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Energy and Water Development: FY2021 Appropriations

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SUMMARY

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Energy and Water Development: FY2021 Appropriations

The Energy and Water Development and Related Agencies appropriations bill provides funding for civil works projects of the U.S. Army Corps of Engineers (USACE); 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); the Appalachian Regional Commission (ARC); and several other independent agencies. DOE typically accounts for about 80% of the bill's funding.

Overall Funding Totals

President Trump submitted his FY2021 budget proposal to Congress on February 10, 2020. The budget requests for agencies included in the Energy and Water Development appropriations bill total $42.801 billion, including budget offsets. This was $5.450 billion (11%) below the FY2020 enacted Energy and Water Development total of $48.251 billion, not including supplemental appropriations.

DOE would receive $36.084 billion under the Administration's FY2021 budget request (excluding offsets)—a decrease of $2.444 billion (6%) from the FY2020 enacted level. The FY2021 request for Energy Efficiency and Renewable Energy is $720 million, which is $2.058 billion (74%) below the FY2020 enacted level. Nuclear Energy Research and Development (R&D) would drop from $1.34 billion in FY2020 to $1.042 billion in FY2021 (22%), and Fossil Energy R&D would be reduced from $750 million to $731 million (3%). DOE's Office of Science, which funds a wide range of research, would receive $5.838 billion, down $1.162 billion (17%) from the FY2020 enacted level. The Advanced Research Projects Agency—Energy would receive no funding for new projects and unobligated prior-year funds would be rescinded. Environmental Management (waste management and cleanup) would decline from $7.455 billion in FY2020 to $6.066 billion in FY2021 (down $1.39 billion, or 19%). The National Nuclear Security Administration, the DOE agency responsible for defense-related nuclear activities, would be increased from $16.705 billion in FY2020 to $19.771 billion in FY2021 (up $3.066 billion, or 18%). Also proposed for increases are DOE's Office of Electricity (up $5 million, or 3%) and the Office of Cybersecurity, Energy Security, and Emergency Response (up $29 million, or 18%).

The two major water agencies in the Energy and Water Development appropriations bill would see funding cuts under the FY2021 budget request. USACE would decline from $7.651 billion in FY2020 to $5.966 billion in FY2020 (down $1.685 billion, or 22%). Reclamation (separately from CUP) would be reduced from $1.660 billion in FY2020 to $1.128 billion in FY2021 (down $532 million, or 32%).

Major Issues

Some of the major Energy and Water Development funding issues for FY2021 are listed below. They were selected based on total funding involved, percentage of proposed increases or decreases, amount of congressional debate engendered, and potential impact on broader public policy considerations.

- *Proposed Water Agency Funding Reductions*. Reclamation's FY2021 budget request would reduce funding for WaterSMART—seven programs promoting water conservation—by 87%, from $137 million in FY2020 to $18 million in FY2021. For USACE, the largest dollar reduction is in Coastal Navigation, which would decline from $2.9 billion in FY2020 (with $1.6 billion coming from the Harbor Maintenance Trust Fund, HMTF) to $1.624 billion in FY2021 ($1.015 billion from HMTF)—for an overall reduction of $1.276 billion, or 44%.
- *Proposed Reductions in Energy Research and Development*. Under the FY2021 budget request, DOE energy research and development appropriations would be reduced and refocused on early-stage research. Congress has not approved similar proposals in recent years, instead increasing energy research funding and directing that it be used for all stages of research.
- *Weapons Activities.* The FY2021 budget request for DOE Weapons Activities is 25% greater than the FY2020 enacted level ($15.602 billion vs. $12.457 billion), in contrast to a proposed 6% reduction in DOE's total funding. This follows a 12% increase for Weapons Activities enacted for FY2020. The FY2021 request includes funding increases for several major nuclear warhead life-extension programs, funding increases to prepare for expanded production of plutonium pits (or cores), and a reorganization of major Weapons Activities program areas.

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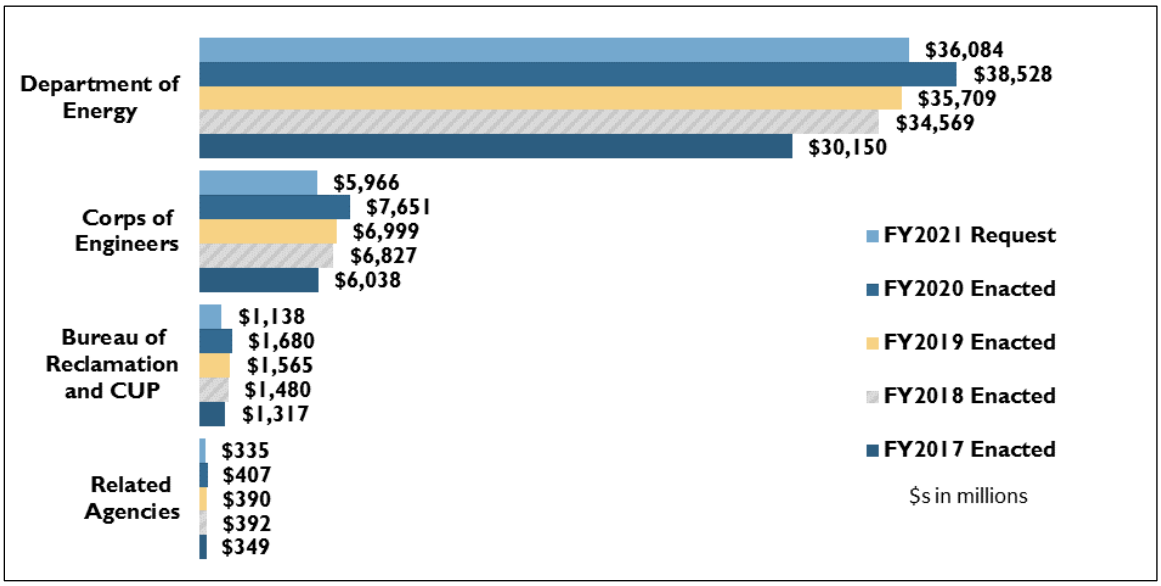
Introduction and Overview

The Energy and Water Development and Related Agencies appropriations bill includes funding for civil works projects of the U.S. Army Corps of Engineers (USACE), in Title I; the Department of the Interior's Bureau of Reclamation (Reclamation) and Central Utah Project (CUP), in Title II; the Department of Energy (DOE), in Title III; and a number of independent agencies, including the Nuclear Regulatory Commission (NRC) and the Appalachian Regional Commission (ARC), in Title IV. **Figure 1** compares the major components of the Energy and Water Development appropriations bill from FY2017 through the FY2021 Administration request.

Figure 1. Funding for Major Components of Energy and Water Development Appropriations Bill, FY2017 through FY2021 Request



Sources: DOE FY2021 Congressional Budget Justification, Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; S. 2470; H.R. 2740; FY2021 Budget Appendix; and agency budget justifications. Includes some adjustments; see tables 4-7 for details.

Notes: FY2021 DOE request total does not include asset sales and certain other offsets. Enacted amounts do not include subsequent emergency supplemental appropriations. CUP=Central Utah Project Completion Account.

President Trump submitted his FY2021 budget request to Congress on February 10, 2020. The budget requests for agencies included in the Energy and Water Development appropriations bill total $42.801 billion, including $722 million in budget offsets. This was $5.450 billion (11%) below the FY2020 enacted Energy and Water Development total of $48.251 billion, not including supplemental appropriations.

DOE would receive $36.084 billion under the Administration's FY2021 budget request (excluding offsets)—a decrease of $2.444 billion (6%) from the FY2020 enacted level. The FY2021 request for Energy Efficiency and Renewable Energy (EERE) is $720 million, which is $2.058 billion (74%) below the FY2020 enacted level. This includes elimination of grants for home weatherization assistance and state energy programs. Nuclear Energy Research and Development (R&D) would drop from $1.340 billion in FY2020 to $1.042 billion in FY2021 (22%), and Fossil Energy R&D would be reduced from $750 million to $731 million (3%). DOE's Office of Science, which funds a wide range of research, would receive $5.838 billion, down $1.162 billion (17%) from the FY2020 enacted level. Funding for the Advanced Research

Projects Agency—Energy (ARPA-E), which received $425 million in FY2020, would be eliminated and $311 million in prior-year funding rescinded. Environmental Management (waste management and cleanup) would decline from $7.455 billion in FY2020 to $6.066 billion in FY2021 (down $1.39 billion, or 19%).

The National Nuclear Security Administration, the DOE agency responsible for defense-related nuclear activities, would be increased from $16.705 billion in FY2020 to $19.771 billion in FY2021 (up $3.066 billion, or 18%). Also proposed for increases are DOE's Office of Electricity (up $5 million, or 3%) and the Office of Cybersecurity, Energy Security, and Emergency Response (up $29 million, or 18%).

The two major water agencies in the Energy and Water Development appropriations bill would see funding reductions under the FY2021 budget request. USACE would decline from $7.651 billion in FY2020 to $5.966 billion in FY2021 (down $1.685 billion, or 22%). Reclamation (separately from CUP) would be reduced from $1.660 billion in FY2020 to $1.128 billion in FY2021 (down $532 million, or 32%).

Among the independent agencies funded by the bill, the Nuclear Regulatory Commission (NRC) would receive an increase in total appropriations from $856 million in FY2020 to $863 million in FY2021 (up $7 million, or 1%). Because most of NRC's budget is offset by nuclear industry fees, the agency's net appropriation would decline from $128 million in FY2020 to $123 million in FY2021 (down $5 million, or 4%). Funding for the Appalachian Regional Commission would decrease from $175 million in FY2020 to $169 million in FY2021 (down $6 million, or 3%). Deeper percentage reductions in appropriations are proposed for smaller regional authorities in the bill: Denali Commission (-51%), Delta Regional Authority (-92%), Northern Border Regional Commission (-97%), and Southeast Crescent Regional Commission (-100%).

