

**COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
HEARING CHARTER**

Oversight of the Department of Energy’s Research and Development Enterprise

Tuesday, June 25, 2019

10:00AM EST

2318 Rayburn House Office Building, Washington, D.C. 20015

PURPOSE

The purpose of the hearing is to examine the Department of Energy’s research, development, and demonstration (RD&D) and commercialization activities, including the impact of the President’s fiscal year (FY) 2020 budget request.

WITNESS

- **The Honorable Rick Perry**, Secretary, U.S. Department of Energy

Background

The Department of Energy (DOE) supports a wide range of research, development, demonstration, and commercialization activities. This includes the management and support of 17 national laboratories, and programs that advance our scientific understanding and technologies in areas as varied as: nuclear power, materials science, renewable energy, particle physics, carbon capture and storage, fusion energy, computational modeling, energy efficiency, energy storage, modernization of the electric grid, climate research, engineering biology, next generation vehicle technologies, and more.

Budget

FY 2019 Enacted: \$11.69 billion

FY 2020 Budget Request: \$7.16 billion

Difference: - \$4.53 billion (-38.8%)

Office of Energy Efficiency and Renewable Energy

The mission of Office of Energy Efficiency and Renewable Energy (EERE) is to accelerate development and facilitate deployment of energy efficiency and renewable energy technologies.¹ EERE partners with industry and community leaders to bring clean energy technologies into the marketplace by providing research support and sharing developed technologies with industry and community leaders in the renewable electricity generation, buildings, manufacturing, and sustainable transportation sectors.²

The office houses such programs as DOE's Advanced Manufacturing, Buildings, Solar, Wind, Hydrogen and Fuel Cells, and Vehicles activities. The President's FY 2020 budget request proposes significant cuts to all EERE programs which range between 57% for water power to 82% for bioenergy technologies; and draw on \$353 million in previously appropriated but unspent EERE funds from FY 2018 and FY 2019 to meet the FY 2020 proposed funding level of \$696 million.

Budget

FY 2019 Enacted:	\$2.40 billion
FY 2020 Budget Request:	\$343 million
Difference:	- \$2.36 billion (-85.6%)

Office of Electricity Delivery and Energy Reliability

The mission of the Office of Electricity Delivery and Energy Reliability (OE) is to ensure that the nation's energy delivery system is secure, resilient, and reliable. OE works to develop new technologies to improve the infrastructure that brings electricity into our homes, offices, and factories, and the federal and state electricity policies and programs that shape electricity system planning and market operations. OE also works to bolster the resilience of the electric grid and assists with restoration when major energy supply interruptions occur.³

Budget

FY 2019 Enacted:	\$156 million
FY 2020 Budget Request:	\$182.5 million

¹ U.S. Department of Energy, DOE Program Offices <https://www.energy.gov/technologytransitions/doe-program-offices>

² U.S. Department of Energy, EERE Partner Testimonials <https://www.energy.gov/eere/success-stories/partner-testimonials>

³ U.S. Department of Energy, DOE Program Offices <https://www.energy.gov/technologytransitions/doe-program-offices>

Difference: \$26.5 million (+17%)

Office of Cybersecurity, Energy Security, and Emergency Response

The Office of Cybersecurity, Energy Security, and Emergency Response (CESER) supports activities to improve energy infrastructure security, including preparedness and response to both natural and man-made threats.⁴

Budget

FY 2019 Enacted: \$120 million
FY 2010 Budget Request: \$156.5 million

Difference: \$36.5 million (+30.4%)

Office of Fossil Energy

The Office of Fossil Energy is responsible for Federal research, development, and demonstration efforts on carbon capture, utilization, and storage (CCUS) technologies, efficiency water management, and other areas to mitigate the environmental impacts of coal and natural gas production and use.⁵

Budget

FY 2019 Enacted: \$740 million
FY 2020 Budget Request: \$562 million

Difference: **-\$178 million (-24.1%)**

The President's FY 2020 budget request would, if enacted, reduce federal support for FE R&D activities by 24.1% from the FY19 enacted level. This would include a 65% cut for CCUS R&D and a 40% cut for research activities to reduce emissions resulting from the extraction and use of natural gas.

