The Trump Era: An Unexpected Renaissance for the Physical Sciences?

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The state of federal support for science

- With respect to science, the Trump era has been defined by:
  - President Trump’s apathy toward science
  - In response, unprecedented activism among U.S. scientists
  - Congress’s wholesale rejection of Trump administration’s science/R&D policies
  - Surprisingly robust ‘17 and ‘18 budgets for the science agencies
AAAS CEO Rush Holt: “If you can have this fact or this alternative fact, and they’re equivalent—that calls into question the very idea that science is a special way for separating truth from falsehood. ... Now where fake news is indistinguishable in many people’s minds from fact, we have to act. And it will not be done by asserting what is the fact, but rather empowering people to handle evidence for themselves [and] to rebuild the traditional American reverence for evidence.”
Scientific Integrity Under Scrutiny During Trump’s First Week

2 Feb 2017

Last week, a flurry of reports out of science-related federal agencies indicated that they had restricted external communications, among other changes. Although these changes now appear not to have represented any immediate long-term shift in policy on scientific communications, scientific organizations have reaffirmed their commitment to scientific freedom and integrity.

160+ Science Organizations Urge President to Rescind Immigration Order

1 Feb 2017

In a letter to President Donald Trump, the organizations warn that his executive order temporarily barring citizens of seven nations from entering the U.S. will negatively impact the nation’s science and engineering capacity.
Senate Confirms White House Budget Director Committed to Shrinking Federal Government

22 Feb 2017
Mick Mulvaney, the new director of the White House Office of Management and Budget, has been a leader in efforts to downsize the federal government. During the Senate confirmation process, he said he believes there is a “proper role for federal government in research.”

White House Requesting Immediate $3 Billion Cut to R&D Budgets

29 Mar 2017
President Trump has asked Congress to impose an $18 billion cut in non-defense spending in its appropriations legislation for fiscal year 2017. According to a leaked document, the White House has suggested that about $3 billion be taken from R&D programs. Several key congressional appropriators have said it is too late in the fiscal year to consider such large cuts.

Science a Casualty of Trump’s Broader Mission to Cut Gov’t, Boost Defense
FY18 Trump Budget Request
(% change from FY17 enacted)

-109%  ARPA-E*
-70%   DOE Renewable Energy (EERE)
-58%   DOE Fossil Energy
-32%   NOAA Research
-31%   DOE Nuclear Energy
-23%   NIST
-22%   NIH
-17%   DOE Office of Science
-15%   USGS
-11%   NSF
-5.8%  DOD S&T
-0.9%  NASA Science
7.7%   NNSA

* Includes use of $46 million in prior year balances
Protesters rallied to support science and reject the dismissal of evidence.

This article was first published in the Politics and Policy section of Physics Today.

The March for Science was held beside the Washington Monument.

(Image credit - Andrew Grant)
Congress Holds Power of the Purse

Selected Science Agency Appropriations in FY17 Omnibus

Congress Stands by Science in Final Budget Deal
2 May 2017

Congress has reached a final agreement on a fiscal year 2017 appropriations bill that boosts funding for a few science agencies while holding others steady. The bill stands in stark contrast to a Trump administration proposal that would have imposed deep cuts on federal science to help pay for a defense and border security buildup.
A Year of Vast Uncertainties at Science Agencies

**Budgetary Uncertainties Abound at Science Agencies as Fiscal Year 2018 Begins**

Science agencies have stable funding as they begin fiscal year 2018 under a continuing resolution. However, their long-term outlook is less clear, as they wait for annual appropriations to be finalized and prepare for the fiscal year 2019 budget request. The deadline has just passed for them to submit “agency reform plans” detailing workforce and program cuts to be implemented over the next several years.

**White House Releases R&D Priorities for Its Next Budget Request**

Following precedent, the White House has released its memo to federal agencies signaling its R&D priorities for the president’s fiscal year 2019 budget request. Among its directions, the memo calls for fiscal restraint and reinforces the administration’s commitment to rolling back support for later-stage R&D and technology commercialization.

(Image source – The White House)
Many Science Leadership Positions Remain Vacant After Trump's First Year

In the second half of his first year in office, President Trump increased his pace in making nominations to science-related positions in the federal government. However, many Senate-confirmed positions still lack nominees and some nominees have faced difficulties with Senate confirmation, resulting in an unprecedented number of long-term vacancies.
FY18 Science Agency Funding

% change from FY17 enacted

Numbers in parentheses are the FY17 amounts

- NIST ($1.0 B)
  - FY18 Trump Request: -23%
  - FY18 Enacted: 26%

- DOE Nuclear Energy ($1.0 B)
  - FY18 Trump Request: -31%
  - FY18 Enacted: 19%

- DOE Office of Science ($5.4 B)
  - FY18 Trump Request: -17%
  - FY18 Enacted: 16%

- DOE ARPA-E ($0.3 B)
  - FY18 Trump Request: -93%
  - FY18 Enacted: 15%

- DOE Nuclear Security [NNSA] ($13.0 B)
  - FY18 Trump Request: -70%
  - FY18 Enacted: 11%

- DOE Renewable Energy [EERE] ($2.1 B)
  - FY18 Trump Request: -58%
  - FY18 Enacted: 9%

- DOE Fossil Energy ($0.7 B)
  - FY18 Trump Request: -22%
  - FY18 Enacted: 9%

- NIH ($34.1 B)
  - FY18 Trump Request: -1%
  - FY18 Enacted: 8%

- NASA Science ($5.8 B)
  - FY18 Trump Request: -6%
  - FY18 Enacted: 6%

- DOD S&T ($14.0 B)
  - FY18 Trump Request: -15%
  - FY18 Enacted: 6%

- USGS ($1.1 B)
  - FY18 Trump Request: -16%
  - FY18 Enacted: 4%

- NOAA ($5.7 B)
  - FY18 Trump Request: -11%
  - FY18 Enacted: 4%

- NSF ($7.5 B)
  - FY18 Trump Request: 0%
  - FY18 Enacted: 0%

- EPA S&T ($0.7 B)
  - FY18 Trump Request: -36%
  - FY18 Enacted: 0%

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Three Big Questions Looking Forward

1. If Congress continues to buck the administration’s R&D policies and set its own directions for the science agencies, what resources does it need to do so effectively?

2. To what extent should we be concerned with how the nation’s growing debt and entitlement spending constrains the long-term outlook for federal spending, including for science?

3. How should we grapple with the loss of trust in institutions and credibly established knowledge in the U.S., of which Trump’s rise is symptom?
To follow federal science budgets in greater detail, resources include:

- Sign up for FYI: Science Policy News: [http://www.aip.org/fyi](http://www.aip.org/fyi)

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Discretionary Spending Caps

![Graph showing discretionary spending caps over fiscal years from 2014 to 2021.](image)

- **Budget Control Act Defense Cap (post sequestration + previous amendments)**
- **Budget Control Act Non-Defense Cap (post sequestration + previous amendments)**
- **2018 Bipartisan Budget Agreement Caps**

Figures for the amended Budget Control Act caps are from Congressional Research Service report R44874.
Gross Expenditures on R&D

Purchasing Power Parity in billions (constant 2009 $)


SOURCES: All data are from Science and Engineering Indicators 2018 except for the U.S. estimated R&D expenditures for 2016, which are from the National Center for Science and Engineering Statistics National Patterns of R&D Resources, 2017.