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Energy and Water Development: FY2018 Appropriations

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Summary

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 FY2018 budget proposal to Congress on May 23, 2017. The budget requests for agencies included in the Energy and Water Development appropriations bill total $34.189 billion (including offsets)—$4.261 billion (11.1%) below the FY2017 level. The largest proposed increase would go toward DOE nuclear weapons activities, up by $994 million (10.7%). The House Appropriations Committee approved its version of the FY2018 Energy and Water Development appropriations bill with a manager's amendment by voice vote on July 12, 2017, with total funding of $37.64 billion without scorekeeping adjustments—$809 million below FY2017 and $3.45 billion above the Administration request (H.R. 3266, H.Rept. 115-230). On July 18, 2017, the House Rules Committee released the amendment process for H.R. 3219, the Department of Defense Appropriations Act, 2018; amendments are to be drafted to a version of the bill that contains the language of four FY2018 appropriations bills including H.R. 3266. The Senate Appropriations Subcommittee on Energy and Water Development approved its version of the Energy and Water Development Appropriations bill by voice vote on July 18, 2017, with total funding of $38.4 billion.

Major Energy and Water Development funding issues for FY2018 include

- *Water Agency Funding Reductions*. The Trump Administration requested reductions of 17.2% for the Corps and 14.3% for Reclamation for FY2018. Those cuts were largely rejected by the House Appropriations Committee and the Senate Appropriations Subcommittee.
- *Termination of Energy Efficiency Grants*. DOE's Weatherization Assistance Program and State Energy Program would be terminated under the FY2018 budget request. The House committee voted to continue those programs at the FY2017 funding level. The Senate subcommittee also voted to continue those programs.
- *Cuts in Energy R&D*. Under the FY2018 budget request, appropriations for DOE research and development on energy efficiency and renewable energy (EERE), nuclear energy, and fossil energy would be cut by a total of 53.7%. The House panel approved most of the reductions in EERE R&D (54.4% from FY2017 enacted) but largely rejected the proposed nuclear and fossil energy reductions (4.7% and 5.0%, respectively). The Senate subcommittee largely rejected reductions in EERE approving funding at $153 million below FY2017 enacted level (7.3% reduction).
- *Nuclear Waste Repository.* The Administration's budget request would provide new funding for the first time since FY2010 for a proposed nuclear waste repository at Yucca Mountain, NV. DOE would receive $110 million to seek an NRC license for the repository, and NRC would receive $30 million to consider DOE's application. DOE would receive $10 million to develop interim nuclear waste storage facilities. The House panel approved the request.
- *Elimination of Advanced Research Projects Agency—Energy (ARPA-E)*. The Trump Administration proposes to eliminate funds for new research projects by

ARPA-E, and terminate the program after currently funded projects are completed. The ARPA-E termination was approved by the House committee. The Senate subcommittee rejected the termination and approved an increase in funding for ARPA-E above the FY2017 enacted level.

- *Plutonium Disposition Plant Termination.* Construction of the Mixed-Oxide Fuel Fabrication Facility (MFFF), which would make fuel for nuclear reactors out of surplus weapons plutonium, would be terminated under the Trump Administration request. The Obama Administration had recommended termination since FY2015, but Congress has voted to continue construction. For FY2018, the House committee also voted to continue construction.

Contents

Figures

Tables

Contacts

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).

President Trump submitted his FY2018 budget proposal to Congress on May 23, 2017. The budget requests for agencies included in the Energy and Water Development appropriations bill total $34.189 billion, including offsets—$4.261 billion (11.1%) below the FY2017 appropriation. The largest proposed increase would go toward DOE nuclear weapons activities, up by $994 million (10.7%). For the first time since FY2010, DOE would receive new funding to pursue an NRC license for a proposed nuclear waste repository at Yucca Mountain, NV, totaling $120 million (including funding for interim nuclear waste storage).

Substantial reductions are proposed for DOE energy research and development (R&D) programs, including a cut of $1.454 billion (69.6%) in energy efficiency and renewable energy, $388 million (58.1%) in fossil fuels, and $314 million (30.8%) in nuclear. DOE science programs would be cut by $920 million (17.1%). Programs targeted by the budget for elimination or phaseout include the Advanced Research Projects Agency—Energy (ARPA-E), loan guarantee programs, and the ARC.

The House Appropriations Committee approved its version of the FY2018 Energy and Water Development Appropriations bill with a manager's amendment by voice vote on July 12, 2017, with total funding of $37.641 billion without scorekeeping adjustments—$809 million below FY2017 and $3.45 billion above the Administration request (H.R. 3266, H.Rept. 115-230).[1] The committee-reported bill includes the Administration's proposed funding increase for DOE weapons activities, funding for Yucca Mountain, a decrease in funding for energy efficiency and renewable energy (EERE) R&D, and the elimination of ARPA-E and the loan programs. Most of the Administration's proposed reductions in nuclear and fossil energy R&D were not approved by the House panel, nor was the proposed elimination of the ARC.

On July 18, 2017, the House Rules Committee released the amendment process for H.R. 3219, the Make America Secure Appropriations Act, 2018.[2] Amendments to H.R. 3219 are to be drafted to a version of the bill that contains the language of four FY2018 appropriations bills including H.R. 3266.[3]

The Senate Appropriations Subcommittee on Energy and Water approved legislation by voice vote on July 18, 2017, with total FY2018 funding of $38.4 billion.[4] The subcommittee approved funding increases to DOE's weapons activities, funding for support of nuclear waste storage at

[1] According to p.4 of H.Rept. 115-230, the grand total for the bill is $37.562 billion accounting for $79.376 million in scorekeeping adjustments; the grand total is $209 million below FY2017 and $3.241 billion above the Administration request.

[2] House Committee on Rules, *Amendment Process for* H.R. 3219, 115th Cong., July 18, 2017.https://rules.house.gov/news/announcement/amendment-process-hr-3219.