⁴U.S. Department of Energy, Cybersecurity, Energy Security, and Emergency Response, About Us <https://www.energy.gov/ceser/about-us>

⁵ About Fossil Energy, U.S. Department of Energy, Office of Fossil Energy <https://www.energy.gov/fe/about-fossil-energy>

Office of Nuclear Energy

The Office of Nuclear Energy's (NE) seeks to resolve technical, cost, safety, security, and regulatory issues through research, development, and demonstration of nuclear technologies.⁶

Budget

FY 2019 Enacted: \$1.32 billion

FY 2020 Budget Request: \$824 million

Difference: **-\$502 million (-37.9%)**

The President's FY 2020 budget request would, if enacted, reduce federal support for NE by 37.9% from the FY19 enacted level. This includes the elimination of the integrated university program, a 65.9% cut to fuel cycle R&D, and a 33.5% cut to advanced reactor concepts RD&D.

Advanced Research Projects Agency-Energy

The Advanced Research Projects Agency-Energy (ARPA-E) advances high-risk, high-reward energy technologies that that neither the public nor the private sector had previously been willing or able to sufficiently support.

Since 2009, 71 projects supported by ARPA-E have led to the formation of new companies, 109 have partnered with non-DOE government agencies, and 136 have attracted over \$2.6 billion in private sector follow-on funding. ARPA-E projects have also produced 245 U.S. patents and 1,724 peer reviewed journal articles.⁷

Budget

FY 2019 Enacted: \$366 million

FY 2020 Budget Request: -\$287 million

Difference: **-\$653 million (-178.4%)**

⁶ U.S. Department of Energy, DOE Program Offices <https://www.energy.gov/technologytransitions/doe-program-offices>

⁷ "ARPA-E Impact." Department of Energy. Accessed 21 Jun 2019 <https://arpa-e.energy.gov/?q=site-page/arpa-e-impact>

As it has in the President's FY 2018 and FY 2019 budget requests, the President's proposed FY 2020 budget has requested the elimination of ARPA-E and, if enacted, would rescind \$287 million of previously appropriated funding from FY 2018 and FY 2019.

Loan Programs Office

The Department of Energy's Loan Programs, administered by the Loan Programs Office (LPO), enable DOE to work with private companies and lenders to mitigate the financing risks associated with first-of-a-kind commercial clean energy projects, and thereby encourage their development on a larger scale. LPO stewards two major programs, the Loan Guarantee Program and the Advanced Technology Vehicles Manufacturing Loan Program, through which it originates, guarantees, and monitors loans.⁸

Thus far, the LPO portfolio has issued \$35.7 billion in loans and loan guarantees. This portfolio has generated \$2.58 billion in interest payments to the federal government and the actual and estimated loans losses are \$810 million. These losses are approximately 3% of the total disbursements.⁹

Budget

FY 2019 Enacted:	\$19 million
FY 2010 Budget Request:	-\$169.2 million

Difference:	-\$188.2 million
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As it has in the President's FY 2018 and FY 2019 budget requests, the President's FY 2020 budget request proposes to eliminate LPO.

Office of Science

The U.S. Department of Energy Office of Science is the lead federal agency supporting scientific research for energy applications and the nation's largest supporter of research in the physical sciences, supporting over 22,000 investigators at over 300 U.S. academic institutions and the DOE laboratories. The Office of Science portfolio has two principal thrusts: direct support of

⁸ https://www.energy.gov/sites/prod/files/2019/04/f61/doe-fy2020-budget-volume-3-part-1_0.pdf

⁹ <https://www.energy.gov/lpo/portfolio>

scientific research and direct support of the development, construction, and operation of unique, open-access scientific user facilities.

Budget

FY 2019 Enacted: \$ 6.58 billion

FY 2010 Budget Request: \$ 5.54 billion

Difference: **-\$ 1.04 billion (-15.8%)**

The President's FY 2020 budget request would, if enacted, reduce federal support for the Office of Science by 15.8% from the FY19 enacted level.

Within the Office of Science, the Biological and Environmental Research program would be cut by 29.9%. Fusion Energy Sciences would receive a 28.6% cut, High Energy Physics would receive a 15.2% cut, Basic Energy Sciences would receive 14.2% cut, and Nuclear Physics would receive a 9.4% cut.

