

Accounts of Interest in the
Presidential Budget Request for Fiscal Year 2019

DEPARTMENT OF DEFENSE

Office of the Secretary of Defense: KEY TRUST RELATED RESEARCH AREAS			
Office of the Deputy Assistant Secretary for Defense, Systems Engineering			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Trusted and Assured Microelectronics (PE 604294D8Z)		\$83.6	\$233.1
Verification & Validation	\$0	\$41.5	\$41.7
New approaches for Trust		\$42.1	\$191.3
Trusted and Assured Microelectronics (PE 0605294D8Z)	\$0	\$61.0	\$56.1
Trusted Mask		\$2.0	\$2.0
New Trust Approach Demo		\$59.0	\$54.1
Office of the Deputy Assistant Secretary for Defense, Research Defense Microelectronics Activity (DMEA)			
Microelectronics Technology Development & Support (PE 0603720S)	\$88.3	\$249.8	\$168.9
Technology Development	\$44.8	\$133.0	\$73.4
Trusted Foundry	\$43.5	\$116.7	\$95.4

OSD is launching a large new effort focused on trusted microelectronics. The anchor program is the Trusted and Assured Microelectronics effort which was increased \$144.61M from FY18.

Defense Advanced Research Projects Agency (DARPA): ELECTRONICS TECHNOLOGIES			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Electronics Technology (PE 0602716E)	\$190.6	\$295.4	\$333.8
Advanced Electronics Technologies (PE 0603739E)	\$52.9	\$79.2	\$111.1

The President's Budget requests a significant increase for DARPA's electronics programs in FY19. The proposed increase includes \$242M to continue the "Beyond Scaling" initiative, which was launched in FY18 to "pursue potential electronics performance advancements that do not rely on Moore's Law but instead leverage circuit specialization, to include leveraging materials, architectures, and designs that are designed to suit a specific need."

ARMY RESEARCH, DEVELOPMENT, TEST & EVALUATION (RDT&E)			
ELECTRONICS TECHNOLOGIES			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Electronics and Electronic Devices (PE 0602705A)	\$72.9	\$91.4	\$58.3
Electronic Warfare Technology (PE 0603270A)	\$40.8	\$34.3	\$31.5

The Army's fiscal year (FY) 2019 budget request maintains FY 2018 funding levels for electronics research efforts. The Army's FY 2019 budget request represents their six modernization priorities with research efforts aligned to reach those specific goals. Of note, there are electronics research opportunities in program elements not stated above although they are not the main focus. Programs related to combat vehicle prototyping and command and platform electronics have a vested interest in secure electronics.

NAVY RESEARCH, DEVELOPMENT, TEST & EVALUATION (RDT&E)			
ELECTRONICS TECHNOLOGIES			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Defense Research Sciences (PE 0601153N)	\$413.8	\$458.3	\$458.7
Sensors, Electronics And Electronic Warfare	\$45.9	\$49.7	\$48.3
Electromagnetic Systems Applied Research (PE 0602271N)	\$114.6	\$85.6	\$83.8
Solid State Electronics	\$12.4	\$11.0	\$15.5
Vacuum Electronics Power Amplifiers	\$2.6	\$2.3	\$2.3
Manufacturing Technology Program (PE 0603680N)	\$55.5	\$67.8	\$58.6
Electronics Processing and Fabrication	\$12.0	\$12.0	\$12.0

The FY19 budget largely maintains FY18 funding levels for electronics research, with a few notable changes. The increase from FY 2018 to FY 2019 is in solid state electronics due to a ramp up in funding towards the Anti-Tamper Program. The vacuum electronics research is driven by simultaneous requirements on power, frequency, bandwidth, weight, and size which exceed commercial off the shelf (COTS) technologies.

