



ADVANCING SCIENCE, SERVING SOCIETY

## FY 2016 R&D Appropriations So Far: A Roundup

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Congress has returned from the August recess with FY 2016 appropriations still unfinished and less than a month left in the fiscal year, but a long wait is likely before funding decisions are finalized. Here's a brief look at appropriations so far for some of the major federal R&D agencies and programs.

### Current Context

Coming into the appropriations cycle, President Obama had requested \$146.4 billion in R&D, good for a 6.5

percent increase per updated AAAS estimates, with larger relative increases for development and smaller for basic and applied research. As in years past, the President's request emphasized certain priorities like energy efficiency and renewable energy, advanced manufacturing, climate science, neuroscience, and advanced computing, among others, as well as new initiatives on antibiotic-resistant bacteria and precision medicine. To carry out these and other priorities, several agencies would receive significant increases in the President's budget.

R&D Funding in FY 2016 Appropriations									
(current AAAS estimates of budget authority in billions of nominal dollars)									
Appropriations Bill	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
<b>DEFENSE<sup>1</sup></b>	66.5	66.6	<b>72.0</b>	<b>70.5</b>	-2.1%	5.8%	<b>73.4</b>	1.9%	10.1%
<i>DOD Science &amp; Tech</i>	13.4	14.0	<b>13.2</b>	<b>14.3</b>	7.7%	2.0%	<b>14.6</b>	10.4%	4.6%
<b>LABOR/HHS/EDUCATION<sup>2</sup></b>	30.8	31.4	<b>32.3</b>	<b>31.8</b>	-1.7%	1.3%	<b>33.1</b>	2.3%	5.5%
<i>Includes NIH, Dept. of Education</i>									
<b>COMMERCE/JUSTICE/SCIENCE<sup>1</sup></b>	19.2	19.7	<b>20.8</b>	<b>20.2</b>	-3.1%	2.3%	<b>20.1</b>	-3.5%	1.9%
<i>Includes NSF, NASA, NOAA, NIST</i>									
<b>ENERGY AND WATER<sup>1</sup></b>	12.1	11.9	<b>12.6</b>	<b>12.0</b>	-4.8%	0.9%	<b>12.1</b>	-3.7%	2.0%
<i>Includes Dept. of Energy</i>									
<b>AGRICULTURE<sup>2</sup></b>	2.5	2.6	<b>3.0</b>	<b>2.5</b>	-15.9%	-1.4%	<b>2.5</b>	-16.4%	-2.0%
<i>Includes USDA</i>									
<b>INTERIOR AND ENVIRONMENT<sup>2</sup></b>	2.0	2.0	<b>2.1</b>	<b>1.9</b>	-9.4%	-5.0%	<b>1.9</b>	-9.0%	-4.5%
<i>Includes USGS, EPA, Forest Service</i>									
<b>OTHER</b>	3.4	3.3	<b>3.5</b>	<b>3.2</b>	-7.7%	-0.9%	<b>3.3</b>	-7.0%	-0.2%
<b>TOTAL R&amp;D</b>	<b>136.6</b>	<b>137.4</b>	<b>146.4</b>	<b>142.1</b>	<b>-2.9%</b>	<b>3.4%</b>	<b>146.4</b>	<b>0.0%</b>	<b>6.5%</b>
<b>Defense Function<sup>3</sup></b>	71.5	71.4	<b>76.8</b>	<b>75.4</b>	-1.8%	5.7%	<b>78.2</b>	1.8%	9.6%
<b>Nondefense Functions</b>	65.1	66.1	<b>69.5</b>	<b>66.7</b>	-4.1%	0.9%	<b>68.1</b>	-2.1%	3.1%

FY 2015 figures are estimates and exclude Ebola funding. Inflation from FY15-16 is 1.6 percent.  
<sup>1</sup> Passed by Appropriations Committees in both chambers, and approved by full House.  
<sup>2</sup> Passed by House and Senate Appropriations Committees.  
<sup>3</sup> Includes Dept. of Defense and NNSA.