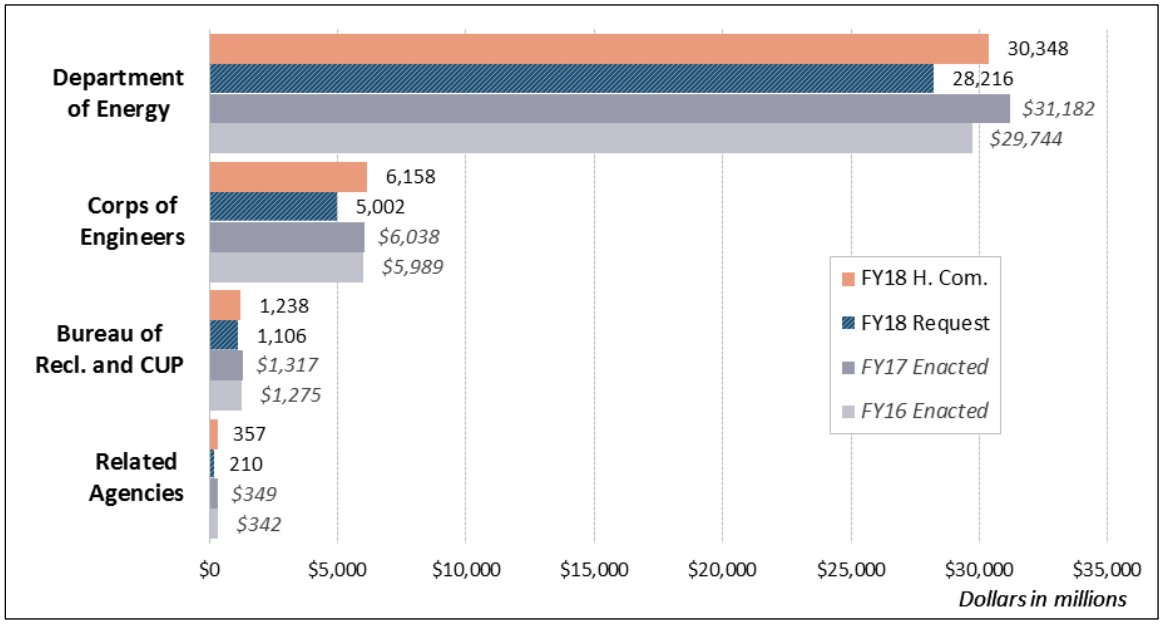
[3] Members must draft their amendments to Rules Committee Print 115-30, http://docs.house.gov/billsthisweek/20170724/BILLS%20-115HR3219HR3162HR2998HR3266-RCP115-30.pdf.

[4] Senate Committee on Appropriations, "Senate Subcommittee Approves FY2018 Energy and Water Development Appropriations Bill," majority news release, July 18, 2017, https://www.appropriations.senate.gov/news/majority/senate-subcommittee-approves-fy2018-energy-and-water-development-appropriations-bill.

private facilities, a decrease in funding for EERE R&D, and elimination of the Title 17 Loan Guarantee program.[5] The subcommittee rejected the elimination of ARPA-E and approved an increase in funding for ARPA-E above the FY2017 enacted level.[6] Details on approved funding levels for all programs by the subcommittee are not yet available.

Figure 1 compares the major components of the Energy and Water Development bill.

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



Sources: H.Rept. 115-230, FY2018 and FY2017 agency budget justifications, P.L. 115-31 and explanatory statement, S.Rept. 114-236, H.Rept. 114-532, P.L. 115-31, congressional appropriations explanatory statements, Congressional Budget Office. Includes some adjustments.

For FY2017, funding for energy and water development programs was provided by Division D of the Consolidated Appropriations Act, 2017 (P.L. 115-31), an omnibus funding measure passed by Congress May 4, 2017, and signed into law the following day. Total funding for Division D was $38.89 billion, offset by $436 million in rescissions. That total was $1.27 billion above the Obama Administration request and $1.54 billion over the FY2016 level, excluding rescissions. The Obama Administration also had proposed $2.26 billion in new mandatory funding for DOE, which was not approved. Proposed reductions for the Corps, Reclamation, and CUP were also rejected.[7] For more information, see CRS Report R44465, *Energy and Water Development: FY2017 Appropriations*, by Mark Holt.

[5] Senate Committee of Appropriations Subcommittee on Energy and Water Development, "Chairman Lamar Alexander Opening Statement on Markup of the FY2018 Energy and Water Development Appropriations Bill," July 18, 2017, https://www.appropriations.senate.gov/imo/media/doc/071817-Chairman-Alexander-Opening-Statement1.pdf.

[6] Ibid.

[7] For details, see the Explanatory Statement for the Consolidated Appropriations Act, 2017, Division D, *Congressional Record*, May 3, 2017, Book II, p. H3704, https://www.congress.gov/crec/2017/05/03/CREC-2017-05-03-bk2.pdf.

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 subdivisions 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.

For more information on discretionary spending limits, 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 are likely to generate debate during congressional consideration of Energy and Water Development appropriations for FY2018. The issues described in this section—listed approximately in the order they appear in the Energy and Water Development bill—were selected based on the total funding involved and the percentage of increases or decreases, the amount of congressional attention received, and their impact on broader public policy considerations.

Proposed Reductions to Corps and Reclamation Budgets

For the Army Corps of Engineers, the Trump Administration requested $5.002 billion for FY2018, which is $1.026 billion (17.2%) below the FY2017 appropriation. The deepest proposed cuts in the Corps budget are for Construction (45.6%), Mississippi River and Tributaries (30.1%), and Investigations (28.9%). The FY2018 request for the Bureau of Reclamation was $1.097 billion, a reduction of $209 million (14.3%) below FY2017. The House Appropriations Committee approved a 2% total increase for the Corps and a 5.9% decrease for Reclamation from the FY2017 appropriation. The Senate Appropriations Subcommittee approved $6.2 billion for the Corps and $1.3 billion for Reclamation.

