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

A Review of the Administration's Federal Research and Development Budget for Fiscal Year 2021

Thursday, February 27, 2020
10:00 am – 12:00 pm
2318 Rayburn House Office Building

PURPOSE

On Thursday, February 27, 2020, the Committee on Science, Space, and Technology will hold a hearing to examine the Administration's proposed Fiscal Year 2021 (FY21) budget for Federal research, development, demonstration, and commercial application programs within the Committee's jurisdiction and to discuss related policy issues.

WITNESS

- **Dr. Kelvin K. Droegemeier**, Director, White House Office of Science and Technology Policy

OVERVIEW

Overall Federal R&D Spending[1]
(dollars in millions)

Agency	FY 19 Actual	FY 20 Estimate	FY 21 Request	FY21-FY20 $	FY21-FY20 %
Department of Defense	54691	64544	59831	-4713	-5.85
Department of Health and Human Services	38511	40818	37875	-2943	-7.21
Department of Energy	18271	19219	16051	-3168	-16.48
National Aeronautics & Space Administration	10698	14057	13334	-723	-5.14
National Science Foundation	6586	6752	6328	-424	-6.28
Department of Agriculture	3026	2941	2769	-172	-5.85
Department of Commerce	1959	1948	1506	-442	-22.69
Department of Transportation	1071	1134	594	-540	-47.62
Department of Homeland Security	668	532	450	-82	-15.41
Department of Veterans Affairs	1370	1313	1351	38	2.89
Department of the Interior	958	973	725	-248	-25.49
Environmental Protection Agency	489	492	318	-174	-35.37
Department of Education	248	259	230	-29	-11.20
Smithsonian Institution	339	330	328	-2	-0.61
Veterans Affairs	1370	1313	1351	38	2.89
Total	**138885**	**155312**	**141690**	**-13622**	**-8.77**

Shading indicates agencies within the Science, Space, and Technology Committee's jurisdiction.

[1] Fiscal Year 2021 Analytical Perspectives, Budget of the U.S. Government, OMB, p. 233. https://www.whitehouse.gov/wp-content/uploads/2020/02/spec_fy21.pdf

The President's FY21 budget proposal includes a total of $141.7 billion for research and development (R&D) across all agencies, a $1.4 billion or 9% decrease from the FY20 enacted level. Under the proposal, defense-related R&D spending would decrease by $4.7 billion or 6% to $59.8 billion and health-related R&D would decrease by $2.9 billion or 7% to $37.9 billion. Therefore, the total request for non-defense and non-health specific R&D, a majority of which is in the Science Committee's jurisdiction, is $38.6 billion, which represents a 13% decrease from the FY20 level. This amount includes basic and applied research, experimental development, and facilities and equipment.

The Administration proposes to reduce R&D spending across all agencies in the Committee's jurisdiction. However, the aggregate numbers mask variation across agencies and programs. The request includes significant increases in areas such as artificial intelligence, quantum information science, and deep space exploration, while reducing spending in climate science, NASA science missions, energy technologies, and STEM education.

AGENCY HIGHLIGHTS

National Aeronautics and Space Administration (NASA)

NASA Spending[2]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY21 Request	Change FY21 - FY20	
				Amount	Percent
National Aeronautics and Space Administration	**21,500.0**	**22,629.0**	**25,246.0**	**2,617.0**	**11.6%**
Science	6,905.7	7,138.9	6,306.5	-832.4	-11.7%
Aeronautics	725.0	783.9	819.0	35.1	4.5%
Space Technology	926.9	1,100.0	1,578.3	478.3	43.5%
Exploration	5,050.8	6,017.6	8,761.7	2,744.1	45.6%
Space Operations	4,639.1	4,140.2	4,187.3	47.1	1.1%
Education	110.0	120.0	0.0	-120.0	-100.0%
Safety, Security, and Mission Services	2,755.0	2,913.3	3,009.9	96.6	3.3%
Construction & Environmental Compliance & Restoration	348.2	373.4	539.1	165.7	44.4%
Inspector General	39.3	41.7	44.2	2.5	6.0%

The Administration has requested $25.2 billion for NASA for FY21, an increase of nearly $2.7 billion, or 12%, over the FY20 enacted appropriation. Nearly half, or $12.4 billion, of the overall request would be devoted to NASA's Moon to Mars campaign, an exploration effort to return humans to the surface of the Moon by 2024 and eventually send astronauts to Mars. The total Moon to Mars request is 40% ($3.5 billion) higher than the campaign's FY20 appropriation.