But, of course, these increases would have to be facilitated by a corresponding increase in discretionary spending, a central and controversial element of the President’s budget. Under current law, discretionary spending must live at the post-sequestration level of \$1.016 trillion in FY 2016, nearly flat for the second straight year. The President and most Democrats want the cap increased by \$71 billion or 7.2 percent, to \$1.087 trillion, rolling back most of the spending reductions under current law. The requested increase would apply to both defense and nondefense discretionary spending.

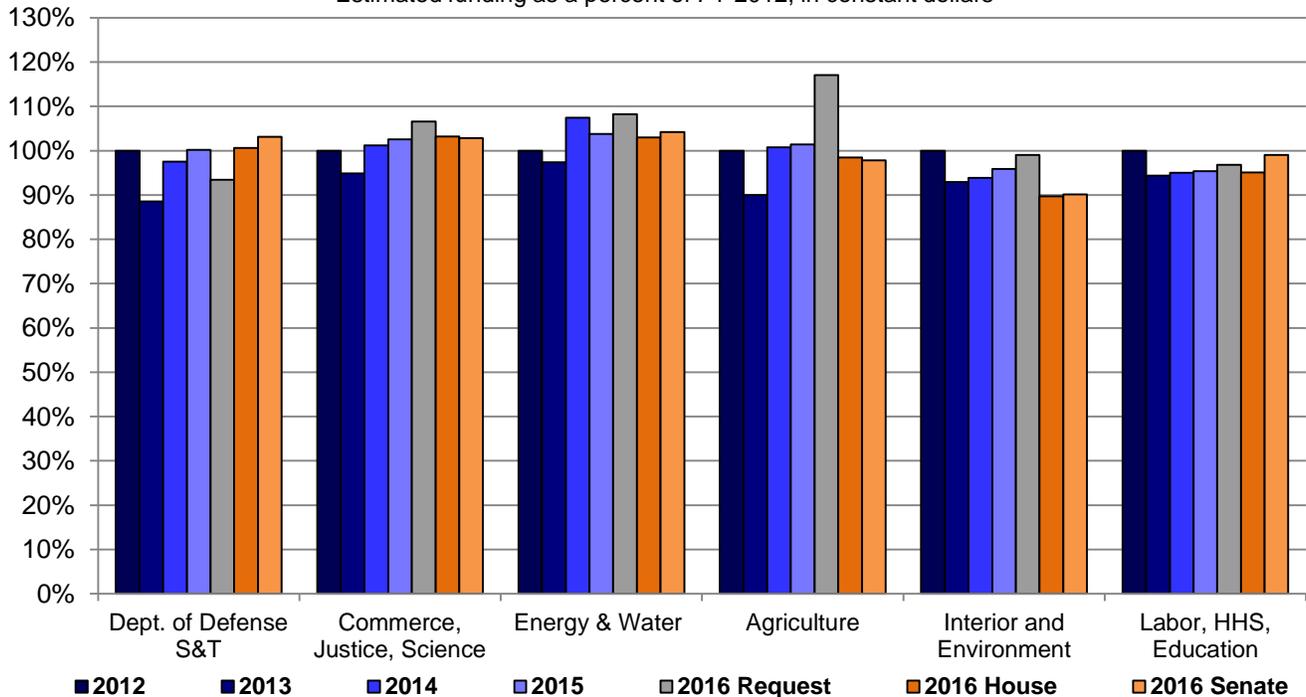
Congress opted instead to set spending at current-law levels in its own budget resolution, passed in May for the first time in six years.<sup>1</sup> Even so, a deal remains possible. Most Republicans would embrace a defense increase, and defense hawks have already used the war budget, dubbed Overseas Contingency Operation or OCO spending, to controversially secure extra dollars for the Department of Defense while avoiding the statutory caps (see the Defense Department section below for more). Many in the majority would also accept a nondefense increase, but only as part of a deficit-neutral package. But formal negotiations on this have not yet commenced

at the time of this writing, and the parties remain split. The President has threatened to veto, and Senate Democrats have blocked, every spending bill. In the House, six of twelve bills were adopted before the process was derailed in part by policy riders. A continuing resolution will be necessary to avoid a shutdown on October 1, but even that remains uncertain given the debate over federal funding of Planned Parenthood.