For FY2020 enacted funding, Congress approved the FY2020 Energy and Water Development and Related Agencies Appropriations Act on December 19, 2019, as Division C of the Further Continuing Appropriations Act, 2020, which was signed by the President on December 20, 2019 (P.L. 116-94). The enacted measure provided $48.236 billion for Energy and Water programs (including rescissions), $3.576 billion (8%) above the FY2019 funding level (excluding emergency supplemental appropriations) and $10.28 billion (27%) above the Administration request. Funding tables and other details are provided in the Explanatory Statement submitted with the Further Continuing Appropriations Act, 2020.[1]

Figures for FY2019 exclude emergency supplemental appropriations totaling $17.419 billion provided to USACE and DOE for natural disaster response by the Bipartisan Budget Act of 2018 (P.L. 115-123), signed February 9, 2018. Similarly, the discussion and amounts in this report do not reflect the emergency supplemental appropriations provided in the Additional Supplemental Appropriations for Disaster Relief Act, 2019 (P.L. 116-20) for USACE ($3.258 billion) and Reclamation ($16 million) or Coronavirus Disease 2019 (COVID-19)-related supplemental appropriations (e.g., P.L. 116-136). For more details, see CRS In Focus IF11435, *Supplemental Appropriations for Army Corps Flood Response and Recovery*, by Nicole T. Carter and Anna E. Normand, and CRS Report R45708, *Energy and Water Development: FY2020 Appropriations*, by Mark Holt and Corrie E. Clark.

[1] Further Consolidated Appropriations Act, 2020, Committee Print of the Committee on Appropriations, U.S. House of Representatives, on H.R. 1865/P.L. 116-94, Legislative Text and Explanatory Statement, January 2020, https://www.govinfo.gov/content/pkg/CPRT-116HPRT38679/pdf/CPRT-116HPRT38679.pdf.

Budgetary Limits

Congressional consideration of the annual Energy and Water Development appropriations bill is affected by certain procedural and statutory budget enforcement requirements. These consist primarily of procedural limits on discretionary spending (spending provided in annual appropriations acts) established in a budget resolution or through some other means, and allocations of this amount that apply to spending under the jurisdiction of each appropriations subcommittee.

Statutory budget enforcement is currently 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 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, known as a sequester, within that spending category.

The BCA's statutory discretionary spending limits were increased for FY2020 and FY2021 by the Bipartisan Budget Act of 2019 (BBA 2019, P.L. 116-37, H.R. 3877), signed by the President August 2, 2019. For FY2021, BBA 2019 sets discretionary spending limits of $671.5 billion for defense funding and $626.5 billion for nondefense funding. P.L. 116-136 (§14003) altered the accounting of certain harbor maintenance spending toward the discretionary spending limits.

(For more information, see CRS Insight IN11148, *The Bipartisan Budget Act of 2019: Changes to the BCA and Debt Limit*, by Grant A. Driessen and Megan S. Lynch, and CRS Report R44874, *The Budget Control Act: Frequently Asked Questions*, by Grant A. Driessen and Megan S. Lynch.)

Funding Issues and Initiatives

Several issues have drawn particular attention during congressional consideration of Energy and Water Development appropriations for FY2021. 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 total funding involved, percentage of proposed increases or decreases, amount of congressional debate engendered, and potential impact on broader public policy considerations. The Administration's FY2021 budget request was prepared before the widespread COVID-19 outbreak occurred in the United States; funding related to the pandemic could also become an issue in the energy and water development appropriations debate. (For more information, see CRS Insight IN11300, *COVID-19: Potential Impacts on the Electric Power Sector*, by Ashley J. Lawson.)

Army Corps of Engineers and Reclamation Budgets

For USACE, the Trump Administration requested $5.966 billion for FY2021, which is $1.685 billion (22%) below the FY2020 appropriation. The request includes no funding for initiating new studies and construction projects (referred to as *new starts*). The FY2021 request would limit funding for ongoing navigation and flood risk-reduction construction projects to those whose benefits are at least 2.5 times their costs, or projects that address safety concerns. Many congressionally authorized USACE projects do not meet that standard. Congress has not approved previous Administration requests to terminate funding for new starts.[2]

[2] Congress also recommended up to two new starts for environmental infrastructure projects or programs under the

The Administration also seeks to transfer the Formerly Utilized Sites Remedial Action Program (FUSRAP) from USACE to DOE, a proposal included in prior budget requests that Congress has not approved. Other USACE appropriations issues that may arise include efforts to shape the activities of USACE's regulatory program. USACE administers the permit program for Section 404 of the Clean Water Act. For Reclamation (not including CUP), the FY2021 request would reduce funding by $532 million (32%) from the FY2020 level, to $1.128 billion.

For more details, see CRS In Focus IF11462, *Army Corps of Engineers: FY2021 Appropriations*, by Anna E. Normand and Nicole T. Carter, CRS In Focus IF11465, *Bureau of Reclamation: FY2021 Appropriations*, by Charles V. Stern, and CRS Report R46320, *U.S. Army Corps of Engineers: Annual Appropriations Process and Issues for Congress*, by Anna E. Normand and Nicole T. Carter.

Power Marketing Administration Proposals

DOE's FY2021 budget request includes three spending 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 various federal dams. The Administration proposes 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 spending savings from the sale of these assets would total approximately $4.1 billion over a 10-year period.[4] The FY2021 budget request proposes to repeal the borrowing authority for WAPA's Transmission Infrastructure Program, which facilitates the delivery of renewable energy resources.

The FY2021 budget also proposed eliminating the statutory requirement that PMAs limit rates to amounts necessary to recover only construction, operations, and maintenance costs. The budget proposes that the PMAs instead transition to a market-based approach to setting rates. The Administration estimated that this proposal would yield $7.4 billion in new revenues over 10 years.[5] The 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 was estimated to save $500 million over 10 years.[6]

The Administration has made all of these proposals in previous years. To take effect, they 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, and they have been the

Construction account. For more on environmental infrastructure authorities, see CRS In Focus IF11184, *Army Corps of Engineers: Environmental Infrastructure Assistance*, by Anna E. Normand.

[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. Mandatory spending is provided by permanent law outside the annual appropriations process; for details, see CBO, "What is the difference between mandatory and discretionary spending?," https://www.cbo.gov/content/what-difference-between-mandatory-and-discretionary-spending.

[4] Office of Management and Budget, *A Budget for America's Future: Major Savings and Reforms*, Fiscal Year 2021, p. 138, https://www.whitehouse.gov/wp-content/uploads/2020/02/msar_fy21.pdf.

[5] Ibid., p. 139.

[6] Ibid., p. 140.

subject of opposition letters to the Administration from several regionally based bipartisan groups of Members of Congress. PMA reforms have been supported by some policy research institutes, such as the Heritage Foundation.

For further information, see CRS Report R45548, *The Power Marketing Administrations: Background and Current Issues*, by Richard J. Campbell.

Termination of Energy Efficiency Grants

The FY2021 budget request proposes to terminate both the DOE Weatherization Assistance Program and the State Energy Program (SEP). The Weatherization Assistance Program provides grants under a predetermined formula to states to fund energy efficiency improvements for low-income housing units to reduce their energy costs 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 $305 million and SEP $63 million for FY2020, after also having been proposed for elimination in that year's budget request, as well as in FY2019 and FY2018. According to DOE, the proposed elimination of the grant programs is "due to a departmental shift in focus away from deployment activities and towards early-stage R&D."[7]

Proposed Reductions in Energy R&D

Appropriations for applied R&D on energy efficiency, renewable energy, nuclear energy, fossil energy, and related energy activities at DOE would be reduced from $5.442 billion in FY2020 to $3.250 billion (40%) under the Administration's FY2021 budget request.[8] Major proposed reductions include bioenergy technologies (-83%), vehicle technologies (-81%), natural gas technologies (-71%), advanced manufacturing (-75%), building technologies (-79%), wind energy (-79%), solar energy (-76%), geothermal technologies (-76%), and nuclear fuel cycle R&D (-39%). DOE said the proposed reductions would primarily affect the later stages of energy research, which tend to be the most costly. "The Budget focuses DOE resources toward early-stage R&D, where the Federal role is strongest, and reflects an increased reliance on the private sector to fund later-stage research, development, commercialization, and deployment of energy technologies," according to the FY2021 DOE request.[9]

The Administration has proposed similar reductions in previous years but they have not been approved by Congress. The Explanatory Statement for the enacted FY2020 Energy and Water Development Appropriations measure said, "The Department is directed to maintain a diverse portfolio of early-, mid-, and late-stage research, development, and market transformation activities in each applied energy research and development program office."[10]

[7] DOE, *FY2021 Congressional Budget Request, Budget in Brief*, p. 20, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

[8] Related energy activities include state energy efficiency and weatherization grants, energy security programs, and electricity programs. The Office of Science and ARPA-E are not included.

[9] DOE, *FY2021 Congressional Budget Request, Budget in Brief*, p. 17, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

[10] Further Consolidated Appropriations Act, 2020, Committee Print, Legislative Text and Explanatory Statement, January 2020, p. 452, https://www.govinfo.gov/content/pkg/CPRT-116HPRT38679/pdf/CPRT-116HPRT38679.pdf.

Nuclear Waste Management

The Administration's FY2021 budget request does not include new funding for a proposed underground nuclear waste repository at Yucca Mountain, NV, after funding requests for the repository were not approved by Congress in the last three fiscal years. The Administration's previous Yucca Mountain requests had included funding for DOE to pursue an NRC license for the repository and for NRC to consider DOE's license application. Although no funding is requested for Yucca Mountain, the Administration is seeking $28 million to develop nuclear waste central interim storage capacity. "Funding is primarily dedicated to performing activities that would lay the groundwork necessary to ensure near-term deployment of interim storage to ensure safe and effective consolidation and temporary storage of nuclear waste," according to DOE's budget justification.[11]

For more background, see CRS Report RL33461, *Civilian Nuclear Waste Disposal*, by Mark Holt.