[2] https://www.nasa.gov/sites/default/files/atoms/files/fy2021_congressional_justification.pdf

The Human Exploration and Operations Mission Directorate (HEOMD) manages the largest component of the Moon to Mars request, the Deep Space Exploration Systems account ($6 billion under the FY20 appropriation). For FY21, the Administration is requesting $8 billion, which would fund commercial development of a new lunar Human Landing System ($3.4 billion) and continued development of the Space Launch System ($2.3 billion), Orion crew vehicle ($1.4 billion), and Lunar Gateway ($740 million). HEOMD also oversees the Low Earth Orbit and Spaceflight Operations account, which includes all International Space Station operations and research activities, for which the Administration is requesting $4.2 billion in FY21, 1% below the FY20 appropriation.

The Administration is proposing $1.6 billion in FY21 for Exploration Technology, which is the account managed by the Space Technology Mission Directorate and was appropriated $1.1 billion in FY20. Most ($1.2 billion) of the account's FY21 proposal would go toward maturation of early-stage Moon to Mars technologies in areas such as In-Situ Resource Utilization, and advanced power and propulsion.

The request proposes $6.3 billion for the NASA Science Mission Directorate (SMD), nearly 12% ($830 million) below the FY20 appropriation. Under the FY21 proposal, the budgets of each of the four SMD divisions would be cut relative to their FY20 appropriation: Astrophysics by 36%, Earth Science by 10%, Heliophysics by 13%, and Planetary Science by 2%. The FY21 request would increase spending, by $136 million (19%), on science activities that inform human exploration of the Moon and Mars, including the Commercial Lunar Payload Services (CLPS) program and a new Mars Ice Mapper mission. The FY21 request for SMD proposes terminating programs the Administration deems are of lower priority, including two Earth Science missions under development, the Plankton, Aerosol, and Climate Ecosystem (PACE) and the Climate Absolute Radiance and Refractivity Observatory Pathfinder (CLARREO-PF); one Astrophysics mission under development, the Wide Field Infrared Survey Explorer (WFIRST); and one operating Astrophysics mission, the Stratospheric Observatory for Infrared Astronomy (SOFIA). The Administration proposed to cancel WFIRST in the last two budget requests, and PACE and CLARREO-PF in the last three, but Congress fully funded the missions each year.

As in the last three NASA budgets, the Administration's FY21 budget proposes eliminating NASA's Office of STEM Engagement (formerly the Office of Education) in order to "[redirect] those funds to NASA's core mission of exploration." For FY20, Congress supported the continuation of the Office of STEM Engagement and appropriated $120 million for its activities. The Office of STEM Engagement supports the National Space Grant College and Fellowship Program ($48 million appropriated in FY20), the NASA Established Program to Stimulate Competitive Research (EPSCoR, $24 million appropriated in FY20), the Minority University Research and Education Project (MUREP, $36 million appropriated in FY20), and activities in evaluation and informal education. The FY21 proposal would continue support for STEM activities, such as internships and fellowships, within the Mission Directorates, including the Science Activation program under SMD at $46 million, which currently has 24 ongoing awards to deliver SMD's content and expertise to learners of all ages.

The request would increase the budget of the Aeronautics Research Mission Directorate (ARMD) to $819 million, 4.4% over the FY20 enacted level. The ARMD budget request supports research that enables the transformation of aviation, including ongoing programs such as the supersonic Low Boom Flight Demonstrator, Urban Air Mobility Grand Challenges, and activities toward integration of Unmanned Aircraft Systems into the national airspace.

Under the Mission Support Directorate (MSD), the FY21 request proposes increasing the budgets of the Safety, Security, and Mission Services and Construction and Environmental Compliance accounts by 3% and 44%, respectively, relative to the FY20 appropriation. The proposed increases for both accounts are largely in support of Moon to Mars activities.