In some ways the current dynamic has more in common with the debate from summer 2013 (over FY 2014) than last year’s debate (over FY 2015). Last year, Congress was still operating under the Bipartisan Budget Act, which partially rolled back the spending caps for two years.<sup>2</sup> While the final omnibus wasn’t until December, both parties were at least still working from a common baseline. The year before, however, Congress still had not resolved sequestration, leaving a wide partisan gap between spending bills then. At that time the Affordable Care Act played the incendiary role Planned Parenthood is playing now. An acceptable compromise remains to be determined.

### FY16 R&D Appropriations in the Six Major Spending Bills

Estimated funding as a percent of FY 2012, in constant dollars



CJS bill includes NSF, NASA, Commerce. Source: AAAS analyses of agency budget documents and appropriations bills and reports. R&D include conduct of R&D and R&D facilities. © 2015 AAAS

<sup>1</sup> <http://www.aaas.org/news/house-senate-budgets-adopt-sequester-status-quo-now>

<sup>2</sup> <http://www.aaas.org/news/what-ryanmurray-budget-deal-might-mean-rd-budgets>

## Research and Development Funding

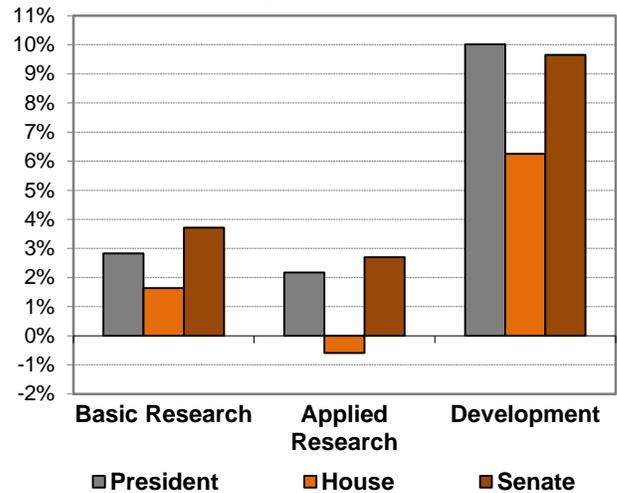
In spite of the constraints on discretionary spending, appropriators have provided some gains to federal R&D. Per current AAAS estimates, House appropriations for R&D are 2.9 percent below the President’s request but still 3.4 percent or \$4.7 billion above FY 2015 levels, while Senate appropriations have actually managed to match the request, granting a 6.5 percent or \$8.9 billion increase above FY 2015 (see table on first page).

However, any consideration of Congressional decisions on science funding must recall that appropriators have been operating under sequestration-level caps for nondefense spending while adding an extra \$35 billion or more to the Pentagon’s OCO budget. This has helped to enable relatively large increases for defense R&D while funding for most nondefense R&D agencies is constrained.

The preference for defense over nondefense R&D this cycle is reflected in breakdowns of R&D by character. The President’s budget sought an \$8.9 billion increase in FY 2016, but two-thirds of this was entirely accounted for by an increase for DOD development activities. Development in the FY 2016 budget was slated for a 10 percent increase, with basic and applied research increased by less than three percent. It has been a similar story in appropriations so far (see chart above right).