Attached

- Table of the President's FY 2020 budget request for Department of Energy Science and Energy programs

FY 2020 DOE Budget Request

(in millions)	FY 2019 Enacted	FY 2020 Request	H - FY 2020 Report	FY20R - FY19E		HFY20 - FY19E	
				Amount	Percent	Amount	Percent
Department of Energy Science and Energy	11,691.1	7,157.8	12,390.5	-4,533.3	-38.8%	699.4	5.6%
Energy Efficiency and Renewable Energy	2,379.0	343.0	2,651.7	-2,036.0	-85.6%	272.7	11.5%
Electricity Delivery	156.0	182.5	200.0	26.5	17.0%	44.0	28.2%
Cybersecurity, Energy Security, and Emergency Response	120.0	156.5	150.0	36.5	30.4%	30.0	25.0%
Fossil Energy R&D	740.0	562.0	740.0	-178.0	-24.1%	0.0	0.0%
Nuclear Energy	1,326.1	824.0	1,317.8	-502.1	-37.9%	-8.3	-0.6%
ARPA-E	366.0	-287.0	425.0	-653.0	-178.4%	59.0	16.1%
Loan Programs	19.0	-169.2	36.0	-188.2	-990.3%	17.0	89.5%
Office of Science	6,585.0	5,546.0	6,870.0	-1,039.0	-15.8%	285.0	4.3%
Department of Energy Advanced Energy Programs	5,106.1	1,611.8	5,520.5	-3,494.2	-68.4%	-9,014.8	-163.3%

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				Amount	Percent	Amount	Percent
Department of Energy Science and Energy	11,696.1	7,157.8	12,390.5	-4,538.3	-38.8%	699.4	5.6%
Energy Efficiency and Renewable Energy	2,379.0	343.0	2,651.7	-2,036.0	-85.6%	272.7	10.3%
Sustainable Transportation	690.0	157.4	770.0	-532.6	-77.2%	80.0	11.6%
Vehicle Technologies	344.0	73.4	370.0	-270.6	-78.7%	26.0	7.6%
Bioenergy technologies	226.0	40.0	256.0	-186.0	-82.3%	30.0	13.3%
Hydrogen and Fuel Cell Technologies	120.0	44.0	144.0	-76.0	-63.3%	24.0	20.0%
Renewable Energy	527.5	163.7	588.7	-363.8	-69.0%	61.2	11.6%
Solar Energy	246.5	67.0	270.0	-179.5	-72.8%	23.5	9.5%
Wind Energy	92.0	23.7	103.7	-68.3	-74.2%	11.7	12.7%
Water Power	105.0	45.0	125.0	-60.0	-57.1%	20.0	19.0%
Geothermal Technologies	84.0	28.0	90.0	-56.0	-66.7%	6.0	7.1%
Energy Efficiency	888.0	145.9	1,005.5	-742.1	-83.6%	117.5	13.2%
Advanced Manufacturing	320.0	80.5	360.0	-239.5	-74.8%	40.0	12.5%
Building Technologies	226.0	57.0	248.0	-169.0	-74.8%	22.0	9.7%
Federal energy management program	30.0	8.4	34.0	-21.6	-72.0%	4.0	13.3%
Weatherization and Intergovernmental Program	257.0	0.0	363.5	-257.0	-100.0%	106.5	41.4%
Corporate support	273.5	229.0	287.5	-44.5	-16.3%	14.0	5.1%
Rescission	0.0	-353.0	0.0	-353.0	#DIV/0!	0.0	#DIV/0!