Termination of Energy Efficiency Grants

The FY2018 budget request proposes 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 energy programs. Both programs are under DOE's Office of Energy Efficiency and Renewable Energy (EERE). The weatherization program received $228 million and SEP $50 million for FY2017. According to the DOE budget justification, "These programs are not aligned with EERE's focus in FY2018 on early stage applied research and development for energy efficiency and renewable energy technologies."[8]

[8] DOE, *FY2018 Congressional Budget Justification*, vol. 3, p. 223, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume3_0.pdf.

However, the House Appropriations Committee voted to continue the grant programs at the FY2017 funding level. The Senate Appropriations Subcommittee also approved continuation of the grant programs. For more information, see CRS In Focus IF10661, *DOE Office of Energy Efficiency and Renewable Energy: FY2017 Appropriations and the FY2018 Budget Request*, by Kelsi Bracmort and Corrie E. Clark.

Proposed Cuts in Energy R&D

Appropriations for DOE research and development on energy efficiency, renewable energy, nuclear energy, and fossil energy would be cut from $3.497 billion in FY2017 to $1.619 billion (53.7%) under the Administration's FY2018 budget request. This includes all funding except grants within DOE's EERE. "The FY2018 Budget Request for the Department of Energy is guided by the reassertion of the proper federal role as a supporter of early-stage R&D—in which the private sector has less incentive to invest—and an increased reliance on the private sector to fund later-stage R&D including demonstration and commercial deployment," according to the budget justification.[9] Major proposed reductions include carbon capture and storage (-84%), nuclear fuel cycle R&D (-57%), sustainable transportation (-70%), renewable energy (-70%), advanced manufacturing (-68%), and building technologies (-66%).[10] The House Appropriations Committee approved most of the Administration's proposed cuts in energy efficiency and renewable energy R&D but reduced nuclear and fossil energy R&D by only 4.7% and 5.0%, respectively, from their FY2017 levels.

Nuclear Waste Management

The Administration's budget request would provide new funding for the first time since FY2010 for a proposed nuclear waste repository at Yucca Mountain, NV. DOE would receive $110 million to seek an NRC license for the repository, and NRC would receive $30 million to consider DOE's application. DOE would also receive $10 million to develop interim nuclear waste storage facilities. DOE's total of $120 million in nuclear waste funding would 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 declared the Yucca Mountain site "unworkable" because of opposition from the State of Nevada. The House Appropriations Committee approved the Yucca Mountain funding for FY2018. For more background, see CRS Report RL33461, *Civilian Nuclear Waste Disposal*, by Mark Holt.

Elimination of Energy Loans and Loan Guarantees

The FY2018 budget request would halt further loans and loan guarantees under DOE's Advanced Technology Vehicles Manufacturing Loan Program and the Title 17 Innovative Technology Loan Guarantee Program. Elimination of the loan programs "reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage research and development," according to

[9] DOE, *FY2018 Congressional Budget Justification*, vol. 3, p. 351, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume3_0.pdf.

[10] DOE, "FY2018 Summary Control Table by Appropriation," https://energy.gov/sites/prod/files/2017/06/f35/FY2018BudgetControlTablebyAppropriation_0.pdf.

the DOE budget justification.[11] DOE would continue to administer its existing portfolio of loans and loan guarantees. According to the request, those administrative costs would be covered by prior-year appropriations, except for $2 million in new appropriations for the innovative loan guarantee program, which would be entirely offset by fees from existing loan guarantee recipients. Unobligated prior-year appropriations to cover potential government losses from the DOE loan programs (called "subsidy costs") would be permanently cancelled. Unused prior-year authority, or ceiling levels, for loan guarantee commitments would also be permanently cancelled. The Administration's proposal to terminate further loans and loan guarantees was approved by the House Appropriations Committee.

International Thermonuclear Experimental Reactor

The International Thermonuclear Experimental Reactor (ITER), under construction in France, continues to draw congressional concerns about management, schedule, and cost. 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. As directed by P.L. 114-113, DOE issued a report in May 2016 on whether the United States should continue as an ITER partner or terminate its participation. DOE recommended that U.S. participation continue at least two more years but be reevaluated before FY2019.[12] Congress appropriated $50 million for FY2017. DOE's request for FY2018 is $63 million. The House Appropriations Committee approved the request, saying in its report, "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."[13] The Senate Appropriations Subcommittee rejected the request and eliminated funding for ITER.

Elimination of Advanced Research Projects Agency—Energy

The Trump Administration proposes to eliminate 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.[14] Because ARPA-E provides advance funding for projects for up to three years, oversight and management of the program would be required through FY2021 even if funding for new projects were halted after FY2017, as proposed by the Administration. The FY2018 budget justification calls for $20 million in new appropriations to be supplemented by $45 million in previous funding provided for research projects, which would be reallocated for closing out the program. The ARPA-E office would close in FY2019, "at which point remaining monitoring and contract closeout activities would be transferred elsewhere within DOE."[15] The House Appropriations Committee approved the Administration's proposal to terminate ARPA-E, which the Administration proposed because "the private sector is better

[11] DOE, *FY2018 Congressional Budget Justification*, vol. 3, p. 717, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume3_0.pdf.

[12] DOE, *U.S. Participation in the ITER Project*, May 2016, http://science.energy.gov/~/media/fes/pdf/DOE_US_Participation_in_the_ITER_Project_May_2016_Final.pdf.

[13] See p. 96 of H.Rept. 115-230.

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

[15] DOE, *FY2018 Congressional Budget Justification*, vol. 3, p. 691, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume3_0.pdf.

positioned to finance disruptive energy research and development and to commercialize innovative technologies."[16] The Senate Appropriations Subcommittee rejected the Administration's proposal and approved funding for ARPA-E at $330 million.