In inflation-adjusted dollars, the President’s budget and

**R&D Changes by Character**  
percent change from FY15, nominal dollars

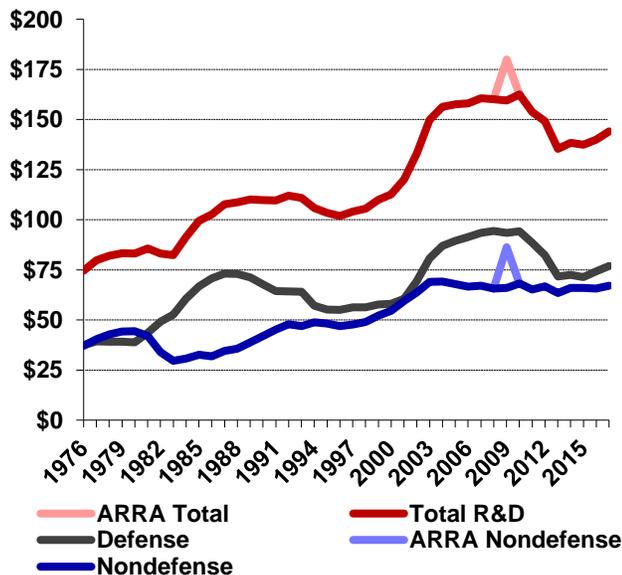


Inflation is 1.6 percent. © 2015 AAAS

the current Senate total would return total federal R&D to within a few billion dollars of pre-sequestration FY 2012, while the current House figures would represent a much slower R&D recovery. Per current AAAS estimates, federal R&D would remain slightly below 0.8 percent of gross domestic product in the President’s budget and House and Senate appropriations (see graphs below).

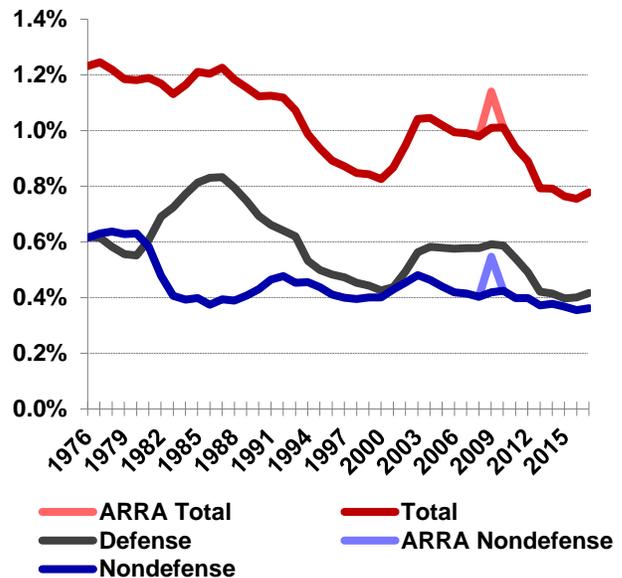
An agency-by-agency recap follows, and a full agency R&D table can be found at the end of this document.

**Total Federal R&D**  
billions of constant 2015 dollars



Source: Up to 1994: NSF, Federal Funds for R&D. 1995 to Present: AAAS analysis of agency budget data. © 2015 AAAS

**Federal R&D As Percent of GDP**



Source: Up to 1994: NSF, Federal Funds for R&D. 1995 to Present: AAAS analysis of agency budget data. © 2015 AAAS

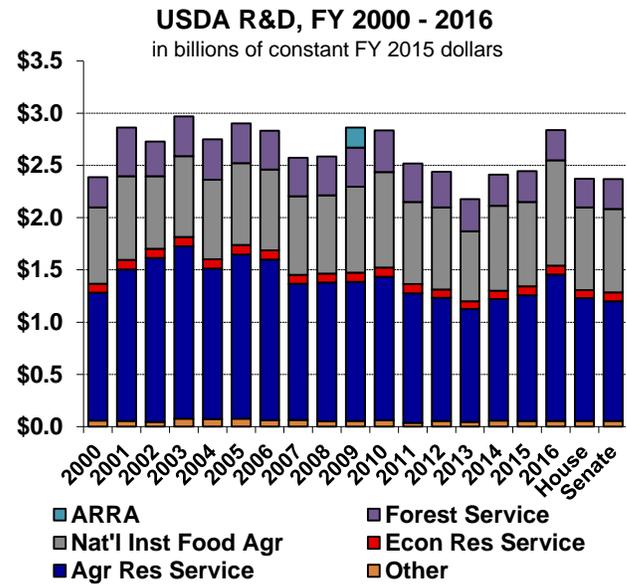
## Department of Agriculture

**Spending Bill:** Agriculture (H.R. 3049, S. 1800); **Latest Approvals:** House Appropriations Committee on July 8; Senate Appropriations Committee on July 16

**Spending Bill:** Interior and Environment (H.R. 2822, S. 1645); **Latest Approvals:** House Appropriations Committee on June 16; Senate Appropriations Committee on June 18

In the end, appropriators appear set to make only limited changes to USDA's R&D program funding levels from the current fiscal year.

