

Trump's materials world

US research funding sees both winners and losers as the Trump administration outlines its agenda.

When President Donald Trump took office in January 2017, many US scientists bemoaned what his administration might do to the nation's research enterprise. More than a year later, the Trump presidency is indeed hostile to science in many areas, such as environmental protection. And two of his most economically controversial moves — to impose tariffs on imported steel and aluminium, as well as solar panels — involve materials.

But when it comes to funding materials research, there is a faint glimmer of ... well, if not hope, then at least not despair. And the science-friendly Congress may provide a bulwark against drastic cuts.

For the past few years, US federal research funding has been in a sorry state. Paralysed by partisanship, Congress has been serially unable to pass bills to fund the government. Instead, agencies have had to work under a series of 'continuing resolutions', which are stopgap funding measures that extend last year's numbers for a short period of time. Programme officers at places like the National Science Foundation (NSF) have been reduced to taking their previous year's budget, dividing by twelve, and parcelling out funds month by month.

But on 9 February 2018, Congress got its act together enough to pass legislation involving not just the usual one year of funding, but two. The bipartisan budget deal lifts caps on non-military discretionary spending, a category that includes almost all research agencies. The deal dumped so much extra money into the government that the Trump administration had to scramble to find ways to propose spending it all.

Three days after signing the deal into law, Trump proposed his own set of budget priorities for fiscal year 2019 (*Budget of the United States Government, Fiscal Year 2019*). The result was something of a budgetary whiplash. Trump had planned to propose cutting US\$2.2 billion, or 29%, out of the NSF's annual budget. With the Congressional windfall, he reversed, and added those monies back. Now the presidential request for NSF is essentially flat, at \$7.47 billion. (Comparisons are to fiscal year 2017, the last year with complete budget appropriations.)

Within NSF, Trump proposed a 1.3% cut to its mathematical and physical sciences directorate to \$1.35 billion; within that, a



US President Donald Trump wanted to slash some research funding, but Congress seems to have foiled him — for now. Credit: White House Photo / Alamy Stock Photo

6.1% cut for its division of materials research to \$295 million. Research funding in the materials division would drop by 5.7% to \$235 million; infrastructure would drop by 4% to \$58 million; and education would be slashed by 56% to \$2.1 million.

To save \$296 million the administration proposes terminating a programme into cyber-enabled materials, manufacturing and smart systems that began in 2013 and has achieved its goals, according to NSF budget documents. But Trump also proposed new funding for the 10 "Big Ideas" the agency unveiled in 2016 — including \$30 million for a "quantum leap" initiative involving research into quantum materials.

The quantum interest carries over into the Department of Energy (DOE). As with the NSF, the DOE's Office of Science had also been slated for drastic cuts — of 23% — but was restored to a proposed flat funding of \$5.4 billion after the Congressional budget deal. Its basic energy sciences division would decrease by 1.1% to \$1.85 billion, but within that condensed matter and materials physics would grow by 22% to \$123 million. Highest priorities include quantum information science, ultrafast science, and materials and chemistry for future nuclear energy. For the second year in a row, Trump also proposed killing the Advanced Research Projects Agency-Energy

(ARPA-E), meant to develop high-impact energy technologies. Congress has so far kept ARPA-E alive.

At the Department of Defense, the combined amounts for basic research, applied research, and advanced technology development would be cut by 2% to \$13.7 billion. The Defense Advanced Research Projects Agency (DARPA) would do well in a Trump budget, increasing by 19% to \$3.4 billion.

Among the biggest overall losers would be the National Institute of Standard and Technology (NIST). Under the president's budget proposal it would be cut by 34% to \$629 million. Funding for laboratory programmes would drop by 15% to \$517 million. Environmental measurements, and time-and-frequency dissemination, would be cut back in favour of focusing on quantum science. Also within NIST, Trump would eliminate the Manufacturing Extension Partnership programme, a public-private partnership that supports US businesses, and trim contributions to a national network of manufacturing institutes.

At the National Institutes of Health, the National Institute of Biomedical Imaging and Bioengineering would drop by 2.3% from the 2018 continuing resolution numbers to \$347 million. Priorities include accelerating biomedical innovations into applied health technologies.

In the end, Trump's proposal is just that — a proposal. Congress will decide on the final numbers, and may well restore many of the proposed cuts. But beyond the budget battles, US research policy faces other challenges in the Trump administration. As *Nature Materials* went to press, the president had not yet nominated a science adviser, a record-breaking delay in this crucial position. Other top jobs remain vacant throughout the government, with agencies such as the National Oceanic and Atmospheric Administration and NASA currently leaderless.

So even as US materials scientists debate how their favourite funding programmes might fare, they would do well to keep their eye on the bigger picture on where Trump is leading the country. □

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