes five programs that focus on "efforts to develop and maintain critical capabilities, tools, and processes needed to support science based stockpile stewardship, refurbishment, and continued certification of the stockpile over the long-term in the absence of underground nuclear testing." This area includes operation of some large experimental facilities, such as the National Ignition Facility at Lawrence Livermore National Laboratory.

Infrastructure and Operations has as its main funding elements material recycle and recovery, recapitalization of facilities, and construction of facilities. The latter included two controversial and expensive projects: the Uranium Processing Facility (UPF) at the Y-12 National Security Complex (TN) and the Chemistry and Metallurgy Research Replacement (CMRR) Project, which deals with plutonium, at Los Alamos National Laboratory (NM).

Nuclear Weapons Activities also has several smaller programs, including the following:

- **Secure Transportation Asset,** providing for safe and secure transport of nuclear weapons, components, and materials;
- **Defense Nuclear Security,** providing operations, maintenance, and construction funds for protective forces, physical security systems, personnel security, and related activities;
- **Information Technology and Cybersecurity,** whose elements include cybersecurity, enterprise secure computing, and Federal Unclassified Information Technology; and

- **Legacy Contractor Pensions,** providing supplemental funds for pensions for retirees from Los Alamos and Lawrence Livermore National Laboratories who began employment when the University of California was the contractor for those labs.

For more information, see CRS Report R44442, *Energy and Water Development Appropriations: Nuclear Weapons Activities*, by Amy F. Woolf, and CRS Report R45306, *The U.S. Nuclear Weapons Complex: Overview of Department of Energy Sites*, by Amy F. Woolf and James D. Werner.

Defense Nuclear Nonproliferation

DOE's nonproliferation and national security programs provide technical capabilities to support U.S. efforts to prevent, detect, and counter the spread of nuclear weapons worldwide. These nonproliferation and national security programs are administered by NNSA's Office of Defense Nuclear Nonproliferation.

Global Materials Security has three major program elements. International Nuclear Security focuses on increasing the security of vulnerable stockpiles of nuclear material in other countries. Radiological Security promotes the worldwide reduction and security of radioactive sources, including the removal of surplus sources and substitution of technologies that do not use radioactive materials. Nuclear Smuggling Detection and Deterrence works to improve the capability of other countries to halt illicit trafficking of nuclear materials.

Materials Management and Minimization conducts activities to minimize and, where possible, eliminate stockpiles of weapons-useable material around the world. Major activities include conversion of reactors that use highly enriched uranium (useable for weapons) to low-enriched uranium, removal and consolidation of nuclear material stockpiles, and disposition of excess nuclear materials.

Nonproliferation and Arms Control works to "control the spread of nuclear material, equipment, technology, and expertise" and pursue strategies for arms control and verification, according to the FY2019 justification.[51] This program conducts reviews of nuclear export applications and technology transfer authorizations, implements treaty obligations, and analyzes nonproliferation policies and proposals.

Other programs under Defense Nuclear Nonproliferation include research and development and construction, which advances nuclear detection and nuclear forensics technologies. The Nonproliferation Construction program consists of the Mixed Oxide (MOX) Fuel Fabrication Facility (described under "Surplus Plutonium Disposition" above), which both the Obama and Trump Administrations have proposed to terminate. Nuclear Counterterrorism and Incident Response provides "interagency policy, contingency planning, training, and capacity building" to counter nuclear terrorism and strengthen incident response capabilities, according to the FY2019 budget justification.[52]

[51] DOE, *FY 2019 Congressional Budget Justification*, vol. 1, p. 489, https://www.energy.gov/sites/prod/files/2018/03/f49/FY-2019-Volume-1.pdf.

[52] Ibid., p. 549.

Cleanup of Former Nuclear Weapons Production and Research Sites

The development and production of nuclear weapons for national defense purposes during half a century since the beginning of the Manhattan Project resulted in a waste and contamination legacy that continues to present substantial challenges today. In 1989, DOE established the Office of Environmental Management primarily to consolidate its responsibilities for the cleanup of former nuclear weapons production sites that had been administered under multiple offices.[53]

DOE's nuclear cleanup efforts are broad in scope and include the disposal of large quantities of radioactive and other hazardous wastes generated over decades; management and disposal of surplus nuclear materials; remediation of extensive contamination in soil and groundwater; decontamination and decommissioning of excess buildings and facilities; and safeguarding, securing, and maintaining facilities while cleanup is underway.[54] The Office of Environmental Management also is responsible for the cleanup of DOE sites that were involved in civilian nuclear energy research, which also generated wastes and contamination. These research sites add a nondefense component to the office's mission, albeit smaller in terms of the scope of their cleanup and associated funding.[55]