Department of Energy (DOE) R&D Programs

DOE R&D Spending[3]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY 2021 Request	Change FY21 - FY20	
				Amount	Percent
Department of Energy R&D	**11,696.1**	**12,840.4**	**8,369.0**	**-4,471.4**	**-34.8%**
Energy Efficiency and Renewable Energy	2,379.0	2,790.0	720.0	-2,070.0	-74.2%
Electricity	156.0	190.0	195.0	5.0	2.6%
Cybersecurity, Energy Security, and Emergency Response	120.0	156.0	185.0	29.0	18.6%
Fossil Energy R&D	740.0	750.0	731.0	-19.0	-2.5%
Nuclear Energy	1,326.1	1,493.4	1,180.0	-313.4	-21.0%
Office of Science	6,585.0	7,000.0	5,838.0	-1,162.0	-16.6%
ARPA-E*	366.0	425.0	-311.0	-736.0	-173.2%
Loan Programs*	24.0	36.0	-169.0	-205.0	-569.4%

The Trump Administration is proposing to cut DOE's non-defense research, development, and demonstration budget by 34.8% overall compared to FY20 enacted levels. These proposed cuts include the elimination of the Advanced Research Projects Agency – Energy (ARPA-E) and the Loan Programs Office (LPO).

Most of DOE's other energy technology offices would receive significant cuts from FY20 funding levels. The Office of Energy Efficiency and Renewable Energy (EERE) would receive the largest cut of 74.2% (or $2.07 billion). Within EERE's Sustainable Transportation program, the Administration would cut Vehicle Technologies by 75.5%, Bioenergy Technologies by 68%, and Hydrogen and Fuel Cell Technologies by 70.7%. Under its Renewable Energy program, the Budget Request calls for a 58.2% cut to Solar Energy, a 64.4% cut to Wind Energy, a 56.8% cut to Water Power, and a 52.7% cut to Geothermal Technologies. Under the Energy Efficiency

[3] https://www.energy.gov/cfo/downloads/fy-2021-budget-justification

program, funding for Advanced Manufacturing and Building Technologies would decrease by 67.6% and 67%, respectively. Nuclear Energy would also be cut by 21% (or $313 million) and Fossil Energy R&D would be cut by 2.5% (or $19 million).

In addition, the Administration is proposing to cut the Office of Science by $1.16 billion, or 16.6%, from FY20 enacted levels. The Office of Science is responsible for stewarding ten national laboratories and a portfolio of major scientific user facilities that provide unique capabilities to carry out research conducted by thousands of users from industry and academic institutions across the country. Within the Office of Science, the Administration proposes cutting Fusion Energy Sciences by 36.6% ($246 million), Biological and Environmental Research by 31.1% ($233 million), High Energy Physics by 21.7% ($227 million), Basic Energy Sciences by 12.5% ($227 million), and Nuclear Physics by 8.4% ($60 million). The request also proposes a marginal increase for Advanced Scientific Computing and Research of 0.8% ($8 million). Construction for the ITER international fusion project within the Fusion Energy Sciences program would receive a 58.4% cut, and construction for the Long Baseline Neutrino Facility within the High Energy Physics Program would receive a 47.8% cut. If enacted, these levels would put funding for these projects well below what DOE itself determined would be required to keep them both on schedule and minimize their total project costs. The Office of Science would also receive a major 42.2% ($126.9 million) cut to its Science Laboratories Infrastructure account.

The Office of Electricity (OE) and the Office of Cybersecurity, Energy Security, and Emergency Response would both receive proposed budget increases of 2.6% ($5 million) and 18.6% ($29 million), respectively. Within the Office of Electricity, the Administration proposes providing $2 million to a new Defense Critical Energy Infrastructure program to advance technologies that ensure critical infrastructure possesses reliable, resilient energy systems.

Within the Administration's topline request for DOE R&D, it allocates $190 million across EERE, OE, and the Office of Science to support an Energy Storage Grand Challenge to advance next-generation energy storage technologies.

National Science Foundation (NSF)

NSF Spending[4]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY21 Request	Change FY21 - FY20	
				Amount	Percent
National Science Foundation	**8,150.2**	**8,278.3**	**7,741.4**	**-536.9**	**-6.5%**
Research & Related Activities	6,578.1	6,737.2	6,213.0	**-524.2**	**-7.8%**
Education & Human Resources	934.5	940.0	930.9	**-9.1**	**-1.0%**
Major Research Equipment & Facilities Construction	285.3	243.2	229.8	**-13.5**	**-5.5%**
Agency Operations & Award Management	332.7	336.9	345.6	**8.7**	**2.6%**
National Science Board	4.3	4.5	4.2	**-0.3**	**-6.4%**
Office of Inspector General	15.3	16.5	17.9	**1.4**	**8.2%**

The Administration's proposal includes $7.74 billion for the National Science Foundation, a decrease of $536.93 million from the FY20 appropriated level of $8.28 billion. The proposal includes a large increase for certain areas of science and technologies the Administration describes as having the potential to drive "industries of the future" and significant cuts to investments in all other areas of research, STEM education, and broadening participation activities.