Advanced Reactor Demonstrations

A new, $230 million sub-account for an Advanced Reactors Demonstration Program within the DOE Nuclear Energy account was included in the Explanatory Statement for the FY2020 enacted appropriations measure. Of that funding, $160 million was provided for DOE to begin two advanced nuclear reactor demonstration projects, with a cost-share of at least 50% from nonfederal sources. Another $30 million was provided for grants to reduce the technical risk of two-to-five additional reactor demonstration proposals, with a nonfederal cost-share of at least 20%. The FY2021 DOE request includes no further funding for reactor demonstrations but would provide $20 million to continue R&D related to the program. The budget request would formally establish the Versatile Test Reactor (VTR) as a DOE construction project and more than quadruple its funding to $295 million. The VTR would be a new reactor to provide fast (high energy) neutrons for testing advanced reactor fuels and materials. DOE estimates the project's total construction cost at between $3 billion and $6 billion, with completion ranging from 2026 to 2030.[12]

Proposed Uranium Reserve

The FY2021 budget request for the DOE Office of Nuclear Energy includes $150 million to establish a Uranium Reserve. Under this initiative, DOE would purchase uranium from domestic uranium producers and have it converted to uranium hexafluoride (a necessary step in making nuclear reactor fuel) by a domestic conversion facility. According to DOE, this stockpile of uranium would be available for nuclear power operators in the event of a civilian nuclear fuel market disruption and provide a source of U.S.-origin uranium for defense purposes. "Establishing a reserve is an urgent step needed in response to an overreliance on imported uranium product that has undermined U.S. energy security and impacted U.S. fuel supply capabilities," according to the DOE budget justification. However, the justification notes that, for

[11] DOE, *Budget in Brief*, February 2020, p. 38, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

[12] Thomas J. O'Connor, VTR Program Director, DOE Office of Nuclear Energy, "Versatile Test Reactor Update," March 28, 2019, https://www.energy.gov/sites/prod/files/2019/04/f61/VTR%20NEAC%20Rev%202%20%28003%29_1.pdf.

the newly stockpiled uranium, "no immediate national security need has been identified."[13] "Subsequent support will be considered as deemed necessary across a 10-year period as the government and private sector work to reestablish US technology and market share," according to a report released April 23, 2020, by the Administration's Nuclear Fuel Working Group (NFWG).[14]

U.S. uranium production in calendar year 2019 was the lowest since before 1949, according to the Energy Information Administration (EIA). As of the fourth quarter of 2019, EIA reported that three domestic in-situ uranium plants (solution mining operations in which a solvent is pumped through underground ore bodies to recover uranium) were operating and that three domestic conventional uranium mills were on standby. Two domestic uranium producers petitioned the Department of Commerce (DOC) in 2018 to investigate foreign uranium imports under Section 232 of the Trade Expansion Act of 1962 (19 U.S.C. §1862). DOC subsequently recommended presidential action to restrict imports, but President Trump did not concur.[15] Nonetheless, the Trump Administration expressed significant concerns regarding national security and responded by establishing the NFWG. The DOE FY2021 budget justification called the Uranium Reserve initiative "consistent with the priorities" of the NFWG and said it would "directly support the operation of at least two U.S. uranium mines and the reestablishment of active domestic conversion capabilities" and was "not designed to replace or disrupt market mechanisms."[16]

For more information, see CRS In Focus IF11505, *Uranium Reserve Program Proposal: Policy Implications*, by Lance N. Larson.

Strategic Petroleum Reserve Sales and Purchases

The Strategic Petroleum Reserve (SPR), managed by DOE, holds more than 600 million barrels of crude oil in storage caverns along the Texas and Louisiana coasts. In 2015, Congress began mandating sales of SPR oil.[17] Mandated sales direct the Secretary of Energy to sell a specified quantity of SPR oil, with proceeds deposited into the general fund of the U.S. Treasury. In addition to mandated sales, modernization sales under various laws authorize the Secretary of Energy to draw down and sell SPR oil from FY2017 through FY2020.[18] Proceeds from these sales are to be deposited in the Energy Security and Infrastructure Modernization Fund (ESIMF) for construction and maintenance of SPR facilities.

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[13] DOE, Budget in Brief, February 2020, p. 39, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

[14] DOE, "Strategy to Restore American Nuclear Energy Leadership," news release, April 23, 2020, https://www.energy.gov/strategy-restore-american-nuclear-energy-leadership.

[15] White House, "Memorandum on the Effect of Uranium Imports on the National Security and Establishment of the United States Nuclear Fuel Working Group," July 12, 2019, https://www.whitehouse.gov/presidential-actions/memorandum-effect-uranium-imports-national-security-establishment-united-states-nuclear-fuel-working-group.

[16] Ibid.

[17] Bipartisan Budget Act of 2015 (P.L. 114-74); Fixing America's Surface Transportation (FAST) Act (P.L. 114-94); 21st Century Cures Act of 2016 (P.L. 114-255); An Act to Provide for Reconciliation Pursuant to Titles II and V of the Current Resolution on the Budget for Fiscal Year 2018 (P.L. 115-97); Bipartisan Budget Act of 2018 (P.L. 115-123); Consolidated Appropriations Act, 2018 (P.L. 115-141); and America's Water Infrastructure Act of 2018 (P.L. 115-270).

[18] These laws include the Further Continuing and Security Assistance Appropriations Act, 2017 (P.L. 114-254), which allows sales up to $375.4 million; Bipartisan Budget Act of 2018 (P.L. 115-123), which allows sales up to $350 million; and Energy and Water, Legislative Branch, and Military Construction and Veterans Affairs Appropriations Act, 2019 (P.L. 115-244), which allows sales up to $300 million.

Global oil prices have declined precipitously since January 2020, as a result of a number of factors, including reduced demand and economic impacts related to the evolving COVID-19 pandemic. Due to these recent developments, a plan to sell crude oil from the SPR for the ESIMF—as required in FY2020 by P.L. 116-94—was suspended. Discussions transitioned from selling oil from the SPR to purchasing oil to fill it to capacity. Acquiring crude oil for SPR storage could absorb a limited amount of market oversupply. Physical SPR capacity is approximately 713.5 million barrels, while actual inventories are 635 million barrels.[19] At the direction of President Trump, DOE issued a solicitation to purchase an initial 30 million barrels of crude oil as part of a plan to acquire 77 million barrels. However, on March 25, 2020, DOE cancelled this solicitation, noting "uncertainty related to adequate Congressional Appropriations."[20] On April 2, 2020, DOE announced a solicitation for storage of 30 million barrels in exchange for a certain percentage of the stored oil, which would become part of the SPR stockpile.[21]

DOE's FY2021 budget request, similar to FY2020's request, is not requesting appropriations for the SPR Petroleum Account, which is used for oil purchases. Instead, DOE seeks to dissolve the Northeast Gasoline Supply Reserve (NGSR), which consists of government-owned refined petroleum products in storage in the Northeast. According to DOE, the NGSR has never been utilized and is "not considered to be cost efficient or operationally effective."[22] DOE would use proceeds from the NGSR sale to fund drawdown costs related to Mandated and Modernization sales of crude oil from the SPR. DOE is requesting $187 million in appropriations for SPR facilities development, management, and operations.[23]

For more information, see CRS Insight IN11373, *Strategic Petroleum Reserve: Recent Developments*, by Phillip Brown, and CRS Insight IN11246, *Low Oil Prices and U.S. Oil Producers: Policy Considerations*, by Phillip Brown and Michael Ratner. Also see CRS Congressional Distribution Memo CD1308862, *Strategic Petroleum Reserve: Mandated and Modernization Oil Sales*, by Phillip Brown and Heather L. Greenley, available from the authors.

Elimination of Energy Loans and Loan Guarantees

The FY2021 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. Similar proposals to eliminate the programs in FY2018 through FY2020 were not enacted. The FY2021 budget request would also halt further loan guarantees under DOE's Tribal Energy Loan Guarantee Program, a proposal that also was not approved by Congress in previous years. Under the FY2021 budget proposal, DOE would receive $3 million (offset by fees) to administer its existing portfolio of loans and loan guarantees. Unused prior-year authority, or ceiling levels, for loan guarantee commitments would be rescinded, as well as

[19] U.S. Department of Energy, Strategic Petroleum Reserve Inventory, April 17, 2020, https://www.spr.doe.gov/dir/dir.html.

[20] U.S. Department of Energy, Amendment of Solicitation, 89243520RFE000015, March 25, 2020, available at https://www.spr.doe.gov/doeec/2020-03_CrudeOilPurchase/Docs/89243520RFE000015_Amendment_0001.pdf.

[21] U.S. Department of Energy, "U.S. Department of Energy to Make Strategic Petroleum Reserve Storage Capacity Available to Struggling U.S. Oil Producers," press release, April 2, 2020, https://www.energy.gov/articles/us-department-energy-make-strategic-petroleum-reserve-storage-capacity-available-struggling.

[22] U.S. Department of Energy, "FY 2021 Congressional Budget Request, Budget in Brief," February 2020, p. 31.

[23] U.S. Department of Energy, "FY 2021 Congressional Budget Request, Budget in Brief," February 2020, p. 30.

$170 million in unspent appropriations to cover loan guarantee "subsidy costs" (which are primarily intended to cover potential losses).