DOE has identified more than 100 "geographic" sites in over 30 states that historically were involved in the production of nuclear weapons and nuclear energy research for civilian purposes.[56] The geographic scope of these sites is substantial, collectively encompassing a land area of approximately 2 million acres. Cleanup remedies are in place and operational at the majority of these sites. The responsibility for the long-term stewardship of these sites has been transferred to the Office of Legacy Management and other offices within DOE for the operation and maintenance of cleanup remedies and monitoring.[57] Some of the smaller sites for which DOE initially was responsible were transferred to the Army Corps of Engineers in 1997 under the Formerly Utilized Sites Remedial Action Program (FUSRAP). Once the Corps completes the cleanup of a FUSRAP site, it is transferred back to DOE for long-term stewardship under the Office of Legacy Management.

Three appropriations accounts fund the Office of Environmental Management. The Defense Environmental Cleanup account is the largest in terms of funding, and it finances the cleanup of former nuclear weapons production sites. The Non-Defense Environmental Cleanup account funds the cleanup of federal nuclear energy research sites. Title XI of the Energy Policy Act of 1992 (P.L. 102-486) established the Uranium Enrichment Decontamination and Decommissioning Fund to pay for the cleanup of three federal facilities that enriched uranium for

[53] In 1989, DOE created the Office of Environmental Restoration and Waste Management, which later was renamed the Office of Environmental Management.

[54] The term "cleanup" often is used in reference to the remediation of risks at a site. Cleanup may be accomplished through various means to prevent potentially harmful levels of exposure to wastes and contamination. Cleanup may not necessarily entail the removal of all hazards from a site, but in some instances may involve the permanent containment of wastes or contamination to address exposure risks. If residual wastes or contamination remains on-site after cleanup is complete, long-term stewardship may continue to monitor residual wastes or contamination and ensure that cleanup measures continue to operate effectively.

[55] For additional information on the history, mission, and scope of the Office of Environmental Management, see DOE's website: http://energy.gov/em/office-environmental-management.

[56] For a list of each active and completed site, see DOE's Office of Environmental Management website, http://energy.gov/em/cleanup-sites.

[57] The Office of Legacy Management administers the long-term stewardship of DOE sites that do not have a continuing mission once cleanup remedies are in place. Sites that have a continuing mission are transferred to the DOE offices that administer those missions, which are responsible for their long-term stewardship.

national defense and civilian purposes.[58] Title X of P.L. 102-486 also authorized the reimbursement of uranium and thorium licensees for their costs of cleaning up contamination at sites that processed nuclear materials for national defense purposes at these federal facilities.[59] The three federal uranium enrichment facilities are located near Paducah, KY; Piketon, OH (Portsmouth plant); and Oak Ridge, TN.

The adequacy of funding for the Office of Environmental Management to attain cleanup milestones across the entire site inventory has been a recurring issue. Cleanup milestones are enforceable measures incorporated into compliance agreements negotiated among DOE, the Environmental Protection Agency, and the states. These milestones establish time frames for the completion of specific actions to satisfy applicable requirements at individual sites.[60]

Power Marketing Administrations

DOE's four Power Marketing Administrations were established to sell the power generated by the dams operated by the Bureau of Reclamation and the Army Corps of Engineers. Preference in the sale of power is given to publicly owned and cooperatively owned utilities. The PMAs operate in 34 states; their assets consist primarily of transmission infrastructure in the form of more than 33,000 miles of high voltage transmission lines and 587 substations. PMA customers are responsible for repaying all power program expenses, plus the interest on capital projects. Since FY2011, power revenues associated with the PMAs have been classified as discretionary offsetting receipts (i.e., receipts that are available for spending by the PMAs), thus the agencies are sometimes noted as having a "net-zero" spending authority. Only the capital expenses of WAPA and SWPA require appropriations from Congress.

Independent Agencies

Independent agencies that receive funding in Title IV of the Energy and Water Development bill include the Nuclear Regulatory Commission (NRC), the Appalachian Regional Commission (ARC), and the Defense Nuclear Facilities Safety Board. NRC is by far the largest of the independent agencies, with a total budget of more than $900 million. However, as noted in the description of NRC below, about 90% of NRC's budget is offset by fees, so that the agency's net appropriation is less than half of the total funding in Title IV. The recent appropriations history for all the Title IV agencies is shown in **Table 7**.

[58] 42 U.S.C. §2297g.

[59] 42 U.S.C. §2296a.

[60] Compliance agreements for individual sites are available on DOE's Office of Environmental Management website: http://energy.gov/em/compliance-documents.