The proposal includes a $403 million (87%) increase for investments in artificial intelligence (AI) and a $120 million (113%) increase for quantum science, while funding for advanced manufacturing is essentially flat. Funding for implementing the 10 Big Ideas is also increased, with Quantum Leap ($26 million or 44% increase), Mid-Scale Research Infrastructure ($38 million or 63% increase), and Convergence Accelerator ($29 million or 69% increase) getting the biggest boost.[5]

Most of the proposed budget cut comes from the Research and Related Activities (R&RA) account, which is reduced by $524 million (8%) compared with FY20. All but one of the research directorates has a proposed cut. The geosciences (GEO) directorate, which supports research related to climate change, is cut the most ($133 million or 14% reduction), while the budgets for the two directorates that support research in artificial intelligence and quantum science are largely spared. The computer and information science and engineering (CISE) directorate is increased ($77 million or 8%) and the mathematical and physical sciences (MPS) directorate is only slightly decreased ($42 million or 3%). [6]

[4] https://www.nsf.gov/about/budget/fy2021/index.jsp
[5] Since funding levels for AI and quantum activities and the Big Ideas are not specified in the FY20 appropriations, we compare with FY 19 spending levels.
[6] Since funding at the directorate or division level is not specified in the FY20 appropriations, we compare the proposal for R&RA directorates and EHR divisions to agency spending in FY19.

One key focus for the proposed investments in AI is funding for up to six National AI Research Institutes (up to $20.0 million each over five years) "that will serve as national hubs for universities, federal agencies, industry, and nonprofits to advance AI research and workforce development in key areas while addressing grand challenges."[7] Investments in quantum science will support up to three additional Quantum Leap Challenge Institutes (up to $25 million each over five years). The proposal also includes $17 million for a new Spectrum Innovation Initiative with the goal to "promote dynamic and agile electromagnetic spectrum utilization."[8] This funding would support piloting, testing, and rolling out National Radio Dynamic Zones[9] and standing up a National Center for Wireless Spectrum Research.

Programs in the broadening participation portfolio are cut by a combined $180 million (15%) compared with FY20. The program with the biggest proposed cut is the Hispanic serving institution (HSI) program, a decrease from $45 million to $14 million (68%) compared with FY20 appropriations. The HBCU Undergraduate Program and the HBCU Excellence in Research programs are cut by 11 and 47%, respectively. The INCLUDES and ADVANCE programs are each cut by 5% and the Tribal Colleges and Universities Program (TCUP) is cut by 17%. The Established Program to Stimulate Competitive Research (EPSCoR) program is also cut by $26 million (14%).

The Education and Human Resources (EHR account) is cut by $9 million (1%). While the topline EHR budget is held essentially flat, the proposal funnels money out of the Division of Undergraduate Research ($28 million decrease) and into the Division of Graduate Research ($28 million increase).[10] The request includes a $9 million (3%) cut to the Graduate Research Fellowship which would result in 300 fewer fellowships being awarded. The Robert Noyce Teacher Scholarship program is cut by $22 million (34%) and the Advanced Technological Education (ATE) is cut by $4 million (5%). Finally, spending on education activities across the R&RA directorates is decreased by $58 million (36%).

Construction is fully funded for the three ongoing major research facility projects – the Antarctic Infrastructure Modernization for Science (AIMS), the High Luminosity-Large Hadron Collider (HL-LHC) Upgrade, and the Vera C. Rubin Observatory (formerly the Large Synoptic Survey Telescope-LSST). The budget includes no funding for the design of next generation multi-user research facility projects.

[7] https://www.nsf.gov/about/budget/fy2021/index.jsp
[8] Ibid
[9] Innovative approaches to dynamic spectrum sharing in specialized geographic regions.
[10] Ibid.