Electricity	156.0	182.5	200.0	26.5	17.0%	44.0	22.0%
Transmission Reliability and Resilience	39.0	70.5	54.4	31.5	80.8%	15.4	39.5%
Resilient Distribution Systems	40.0	27.9	50.0	-12.1	-30.3%	10.0	25.0%
Energy storage	46.0	48.5	62.0	2.5	5.4%	16.0	34.8%
Transformer resilience and advanced components	7.0	9.0	7.0	2.0	28.6%	0.0	0.0%
Transmission Permitting and Technical Assistance	7.0	7.0	7.0	0.0	0.0%	0.0	0.0%
Program direction (OE)	17.0	19.6	19.6	2.6	15.3%	2.6	15.3%
Cybersecurity, Energy Security, and Emergency Response	120.0	156.5	150.0	36.5	30.4%	30.0	20.0%
Infrastructure Security and Energy Restoration	19.0	70.0	42.0	51.0	268.4%	23.0	121.1%
Cyber security for energy delivery systems	89.5	75.0	95.0	-14.5	-16.2%	5.5	6.1%
Program direction	11.5	11.5	13.0	0.0	0.0%	1.5	13.0%
Fossil Energy R&D	740.0	562.0	740.0	-178.0	-24.1%	0.0	0.0%
Advanced Coal Energy Systems and CCUS	486.2	387.4	504.3	-98.8	-20.3%	18.0	3.7%
Carbon Capture, Utilization, and Storage	198.8	68.8	227.0	-130.0	-65.4%	28.2	14.2%
Transformational Coal Pilot	25.0	0.0	20.0	-25.0	-100.0%	-5.0	-20.0%
Advanced Energy Systems	129.7	185.3	107.0	55.6	42.9%	-22.7	-17.5%
Cross Cutting Research and Analysis	56.4	72.8	88.3	16.5	29.2%	31.9	56.6%
NETL Coal R&D	54.0	60.5	38.0	6.5	12.0%	-16.0	-29.6%
STEP	22.4	0.0	24.0	-22.4	-100.0%	1.6	7.0%
Natural Gas Technologies	51.0	10.7	48.0	-40.3	-79.0%	-3.0	-5.9%
Unconventional Fossil Energy Technologies	46.0	19.0	30.0	-27.0	-58.7%	-16.0	-34.8%
NETL Research and Operations	50.0	40.0	50.0	-10.0	-20.0%	0.0	0.0%
NETL Infrastructure	45.0	43.1	46.0	-1.9	-4.2%	1.0	2.2%
Program direction	61.1	61.0	61.0	0.0	0.0%	0.0	0.0%
Special recruitment programs	0.7	0.7	0.7	0.0	0.0%	0.0	0.0%
Nuclear Energy	1,326.1	824.0	1,317.8	-502.1	-37.9%	-8.3	-0.6%
Integrated university program	5.0	0.0	5.0	-5.0	-100.0%	0.0	0.0%
STEP R&D	5.0	0.0	5.0	-5.0	-100.0%	0.0	0.0%
Nuclear energy enabling technologies	152.6	98.5	125.0	-54.1	-35.5%	-27.6	-18.1%
Reactor concepts RD&D	323.5	215.2	325.0	-108.4	-33.5%	1.5	0.5%
Fuel cycle research and development	263.9	90.0	318.5	-173.9	-65.9%	54.6	20.7%
International nuclear energy cooperation	3.0	0.0	2.5	-3.0	-100.0%	-0.5	-16.7%
Radiological facilities management	29.0	9.0	9.0	-20.0	-69.0%	-20.0	-69.0%
INL facilities management	318.0	209.2	310.0	-108.8	-34.2%	-8.0	-2.5%