Upgrading Nuclear Weapons Infrastructure

The Weapons Activities account in DOE's National Nuclear Security Administration (NNSA) supports programs that maintain U.S. nuclear missile warheads and gravity bombs and the infrastructure programs that support that mission. In hearings on the FY2017 budget, NNSA Administrator Frank G. Klotz testified, "The age and condition of NNSA's infrastructure will, if not addressed, put the mission, the safety of our workers, the public, and the environment at risk. More than half of NNSA's facilities are over 40 years old while 30% of them date back to the Manhattan Project era."[17] Congress appropriated $9.246 billion for Weapons Activities for FY2017, including $2.808 billion for Infrastructure and Operations. For FY2018, the Administration requested a 10.7% increase in Weapons Activities to $10.239 billion. Infrastructure and Operations would get nearly flat funding (-0.2%), but the request shows some shifting of funds to bolster maintenance and recapitalization. The House Appropriations Committee approved the Administration's funding request. 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 has continued to appropriate construction funds for MFFF, including $335 million for FY2017. For FY2018, the Trump Administration also proposed to end the MFFF project, requesting $279 million to begin the termination process. The Trump Administration requested $9 million to begin a new Surplus Plutonium Disposition Project that would dilute surplus plutonium for disposal in a deep repository.[18] The Obama Administration had also recommended the dilute and dispose option. The House Appropriations Committee approved $340 million to continue MFFF construction in FY2018 and prohibited "the use of MOX funding to terminate the project while the Congress is considering an alternative approach for disposing of these materials." 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*

[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.

[17] Statement of Lt. Gen. Frank G. Klotz, USAF (Ret), Administrator, National Nuclear Security Administration, U.S. Department of Energy, on the Fiscal Year 2017 President's Budget Request Before the Subcommittee on Energy and Water Development House Committee on Appropriations, March 1, 2016, http://docs.house.gov/meetings/AP/AP10/20160301/104561/HHRG-114-AP10-Wstate-KlotzF-20160301.pdf.

[18] DOE, *FY2018 Congressional Budget Justification*, vol. 1, p. 548, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume1_1.pdf.

Fabrication Plant and Plutonium Disposition: Management and Policy Issues, by Mark Holt and Mary Beth D. Nikitin.

Cleanup of DOE Nuclear Facilities

DOE's Office of Environmental Management (EM) is responsible for environmental cleanup and waste management at the department's nuclear facilities. The total FY2018 appropriations request for EM activities was $6.508 billion, an increase of $88 million (1.4%) from the FY2017 enacted appropriation. The three EM appropriations accounts are Defense Environmental Cleanup, which would increase $132 million (2.4%) over FY2017; Non-Defense Environmental Cleanup, down $28.6 million (11.6%); and Uranium Enrichment Decontamination and Decommissioning (D&D), down $15.3 million (2.0%). The House Appropriations Committee approved flat funding for Defense Environmental Cleanup and Uranium Enrichment D&D, and a 10.0% reduction in Non-Defense Environmental Cleanup from the FY2017 appropriation. The Senate Appropriations Subcommittee approved an increase for a total of $6.6 billion for EM activities. Although the Administration's request generally would continue 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. Milestones establish schedules for the completion of specific work under enforceable compliance agreements. Previous Administrations have taken a similar approach to modifying milestones that later may become infeasible to attain due to resource constraints or technical challenges.

Divest Transmission Infrastructure and Repeal Borrowing Authority for Power Marketing Administrations

DOE's budget included two 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 the Bureau of Reclamation and the Army Corps of Engineers. The Administration's FY2018 budget would divest the assets of the three PMAs that own transmission infrastructure: BPA, SWPA, and WAPA.[19] These assets consist of thousands of miles of high voltage transmission lines and hundreds of power substations. The budget projected mandatory savings of approximately $5.5 billion over a 10-year horizon associated with the sale of these assets, which would need to be approved in legislation by the authorizing committees. The proposal has been opposed by the American Public Power Association and the National Rural Electrical Cooperative Association, and was the subject of opposition letters to the Administration from bipartisan groups of 21 western Senators and 12 Pacific Northwest Members of Congress.

The Administration's budget would also repeal $3.25 billion in borrowing authority provided to WAPA for transmission projects that were enacted under the American Recovery and Reinvestment Act of 2009 (P.L. 111-5). The proposal is estimated to save $4.4 billion over a 10-year horizon. Similar to the divestiture proposal, it too would need to be enacted by the authorizing committees in order to become law.

[19] SEPA markets hydroelectric power from 22 Corps of Engineers facilities in 11 Southeastern states, but does not own or operate transmission facilities.

Bill Status and Recent Funding History

Table 1 indicates the steps taken during consideration of FY2018 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, FY2018

Subcommittee Markup							Final Approval		
House	Senate	House Committee	House Passed	Senate Committee	Senate Passed	Conf. Report	House	Senate	Public Law
6/28/2017	7/18/2017	7/12/17							

Notes: Details on the Senate version of the Energy and Water Development and Related Agencies Appropriations Act, 2018 are not yet available. The Senate Appropriations Committee is scheduled to discuss the markup of the FY2018 Energy and Water Development appropriations bill on July 20, 2017.

Table 2 includes budget totals for energy and water development appropriations enacted for FY2010 through FY2017, plus the Trump Administration's FY2018 request.

Table 2. Energy and Water Development Appropriations and Request, FY2010 to FY2018

(budget authority in billions of current dollars)

FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018 request
33.4	31.7	34.4[a]	36.0[b]	34.1	34.8	37.3	38.4	34.2

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

Notes: Figures exclude permanent budget authorities and reflect rescissions. Figures for FY2016 and previous years are enacted levels.

a. Includes $1.7 billion in emergency funding for the Corps of Engineers.

b. Includes $5.4 billion in emergency funding for the Corps of Engineers.