National Oceanic and Atmospheric Administration (NOAA) [11]

The Administration's budget proposal includes a total discretionary budget[12] of $4.6 billion for the NOAA, a decrease of $728 million from the FY20 enacted total discretionary appropriation of $5.4 billion. Major cuts are proposed to ocean science and research, climate research and climate services, education and grant programs, the National Weather Service workforce, and laboratories and Cooperative Institutes funding, whereas investments in mapping the EEZ, commercial weather data programs, and the GOES-R and Space Weather programs are increased. Overall, despite modest increases to some programs, there are cuts proposed to every line office.

Most of the proposed cuts come from the Office of Oceanic and Atmospheric Research (OAR), which is reduced by $238 million (40%) compared with FY20. Within OAR, the largest cuts are to the Climate Research program, with the proposed elimination of Climate Competitive Research, compared to the $63 million enacted for this program in FY20. The request also proposes to eliminate OAR's National Sea Grant College program, funded at $87 million in FY20, and significantly cuts the budgets for laboratories and Cooperative Institutes across OAR. The budgets for the Climate Research program, the Weather & Air Chemistry Research program, and the Ocean, Coastal, and Great Lakes Research program, have proposed reductions of $13.5 million (20%), $16.8 million (17.5%) and $7.2 million (16.6%) respectively compared with FY20 enacted levels.

The proposed budget for the National Ocean Service (NOS) is reduced by $225 million (37%) compared with FY20. Within NOS, there are major cuts to coastal science and management, specifically, competitive research through the Coastal Science and Assessment program is eliminated, compared with $19 million enacted in FY20, and coastal management grants under the Ocean and Coastal Management and Services program are also eliminated, compared with $77 million in FY20.

The National Weather Service (NWS) is reduced by $48 million (4%) compared with FY20. The proposed cuts reduce funding for its Analyze, Forecast and Support workforce by $15 million (2.9%) compared with FY20. Other cuts include a $9 million (0.6%) reduction to the National Environmental Satellite, Data, and Information Service (NESDIS) compared to FY20, a $10 million (3%) reduction to the Office of Marine and Aviation Operations (OMAO) compared to FY20, and a $29.1 million (96%) reduction of the budget of the Office of Education within the Mission Support office compared with FY20.

[11] As of February 24, 2020, NOAA has not published their Congressional Justification for FY21. This charter is based on preliminary budget request tables.

[12] Total discretionary budget includes discretionary ORF, PAC, and other discretionary appropriations, but does not include direct obligations or mandatory accounts.

Department of Homeland Security (DHS)

DHS R&D Spending[13]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY21 Request	Change FY21 - FY20	
				Amount	Percent
Department of Homeland Security					
Science & Technology Directorate	819.8	737.3	643.7	-93.6	-12.7%
Countering WMD Office	434.9	432.3	377.2	-55.1	-12.7%
U.S. Fire Administration	44.2	46.8	49.7	2.9	6.2%
Assistance to Firefighter Grants (AFG)	350.0	355.0	344.3	-10.7	-3.0%
Staffing for Adequate Fire and Emergency Response (SAFER) Grants	350.0	355.0	344.3	-10.7	-3.0%

Science and Technology Directorate

The President's Budget Request proposes $643.7 million for the DHS Science and Technology (S&T) Directorate, $93.6 million (12.7%) below the FY20 enacted level. These cuts include an $82 million overall decrease to the Research and Development account. The R&D cuts include $22 million from chemical, biological, and explosive R&D and $5.5 million from cybersecurity and information analysis R&D. Further, the request decreases funding for university programs from $40.5 million in FY20 to $21.7 million for FY21 and eliminates five of the 10 university-based centers of excellence.

Countering Weapons of Mass Destruction (CWMD)

The Office of Countering Weapons of Mass Destruction carries out the core functions of the former Domestic Nuclear Detection Office (DNDO) and the Office of Health Affairs (OHA). The request proposes to fund CWMD at $377.2 million, $55.1 million (12.7%) below FY20 funding of $432.3 million. The decrease in funding includes a $6 million cut to Federal assistance to local communities which helps them prepare and build capacity in detecting, identifying, responding to, and mitigating nuclear, chemical, radiological, and biological threats and incidents. The decrease also cuts $11 million from R&D, including technical forensics and detection capability development. The proposed R&D funding for FY21 is $25 million below (30%) FY19 funding.

Federal Emergency Management Administration: U.S. Fire Administration; Fire Grants

The request proposes to fund the U.S. Fire Administration at $49.7 million for FY21, a 6% increase above the FY20 funding level of $46.8 million.