INL Sitewide Safeguards and Security	146.1	137.8	137.8	-8.3	-5.7%	-8.3	-5.7%
Program Direction	80.0	64.4	80.0	-15.7	-19.6%	0.0	0.0%
Office of Science	6,585.0	5,546.0	6,870.0	-1,039.0	-15.8%	285.0	4.1%
Advanced scientific computing research	935.5	920.9	956.5	-14.6	-1.6%	21.0	2.2%
<i>Research</i>	702.8	732.2	767.8	29.4	4.2%	65.0	9.3%
<i>Exascale Computing Project</i>	232.7	188.7	188.7	-44.0	-18.9%	-44.0	-18.9%
Basic energy sciences	2,166.0	1,858.3	2,143.0	-307.7	-14.2%	-23.0	-1.1%
<i>Research</i>	1,757.7	1,675.3	1,819.0	-82.4	-4.7%	61.3	3.5%
<i>Construction (LCLS-II, APS-U, ALS-U)</i>	408.3	183.0	324.0	-225.3	-55.2%	-84.3	-20.6%
Biological and environmental research	705.0	494.4	730.0	-210.6	-29.9%	25.0	3.5%
Fusion energy sciences	564.0	402.8	688.0	-161.3	-28.6%	124.0	22.0%
<i>Research</i>	432.0	294.8	438.0	-137.3	-31.8%	6.0	1.4%
<i>Construction (ITER)</i>	132.0	108.0	250.0	-24.0	-18.2%	118.0	89.4%
High Energy Physics	980.0	768.0	1,045.0	-212.0	-21.6%	65.0	6.6%
<i>Research</i>	800.0	648.0	814.0	-152.0	-19.0%	14.0	1.8%
<i>Construction</i>	180.0	120.0	231.0	-60.0	-33.3%	51.0	28.3%
Nuclear Physics	690.0	624.9	735.0	-65.1	-9.4%	45.0	6.5%
<i>Operations and maintenance</i>	615.0	579.9	669.0	-35.1	-5.7%	54.0	8.8%
<i>Construction</i>	75.0	45.0	66.0	-30.0	-40.0%	-9.0	-12.0%
Workforce development for teachers and scientists	22.5	19.5	25.0	-3.0	-13.3%	2.5	11.1%
Science laboratories infrastructure	232.9	163.6	250.8	-69.3	-29.8%	17.9	7.7%
<i>Infrastructure support</i>	79.7	45.2	65.2	-34.5	-43.3%	-14.5	-18.2%
<i>Payment in lieu of taxes</i>	1.7	4.5	5.6	2.8	165.0%	3.9	227.5%
<i>Oak Ridge landlord</i>	6.4	5.6	5.6	-0.8	-12.8%	-0.8	-12.8%
<i>Facilities and infrastructure</i>	45.5	25.1	45.0	-20.5	-45.0%	-0.5	-1.2%
<i>Oak Ridge nuclear operations</i>	26.0	10.0	10.0	-16.0	-61.5%	-16.0	-61.5%
<i>Construction</i>	153.2	118.4	185.7	-34.8	-22.7%	32.5	21.2%
<i>BNL - Critical Utilities Rehabilitation Project</i>	0.0	12.0	15.0	12.0	#DIV/0!	15.0	0.0%
<i>LBNL - Seismic and Safety Modernization</i>	0.0	5.0	5.0	5.0	#DIV/0!	5.0	0.0%
<i>TJNAF - CEBAF Renovation and Expansion</i>	0.0	2.0	2.0	2.0	#DIV/0!	2.0	0.0%
<i>ORNL - Craft Resources Support Facility</i>	0.0	20.0	15.0	20.0	#DIV/0!	15.0	0.0%
<i>SLAC - Large Scale Collaboration Center</i>	0.0	3.0	10.7	3.0	#DIV/0!	10.7	0.0%
<i>BNL - Science User Support Center</i>	7.0	6.4	20.0	-0.6	-8.6%	13.0	185.7%
<i>ANL - Electrical Capacity and Distribution Capability</i>	30.0	30.0	30.0	0.0	0.0%	0.0	0.0%
<i>ORNL - Translational Research Capacity</i>	25.0	15.0	25.0	-10.0	-40.0%	0.0	0.0%
<i>LBNL - BioEPIC</i>	5.0	6.0	12.0	1.0	20.0%	7.0	139.6%
<i>PNNL - Energy Sciences Capability</i>	24.0	9.0	26.0	-15.0	-62.5%	2.0	8.3%
<i>FNAL - Integrated Engineering Research Center</i>	20.0	10.0	25.0	-10.0	-50.0%	5.0	25.0%
<i>BNL - Core Facility Revitalization</i>	42.2	0.0	0.0	-42.2	-100.0%	-42.2	-100.0%
<i>ANL - Materials Design Laboratory</i>	0.0	0.0	0.0	0.0	#DIV/0!	0.0	#DIV/0!
<i>LBNL - Integrative Genomics Building</i>	0.0	0.0	0.0	0.0	#DIV/0!	0.0	#DIV/0!
Safeguards and security	106.1	110.6	110.6	4.5	4.3%	4.5	4.3%
Program Direction	183.0	183.0	186.0	0.0	0.0%	3.0	1.6%
ARPA-E	366.0	-287.0	425.0	-653.0	-178.4%	59.0	16.1%
ARPA-E projects	334.8	0.0	391.0	-334.8	-100.0%	56.3	16.8%
Program direction	31.3	0.0	34.0	-31.3	-100.0%	2.8	8.8%
Rescission of prior year balances	0.0	-287.0	0.0	-287.0	#DIV/0!	0.0	#DIV/0!
Loan Guarantee Programs	19.0	-169.2	36.0	-188.2	-990.3%	17.0	47.2%
TITLE 17 - Innovative Technology Loan Guarantee Program	13.0	0.0	30.0	-13.0	-100.0%	17.0	130.8%
<i>Administrative expenses</i>	33.0	3.0	33.0	-30.0	-90.9%	0.0	0.0%
<i>Offsetting collection</i>	-15.0	-3.0	-3.0	17.0	85.0%	12.0	-80.0%
<i>Rescission of prior year balances</i>	0.0	-160.7	0.0	-160.7	-160.7%	0.0	0.0%
Advanced Technology Vehicles Manufacturing Loan Program	5.0	0.0	5.0	-5.0	-100.0%	0.0	0.0%
<i>Administrative expenses</i>	5.0	0.0	5.0	-5.0	-100.0%	0.0	0.0%
Tribal Energy Loan Guarantee Program	1.0	-8.5	1.0	-9.5	-950.0%	0.0	0.0%
<i>Administrative expenses</i>	1.0	0.0	1.0	-1.0	-100.0%	0.0	0.0%
<i>Recession</i>	0.0	-8.5	0.0	-8.5	#DIV/0!	0.0	0.0%