Artificial Intelligence and Quantum Computing Initiatives

DOE's FY2021 budget justification emphasizes the importance of the Office of Science's crosscutting research on quantum information science (QIS) and artificial intelligence (AI) in supporting "U.S.-based leadership in microelectronics."[24] The FY2021 request includes $237 million for QIS and $125 million for AI, plus $12 million requested by NNSA in support of QIS research. The DOE Office of Science's funding for QIS has grown in the past five years, from $6 million in FY2017 to $195 million in FY2020—with a further 21% increase sought for FY2021. The funding request is spread across six Office of Science program areas, mostly in Advanced Scientific Computing Research ($86 million) and Basic Energy Sciences ($72 million).[25]

QIS, including quantum computing, builds on the principles governing the smallest particles of matter and energy to obtain and process information in ways that cannot be achieved based on classical physics principles. AI generally involves computerized systems that work and react in ways commonly thought to require intelligence, such as solving complex problems in real-world situations. AI is often considered to include machine learning as a subfield. DOE's budget documents describe the QIS and AI program areas as "fundamental for the Industries of the Future Initiative" and the National Quantum Initiative, which are intended to advance U.S. industrial and scientific leadership.[26] DOE established the Artificial Intelligence and Technology Office (AITO) in September 2019 to coordinate AI activities. The FY2021 DOE request includes a new appropriations account for AITO, which would receive $5 million—nearly double the FY2020 funding level for AI coordination, which had been included in the Departmental Administration account. Additionally, the National Security Commission on AI recommended in March 2020 that federal AI funding be doubled, including $300 million for DOE.[27]

For more information, see CRS Report R45409, *Quantum Information Science: Applications, Global Research and Development, and Policy Considerations*, by Patricia Moloney Figliola, CRS In Focus IF10608, *Overview of Artificial Intelligence*, by Laurie A. Harris, and CRS Video WVB00311, *Artificial Intelligence: An Overview of Technologies and Issues for Congress*, by Laurie A. Harris.

International Thermonuclear Experimental Reactor and Fusion Research Grants

The Administration's FY2021 request for DOE's Fusion Energy Sciences (FES) program under the Office of Science includes $107 million for the U.S. contribution to the International Thermonuclear Experimental Reactor (ITER), which is under construction in France by a multinational consortium. "ITER will be the first fusion device to maintain fusion for long

[24] Secretary of Energy Dan Brouillette, Testimony Before the Senate Appropriations Committee, Subcommittee on Energy and Water Development, March 4, 2020, https://www.appropriations.senate.gov/imo/media/doc/03.04.20%20—%20Brouillette%20Testimony.pdf.

[25] Email from Robert Tuttle, DOE Office of Congressional and Intergovernmental Affairs, April 16, 2020.

[26] Ibid., and DOE, *FY 2021 Congressional Budget Justification*, vol. 4, February 2020, p. 150, https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-4_0.pdf.

[27] National Security Commission on Artificial Intelligence, First Quarter Recommendations, March 2020, p. 9, https://sites.google.com/nscai.gov/home/reports.

periods of time" and is to lay the technical foundation "for the commercial production of fusion-based electricity," according to the consortium's website.[28] The FY2021 DOE appropriation request, 56% below the FY2020 enacted level of $242 million (which had been an 83% increase from FY2019), includes funding to pay for components supplied by U.S. companies for the project, such as central solenoid superconducting magnet modules.

ITER has long attracted congressional concern about management, schedule, and cost. The United States is to pay 9% 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 to be between $4.0 billion and $6.5 billion, up from $1.45 billion to $2.2 billion in 2008. Some private-sector fusion companies contend that the technologies they are pursuing could produce practical fusion power sooner and less expensively than ITER.[29] The FY2021 FES budget request includes $4 million, the same as in FY2020, for the Innovation Network for Fusion Energy (INFUSE) program, which provides private-sector fusion companies with access to DOE national laboratory facilities and expertise.[30] In addition, ARPA-E is funding some alternative fusion concepts.[31]

Elimination of Advanced Research Projects Agency—Energy

The Trump Administration's FY2021 budget would eliminate the Advanced Research Projects Agency—Energy and rescind $332 million of the agency's unobligated balances. ARPA-E funds research on technologies that are determined to have potential to transform energy production, storage, and use.[32] According to the budget request, DOE would end ARPA-E "while incorporating ARPA-E's approach to technology development into the execution of applied energy office Small Business Innovation Research/Small Business Technology."[33] The Administration also proposed to terminate ARPA-E in its FY2018, FY2019, and FY2020 budget requests, but Congress increased the program's funding in all three years. The FY2020 enacted appropriations measure provided $425 million for ARPA-E, $59 million (16%) above the FY2019 level. The Administration is requesting $21 million for ARPA-E close-out activities and oversight of existing projects in FY2021.

Weapons Activities Funding Increases

The FY2021 budget request for DOE Weapons Activities is 25% greater than the FY2020 enacted level ($15.602 billion vs. $12.457 billion). The FY2020 enacted appropriation for Weapons Activities was 12% above the FY2019 level. Weapons Activities programs are carried out by the National Nuclear Security Administration (NNSA), a semiautonomous agency within DOE.

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

[29] Bourzac, Katherine, "Fusion Start-Ups Hope to Revolutionize Energy in the Coming Decades," *Chemical and Engineering News*, August 6, 2018, https://cen.acs.org/energy/nuclear-power/Fusion-start-ups-hope-revolutionize/96/i32.

[30] DOE, *FY 2021 Congressional Budget Justification*, vol. 4, February 2020, p. 188, https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-4_0.pdf.

[31] DOE, "Department of Energy Announces $32 Million for Lower-Cost Fusion Concepts," April 7, 2020, https://www.energy.gov/articles/department-energy-announces-32-million-lower-cost-fusion-concepts.

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

[33] DOE, *FY2021 Congressional Budget Request, Budget in Brief*, p. 75, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

Under Weapons Activities, the FY2021 budget request includes funding for several major nuclear warhead life-extension programs (LEPs):

- NNSA requests $816 million for the B61-12 LEP in FY2021, an increase of $23 million over the $793 million enacted for FY2020. The B61-12 is to combine four existing types of B61 warheads. The first production unit (FPU) had been scheduled for FY2020 but was delayed due to an issue with capacitors used in six major electrical components. According to NNSA, FPU is now scheduled for FY2022, and the program is to be completed in FY2026.
- NNSA requests $257 million for the W88 Alteration in FY2021, a reduction of $47 million from the $304 million enacted in FY2020. The program is to upgrade the arming-fuzing-firing system on the warhead and refresh the warhead's conventional high explosives. This warhead is carried on a portion of the D-5 (Trident) submarine-launched ballistic missiles (SLBMs). NNSA expected to provide the FPU of this warhead in 2020, but according to NNSA, the delivery was delayed due to an issue with capacitors used in three major components. According to its budget documents, NNSA now estimates that it will provide the FPU in FY2021.
- NNSA is requesting $1.000 billion for the W80-4 in FY2021, an increase of 11% over the $899 million enacted in FY2020. This is the warhead for the new long-range cruise missile. The LEP would seek to use common components from other LEPs and to improve warhead safety and security. The increase in the budget request for FY2021 reflects an increase in the scope of work on the program. The FPU is scheduled for FY2025.
- NNSA is requesting $541 million for the W87-1 warhead modification program for FY2021, a nearly fivefold increase over the $112 million enacted for FY2020. This increase reflects a "ramp-up" of activities across all program areas. The Air Force plans to deploy the W87-1 on the new U.S. land-based intercontinental ballistic missile (ICBM), the Ground-Based Strategic Deterrent (GBSD). NNSA has indicated that the FPU for the W87-1 is currently planned for FY2030. However, the FY2021 budget documents also note that the W87-0 warhead, which is currently deployed on U.S. ICBMs, will also be "qualified and deployed onto the GBSD." This would provide the Air Force with an alternative warhead if the W87-1 FPU is delayed.[34]

NNSA is requesting $2.458 billion for a new program area—Production Modernization. This new program area funds many of the nuclear materials projects that were a part of Directed Stockpile Work in the FY2020 budget. It has four subprograms: Primary Capability Modernization, Secondary Capability Modernization, Non-nuclear Capability Modernization, and Tritium and Domestic Uranium Enrichment. The budget request seeks increases in funding for each of the subprograms, although nearly 70% of the added funding supports Primary Capability Modernization.

According to NNSA's budget documents, the Primary Capability Modernization program "consolidates management of nuclear material processing capabilities … needed for the production of primaries."[35] Primaries are the plutonium pits and high explosives that serve as the core of nuclear weapons. In FY2020, Congress approved $797.8 million for the plutonium

[34] DOE, *FY 2021 Congressional Budget Justification*, vol. 1, February 2020, p. 118, https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-1_2.pdf.

[35] Ibid., p. 92.

modernization programs that are now a part of this program area; NNSA is requesting $1.369 million for FY2021. Congress approved $13.8 million for high explosives and energetics in FY2020; NNSA is requesting $67.4 million in FY2021.

The Plutonium Sustainment subprogram plans to expand production of plutonium pits from existing facilities at Los Alamos National Laboratory in New Mexico to a new facility (repurposed from the canceled Mixed Oxide Fuel Fabrication Facility) at the Savannah River Site in South Carolina. The Plutonium Sustainment subprogram, which received $712 million for FY2020, is to be divided into four subprograms for FY2021: Los Alamos Plutonium Modernization ($593.5 million), Plutonium Pit Production Project at Los Alamos ($226 million), Savannah River Plutonium Modernization ($200 million), and Savannah River Plutonium Processing ($241.9 million). The two program areas at Los Alamos fund activities needed to recapitalize buildings and capacity to meet pit production requirements at Los Alamos. The programs at Savannah River support efforts to plan for operations at the new pit facility, to work on its design and site and facility preparation, and to begin long-lead procurement.