AIR FORCE RESEARCH, DEVELOPMENT, TEST & EVALUATION (RDT&E)			
ELECTRONICS TECHNOLOGIES			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Defense Research Sciences (PE 0601102F)	\$370.6	\$342.9	\$348.3
Physics and Electronics			
Materials (PE 0602102F)	\$158	\$124	\$125
Materials for Electronics, Optics, and Survivability	\$50	\$31	\$32.5
Aerospace Sensors (PE 0602204F)	\$160	\$153	\$166
Electronic Component Technology	\$44	\$38	\$43
Trusted Electronics for Intelligence, Surveillance, Reconnaissance and Avionics Systems	\$6.6	\$6.2	\$9.8
Space Technology (PE 0602601F)	\$119.7	\$116.5	\$0
Spacecraft Payload Technologies	\$15.7	\$15.8	\$0
Space Technology (PE 1206601F)	\$0	\$0	\$117
Spacecraft Payload Technologies			\$15.9

As with the Navy, much of what appears to be increased funding is in fact a realignment of accounts. Nonetheless, there are increases in funding for the Aerospace Sensors account, which includes a program on Trusted Electronics. In FY 2019, the entirety of Project 624846, Spacecraft Payload Technologies will be reported under PE 1206601F, Space Technology, Project 624846, Spacecraft Payload Technologies.

DEPARTMENT OF ENERGY

ARPAe: ELECTRONICS TECHNOLOGIES			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Advanced Research Projects Agency-Energy	\$305.2	\$303.2	\$0
OFFICE OF SCIENCE			
Office of Science Total	\$5,672.	\$4,472.	\$5,391
Materials Science and Engineering			
Basic Energy Sciences-OS	\$76.6	-	\$60.9
Transformer Resilience and Advanced Components			
Electricity Delivery-Energy Programs	\$6.0	\$5.9	\$5.0
ENERGY EFFICIENCY & RENEWABLE ENERGY (EERE)			
Vehicle Technologies	\$468.	\$82.	\$68.
Advanced Manufacturing	\$261.	\$82.	\$75.
Solar Energy Technologies	\$285.	\$69.7	\$67.

The President's Budget Request calls for the zeroing out of the Advanced Research Projects Agency-Energy (ARPA-E) in FY19. Other budget activities include \$61 million for Materials Science and Engineering within the Office of Science for sensor and component production and \$5 million for Transformer Resilience and Advanced Components, which "supports modernization, hardening, and resilience of the grid by addressing the unique challenges facing transformers and other critical grid components."

The office of Vehicle Technologies funds significant microelectronics and sensor integration into vehicles for the purpose of increasing fuel and energy efficiency. The Advanced Manufacturing and Solar Energy Technologies support the development of power electronics, energy storage technologies, and integration of photovoltaics into the national electricity grid.

CROSSCUTTING INITIATIVES

The Department of Energy funds two crosscutting initiatives. The funds for these efforts are split across multiple offices within the DOE, with each office responsible for a subset of the goals of the overall initiative. The offices then work together to coordinate funding.

DOE CROSSCUTTING INITIATIVE: EXASCALE COMPUTING			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Office of Science: Exascale Computing Program	\$190.	\$346.	\$232.
NNSA: Advanced Simulation & Computing	\$95.	\$161.	\$163.

A major department-wide trend is the continued increase in funding occurring for exascale computing efforts, shared between the Office of Science and the NNSA. The major programs of the two offices (Advanced Scientific Computing Research in the Office of Science and Advanced Simulation & Computing in NNSA) have worked closely for years and beginning in 2017 the Office of Science has received funding dedicated specifically to exascale computing research.

DOE CROSSCUTTING INITIATIVE: CYBERSECURITY EFFORTS			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Electricity Delivery & Energy Reliability	\$262.	\$120.	\$61.
Cybersecurity, Energy Security, and Energy Resiliency	\$0	\$0	\$95.

Cybersecurity is another major crosscutting effort within the DOE. Nearly all offices within the DOE receive funding for various cybersecurity activities, and the budget request specifically provides a total each year across the entire department. The requested 2019 funding for cybersecurity efforts at the DOE also contains a major restructuring of the department. In previous years, the mission of ensuring energy grid cybersecurity and emergency response was primarily the responsibility of the Office of Electricity Delivery and Energy Reliability (OE). In the 2019 budget request, Cybersecurity R&D efforts have been moved to a newly created office of Cybersecurity, Energy Security, and Energy Resiliency (CESER).¹ This office creation is paired with the proposed restructuring of OE to become the Office of Electricity Delivery, limiting its focus and budget to mainly non-security efforts.