Table 7. Independent Agencies Funded by Energy and Water Development Appropriations

(budget authority in millions of current dollars)

Program	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Appalachian Regional Commission	152.0	155.0	152.0	155.0	155.0	165.0
Nuclear Regulatory Commission	*917.1*	*922.0*	*970.7*	*965.7*	*911.0*	*911.0*
(Revenues)	*-804.6*	*-790.4*	*-815.4*	*-774.0*	*-804.6*	*-780.8*
Net NRC (including Inspector General)	112.5	131.6	155.3	191.7	106.4	130.1
Defense Nuclear Facilities Safety Board	30.9	31.0	31.2	31.2	31.0	31.0
Nuclear Waste Technical Review Board	3.6	3.6	3.6	3.6	3.6	3.6
Denali Commission	15.0	30.0	7.3	15.0	15.0	15.0
Delta Regional Authority	25.0	25.0	2.5	15.0	25.0	25.0
Northern Border Regional Commission	10.0	15.0	0.9	12.0	20.0	20.0
Southeast Crescent Regional Commission	0.3	0.3	0	0.3	0	0.3
Total	**349.2**	**391.5**	**352.8**	**423.8**	**356.0**	**390.0**

Sources: H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; P.L. 115-31 and explanatory statement; S.Rept. 114-236; H.Rept. 114-532; FY2018 and FY2017 Agency budget justifications; H.R. 83 explanatory statement; agency budget requests; H.Rept. 113-486; S.Rept. 114-54; H.R. 2029 explanatory statement; H.R. 1625 explanatory statement, https://www.congress.gov/crec/2018/03/22/CREC-2018-03-22-bk2.pdf.

Note: Figures may not add due to rounding.

Nuclear Regulatory Commission

NRC is an independent agency that establishes and enforces safety and security standards for nuclear power plants and users of nuclear materials. Major appropriations categories for NRC are shown in **Table 8**. NRC is required by law to charge fees to nuclear reactors and other regulated entities that are equal to about 90% of its total budget, excluding specified items. As a result, NRC's net appropriation is typically about 10% of its total funding level, depending on the activities that are excluded from fee recovery. Excluded items in NRC's FY2019 enacted appropriation are prior-year balances, development of advanced reactor regulations, and international activities.

Table 8. Nuclear Regulatory Commission Funding Categories

(budget authority in millions of current dollars)

Funding Category	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Nuclear Reactor Safety	460.2	466.7	474.8	474.8	469.8	469.8
Nuclear Materials and Waste Safety	114.3	113.1	158.8	158.8	108.6	108.6
Yucca Mountain Licensing	0	0	47.7	47.7	0	0
Decommissioning and Low-Level Waste	26.8	28.0	25.4	25.4	25.4	25.4

Funding Category	FY2017 Approp.	FY2018 Approp.	FY2019 Request	FY2019 House	FY2019 Senate	FY2019 Approp.
Corporate Support	306.7	301.4	299.6	299.6	299.6	299.6
Integrated University Program	15.0	15.0	0	15.0	15.0	15.0
Inspector General	12.2	12.9	12.6	12.6	12.6	12.6

Source: H.Rept. 115-929, NRC FY2019 Budget Justification; H.Rept. 115-697; S.Rept. 115-258.

Note: Yucca Mountain Licensing is included in the total for Nuclear Materials and Waste Safety; offsets excluded.

Congressional Hearings

The following hearings were held by the Energy and Water Development subcommittees of the House and Senate Appropriations Committees on the FY2019 budget request. Testimony and opening statements are posted on most of the web pages cited for each hearing, along with webcasts in many cases.

House

- *Corps of Engineers (Civil Works) and the Bureau of Reclamation*, March 14, 2018, https://appropriations.house.gov/calendararchive/eventsingle.aspx?EventID=395119.
- *Department of Energy*, March 15, 2018, https://appropriations.house.gov/calendararchive/eventsingle.aspx?EventID=395124.
- *National Nuclear Security Administration*, March 20, 2018, https://appropriations.house.gov/calendararchive/eventsingle.aspx?EventID=395134.

Senate

- Department of Energy and National Nuclear Security Administration, April 11, 2018, https://www.appropriations.senate.gov/hearings/review-of-the-dept-of-energy-and-nnsa-budget-requests-for-fy2019.
- *U.S. Army Corps of Engineers and Bureau of Reclamation*, April 18, https://www.appropriations.senate.gov/hearings/review-of-the-fy2019-budget-request-for-the-us-army-corps-of-engineers-and-bureau-of-reclamation.
- *Nuclear Regulatory Commission*, April 25, 2018, https://www.appropriations.senate.gov/hearings/review-of-the-fy2019-budget-request-for-the-us-nuclear-regulatory-commission.

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