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 FY2018 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 Request	FY2017 Approp.	FY2018 Request	FY2018 H. Comm.
Title I: Corps of Engineers	5,989	4,620	6,038	5,002	6,158
Title II: CUP and Reclamation	1,275	1,112	1,317	1,106	1,238
Title III: Department of Energy	29,744	31,568	31,182	28,216	30,348
Title IV: Independent Agencies	342	312	349	210	357
Subtotal	37,350	37,612	38,886	34,534	38,101
Rescissions and Scorekeeping Adjustments[a]	-27	-64	-436	-345	-460
E&W Total	**37,323**[b]	**37,547**	**38,450**	**34,189**	**37,641**[c]

Sources: H.Rept. 115-230, 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, Congressional Budget Office, H.R. 2029 explanatory statement, https://www.congress.gov/crec/2015/12/17/CREC-2015-12-17-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 grand 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.

c. The grand total on p. 4 of H.Rept. 115-230 is $37.562 billion, which includes an additional $79.376 million in scorekeeping adjustments not reflected here.

Agency Budget Justifications

FY2017 budget justifications for the largest agencies funded by the annual Energy and Water Development Appropriations bill can be found at

- 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/fy2018_cupca_budget_justification.pdf
- Title III, Department of Energy, https://energy.gov/cfo/downloads/fy-2018-budget-justification
- Title IV, Independent Agencies
  - Nuclear Regulatory Commission, http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1100/

- Defense Nuclear Facilities Safety Board, https://www.dnfsb.gov/content/fy-2018-congressional-budget-justification
- Nuclear Waste Technical Review Board, http://www.nwtrb.gov/plans/2018%20CBJ.pdf

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, Corps studies, construction projects, and other activities have been generally authorized in Water Resources Development Acts before they were considered eligible for Corps appropriations. Congress enacted water resources development 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). These bills authorized new Corps projects and altered numerous Corps policies and procedures.[20]

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 the President's annual budget request for the Corps identifying funding for site-specific projects, Congress identified during the discretionary appropriations process many additional Corps projects to receive funding or adjusted the funding levels for the projects identified in the President's request.[21] 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 (e.g., "ongoing navigation work"), and provided direction and limitations on the use of these funds. For more information, see CRS In Focus IF10671, *Army Corps of Engineers: FY2018 Appropriations*, by Nicole T. Carter; CRS In Focus IF10361, *Army Corps of Engineers: FY2017 Appropriations*, by Charles V. Stern; and CRS In Focus IF10176, *Army Corps of Engineers: FY2016 Appropriations*, by Charles V. Stern. Previous appropriations and recommendations for FY2018 are shown in **Table 4**.

[20] For detailed background on the WRRDA 2014 legislation, see CRS Report R43298, *Water Resources Reform and Development Act of 2014: Comparison of Select Provisions*, by Nicole T. Carter et al.

[21] 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.

Table 4. Army Corps of Engineers

(budget authority in millions of current dollars)

Program	FY2014 Approp.	FY2015 Approp.	FY2016 Approp.	FY2017 Request	FY2017 Approp.	FY2018 Request	FY2018 H. Com.
Investigations and Planning	125.0	122.0	121.0	85.0	121.0	86.0	105.0
Construction	1,656.0	1,639.5	1,862.3	1,090.0	1,876.0	1,020.0	1,697.0
Mississippi River and Tributaries (MR&T)	307.0	302.0	345.0	222.0	362.0	253.0	301.0
Operation and Maintenance (O&M)	2,861.0	2,908.5	3,137.0	2,705.0	3,149.0	3,100.0	3,519.0
Regulatory	200.0	200.0	200.0	200.0	200.0	200.0	200.0
General Expenses	182.0	178.0	179.0	180.0	181.0	185.0	181.0
FUSRAP[a]	103.5	101.5	112.0	103.0	112.0	118.0	118.0
Flood Control and Coastal Emergencies (FC&CE)	28.0	28.0	28.0	30.0	32.0	35.0	32.0
Office of the Asst. Secretary of the Army	5.0	3.0	4.8	5.0	4.8	5.0	4.8
Rescission		-28.0					
Total Title I	**5,467.5**	**5,454.5**	**5,989**	**4,620**	**6,037.8**	**5,002.0**	**6,157.8**

Sources: H.Rept. 115-230, P.L. 115-31 and explanatory statement, S.Rept. 114-236, H.Rept. 114-532, FY2017 and FY2016 budget requests and Work Plans for FY2013, FY2014, and FY2015; S.Rept. 114-54; P.L. 113-2; H.R. 2029 explanatory statement. FY2017 request numbers can be found at https://obamawhitehouse.archives.gov/sites/default/files/omb/budget/fy2017/assets/budget.pdf.

a. Formerly Utilized Sites Remedial Action Program.

Bureau of Reclamation

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 Army 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 protecting 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 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 and relatively few "programs." Also similar to 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.[22] 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) is conducted by a separate office within the Department of the Interior.

For more information, see CRS In Focus IF10692, *Bureau of Reclamation: FY2018 Appropriations*, by Charles V. Stern. Previous appropriations and recommendations for FY2018 are shown in **Table 5**.