For more information, see CRS Report R44442, *Energy and Water Development Appropriations: Nuclear Weapons Activities*, by Amy F. Woolf.

Cleanup of Former Nuclear Sites: Reductions and Transfers

DOE's Office of Environmental Management (EM) is responsible for environmental cleanup and waste management at the department's nuclear facilities. The $6.066 billion request for EM activities for FY2021 would be a decrease of $1.390 billion (19%) from the FY2020 enacted level of $7.455 billion. The budgetary components of the EM program are Defense Environmental Cleanup (-20%) and Non-Defense Environmental Cleanup (-14%). The largest proposed decreases are at the Hanford Site (WA), where projects managed by the Richland Operations Office would be reduced by $347 million (-35%) and those by the Office of River Protection by $358 million (-22%). Other relatively large EM reductions are proposed for the Oak Ridge Site (TN), down by $251 million (-37%); Idaho National Laboratory, down by $175 million (-39%); and Los Alamos National Laboratory, down by $100 million (-46%). The DOE budget justification attributed many of the proposed funding decreases to completion of various cleanup projects at the sites involved.[36]

The FY2021 request includes a proposal to transfer management of the Formerly Utilized Sites Remedial Action Program from USACE to the Office of Legacy Management (LM), the DOE office responsible for long-term stewardship of remediated sites. The transfer was also proposed for FY2020 but not approved by Congress. The FY2021 LM budget request includes $150 million for FUSRAP, down from $200 million appropriated to USACE for the program in FY2020. According to the DOE budget justification, "LM will be responsible for the administration of FUSRAP, USACE will continue to conduct cleanup of FUSRAP sites, and LM will continue to conduct LTS&M [long-term surveillance and maintenance] after cleanup activities are completed." Under the proposal, LM would reimburse USACE for the cost of the cleanup activities.[37]

[36] DOE, *FY2021 Congressional Budget Request, Budget in Brief*, p. 53, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

[37] DOE, *FY2021 Budget in Brief*, February 2020, p. 56, https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

Bill Status and Recent Funding History

Table 1 will be used in future updates of this report to indicate the steps taken during consideration of FY2021 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, FY2021

Subcommittee Markup							Final Approval		
House	Senate	House Comm.	House Passed	Senate Comm.	Senate Passed	Conf. Report	House	Senate	Public Law

Source: CRS Appropriations Status Table.

Table 2 includes budget totals for energy and water development appropriations enacted for FY2012 through the FY2021 request.

Table 2. Energy and Water Development Appropriations, FY2012- FY2021 Request

(budget authority in billions of current dollars)

FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	FY2021 Request
32.7[a]	30.7[b]	34.1	34.8	37.3	37.4[c]	43.2[d]	44.7[e]	48.3[f]	42.8

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 USACE ($1.9 billion emergency and $3.5 billion additional).

c. Amount does not includes $1.0 billion in emergency funding for the USACE.

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

e. Amount does not include supplemental funding provided by P.L. 116-20 ($3.258 billion for USACE and $15.85 million for Reclamation).

f. Amount does not include supplemental funding provided by P.L. 116-136.

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 (Bureau of Reclamation and Central Utah Project); 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 the amounts recommended and approved during the major stages of the FY2021 appropriations process 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. Congressional clients may obtain more detailed information by

contacting CRS analysts listed in CRS Report R42638, *Appropriations: CRS Experts*, by James M. Specht and Justin Murray.

Table 3. Energy and Water Development Appropriations Summary

(budget authority in millions of current dollars)

Title	FY2017 Approp.	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Title I: Corps of Engineers	6,038	6,827	6,999	4,964	7,651	5,966
Title II: CUP and Reclamation	1,317	1,480	1,565	1,120	1,680	1,138
Title III: Department of Energy	30,150	34,569	35,709	32,198	38,528	36,084
Title IV: Independent Agencies	349	392	390	370	407	335
General provisions	-62	-	21	-	-	-
Subtotal	37,791	43,268	44,684	38,652	48,266	43,522
Rescissions and Scorekeeping Adjustments[a]	-436	-49	-24	-696	-15	-722
E&W Total	**37,355**	**43,219**	**44,660**	**37,956**	**48,251**	**42,801**

Sources: President's Budget FY2021; Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; S. 2470; H.R. 2740; CBO Current Status Report; H.Rept. 116-83; H.Rept. 115-929; S.Rept. 115-258; and P.L. 115-31 and explanatory statement. Subtotals may include other adjustments. Columns may not sum to totals because of rounding and adjustments.

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

Agency Budget Justifications

FY2021 budget justifications for the largest agencies funded by the annual Energy and Water Development appropriations bill can be found through the links below. The justifications provide detailed descriptions and funding breakouts for programs, projects, and activities under the agencies' jurisdiction.

- Title I, U.S. Army Corps of Engineers, Civil Works, http://www.usace.army.mil/Missions/CivilWorks/Budget
- Title II
  - Bureau of Reclamation, https://www.usbr.gov/budget/
  - Central Utah Project, https://www.doi.gov/sites/doi.gov/files/uploads/fy2020_cupca_budget_justification.pdf
- Title III, Department of Energy, https://www.energy.gov/cfo/downloads/fy-2021-budget-justification
- Title IV, Independent Agencies
  - Appalachian Regional Commission, https://www.arc.gov/publications/BudgetDocuments.asp

- Nuclear Regulatory Commission, https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1100/
- 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

USACE 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 Development appropriations bill, USACE plans, builds, operates, and in some cases maintains water resource facilities for coastal and inland navigation, riverine and coastal flood risk reduction, and aquatic ecosystem restoration.[38]

In recent decades, Congress has generally authorized USACE studies, construction projects, and other activities in omnibus water authorization bills, typically titled as Water Resources Development Acts (WRDA), prior to funding them through appropriations legislation. Recent Congresses enacted the following omnibus water resources authorization acts: in June 2014, the Water Resources Reform and Development Act of 2014 (WRRDA, P.L. 113-121); 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 Act]); and in October 2018, the Water Resources Development Act of 2018 (Title I of P.L. 115-270, America's Water Infrastructure Act of 2018 [AWIA 2018]). These acts consisted largely of authorizations for new USACE projects, and they altered numerous USACE policies and procedures.[39]

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

Since the 112th Congress, earmark moratorium policies have limited congressionally directed funding of site-specific projects (i.e., *earmarks*). Prior to the 112th Congress, Congress would direct funds to specific projects not in the budget request or increase funds for certain projects. Each year since FY2011, Congress has appropriated additional funding for categories of USACE work without identifying specific projects. For example, in FY2020, Congress provided $2.53 billion in additional funding for 26 categories of USACE activities (e.g., construction related to flood and storm damage reduction). After congressional enactment of the appropriations legislation and accompanying report language on priorities and other guidance for use of the additional funding, the Administration develops a work plan that reports on (1) the studies and construction projects selected to receive funding for the first time (new starts) and (2) the specific projects receiving additional funds. For more information, see CRS In Focus IF11462, *Army Corps of Engineers: FY2021 Appropriations*, by Anna E. Normand and Nicole T. Carter, and CRS Report R46320, *U.S. Army Corps of Engineers: Annual Appropriations Process and Issues for*

[38] Military responsibilities are funded through the Military Construction, Veterans Affairs, and Related Agencies appropriations bill.

[39] For more information on USACE authorization legislation, see CRS In Focus IF11322, *Water Resources Development Act: Primer*, by Nicole T. Carter and Anna E. Normand, and CRS Report R45185, *Army Corps of Engineers: Water Resource Authorization and Project Delivery Processes*, by Nicole T. Carter and Anna E. Normand.

Congress, by Anna E. Normand and Nicole T. Carter. Previous appropriations and the FY2020 and FY2021 requests are shown in **Table 4**.

Table 4. Army Corps of Engineers

(budget authority in millions of current dollars)

Program	FY2017 Approp.	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Investigations and Planning	121.0	123.0	125.0	77.0	151.0	102.6
Construction	1,876.0	2,085.0	2,183.0	1,306.9[a]	2,681.0	2,173.2[a]
Mississippi River and Tributaries (MR&T)	362.0	425.0	368.0	209.9[a]	375.0	209.9[a]
Operation and Maintenance (O&M)	3,149.0	3,630.0	3,739.5	1,930.4[a]	3,790.0	1,996.5[a]
Regulatory	200.0	200.0	200.0	200.0	210.0	200.0
General Expenses	181.0	185.0	193.0	187.0	203.0	187.0
FUSRAP[b]	112.0	139.0	150.0	0	200.0	0
Flood Control and Coastal Emergencies (FCCE)	32.0	35.0	35.0	27.0	35.0	77.0
Office of the Asst. Secretary of the Army	4.8	5.0	5.0	5.0	6.0	5.0
Harbor Maintenance Trust Fund				965.0		1,015.0
Inland Waterways Trust Fund				55.5		0
Total Title I	**6,037.8**	**6,827.0**	**6,998.5**	**4,963.8**	**7,651.0**	**5,966.2**

Sources: President's Budget, FY2021; Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; S. 2470; H.R. 2740; CBO Current Status Report; H.Rept. 116-83; FY2020 Budget Justification; H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; and P.L. 115-31 and explanatory statement. FY2020 and FY2021 request numbers can be found at https://www.usace.army.mil/Missions/Civil-Works/Budget/. Columns may not sum to totals because of rounding.

a. In the Administration's request, some activities that would have previously been funded in these accounts were proposed to be funded directly from the Harbor Maintenance Trust Fund (HMTF) and Inland Waterway Trust Fund (IWTF) accounts. That is, the Administration proposed funding eligible USACE activities directly from the trust funds. This would replace the current practice of having USACE's O&M, Construction, and MR&T accounts incur expenses for HMTF-eligible and IWTF-eligible activities, and for these expenses to be reimbursed from the HMTF and IWTF accounts. For example, HMTF-eligible maintenance dredging would no longer be funded by the O&M account and reimbursed by the HMTF ; instead the dredging would be funded directly from the HMTF account. Similar proposals were not enacted in FY2019 and FY2020.

b. Formerly Utilized Sites Remedial Action Program. The Administration's FY2020 request proposed transferring administration and funding of FUSRAP to the DOE Office of Legacy Management, but the proposal was not enacted. The proposal is also included in the FY2021 budget request.