Coming into the cycle, the President's USDA budget focused on just a handful of significant funding shifts. The Agricultural Research Service (ARS) had proposed a large funding increase for its buildings and facilities accounts, to include \$113.7 million for construction of the Southeast Poultry Research Laboratory in Georgia, as well as other upgrades to other intramural facilities elsewhere. On the extramural front, the Agriculture and Food Research Initiative (AFRI), USDA's premier competitive research program, had requested a 38.5 percent boost. USDA also requested \$80 million for public-private "innovation institutes" to promote multidisciplinary research on biomanufacturing and cellulosic nanomaterials, to be administered by the National Institute of Food and Agriculture (NIFA). The biomanufacturing institute would also be part of the President's National Network for Manufacturing Innovation, and the White House initiative on antibiotic-resistant bacteria would also receive some funding from USDA. Most major formula funding programs would remain flat under the request.



Source: AAAS R&D reports, agency budget documents, and appropriations reports. FY 2016 is the request. © 2015 AAAS

As can be seen from the current figures below, these proposals have been met with only a lukewarm response from appropriators in both chambers, who have mostly turned aside the new big-ticket items and settled for modest funding adjustments, though the House has been somewhat more negative. Given these outcomes, USDA is an agency that may see particular fiscal benefit should a discretionary budget deal be reached later this fall. USDA funding has lost significant ground in recent years, and for the moment, appropriations would keep USDA R&D well below earlier funding levels (see graph above).

U.S. Department of Agriculture R&D Appropriations (budget authority in millions of dollars)									
Program / Account*	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
Agri Research Service (ARS)	1,122	1,178	1,397	1,167	-16.5%	-0.9%	1,137	-18.6%	-3.5%
<i>Salaries and Expenses</i>	1,122	1,132	1,192	1,123	-5.8%	-0.8%	1,137	-4.6%	0.5%
<i>Buildings and Facilities</i>	0	45	206	45	-78.1%	0.0%	0	-100%	-100%
Nat Inst Food Agri (NIFA)	1,282	1,289	1,503	1,284	-14.5%	-0.4%	1,294	-13.9%	0.3%
<i>Agri Food Res Init (AFRI)</i>	316	325	450	335	-25.6%	3.1%	325	-27.8%	0.0%
Economic Research Service	78	85	86	78	-9.3%	-8.6%	85	-0.8%	0.0%
Nat Agriculture Stats Serv	161	172	180	161	-10.6%	-6.5%	168	-6.8%	-2.5%
Forest Service									
<i>Forest and Rangeland Research</i>	293	296	292	278	-5.0%	-6.2%	292	0.0%	-1.4%
<b>Total Estimated USDA R&amp;D</b>	<b>2,380</b>	<b>2,446</b>	<b>2,884</b>	<b>2,411</b>	<b>-16.4%</b>	<b>-1.4%</b>	<b>2,408</b>	<b>-16.5%</b>	<b>-1.6%</b>

\*Program figures may include funding for non-R&D activities.  
FY 2015 figures are current estimates. Inflation from FY 15-16 is 1.6 percent.