[13] https://www.dhs.gov/publication/congressional-budget-justification-fy-2021

FEMA administers two fire grants programs: the Assistance to Firefighters Grants (AFG), which provides funding to local fire departments to purchase firefighting and emergency response training and equipment, and the Staffing for Adequate Fire and Emergency Response program (SAFER), which provides local fire departments funding for the hiring, recruitment, and retention of firefighters. The Administration proposes $344 million for each AFG and SAFER, a 10 million cut in funding below the FY20 funding level of $355 million for each program.

Department of Commerce

National Institute of Standards Technology

NIST Spending[14]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY21 Request	Change FY21 - FY20	
				Amount	Percent
National Institute of Standards and Technology	**985.5**	**1,034.0**	**717.9**	**-316.1**	**-30.6%**
Scientific and Technical Research and Services	724.5	754.0	652.0	-102.0	-13.5%
Industrial Technology Services	155.0	162.0	25.3	-136.7	-84.4%
Manufacturing Extension Partnership	140.0	146.0	0.0	-146.0	-100.0%
Manufacturing USA	15.0	16.0	25.3	9.3	58.1%
Construction of Research Facilities	106.0	118.0	40.6	-77.4	-65.6%

The FY21 request for NIST is $718 million, a decrease of $316 million or 31% from the FY20 enacted level. Of this, Scientific and Technical Research Services—NIST's core measurement research and standards account—would be cut by $102 million, or 14%. While the Administration claims it plans to increase funding for "industries of the future," at NIST at least, it primarily focuses on artificial intelligence. The budget proposal would increase measurement tools and testbeds for AI technologies by $25 million, while cutting funding for other important information technology challenges, including voting technologies and smart grid interoperability. Moreover, the administration proposes a 30% cut for advanced manufacturing and material measurement, a 6% cut to biosciences, and a 13.5% cut to quantum science and measurement dissemination. Some areas receive small increases, such as cybersecurity and privacy, which combined receive a 2.5% increase. The proposal significantly cuts funding for forensics and greenhouse gas emission estimation. Finally, the proposal calls for a 7% decrease in funding for neutron scattering research.

The Industrial Technology Services Account, which includes the Manufacturing Extension Partnership (MEP) program and the Manufacturing USA institutes, is cut by $137 million or 85%. This cut reflects the Administration's proposal, once again, to eliminate all support for the MEP program. The MEP program has proven to be a successful model for federal-state partnerships with significant payoff in economic growth and job creation across our Nation.

[14] https://www.commerce.gov/sites/default/files/2020-02/fy2021_nist_ntis_congressional_budget_justification.pdf

According to NIST, for every dollar of Federal investment, the MEP National Network generates $29 in new sales growth for manufacturers and $31 in new client investment. However, the budget request does provide $25 million (a 60% increase) to continue to support NIST's current Manufacturing USA institute in Delaware and to competitively award a second institute.

The budget request also cuts NIST's construction budget by $77 million, or 66%. The request covers only some basic maintenance of NIST facilities but falls well short of what is necessary to meet construction needs. Because many of NIST's buildings have not been remodeled since the 1960s, decaying infrastructure has limited staffs' ability to pursue research, reduced the accuracy of standards, and harmed staff morale. In lieu of direct funding, the budget proposes legislation, the Federal Capital Revolving Fund Act of 2021, which would fund large-dollar, federally owned capital projects using special rules.

Economic Development Administration (EDA)[15]

The Administration once again proposes to close the Economic Development Administration, thus eliminating all programs under the agency, including the Regional Innovation Program (RIP) created by the *America Competes Act of 2010* and reauthorized for an additional 5 years in December 2019. Appropriators funded RIP at $33 million in FY20.

Office of Space Commerce[16]

In the FY21 budget request for the Department of Commerce, the Administration is proposing—as it did in its FY20 request—a reorganization and expansion of the Department's commercial space activities as part of its response to the President's issuance of Space Policy Directive-3 in 2018. The FY21 request again proposes combining two offices currently under the National Oceanic and Atmospheric Administration (NOAA), the Office of Space Commerce and the Commercial Remote Sensing Regulatory Affairs (CRSRA) Office, into a single Office of Space Commerce that would fall directly under the Secretary of Commerce. In FY20, Congress maintained the CRSRA Office and the Office of Space Commerce under NOAA and appropriated $1.8 million and $2.3 million, respectively, to the offices. In FY21, the Administration is requesting $15 million for the proposed expansion of the Office of Space Commerce, which is $10.9 million above—or more than triple—that of the combined FY20 appropriation for the CRSRA Office and the Office of Space Commerce.