Bureau of Reclamation and Central Utah Project

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 31 million people. 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 other benefits. Reclamation facility operations 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 USACE, 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.[40] 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, also funded by Title II, is conducted by a separate office within the Department of the Interior.[41]

For more information, see CRS In Focus IF11465, *Bureau of Reclamation: FY2021 Appropriations*, by Charles V. Stern. Previous appropriations and the amounts recommended and approved during the major stages of the FY2021 appropriations process are shown in **Table 5**.

[40] 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.

[41] 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/.

Table 5. Bureau of Reclamation and CUP

(budget authority in millions of current dollars)

Program	FY2017 Approp	FY2018 Approp	FY2019 Approp	FY2020 Request	FY2020 Approp	FY2021 Request
Water and Related Resources	1,155.9	1,332.1	1,392.0	962.0	1,512.2	979.0
Policy and Administration	59.0	59.0	61.0	60.0	60.0	60.0
CVP Restoration Fund (CVPRF)	55.6	41.4	62.0	54.9	54.9	56.0
Calif. Bay-Delta (CALFED)	36.0	37.0	35.0	33.0	33.0	33.0
Gross Current Reclamation Authority	**1,306.5**	**1,469.5**	**1,550.0**	**1,109.9**	**1,660.0**	**1,128.0**
Central Utah Project (CUP) Completion	10.5	10.5	15.0	10.0	20.0	10.0
Total, Title II Current Authority (CUP and Reclamation)	**1,317.0**	**1,480.0**	**1,565.0**	**1,119.9**	**1,680.0**	**1,138.0**

Sources: President's Budget, FY2021; Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; H.R. 2740; CBO Current Status Report; H.Rept. 116-83; FY2020 Budget Justifications; H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; and P.L. 115-31 and explanatory statement. Excludes offsets and permanent appropriations.

Notes: Columns may not sum to totals because of rounding. CVP = Central Valley Project.

Department of Energy

The Energy and Water Development appropriations bill has funded all DOE programs since FY2005. Major DOE activities include (1) R&D on renewable energy, energy efficiency, nuclear power, fossil energy, and electricity; (2) the Strategic Petroleum Reserve; (3) energy statistics; (4) general science; (5) environmental cleanup; and (6) 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)

	FY2017 Approp.	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
ENERGY PROGRAMS						
Energy Efficiency and Renewable Energy	2,034.6	2,321.8	2,379.0	343.0	2,777.3	719.6
Electricity Delivery and Energy Reliability[a]	229.6	248.3				
Electricity Delivery			156.0	182.5	190.0	195.1
Cybersecurity, Energy Security, and Emerg. Resp.			120.0	156.5	156.0	184.6
Nuclear Energy	1,015.8	1,205.1	1,326.1	824.0	1,340.0[c]	1,042.1[c]
Fossil Energy R&D	421.2	726.8	740.0	562.0	750.0	730.6

	FY2017 Approp.	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Uranium Reserve						150.0
Interim Storage and Nuclear Waste Fund Oversight						27.5
Naval Petroleum and Oil Shale Reserves	12.0	4.9	10.0	14.0	14.0	13.0
Strategic Petroleum Reserve	222.6	260.4	245.0	105.0	205.0	187.1
Northeast Home Heating Oil Reserve	6.5	6.5	10.0	-90.0	10.0	0
Energy Information Administration	122.0	125.0	125.0	118.0	126.8	128.7
Non-Defense Environmental Cleanup	246.8	298.4	310.0	247.5	319.2	275.8
Uranium Enrichment Decontamination and Decommissioning Fund	767.9	840.0	841.1	715.1	881.0	806.2
Science	5,391.0	6,259.9	6,585.0	5,546.0	7,000.0	5,837.8
AI Technology Office						4.9
Advanced Research Projects Agency—Energy (ARPA-E)	305.3	353.3	366.0	-287.0	425.0	-310.7
Nuclear Waste Disposal	0	0	0	90.0	0	0
Departmental Admin. (net)	120.7	189.7	165.9	117.6	161.0	136.1
Office of Inspector General	44.4	49.0	51.3	54.2	54.2	57.7
International Affairs			0	36.1	0	33.0
Office of Indian Energy	0	0	18.0	8.0	22.0	8.0
Advanced Technology Vehicles Manufacturing Loans	3.9	5.0	5.0	0	5.0	0
Title 17 Loan Guarantee	0.1	23.0	18.0	-384.7	29.0	-160.7
Tribal Indian Energy Loan Guarantee	9.0	1.0	1.0	-8.5	2.0	-8.5
TOTAL, ENERGY PROGRAMS	**10,953.3**	**12,918.0**	**13,472.4**	**8,349.3**	**14,467.5**	**10,057.9**
DEFENSE ACTIVITIES						
National Nuclear Security Administration (NNSA)						
Weapons Activities	9,240.7	10,642.1	11,100.0	12,408.6	12,457.1	15,602.0

	FY2017 Approp.	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Nuclear Nonproliferation	1,879.7	1,999.2	1,930.0	1,993.3	2,164.4	2,031.0
Naval Reactors	1,419.8	1,620.0	1,788.6	1,648.4	1,648.4	1,684.0
Office of Admin./Salaries and Expenses	387.4	407.6	410.0	434.7	434.7	454.0
Total, NNSA	**12,927.6**	**14,669.0**	**15,228.6**	**16,485.0**	**16,704.6**	**19,771.0**
Defense Environmental Cleanup	5,404.2	5,988.0	6,024.0	5,506.5	6,255.0	4,983.6
Nuclear Energy (Defense)					153.4	137.8
Other Defense Activities	781.7	840.0	860.3	1,035.3[b]	906.0	1,054.7 [b]
Defense Nuclear Waste Disposal	0	0	0	26.0	0	0
TOTAL, DEFENSE ACTIVITIES	**19,113.6**	**21,497.0**	**22,112.9**	**23,052.8**	**24,019.0**	**25,947.1**
POWER MARKETING ADMINISTRATION (PMAs)						
Southwestern	11.1	11.4	10.4	10.4	10.4	10.4
Western	94.7	93.4	89.4	89.2	89.2	89.4
Falcon and Amistad O&M	0.2	0.2	0.2	0.2	0.2	0.2
Colorado River Basins Power Marketing Fund	-23.0				-42.8	-21.4
TOTAL, PMAs	**83.0**	**105.0**	**100.0**	**99.8**	**57.0**	**78.6**
General provisions	-62.7					
DOE total appropriations	**30,149.9**	**34,569.1**	**35,708.9**	**32,197.8**	**38,527.5**	**36,083.7**
Offsets and adjustments	-62.7	-49.0	-23.6	-695.9	-15.0	-722.0
Total, DOE	**30,087.2**	**34,520.1**	**35,685.3**	**31,501.9**	**38,512.5**	**35,361.7**

Sources: President's Budget, FY2021; Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; H.R. 2740; CBO Current Status Report; H.Rept. 116-83; H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; and P.L. 115-31 and explanatory statement. AI=Artificial Intelligence.

Notes: Columns may not sum to totals because of rounding.

a. The Office of Electric Delivery and Energy Reliability was split in FY2019 into the Office of Electricity Delivery and the Office of Cybersecurity, Energy Security, and Emergency Response.

b. Includes $141 million for the Formerly Utilized Sites Remedial Action Program that is currently managed by USACE.

c. The FY2021 request allocates $153.4 million in FY2020 and $137.8 million in FY2021 that had formerly been included in the Nuclear Energy total to Nuclear Energy (Defense).

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 housing units 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] (ultimate goal is $80/kWh), increase range to 300 miles, and decrease charge time to 15 minutes or less." DOE's vehicle fuel cell program is focusing on the costs of fuel cells and hydrogen to fuel them. According to the FY2021 budget request, "Investments in fuel cell technologies will increase the emphasis on heavy-duty vehicles and new applications (e.g. trucks, marine, rail, aviation, data centers)." Regarding biofuels R&D, the DOE request says, "By 2030, the U.S. has the potential to produce 1 billion dry tons of non-food biomass resources without disrupting agricultural markets for food and animal feed."[42]

Renewable power programs focus on electricity generation from solar, wind, water, and geothermal sources. The solar energy program has a goal of achieving, by 2030, costs of 3 cents per kWh for unsubsidized, utility-scale photovoltaics (PV) and 5 cents/kWh for baseload concentrating solar power (CSP) systems. This would require cost reductions of 40%-65% below DOE's 2018 benchmarks. Wind R&D is to focus on early-stage research and testing to reduce costs and improve performance and reliability. For the geothermal program, DOE is requesting funding in FY2021 to "support two new subsurface enhancement and sustainability efforts": one on well technology to isolate geothermal target zones, and the other on assessing reservoir properties for enhanced geothermal systems.[43]

In the energy efficiency program area, the advanced manufacturing program focuses on improving the energy efficiency of manufacturing processes and on the manufacturing of energy-related products. The building technologies program includes R&D on lighting, space conditioning, windows, and control technologies to reduce building energy-use intensity. The energy efficiency program also provides weatherization grants to states for improving the energy efficiency of low-income housing units and state energy planning grants.[44]

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

The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) was created from programs that were previously part of the Office of Electricity Delivery and Energy Reliability. The programs that were not moved into CESER became part of the DOE Office of Electricity (OE).[45]

OE's mission is to lead DOE efforts "to strengthen, transform, and improve energy infrastructure so that consumers have access to secure and resilient sources of energy." Major priorities of OE are developing a model of North American energy vulnerabilities, pursuing megawatt-scale

[42] DOE, *FY2021 Congressional Budget Justification*, vol. 3, part 1, p. 12, https://www.energy.gov/sites/prod/files/2020/04/f73/doe-fy2021-budget-volume-3-part-1.pdf.