## Department of Commerce

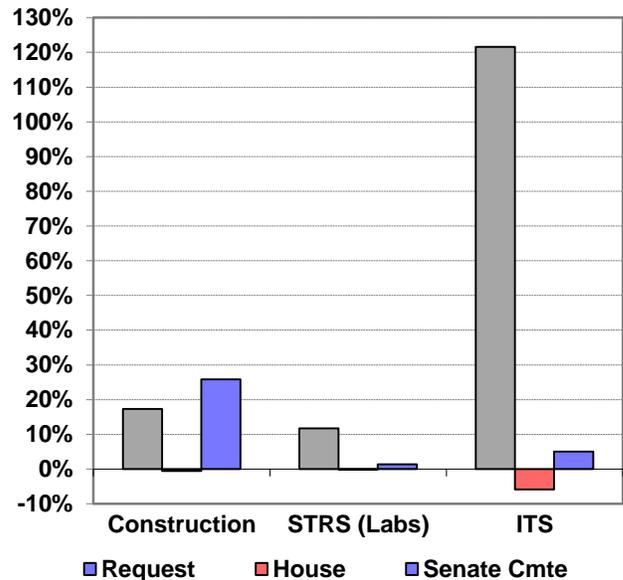
**Spending Bill:** Commerce, Justice, Science (H.R. 2578)

**Latest Approvals:** House on June 3; Senate Appropriations Committee on June 11

The two major Commerce R&D agencies, the National Oceanic and Atmospheric Administration (NOAA) and the National Institute of Standards and Technology (NIST), would receive far less in appropriations than what the Administration requested for next fiscal year (see table below). There would, however, be some targeted increases for NIST R&D in both the House and, in particular, the Senate. Appropriators turned down the Administration’s request to expand NIST’s manufacturing innovation institutes, and funding for NOAA’s climate research wouldn’t come close to the President’s request.

The House’s \$855 million allocation for NIST is well below the President’s request, and a small reduction from FY 2015 levels (see table below). The House appropriation for NIST laboratory programs includes the requested increases for cybersecurity and disaster resiliency, but not the proposed \$5 million for establishing a manufacturing entrepreneurship program. Funding for the Hollings Manufacturing Extension Partnership (MEP) would stay flat at \$130 million versus the \$141 million requested by the Administration. The House also declined a major requested increase for the National Network for Manufacturing Innovation (NNMI), the

**NIST in FY16 Appropriations**  
percent change from FY15, nominal dollars



Some figures include non-R&D. Inflation is 1.6 percent. © 2015 AAAS

multi-agency initiative setting up public-private manufacturing institutes across the country, funded through the Industrial Technology Services account (see chart above). NNMI hasn’t fared well in appropriations elsewhere: neither USDA nor DOE have received their proposed funding for new manufacturing institutes.