Table 5. Bureau of Reclamation

(budget authority in millions of current dollars)

Program	FY2014 Approp.	FY2015 Approp.	FY2016 Approp.	FY2017 Request	FY2017 Approp.	FY2018 Request	FY2018 H. Com.
Water and Related Resources	954.1	978.1	1,119,0	813.4	1,155,9	960.0	1,091.8
Policy and Administration	60.0	58.5	59.5	59.0	59.0	59.0	59.0
CVP Restoration Fund (CVPRF)	53.3	57.0	49.5	55.6	55.6	41.4	41.4
Calif. Bay-Delta (CALFED)	37.0	37.0	37.0	36.0	36.0	37.0	37.0
San Joaquin Restoration Fund[a]	-	-	-	36.0	-	-	-
Indian Water Rights Settlement[a]	-	-	-	106.2	-	-	-
Rescission	0	-0.5	0	0	0	0	0
Gross Current Reclamation Authority	**1,104.4**	**1,130.1**	**1,265.0**	**1,106.2**	**1,306.5**	**1,097.4**	**1,229.2**
Central Utah Project (CUP) Completion	8.7	9.9	10.0	5.6	10.5	9.0	9.0
Total, Title II Current Authority (CUP and Reclamation)	**1,113.1**	**1,140.0**	**1,275.0**	**1,111.8**	**1,317.0**	**1,106.4**	**1,238.1**

Sources: 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. Excludes offsets and permanent appropriations.

Notes: Totals may not add due to rounding. CVP = Central Valley Project.

[22] 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.

a. As in previous requests, the Obama Administration's request included funding for these items, which have in the past been funded within the Water and Related Resources Account, as new accounts. For FY2017, the House Appropriations Committee and the Senate again rejected the Obama Administration's proposal for these new accounts.

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)

Program	FY2015 Approp.	FY2016 Approp.	FY2017 Request	FY2017 Approp.	FY2018 Request	FY2018 H. Com.
ENERGY PROGRAMS						
Energy Efficiency and Renewable Energy	1,914.2	2,069.2	2,898.4	2,090.2	636.1	1,103.9
Electricity Delivery and Energy Reliability	147.0	206.0	262.3	230.0	120.0	218.5
Nuclear Energy	833.4	986.2	993.9	1,016.6	703.0	969.0
Fossil Energy R&D	571.0	632.0	360.0	668.0	280.0	634.6
Naval Petroleum and Oil Shale Reserves	20.0	17.5	15.0	15.0	4.9	4.9
Elk Hills School Lands Fund	15.6	0	0	0	0	0
Strategic Petroleum Reserve	200.0	212.0	257.0	223.0	188.4	252.0
Northeast Home Heating Oil Reserve	1.6	7.6	6.5	6.5	6.5	6.5
Energy Information Administration	117.0	122.0	131.1	122.0	118.0	118.0
Non-Defense Environmental Cleanup	246.0	255.0	218.4	247.0	218.4	222.4
Uranium Enrichment Decontamination and Decommissioning Fund	625.0	673.7	0	768.0	752.7	768.0
Science	5,067.7	5,350.2	5,572.1	5,392.0	4,472.5	5,392.0
Advanced Research Projects Agency-Energy (ARPA-E)	280.0	291.0	350.0	306.0	-26.4	0
Nuclear Waste Disposal	0	0	0	0	90.0	90.0
Departmental Admin. (net)	126.0	131.0	167.0	143.0	145.7	185.7
Office of Inspector General	40.5	46.4	44.4	44.4	49.0	49.0
Office of Indian Energy	0	0	22.9	0	0	0
Advanced Technology Vehicles Manufacturing Loans	4.0	6.0	5.0	5.0	2.0	5.0
Title 17 Loan Guarantee	17.0	17,0	1,027.0[a]	7.0	0	-411
Tribal Indian Energy Loan Guarantee	0	0	0	0[c]	0	0

Program	FY2015 Approp.	FY2016 Approp.	FY2017 Request	FY2017 Approp.	FY2018 Request	FY2018 H. Com.
Office of Technology Transitions	-	-	8.4	0	0	0
Rescission (Clean Coal Technology)	-6.6	0	0	0	0	0
TOTAL, ENERGY PROGRAMS	**10,232,7**	**11,026.6**	**12,339.4**	**11,283.7**	**7,510.9**	**9,609.0**
DEFENSE ACTIVITIES						
National Nuclear Security Administration (NNSA)						
Weapons Activities	8,186.7[b]	8,846.9	9,234.7	9,245.6	10,239.3	10,239.3
Nuclear Nonproliferation	1,616.6	1,940.3	1,807.9	1,882.9	1,793.3	1,776.5
Naval Reactors	1.234.0	1,375.5	1,420.1	1,419.8	1,479.8	1,486.0
Office of Admin./Salaries and Expenses	369.6	363.8	412.8	390.0	418.6	412.6
Total, NNSA	**11,407.3**	**12,526.5**	**12,875.6**	**12,938.3**	**13,931.0**	**13,914.4**
Defense Environmental Cleanup	5,000.0	5,289.7	5,235.4	5,405.0	5,537.2	5,405.0
Defense Uranium Enrichment D&D	463.0	0	155.1	563.0	0	0
Other Defense Activities	754.0	776.4	791.6	784.0	815.5	825.0
Defense Nuclear Waste Disposal	-	-	-	-	30.0	30.0
TOTAL, DEFENSE ACTIVITIES	**17,624.3**	**18,592.7**	**19,057.6**	**19,690.3**	**20.313.7**	**20,174.4**
POWER MARKETING ADMINISTRATION (PMAs)						
Southeastern	0	0	0	0	0	0
Southwestern	11.4	11.4	11.1	11.1	11.4	11.4
Western	93.4	93.4	95.6	95.6	93.4	93.4
Falcon and Amistad O&M	0.2	0.2	0.2	0.2	0.2	0.2
TOTAL, PMAs	**105.0**	**105.0**	**106.9**	**106.9**	**105.0**	**105.0**
Subtotal, DOE	**28,152.9**	**29,744.2**	**31,568.3**	**31,181.8**	**28,216.0**	**30,348.4**
Offsets	**-236.1**	**-26.9**	**-64.4**	**-435.8**	**-345.4**	**-460.0**
Total, DOE	**27,916.8**	**29,717.3**	**31,503.9**	**30.746.0**	**27,870.6**	**29,888.4**

Sources: 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, Congressional Budget Office, H.R. 2029 explanatory statement.