[43] Ibid., p. 13.

[44] Ibid., p. 14.

[45] 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.

electricity storage, integrating electric power system sensing technology, and analyzing electricity-related policy issues.[46] The office also 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. The office conducts R&D on energy infrastructure security technology; provides energy sector security guidelines, training, and technical assistance; and enhances energy sector emergency preparedness and response.[47]

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."[48] The plan includes three goals that DOE has established for energy sector cybersecurity:

- strengthen energy sector cybersecurity preparedness;
- coordinate cyber incident response and recovery; and
- accelerate research, development, and demonstration (RD&D) of resilient energy delivery systems.

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 FY2021 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."[49]

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"). Research on extending the life of existing commercial light water reactors (moderated and cooled by ordinary water) beyond 60 years, the maximum operating period currently licensed by NRC, is being conducted by this program with industry cost-sharing.

The Fuel Cycle Research and Development program includes generic research on nuclear waste management and disposal. One of the program's primary activities is the development of

[46] DOE, *FY 2021 Congressional Budget Justification*, vol. 3, part 1, February 2020, p. 262, https://www.energy.gov/sites/prod/files/2020/04/f73/doe-fy2021-budget-volume-3-part-1.pdf.

[47] Ibid., p. 317.

[48] 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.

[49] DOE, *FY 2021 Congressional Budget Justification*, vol. 3, part 2, February 2020, p. 9, https://www.energy.gov/sites/prod/files/2020/04/f73/doe-fy2021-budget-volume-3-part-2.pdf.

technologies to separate the radioactive constituents of spent fuel for reuse or solidifying 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.

A new Advanced Reactors Demonstration Program was included in the Explanatory Statement for the enacted FY2020 appropriations measure. The program is to provide up to 50% cost sharing for two nuclear reactor demonstration projects, up to 20% cost sharing for development work for two to five additional demonstrations, and funding for related advanced reactor commercialization activities. For more information, see CRS Report R45706, *Advanced Nuclear Reactors: Technology Overview and Current Issues*, by Danielle A. Arostegui and Mark Holt.

Fossil Energy Research and Development

Much of DOE's Fossil Energy R&D Program focuses on technologies for use by coal-fired power plants. Major activities include Advanced Coal Energy Systems and Carbon Capture, Utilization, and Storage (CCUS); Natural Gas Technologies; and Unconventional Fossil Energy Technologies from Petroleum—Oil Technologies.

Advanced Coal Energy Systems includes R&D on modular coal-gasification systems, advanced turbines, solid oxide fuel cells, advanced sensors and controls, and power generation efficiency.

Elements of the CCUS program include the following:

- Carbon Capture subprogram for separating CO_2 in both precombustion and postcombustion systems;
- Carbon Utilization subprogram for R&D on technologies, including direct air capture, to convert carbon to marketable products, such as chemicals and polymers; and
- Carbon Storage subprogram on long-term geologic storage of CO_2, focusing on saline formations, oil and natural gas reservoirs, unmineable coal seams, basalts, and organic shales.[50]

For more information, see CRS In Focus IF11501, *Carbon Capture Versus Direct Air Capture*, by Ashley J. Lawson.

Strategic Petroleum Reserve

The 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 is the U.S. emergency stockpile of crude oil, providing strategic and economic security against foreign and domestic disruptions in U.S. oil supply. The program fulfills U.S. obligations under the International Energy Program agreement, 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.

[50] DOE, *FY 2021 Congressional Budget Justification*, vol. 3, part 2, February 2020, p. 195, https://www.energy.gov/sites/prod/files/2020/04/f73/doe-fy2021-budget-volume-3-part-2.pdf.

The federal government has not purchased oil for the SPR since 1994, but has acquired oil through exchanges and "royalty-in-kind." Statute (codified at 42 U.S.C. §6240) identifies the various objectives and procedures for the Secretary of Energy to acquire crude oil for the SPR. The Secretary may acquire petroleum products through purchase or exchange. For purchase, Congress must appropriate funds to the SPR. During an exchange (also sometimes referred to as a loan), an entity borrows SPR crude and later replaces it with a similar quality crude, "plus payment of an in-kind premium determined according to the period negotiated for return."[51]

For more information, see CRS Report R46355, *The Strategic Petroleum Reserve: Background, Authorities, and Considerations*, by Heather L. Greenley.

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 FY2021 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."[52]

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 levels. 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 Energy 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

[51] U.S. Department of Energy, Office of Fossil Energy, "Guidance for Requesting Emergency Oil Exchange from the SPR," https://www.energy.gov/fe/services/petroleum-reserves/strategic-petroleum-reserve/guidance-requesting-emergency-oil.

[52] DOE, *FY 2021 Congressional Budget Justification*, vol. 4, February 2020, p, 7, https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-4_0.pdf.

provides funding for the International Thermonuclear Experimental Reactor (ITER) project, a multinational effort to design and build an experimental fusion reactor.

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.

Two significant research efforts in the Office of Science cut across multiple program areas: quantum information science, which aims to use quantum physics to process information, and artificial intelligence and machine learning, which use computerized systems that work and react in ways commonly thought to require intelligence.

A separate DOE office, the Advanced Research Projects Agency—Energy, 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 R46341, *Federal Research and Development (R&D) Funding: FY2021*, coordinated by John F. Sargent Jr.

Loan Guarantees and Direct Loans

DOE's Loan Programs Office provides loan guarantees for projects that deploy innovative energy technologies, as authorized by Title 17 of the Energy Policy Act of 2005 (EPACT05, P.L. 109-58), direct loans for advanced vehicle manufacturing technologies, and loan guarantees for tribal energy projects. Section 1703 of the EPACT05 authorizes loan guarantees for advanced energy technologies that reduce greenhouse gas emissions, and Section 1705 authorized a temporary program through FY2011 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.

DOE currently has more than $40 billion in authority available to make direct loans and loan guarantees in the following categories:[53]

- Advanced Fossil Energy Projects Loan Guarantees, $8.5 billion;
- Advanced Nuclear Energy Projects Loan Guarantees, $10.9 billion;
- Renewable Energy and Efficient Energy Projects Loan Guarantees, up to $4.5 billion;
- Advanced Technology Vehicles Manufacturing Loan Program, $17.7 billion in direct loan authority; and

[53] DOE, "Products and Services," as of April 23, 2020, https://www.energy.gov/lpo/title-xvii/products-services#innovativeenergy.

- Tribal Energy Loan Guarantee Program, up to $2 billion in partial loan guarantee authority.

The only loan guarantees under Section 1703 have been $8.3 billion in guarantees provided to the consortium building two new nuclear reactors at the Vogtle plant in Georgia. DOE committed an additional $3.7 billion in loan guarantees for the Vogtle project on March 22, 2019.[54] Another nuclear loan guarantee is being sought by NuScale Power to build a small modular reactor in Idaho.[55]

Nuclear Weapons Activities

In the absence of explosive testing of nuclear weapons, 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 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 NNSA, a semiautonomous agency within DOE established by 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 the 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.

NNSA has reorganized and renamed its program areas in its FY2021 budget request. The four main programs, each with a request of over $2 billion for FY2021, include the following:

- *Stockpile Management*, which contains many of the projects included in Directed Stockpile Work from previous years, supports work directly on nuclear weapons. These include life extension programs, warhead surveillance, maintenance, and other activities.
- *Stockpile Production* programs focus on maintaining and expanding the production capabilities for the components of nuclear weapons that are critical to weapons performance. According to NNSA, these include primaries, canned subassemblies, radiation cases, and non-nuclear components.

[54] DOE, "Secretary Perry Announces Financial Close on Additional Loan Guarantees During Trip to Vogtle Advanced Nuclear Energy Project," news release, March 22, 2019, https://www.energy.gov/articles/secretary-perry-announces-financial-close-additional-loan-guarantees-during-trip-vogtle.

[55] 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. More information about DOE loans and loan guarantees is

at the Loan Programs Office website, https://www.energy.gov/lpo/loan-programs-office.

- *Stockpile Research, Technology, and Engineering* replaces the Research, Development, Test, and Evaluation program area. These programs provide the scientific foundation for science-based stockpile decisions.
- *Infrastructure and Operations* maintains, operates, and modernizes the NNSA infrastructure. It supports construction of new facilities and funds deferred maintenance in older facilities.

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; and
- *Information Technology and Cybersecurity,* whose elements include cybersecurity, secure enterprise computing, and Federal Unclassified Information Technology.

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 programs are administered by NNSA's Office of Defense Nuclear Nonproliferation (DNN).

The Materials Management and Minimization program 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.

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 (typically used in medical and industrial devices), 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.

Nonproliferation and Arms Control works to "to support U.S. nonproliferation and arms control objectives to prevent proliferation, ensure peaceful nuclear uses, and enable verifiable nuclear reductions," according to the FY2021 DOE justification.[56] This program conducts reviews of nuclear export applications and technology transfer authorizations, implements treaty obligations, and analyzes nonproliferation policies and proposals.

[56] DOE, *FY 2021 Congressional Budget Justification*, vol. 1, p. 613, https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-1_2.pdf.