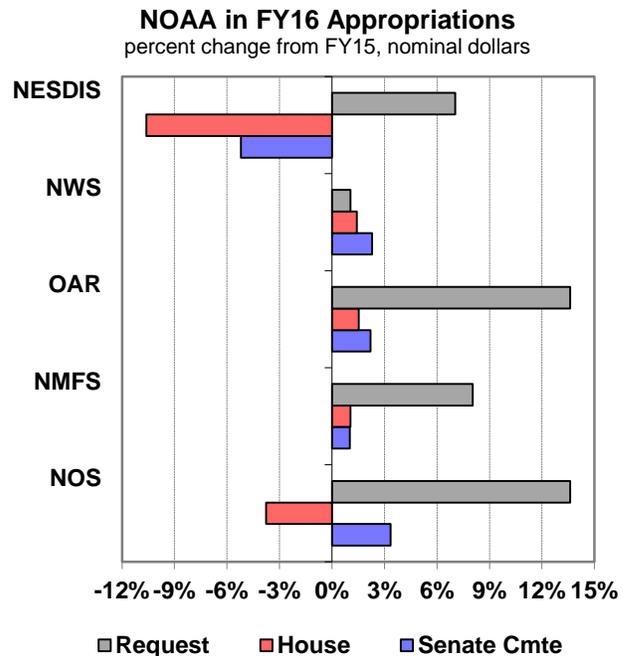
Department of Commerce R&D Appropriations (budget authority in millions of dollars)									
Program / Account**	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
Natl Institute of Standards and Tech (NIST)	850	864	1,120	855	-23.6%	-1.0%	893	-20.2%	3.4%
<i>Scientific &amp; Tech Research and Services</i>	651	676	755	675	-10.6%	-0.1%	685	-9.3%	1.4%
<i>Industrial Technology Services</i>	143	138	306	130	-57.5%	-5.9%	145	-52.6%	5.0%
<i>Construction of Research Facilities</i>	56	50	59	50	-15.3%	-0.6%	63	7.3%	25.8%
<b>Total NIST R&amp;D Estimate</b>	<b>655</b>	<b>668</b>	<b>888</b>	<b>689</b>	<b>-22.3%</b>	<b>3.2%</b>	<b>715</b>	<b>-19.4%</b>	<b>7.1%</b>
Natl Oceanic and Atmos Admin (NOAA)	5,323	5,449	5,983	5,167	-13.6%	-5.2%	5,382	-10.0%	-1.2%
<i>Natl Ocean Service*</i>	475	485	551	467	-15.3%	-3.8%	501	-9.0%	3.4%
<i>Natl Marine Fisheries Service*</i>	809	822	888	831	-6.5%	1.0%	831	-6.5%	1.0%
<i>Oceanic and Atmos Res*</i>	424	446	507	453	-10.6%	1.5%	456	-10.0%	2.2%
<i>Natl Weather Service*</i>	1,063	1,087	1,099	1,103	0.4%	1.4%	1,112	1.2%	2.3%
<i>NESDIS* 1/</i>	2,087	2,223	2,380	1,987	-16.5%	-10.6%	2,107	-11.4%	-5.2%
<i>Off of Marine and Aviat Ops*</i>	206	213	370	219	-40.7%	3.2%	226	-38.9%	6.4%
<b>Total NOAA R&amp;D Estimate</b>	<b>629</b>	<b>682</b>	<b>912</b>	<b>747</b>	<b>-18.1%</b>	<b>9.5%</b>	<b>762</b>	<b>-16.5%</b>	<b>11.7%</b>
<b>Total Commerce R&amp;D Estimate</b>	<b>1,552</b>	<b>1,507</b>	<b>2,115</b>	<b>1,615</b>	<b>-23.6%</b>	<b>7.2%</b>	<b>1,684</b>	<b>-20.4%</b>	<b>11.7%</b>

\*ORF and PAC funding  
 \*\* Discretionary budgets (includes non-R&D components)  
 1/ National Environmental Satellite, Data, and Information Service  
 FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent

In contrast to the House, the Senate would moderately increase NIST’s discretionary budget by 3.4 percent above FY 2015, though still significantly below the request (see prior table). The Committee provides \$72.7 million in support of the Administration’s request for cybersecurity research and development programs, including the National Cybersecurity Center of Excellence and the National Initiative for Cybersecurity Education, among others. Additional research priorities include disaster resilient buildings, sports safety standards, and the Urban Dome program which monitors environmental and human health conditions in densely populated areas. Although the Committee carves out up to \$5 million of the \$15 million given to the Advanced Manufacturing Consortia (AMTech) to fund NIST’s coordination of existing NNMI institutes, no other funds are provided for NIST-led NNMI institutes in FY 2016.

Both the House and Senate share similar priorities when it comes to NOAA: both would like to direct funding to weather-related programs and are less bullish on research funding (see chart at right). The National Weather Service would receive \$1.1 billion under the House and Senate bills, both slightly above the request. The two chambers also agree on only limited funding increases for the Office of Oceanic and Atmospheric Research (OAR; see prior table). The House bill would significantly reduce OAR’s climate research account by \$30 million or 19.0 percent below FY 2015, while the Senate proposes a smaller \$5 million cut that would still fall \$35.8 million short of the Administration’s requested increase. The President’s budget also included \$30 million for an expanded ocean acidification research program at NOAA, but the House and Senate would provide only \$8.4 million and \$11.0 million, respectively.

Appropriators did match the President’s requested amounts for key weather satellite programs, the Joint Polar Satellite System (JPSS) and the Geostationary Operational Environmental Satellite R-Series (GOES-R). However, the Senate gave a bit less than half the amount requested by the Administration for its proposed Polar Follow-on satellite, which would address an approaching gap in weather coverage from polar orbit, whereas the House chose not to fund this initiative at all. The Senate Committee also declined to fully fund the FY 2016 request to construct a new ocean-going survey vessel.