Notes: Totals may not add due to rounding.

a. $1.02 billion under Title 17 Loan Guarantees is a Congressional Budget Office scoring adjustment of the Obama Administration's request for $4 billion in additional loan guarantee authority, which did not include any appropriations.

b. This is the level as enacted in the FY2015 appropriations bill. NNSA proposed to change its budget structure for FY2016, such as transferring Nuclear Counterterrorism Incident Response from Weapons Activities to Defense Nuclear Nonproliferation. The FY2015 Weapons Activities figure comparable to the FY2016 figure is $8,007.7 million.

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

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 cut costs in half for battery and electric drivetrains for plug-in electric vehicles (EVs) by 2022.[23] A key supporting technology goal is to cut the cost of battery capacity from $264/kilowatt-hour (kwh) in 2015 to $125/kwh by 2022.[24] The fuel cell program targets a cost of $40 per kilowatt (kw) and a durability of 5,000 hours (equivalent to 150,000 miles) by 2020.[25] For hydrogen produced from renewable resources, the target is to bring the cost below $4.00 per gasoline gallon-equivalent (gge) by 2020.[26] Bioenergy goals include the development of "drop-in" fuels that would be largely compatible with existing energy infrastructure.

Renewable power programs focus on electricity generation from solar, wind, water, and geothermal sources. DOE's SunShot Initiative is aimed at halving the cost of solar power to 6 cents per kwh to make solar power cost-competitive without subsidies by 2020.[27] For land-based windfarms, there is a cost target of 5.2 cents/kwh by 2020.[28] For offshore wind settings, the target is 14.9 cents/kwh by 2020.[29] 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.[30]

In the energy efficiency program area, the advanced manufacturing program is intended to "catalyze research, development and adoption of energy-related advanced manufacturing technologies and practices."[31] The building technologies program has a goal of reducing building energy use intensity 30% by 2030.[32] According to EERE, the program is "paving the way for high performing buildings that could use 50-70% less energy than typical buildings."[33]

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[23] DOE, *FY2018 Budget Justification*, vol. 3, p. 17, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume3_0.pdf.

[24] Ibid., p. 48.

[25] Ibid., p. 75.

[26] Ibid., p. 71.

[27] Ibid., p. 115.

[28] Ibid., p. 136.

[29] Ibid.

[30] Ibid., p. 12.

[31] DOE, Office of Energy Efficiency and Renewable Energy, *Advanced Manufacturing Office Multi-Year Program Plan for Fiscal Years 2017 through 2012*, Draft, January 2017, p. 27, https://energy.gov/sites/prod/files/2017/01/f34/Draft%20Advanced%20Manufacturing%20Office%20MYPP_1.pdf.

[32] 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.

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

Electricity Delivery and Energy Reliability

The DOE Office of Electricity Delivery and Energy Reliability (OE) has the mission of supporting more economically competitive, environmentally responsible, secure, and resilient U.S. energy infrastructure. To achieve that mission, OE supports electric grid modernization and resiliency through research and development, demonstration projects, partnerships, facilitation, modeling and analytics, and emergency preparedness and response. It 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 2015 Grid Modernization Multi-Year Program Plan describes the department's vision for "a future electric grid that provides a critical platform for U.S. prosperity, competitiveness, and innovation by delivering reliable, affordable, and clean electricity to consumers where they want it, when they want it, how they want it." To help achieve this vision, DOE has established three key national goals:

- 10% reduction in the economic costs of power outages by 2025;
- 33% decrease in the cost of reserve margins while maintaining reliability by 2025; and
- 50% decrease in the net integration costs of distributed energy resources by 2025.[34]

For more details, see 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 FY2018 budget request for the Office of Nuclear Energy (NE) provides this mission statement: "To ensure that nuclear energy remains a viable energy option for the Nation, NE supports research and development activities designed to resolve the technical, cost, safety, waste management, proliferation resistance, and security challenges of nuclear energy."

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. The program also is supporting NRC efforts to develop a new, "technology neutral" licensing framework for advanced reactors. Cost-shared research with the nuclear industry is also conducted on extending the life of existing commercial light water reactors beyond 60 years, the maximum operating period currently licensed by NRC. This subprogram is also conducting research to understand the Fukushima disaster and to develop accident prevention and mitigation measures.[35]

[34] 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.

[35] The Fukushima nuclear disaster occurred on March 11, 2011, after an earthquake and tsunami struck Japan's Fukushima Daiichi nuclear power station, which knocked 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.

NE plans to complete a program in FY2017 that has 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 is currently being provided to the NuScale Power SMR, which has a generating capacity of 50 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. Further funding is not included in DOE's FY2018 budget justification.

The Fuel Cycle Research and Development program conducts generic research on nuclear waste management and disposal. In general, the program is investigating ways to separate 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.

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, *DOE Fossil Energy Research & Development: Funding for CCS*, by Peter Folger, CRS Report R44472, *Funding for Carbon Capture and Sequestration (CCS) at DOE: In Brief*, by Peter Folger, and CRS Report R44387, *Recovery Act Funding for DOE Carbon Capture and Sequestration (CCS) Projects*, by Peter Folger.

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.

By early 2010, the SPR's capacity reached 727 million barrels.[36] 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 the Department of Energy in lieu of cash royalties paid on

[36] For details on the SPR, see CRS Report R41687, *The Strategic Petroleum Reserve and Refined Product Reserves: Authorization and Drawdown Policy*, by Anthony Andrews and Robert Pirog.

production from federal offshore leases. In September 2009, the Secretary of the Interior announced a transitional phasing out of the RIK Program. DOE has been conducting a major maintenance program to address aging infrastructure and a deferred maintenance backlog at SPR facilities.

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 DOE budget justification, the SPR's drawdown capacity in FY2017 will be 4.25 million barrels per day. Currently, the SPR contains about 685 million barrels.[37]

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.