In addition to continuing ongoing commercial space activities of the Department of Commerce, the FY21 budget proposal would also support Administration priorities for streamlining commercial space regulations and significantly improving data and capabilities for space situational awareness (SSA) and space traffic management (STM). The proposed increase in funding for FY21 would provide for additional staff, especially for SSA technical and policy staff; developing technical prototypes for SSA; promoting partnerships with industry toward

[15] https://www.commerce.gov/sites/default/files/2020-02/fy2021_eda_congressional_budget_justification.pdf
[16] https://www.commerce.gov/sites/default/files/2020-02/fy2021_dm_congressional_budget_justification.pdf

improved SSA/STM operations, including notification and warnings systems; and beginning development of an open architecture data repository for dissemination of SSA data from a variety of sources to the growing, diverse civil space user community.

Environmental Protection Agency (EPA)

EPA R&D Spending[17]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY21 Request	Change FY21 - FY20	
				Amount	Percent
Environmental Protection Agency S&T	**695.1**	**716.4**	**484.7**	**-231.7**	**-32.3%**
Office of Research and Development (ORD)	474.3	497.2	296.5	-200.7	-40.4%

The President's Budget for FY21 requests $6.7 billion for the Environmental Protection Agency (EPA), $2.4 billion (26%) below the FY20 enacted level of $9.1 billion. The request for the Science & Technology programs within the EPA is $485 million, which is $232 million (32%) below the FY20 enacted level of $716 million. There are modest budget increases in multiple research program areas to deal with PFAS, lead, and harmful algal blooms. The budget for the Office of Research and Development (ORD), has been proposed to be cut by approximately $201 million (40%) from the FY20 enacted appropriations across five of the six integrated and transdisciplinary research programs.

Cross-cutting reductions include the elimination of the Agency's only extramural research grant program, the Science to Achieve Results (STAR) Grants, on the order of at least $28.6 million, to prioritize intramural research. There are also significant cuts to intramural research within the agency in this budget request. This budget proposes to eliminate all climate change research within the Air and Energy Research Program, which saw the most drastic cut in the President's Budget falling 65% from $94.5 million in the FY20 enacted appropriations to $33.5 million in the FY21 request.

The Sustainable Communities Research Program is cut by nearly 56% to $58.6 million which includes eliminating work related to the Ecotox database and the EPA's Report on the Environment. The Health and Environmental Risk Assessment Research Program, which is responsible for the Integrated Risk Information System (IRIS) program, the development of the Integrated Science Assessments (ISAs) which are utilized to set the National Ambient Air Quality Standards (NAAQS), and supporting the requirements of the new *Toxic Substances Control Act* (TSCA) is cut by 35% from the FY20 enacted levels to $24.7 million. The Safe and Sustainable Water Resources Research Program was cut 29% to $78.9 million, and the Chemical Safety and Sustainability Program was cut 25% to $67 million. The Homeland Security Research Program saw a modest budget increase of $0.69 million (2%) over the FY20 enacted levels to $33.8 million. This budget request also proposes to reduce the total number of FTE

[17] https://www.epa.gov/sites/production/files/2020-02/documents/fy-2021-congressional-justification-all-tabs.pdf

across the agency from an estimated 14,172 in the FY20 enacted appropriations to 12,610. This includes a reduction of 482.7 FTE within the Science and Technology program alone.

Department of Transportation

DOT R&D Spending[18]
(dollars in millions)

	FY19 Actual	FY20 Enacted	FY21 Request	Change FY21 - FY20	
				Amount	Percent
Department of Transportation R&D					
Office of the Asst Sec for Research & Technology	8.5	21.0	11.0	-10.0	-47.6%
Federal Highway Administration R&D***	420.0	420.0			
Nat'l Highway Traffic Safety Administration R&D	356.1	366.3	317.0	-49.3	-13.5%
Federal Rail Administration R&D	40.6	40.6	41.0	0.4	1.0%
Federal Transit Administration R&D	28.0	28.0	8.0	-20.0	-71.4%
Federal Aviation Administration[19]	**17,451.9**	**17,617.7**	**17,521.5**	**-96.2**	**-0.5%**
Research, Engineering, and Development	191.1	192.7	170.0	-22.7	-11.8%
AST Operations	24.9	26.0	27.6	1.5	5.8%

