



TECHVISION21

INSIDE VIEW

SPECIAL BUDGET ISSUE AND UPDATE

With very few bright spots, President Trump's FY 2021 Federal R&D budget calls for drastic cuts in R&D funding across the Federal R&D enterprise.

The proposal is very likely DOA on Capitol Hill.

President's Fiscal Year 2021 Federal R&D Budget

The President proposes to invest \$142 billion in Federal R&D in Fiscal Year 2021, a budget that would cut overall Federal R&D funding by nine percent.

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BIG WINNERS

Within this bleak budget proposal, Trump Administration priorities of non-defense artificial intelligence and quantum information science (QIS) emerge as winners, fields proposed for major increases in funding over the President's FY 2020 budget, on a path to doubling spending in both by 2022.

Within this spending:

- The National Science Foundation would receive more than \$850 million for AI R&D, a more than 70 percent increase over the 2020 Budget.
- NSF would create several National AI Research Institutes, in collaboration with the Departments of Agriculture, Homeland Security, Transportation, and Veterans Affairs.
- The DOE Office of Science will make awards to establish at least two and up to five Quantum Information Science Centers.
- Federal QIS R&D funding across key agencies would rise by 50 percent over the 2020 budget. This includes a doubling of support—an additional \$120 million—for NSF's National Quantum Initiative.
- The Department of Energy would increase its quantum information efforts at the national laboratories, and in academia and industry with an increase of \$75 million.

President's FY 2021 R&D Budget Proposal: Select Highlights				
	FY 2020	FY 2021 Proposed	Dollar Change 2020 to 2021	% Change 2020 to 2021
USDA	2,941	2,769	-172	-6%
National Institute of Food and Agriculture	873	968	95	11%
Commerce	1,948	1,506	-442	-23%
NIST	807	653	-154	-19%
NOAA	978	678	-300	-31%
Defense	64,544	59,831	-4,713	-7%
RDT&E	60,275	59,076	-1,199	-2%
Energy	19,219	16,051	-3,168	-16%
Science	6,924	5,760	-1,164	-17%
EERE	2,054	672	-1,382	-67%
ARPA-E	425	-311	-736	-173%
Cyber/Energy Security	36	62	26	72%
EPA	492	318	-174	-35%
National Institutes of Health	39,907	36,965	-2,942	-7%
Homeland Security	532	450	-82	-15%
Interior	973	725	-248	-25%
NASA	14,057	13,334	-723	-5%
Exploration Technology	1,045	1,515	470	45%
National Science Foundation	6,752	6,328	-424	-6%
Transportation	1,134	594	-540	-48%
FHA	404	0	-404	-100%
NHTSA	68	19	-49	-72%

Source: Analytical Perspectives, President's Budget FY 2021, Office of Management and Budget



BIG LOSERS:

R&D funding at the Departments of Energy, Commerce, Transportation, Interior, Homeland Security and Education, and the Environmental Protection Agency would take a double digit hit. For example:

- At Commerce, research funding at the National Oceanic and Atmospheric Administration would be cut by 31 percent, and at NIST by 19 percent.
- DOE's Office of Energy Efficiency and Renewable Energy R&D would be slashed by 67 percent and ARPA-E would be eliminated.
- Cyber security research at Homeland Security would be cut by 57 percent.
- At Transportation, FHA R&D funding would be eliminated and NHTSA R&D cut 72 percent.

President's FY 2021 R&D Budget Proposal (thousands)				
Cuts to Energy Department Clean Energy and Energy Efficiency Programs				
	FY 2020	FY 2021 Proposed	Dollar Change 2020 to 2021	% Change 2020 to 2021
Vehicle Technologies	396,000	74,400	-321,600	-81.20%
Bioenergy Technologies	259,500	44,500	-215,000	-82.90%
Hydrogen/Fuel Cells	105,000	42,000	-108,000	-72.00%
Solar Energy	280,000	67,000	-213,000	-76.10%
Wind Energy	104,000	22,100	-81,900	-78.80%
Water Power	148,000	45,000	-103,000	-69.60%
Geothermal	110,000	26,000	-84,000	-76.40%
Advanced Manufacturing	395,000	94,600	-300,400	-76.10%
Building Technologies	285,000	61,000	-224,000	-78.60%
Science	7,000,000	5,837,806	-1,162,194	-16.60%
ARPA-E	425,000	-310,744	-735,744	-173.12%

Source: Department of Energy FY 2021 Congressional Budget Request, Budget in Brief

CLEAN ENERGY

Within this constrained Department of Energy R&D budget, the Administration highlights a number of clean energy research and energy efficiency priorities (text box).