Science

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 FY2018 budget justification, the Office of Science "is the Nation's largest Federal sponsor of basic research in the physical sciences and the lead Federal agency supporting fundamental scientific research for our Nation's energy future."[38]

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-

[37] DOE, "Strategic Petroleum Reserve Inventory," https://www.spr.doe.gov/dir/dir.html.

[38] DOE, *FY2018 Congressional Budget Justification*, vol. 4, p. 7, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume4_5.pdf.

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 three 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 generate fusion power 30 times the levels produced to date and to exceed the external power applied ... by at least a factor of ten." 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 R44888, *Federal Research and Development Funding: FY2018*, coordinated by John F. Sargent Jr.

Loan Guarantees and Direct Loans

DOE's Loan Programs Office provides loan guarantees for projects that deploy specified energy technologies, as authorized by Title XVII 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 XVII 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. This 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 non-nuclear technologies under Section 1703;
- $2 billion for unspecified projects from FY2007 under Section 1703;

- $18.5 billion ceiling for nuclear power plants ($8.3 billion committed);
- $4 billion allocated for loan guarantees for uranium enrichment plants;
- $1.183 billion ceiling 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
- an appropriation of $161 million 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.

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 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 Weapons Activities account in the NNSA budget.

Most of NNSA's weapons activities take place at the nuclear weapons complex (the "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 complex; contractors to NNSA operate the eight sites.

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).

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.

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 FY2018 justification.[39] 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

[39] DOE, *FY2018 Congressional Budget Justification*, vol. 1, p. 519, https://energy.gov/sites/prod/files/2017/05/f34/FY2018BudgetVolume1_1.pdf.

Nonproliferation Construction program consists of the Mixed Oxide (MOX) Fuel Fabrication Facility (described under "Surplus Plutonium Disposition" above), which 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 supports "expert scientific teams and equipment to provide a technically trained, rapid response to nuclear or radiological incidents and accidents worldwide," according to the FY2018 budget justification.[40]

Cleanup of Former Nuclear 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.[41]

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.[42] 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.[43]

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.[44] 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.[45] 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

[40] Ibid., p. 573.

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

[42] 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.

[43] 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.

[44] For an interactive map and listing of each site, see DOE's Office of Environmental Management website, http://energy.gov/em/cleanup-sites. There are links to separate maps for active and completed sites.

[45] 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.

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 (D&D) Fund to pay for the cleanup of three federal facilities that enriched uranium for national defense and civilian purposes.[46] 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.[47] 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, Environmental Protection Agency, and the states. These milestones establish time frames for the completion of specific actions to satisfy applicable requirements at individual sites.[48]

Power Marketing Administrations

DOE's four Power Marketing Administrations (PMAs)—Bonneville Power Administration (BPA), Southeastern Power Administration (SEPA), Southwestern Power Administration (SWPA), and Western Area Power Administration (WAPA)—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.

Title IV: Independent Agencies

Independent agencies that receive funding from the Energy and Water Development bill include the Nuclear Regulatory Commission (NRC), the Appalachian Regional Commission (ARC), and the Denali Commission. Their recent appropriations history is shown in **Table 7**.

[46] 42 U.S.C. §2297g.

[47] 42 U.S.C. §2296a.

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

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 budget categories for NRC are Nuclear Reactor Safety ($462.3 million for FY2017), Nuclear Materials and Waste Safety ($113.7 million), Decommissioning and Low-Level Waste ($27.2 million), and Integrated University Program ($15.0 million). 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 only about 10% of its total funding level.

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

(budget authority in millions of current dollars)

Program	FY2016 Approp.	FY2017 Request	FY2017 Approp.	FY2018 Request	FY2018 H. Com.
Appalachian Regional Commission	146.0	120.0	152.0	26.7	130.0
Nuclear Regulatory Commission	*1,002.1*	*982.3*	*917.1*	*952.0*	*939.1*
(Revenues)	*-882.9*	*-861.2*	*804.6*	*814.0*	*790.4*
Net NRC (including Inspector General)	119.2	121.1	112.5	138.0	161.6
Defense Nuclear Facilities Safety Board	29.2	31.0	30.9	30.6	30.6
Nuclear Waste Technical Review Board	3.6	3.6	3.6	3.6	3.6
Denali Commission	11.0	15.0	15.0	7.3	11.0
Delta Regional Authority	25.0	16.0	25.0	2.5	15.0
Northern Border Regional Commission	7.5	5.0	10.0	1.0	5.0
Southeast Crescent Regional Commission	0.3	0	0.3	0	0.3
Total	**341.7**	**311.6**	**349.2**	**209.1**	**357.1**

Sources: 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, CBO, H.R. 2029 explanatory statement.

Note: Figures may not add due to rounding.

Congressional Hearings

The following hearings have been held by the Energy and Water Development subcommittees of the House and Senate Appropriations Committees on the FY2018 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*, May 24, 2017, https://appropriations.house.gov/calendararchive/eventsingle.aspx?EventID=394880.
- *Department of Energy*, June 20, 2017, https://appropriations.house.gov/calendararchive/eventsingle.aspx?EventID=394910.

Senate

- *Nuclear Regulatory Commission*, June 7, 2017, https://www.appropriations.senate.gov/hearings/review-of-the-fy2018-budget-request-for-the-nuclear-regulatory-commission.
- *National Nuclear Security Administration*, June 14, 2017, https://www.appropriations.senate.gov/hearings/review-of-the-fy2018-budget-request-for-the-national-nuclear-security-administration.
- *Department of Energy*, June 21, 2017, https://www.appropriations.senate.gov/hearings/review-of-the-fy2018-budget-request-for-the-us-department-of-energy.
- *Army Corps of Engineers and Bureau of Reclamation*, June 28, 2017, https://www.appropriations.senate.gov/hearings/review-of-the-fy2018-budget-requests-for-the-army-corps-of-engineers-and-bureau-of-reclamation.

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