FAA Research, Engineering and Development

The Administration's FY21 budget request proposes $170 million for the FAA Research, Engineering and Development program (RE&D), which is a $22.67 million (12%) decrease from the FY20 appropriation. The RE&D account funds research, engineering and development to improve the safety, efficiency, and environmental impact of the national airspace system. The FY21 request includes $5.8 million for research on the safe integration of commercial space operations into the national airspace, a $3.3 million (130%) increase from the FY20 appropriation; $10.2 million for aeromedical research, which is a $2.3 million (29%) increase from the FY20 appropriation; and $24 million, the same level as in the FY20 appropriation, for Unmanned Aircraft Systems (UAS) safety research into new operational concepts and technologies and to support the new regulatory standards. Other safety-related research areas supported in this budget request include $1 million for advanced materials, a $13.7 million (93%) decrease from the FY20 appropriation; $6.4 million for aircraft icing, a $2.6 million (29%) decrease from the FY20 appropriation; and $9.6 million for continued airworthiness, which is a $0.6 million (6%) decrease from the FY20 appropriation. The FY21 RE&D budget request also includes $40.5 million in activities supporting the FAA's ongoing modernization aviation effort, the Next Generation Air Transportation System (NextGen) a $3.1 million (8%) decrease from the FY20 appropriation. The RE&D programs directly supporting NextGen in FY21 are Wake Turbulence, Air Ground Integration Human Factors, Weather Technology in the

[18] https://www.transportation.gov/mission/budget/fiscal-year-2021-budget-estimates
[19] https://www.transportation.gov/mission/budget/faa-cj-fy-2021-estimates

Cockpit, Flight Deck Data Exchange Requirements, and Environmental Research Aircraft Technologies and Fuels.

FAA Office of Commercial Space Transportation

The Administration's FY21 budget request proposes $27.6 million for the FAA Office of Commercial Space Transportation (AST), $1.5 million (6%) above the FY20 appropriation. AST licenses and monitors the safety of commercial space launches and reentries, as well as commercial spaceports. The FY21 request includes a $685,000 increase to support six additional operational staff and three additional mission support staff to meet the growing demand for AST products and services and to support the safe and efficient integration of space launch and reentry into the national airspace. The request would also support AST's ongoing effort to update the commercial space transportation launch and re-entry licensing process, with a goal of creating a performance-based, single license regime for all types of launch and re-entry vehicle operations.

Surface Transportation Funding

The Administration proposes $11 million in funding, a $2 million increase (22%) over the FY20 funding level, for research coordination activities of the Office of the Assistance Secretary for Research and Technology (OST-R). While OST-R received $21 million in FY20, that funding included $12 million for additional activities, including new Tier 1 University Transportation Centers, a transportation emergency planning data model, a transportation resilience metrics study, and a center of excellence on automated systems. Funding for FY18 and FY19 was $8.5 million.

The Federal Highway Administration (FHWA) receives funding for research activities through the Highway Trust Fund (HTF). The allocations for these activities are authorized by Congress under the *FAST Act*, the surface transportation law. The *FAST Act* authorized funding from FY15 through FY20, and the Administration's budget requests have funded FHWA research in accordance with the *FAST Act*. In FY20, the *FAST Act* authorized $420 million for FHWA research activities. The FY21 budget request does not include funding levels for research at FHWA. The DOT budget justification states "in the coming months the Administration will submit a comprehensive surface transportation reauthorization proposal to Congress."

The Federal Transit Administration (FTA) also receives HTF funds. In FY20, FTA received $28 million for transit research. The Administration proposes $8 million to fund these activities, a $20 million decrease (71%).

The request also cuts National Highway Traffic Safety Administration's (NHTSA) research programs by 13.5% overall. Vehicle safety programs were cut from $194 million in FY20 to $156 million proposed in the FY21 budget. This cut includes a $15 million decrease for vehicle

safety research and analysis. However, highway safety R&D funding increases from $155 million in FY20 to $161 million proposed for FY21.

In addition, the request proposes to flat fund the Federal Railroad Administration research programs at $41 million. Rail research includes funding for reducing derailments due to track related and rolling stock related issues, reducing train collision due to train control and communications, reducing accidents caused by human error, and reducing overall system safety issues.