Project Funding

The budget calls for competitive funding opportunities for research and technology development in the areas of:

- Truck hybridization and electrification
- Truck engine efficiency with co-optimized fuels
- Secure vehicle-grid connection and communications technologies
- Removing technical barriers/accelerating the efficiency and mobility benefits of connected and automated vehicle/transportation systems
- Solar desalination
- Power electronics-based solar generation, new inverter and master PV plant control methods
- Data management for visibility/control of distributed PV systems
- Marine and hydrokinetic energy device including non-grid-scale “Powering the Blue Economy” markets (potentially)
- High performance computing for manufacturing
- Cyber security for energy-efficient manufacturing technologies (R&D consortium)
- Modeling and advanced building controls related to transactions between buildings and the grid
- Solid state lighting
- Cybersecurity solutions for next generation tools and technologies (energy delivery systems)

If you have potential projects in these areas for which you may be interested in pursuing Federal funding, TechVision21 can help you get ahead of the curve before the release of the request for proposals.

PRIORITIES IN DEPARTMENT OF ENERGY CLEAN ENERGY/ENERGY EFFICIENCY R&D

Grid modernization	Passenger/freight transportation efficiency
Energy storage	Materials for harsh environments
Critical minerals	Biofuels
Plastics sustainability solutions	Scaling hydrogen energy
Water security	Solar energy grid integration
Energy sector cyber security	Optimizing wind energy systems
Batteries for vehicle electrification	Wave energy testing and validation
	Smart buildings

FARM ENERGY

The budget includes nearly \$600 million for loans and grants to support renewable energy and energy efficiency projects for rural agriculture producers and rural small businesses.

BROADBAND

For rural communities, the USDA budget includes \$280 million for broadband loans and grants, and \$44 million for distance learning and telemedicine.

ADVANCED MANUFACTURING

The National Institute of Standards and Technology would compete and fund a new Manufacturing (USA) Innovation Institute. NIST would provide \$70 million-\$120 million over 5-7 years, beginning with \$20 million in FY 2021.

At least 100 percent non-Federal cost share required. Since this NIST action is being carried out under the authority of the Revitalize American Manufacturing and Innovation Act (RAMI), the competition will be an open process to allow for the consideration of all applications relevant to advanced manufacturing regardless of technology area.



MICROELECTRONICS

DARPA Beyond Scaling-Electronics Resurgence Initiative

The budget proposes \$1.3 billion (6.2 and 6.3) over the next 5 years, of which \$260 million is proposed for FY 2021. The program will support co-development of new technology with leading industry players. Beyond Scaling responds to the expected end of Moore's Law and reaching the fundamental limits of silicon technology. Programs focus on reducing barriers to making specialized circuits in today's silicon hardware and increasing the ease with which DoD can design, deliver, and upgrade critical, customized electronics. Programs also explore alternatives to traditional circuit architectures, for example, by exploiting vertical circuit integration to optimize electronic devices and by incorporating novel materials, and new techniques for securing data and hardware.

Defense Trusted and Assured Microelectronics: The FY 2021 budget proposes spending more than \$2.2 billion over the next five years on the DoD Trusted and Assured Microelectronics initiative. This funding, beginning with the proposed \$597 million in FY 2021 (6.4 and 6.5), would cover four program areas:

- access to state-of-the-art microelectronics development,
- access to advanced packaging and testing demonstration,
- radiation hardened microelectronics, and
- creating a resilient and robust microelectronics pipeline.

Overall, this initiative seeks to enable defense systems to keep pace with commercial microelectronics technological advances, reduce DoD reliance on obsolete microelectronics, and mitigate DoD's reliance on sole source foundries for assured state-of-the-art microelectronics.

SPACE

Space Development Agency (SDA): The new SDA is beginning its scale up. The budget proposes to spend \$72.4 million in space science and technology R&D in FY 2021 (6.3), scaling spending to a total of \$1.9 billion over five years to 2025. It also proposes to spend \$216 million in space technology development and prototyping (6.4), scaling spending to a total of more than \$4.6 billion over five years to 2025. That's a total spend of \$6.5 billion in five years!

NASA: The budget proposes \$1.6 billion for exploration technology development, an increase of \$478 million or 43.5 percent over FY 2020 enacted levels. The budget calls for scaling investment over 2021-2025, for a total of \$9.2 billion over the five year period! These funds support NASA grants in programs for early stage innovation and partnerships, technology maturation and demonstration, and the Small Business Innovation Research Program.

Rapid Prototyping: The budget proposes spending \$102 million for projects in DoD's Rapid Prototyping Program, which selects, funds, and implements projects as new opportunities and threats emerge.

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