¹ “Secretary of Energy Rick Perry Forms New Office of Cybersecurity, Energy Security, and Emergency Response.” Energy.gov, U.S. Department of Energy, 14 Feb. 2018, www.energy.gov/articles/secretary-energy-rick-perry-forms-new-office-cybersecurity-energy-security-and-emergency.

NATIONAL SCIENCE FOUNDATION

RESEARCH & RELATED ACTIVITIES (R&RA)			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Top-Line	\$6,006.0	\$6,334.5^a	\$6,150.7
Engineering Directorate (ENG)	\$930.9	\$931.0 ^b	\$921.4
Computer & Information Science & Engineering (CISE)	\$935.9	\$936.0 ^b	\$925.4
Mathematics and Physical Science (MPS)	\$1,362.4	\$1362.0 ^b	\$1,345.3
EDUCATION & HUMAN RESOURCES (EHR)			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Top-Line	\$873.0	\$902.0^a	\$873.0

^a Enacted level based on FY 2018 Omnibus Appropriations, signed into law March 23, 2018.

^b Estimated level reported in FY 2019 President's Budget Request (funding is not specified in appropriations for individual research directorates).

The President's Budget requests a slight (2.4%) increase for NSF's research account overall in FY 2019 compared to the FY 2017 enacted level. The Omnibus Appropriations for FY 2018 signed into law on March 23, 2018, after the FY 2019 request was released, provided a larger 5.5% increase, making the FY 2019 request level a cut below FY 2018. Semiconductor R&D funded jointly by the semiconductor industry and NSF, is funded through the ENG and CISE directorates, which each see small cuts in the FY 2019 request.

The proposed budget includes \$30M each for two of NSF's "Big Ideas" that impact electronics R&D, including "Quantum Leap" and "Harnessing the Data Revolution"; this is the first dedicated funding for NSF's 10 Big Ideas, proposed initially in 2016.

The EHR directorate includes funding for research on education at all levels and funding for the Graduate Research Fellowships Program, a key source of support for graduate training. The request proposes a 15% cut to the GRFP program relative to FY 2017 levels (additional funding from Office of Integrative Activities is similarly cut), bringing total funding down to \$270 million.

DEPARTMENT OF EDUCATION

GRADUATE ASSISTANCE IN AREAS OF NATIONAL NEED			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
	\$28M	\$23M	\$0

The GAANN program provides scholarships to graduate students pursuing degrees in areas of national need, including science and engineering. The elimination of this program would likely mean fewer U.S. citizens in graduate programs that train the workforce for the defense electronics industrial base.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY			
Cost (\$ in Millions)	FY 2017	FY 2018	FY 2019
Advanced Communication Networks and Scientific Data Systems	--	\$67.4	\$54.2
Advanced Manufacturing and Material Measurements	--	\$155.1	\$135.5
Cybersecurity and Privacy	--	\$81.6	\$78.3
Fundamental Measurement, Quantum Science and Measurement Dissemination	--	\$176.0	\$127.0
Health and Biological Systems Measurements	--	\$22.8	\$16.5
Physical Infrastructure and Resilience	--	\$65.2	\$58.8
Exploratory Measurement Science	--	\$58.8	\$58.7
Manufacturing USA	--	\$24.8	\$15.1
TOTAL	--	\$651.7	\$544.2

The budget request for the National Institute of Standards and Technology (NIST) sees a significant reduction of over \$100 Million from the 2018 budget request. This reduction is spread relatively evenly across the institute, with the largest funding reductions occurring in fundamental measurement research and advanced manufacturing & materials measurement. While a relatively small amount of the budget, funding for the Manufacturing USA initiative is reduced by nearly 40%.