National Technical Nuclear Forensics Research and Development (NTNF R&D) is proposed as a new NNSA program for FY2021, with the request moving $40 million for NTNF from the Nuclear Detonation Detection subprogram under Defense Nuclear Nonproliferation R&D. The NTNF operational readiness mission is currently located in the Department of Homeland Security. The budget request says that the NTNF program would allow NNSA to "take on a more active leadership role" in nuclear forensics. Another, existing DNN program, Nuclear Counterterrorism and Incident Response, carries out activities to "protect our nation and its citizens from nuclear terrorism and incidents or accidents involving the release of radiological material," according to the FY2021 budget justification.[57] Other DNN programs include R&D and Nonproliferation Construction.

For more information, see CRS Report R44413, *Energy and Water Development Appropriations for Defense Nuclear Nonproliferation: In Brief*, by Mary Beth D. Nikitin.

Cleanup of Former Nuclear Weapons Production and Research Sites

The development and production of nuclear weapons since the beginning of the Manhattan Project[58] during World War II resulted in a waste and contamination legacy managed by DOE that continues to present substantial challenges. DOE also manages legacy environmental contamination at sites used for nondefense nuclear research. 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.[59]

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.[60] DOE's cleanup of nuclear research sites adds a nondefense component to the EM's mission, albeit smaller in terms of the scope of their cleanup and associated funding.[61]

DOE has identified more than 100 separate sites in over 30 states that historically were involved in the production of nuclear weapons and nuclear energy research for civilian purposes.[62] The geographic scope of these sites is substantial, collectively encompassing a land area of

[57] Ibid., p. 665.

[58] As described by the Manhattan Project National Historical Park, "The Manhattan Project was a massive, top secret national mobilization of scientists, engineers, technicians, and military personnel charged with producing a deployable atomic weapon during World War II. Coordinated by the US Army, Manhattan Project activities were located in numerous locations across the United States." The nuclear weapons activities begun by the Manhattan Project are now the responsibility of DOE. See National Park Service, Manhattan Project National Historical Park web site, https://www.nps.gov/mapr/learn/historyculture/index.htm.

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

[60] The term "cleanup" often refers to the remediation of risks at a site. 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 waste or contamination remains on-site after cleanup is complete, long-term stewardship may continue to monitor the site and ensure that cleanup measures continue to operate effectively.

[61] 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.

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

approximately 2 million acres. Cleanup remedies are in place and operational at the majority of these sites. Responsibility for the long-term stewardship of them has been transferred to the Office of Legacy Management and other offices within DOE for the operation and maintenance of cleanup remedies and monitoring.[63] 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. Once USACE completes the cleanup of a FUSRAP site, it is transferred back to DOE for long-term stewardship under the Office of Legacy Management, which is separate from EM and has its own DOE funding subaccount within Other Defense Activities.

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 national defense and civilian purposes.[64] Those facilities are located near Paducah, KY; Piketon, OH (Portsmouth plant); and Oak Ridge, TN. Title X of P.L. 102-486 authorized the reimbursement of uranium and thorium producers for their costs of cleaning up contamination attributable to uranium and thorium sold to the federal government.[65]

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.

Power Marketing Administrations

DOE's four Power Marketing Administrations were established to sell the power generated by various federal dams. 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 the Western Area Power Administration (WAPA) and Southwestern Power Administration (SWPA) are supported by appropriations from Congress.

For more information, see CRS Report R45548, *The Power Marketing Administrations: Background and Current Issues*, by Richard J. Campbell.

[63] 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.

[64] 42 U.S.C. §2297g.

[65] 42 U.S.C. §2296a.

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 nearly $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. NRC and ARC are discussed in more detail below. The recent appropriations history for all the Title IV agencies is shown in **Table 7**.

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

(budget authority in millions of current dollars)

Program	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Appalachian Regional Commission	155.0	165.0	165.0	175.0	169.0
Nuclear Regulatory Commission	*922.0*	*911.0*	*921.1*	*855.6*	*863.4*
(Revenues)	*-790.4*	*-780.8*	*-759.6*	*-728.1*	*740.4*
Net NRC (including Inspector General)	131.6	130.1	161.5	127.5	123.0
Defense Nuclear Facilities Safety Board	31.0	31.0	29.5	31.0	28.8
Nuclear Waste Technical Review Board	3.6	3.6	3.6	3.6	3.6
Denali Commission	30.0	15.0	7.3	15.0	7.3
Delta Regional Authority	25.0	25.0	2.5	30.0	2.5
Northern Border Regional Commission	15.0	20.0	0.9	25.0	0.9
Southeast Crescent Regional Commission	0.3	0.3	0	0.3	0
Total	**391.5**	**390.0**	**370.2**	**407.4**	**335.1**

Sources: FY2021 President's Request; Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; S. 2470; H.R. 2740; CBO Current Status Report; H.Rept. 116-83; H.Rept. 115-929; S.Rept. 115-258; S.Rept. 115-132; H.Rept. 115-230; P.L. 115-31 and explanatory statement.

Note: Columns may not sum to totals because of rounding.

Appalachian Regional Commission

Established in 1965,[66] the Appalachian Regional Commission (ARC) is a regional economic development agency. It awards grants and contracts to state and local governments and nonprofit organizations to foster economic opportunities, improve workforce skills, build critical infrastructure, strengthen natural and cultural assets, and improve leadership skills and capacity in the region. ARC's authorizing statute defines the Appalachian Region as including all of West Virginia and parts of Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. More than 25 million people currently live in the region as defined.

[66] Appalachian Regional Development Act of 1965, P.L. 89-4.

ARC provides funding to several hundred projects each year, with particular focus on the region's most economically distressed counties. Major areas of infrastructure support include broadband communication systems, transportation, and water and wastewater systems. ARC has supported development of the Appalachian Development Highway System (ADHS), a planned 3,000-mile system of highways that connect with the U.S. Interstate Highway System. According to ARC, 90.8% of ADHS is "complete, open to traffic, or under construction."[67]

Since FY2016, Congress has appropriated approximately $50 million per year as a set-aside for ARC's POWER Initiative (Partnerships for Opportunity and Workforce and Economic Revitalization), which assists communities impacted by the decline of the coal industry. The POWER Initiative funds a variety of economic, workforce, and community development projects to stabilize and stimulate economic activity in affected communities.

For more background on ARC and other regional commissions and authorities, see CRS Report R45997, *Federal Regional Commissions and Authorities: Structural Features and Function*, by Michael H. Cecire, and CRS In Focus IF11140, *Federal Regional Commissions and Authorities: Overview of Structure and Activities*, by Michael H. Cecire.

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**. Nuclear Reactor Safety is NRC's largest program and is responsible for licensing and regulating the U.S. fleet of 95 power reactors, plus two under construction. NRC is also responsible for licensing and regulating nuclear waste facilities, such as the proposed underground nuclear waste repository at Yucca Mountain, NV (for which no funding is requested for FY2021).

NRC is required by law to offset about 90% of its total budget, excluding specified items, through fees charged to nuclear reactor owners and other holders of NRC licenses. As a result, NRC's net appropriation can be as low as 10% of its total funding level, depending on the activities that Congress excludes from fee recovery. For example, excluded items in NRC's FY2020 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 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Nuclear Reactor Safety	460.2	462.6	469.8	449.5	447.6	452.8
Nuclear Materials and Waste Safety	114.3	113.0	108.6	104.3	103.2	102.8
Decommissioning and Low-Level Waste	26.8	27.1	25.4	22.9	22.9	22.8
Yucca Mountain Licensing	0	0.1	0	38.5	0	0
Corporate Support	306.7	296.4	299.6	292.6	292.6	271.4

[67] For more information, see ARC home page at https://www.arc.gov.

Funding Category	FY2017 Approp.	FY2018 Approp.	FY2019 Approp.	FY2020 Request	FY2020 Approp.	FY2021 Request
Integrated University Program	15.0	15.5	15.0	0	16.0	0
Prior-Year Balances			-20		-40.0	
Inspector General	12.2	13.3	12.6	13.3	13.3	13.5
Total	**935.2**	**922.0**	**911.0**	**921.1**	**855.6**	**863.4**

Source: NRC FY2021 Budget Justification; Explanatory Statement for Division C of H.R. 1865, 116th Congress; S.Rept. 116-102; H.R. 2740; H.Rept. 116-83; H.Rept. 115-929, NRC FY2020 Budget Justification; H.Rept. 115-697; S.Rept. 115-258.

Note: Fee offsets and some adjustments are excluded.

Congressional Hearings

The following hearings were held by the Energy and Water Development subcommittees of the House and Senate Appropriations Committees on the FY2021 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

- *Department of Energy*, February 27, 2020, https://appropriations.house.gov/events/hearings/department-of-energy-budget-request-for-fy2021.
- *DOE Applied Energy Programs*, March 3, 2020, https://appropriations.house.gov/events/hearings/department-of-energy-applied-energy-programs-budget-requests-for-fy2021.
- *DOE National Nuclear Security Administration*, March 4, 2020, https://appropriations.house.gov/events/hearings/department-of-energynational-nuclear-security-administration.
- *Corps of Engineers and Bureau of Reclamation*, March 10, 2020, https://appropriations.house.gov/events/hearings/us-army-corps-of-engineers-and-bureau-of-reclamation-budget-requests-for-fy2021.
- *DOE Advanced Research Projects Agency—Energy, Office of Science, and Environmental Management*, March 11, 2020, https://appropriations.house.gov/events/hearings/department-of-energy-fy2021-budget-request-for-advanced-research-projects-agency.

Senate

- *Department of Energy*, March 4, 2020, https://www.appropriations.senate.gov/hearings/review-of-the-fy2021-budget-request-for-the-us-department-of-energy.

U.S. Army Corps of Engineers and the Bureau of Reclamation, March 11, 2020, https://www.appropriations.senate.gov/hearings/review-of-the-fy2021-budget-request-for-us-army-corps-of-engineers-and-bureau-of-reclamation-within-dept-of-interior.

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