Figures include non-R&D. Inflation is 1.6 percent. © 2015 AAAS

## Department of Defense

**Spending Bill:** Defense (H.R. 2685; S. 1558); **Latest Approvals:** House on June 11; Senate Appropriations Committee on June 11

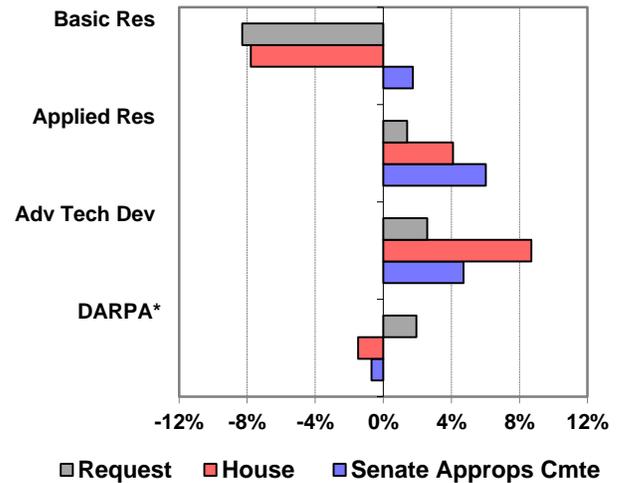
**Spending Bill:** Military Construction and Veterans Affairs (H.R. 2029); **Latest Approvals:** House on April 30; Senate Appropriations Committee on May 21

President Obama’s budget had proposed an 8.3 percent increase for total DOD R&D in FY 2016 according to the most recent AAAS estimates, but this increase was almost entirely driven by an 11.5 percent boost to downstream development activities. Science and technology program funding would remain largely flat in the President’s request, and one of the bigger surprises was a proposed 8.3 percent cut to DOD basic research programs.

During appropriations this summer the House largely accepted these cuts, only adding extra funding for minority-serving institutions and chemical defense programs. However, Senate appropriators did opt to protect basic research programs, levying smaller cuts on DOD’s university programs along with increases for Defense Research Sciences programs. Under the Senate bill, DOD basic research would receive an increase about even with inflation (see chart above right).<sup>3</sup>

Appropriators in both chambers also gave larger increases for applied research across the military branches and in multiple areas, including materials

**DOD S&T in FY16 Appropriations**  
percent change from FY15 levels, nominal dollars



\* DARPA funding comes from the other accounts shown above. Inflation is 1.6 percent. ©2015 AAAS

science, oceanic and undersea warfare, and others. The House would grant \$597.1 million for peer-reviewed medical research while the Senate would grant \$818.5 million; in recent years this funding has surpassed \$900 million.

Neither the House nor the Senate would grant the Defense Advanced Research Projects Agency (DARPA) with the requested 1.9 percent increase, instead opting to trim funding by 1.5 percent and 0.7 percent, respectively, as shown below. The House granted the

Department of Defense R&D Appropriations (budget authority in billions of nominal dollars)									
Program / Account	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
Science & Tech	11.7	12.3	12.3	12.6	2.9%	3.1%	12.8	4.5%	4.7%
<i>Basic Research (6.1)</i>	2.1	2.3	2.1	2.1	0.6%	-7.8%	2.3	10.9%	1.7%
<i>Applied Research (6.2)</i>	4.5	4.6	4.7	4.8	2.6%	4.1%	4.9	4.6%	6.0%
<i>Advanced Technology Dev (6.3)</i>	5.1	5.3	5.5	5.8	6.0%	8.7%	5.6	2.1%	4.7%
Medical Research	1.7	1.7	1.0	1.6	67.4%	-5.2%	1.8	83.5%	3.9%
Tech Development	51.7	51.8	57.7	55.2	-4.3%	6.7%	57.7	0.0%	11.5%
Other*	1.3	1.1	1.2	1.2	-4.3%	7.5%	1.2	-0.4%	11.8%
<i>Budget Adjustment</i>		-0.2							
<b>TOTAL R&amp;D</b>	<b>66.5</b>	<b>66.6</b>	<b>72.2</b>	<b>70.7</b>	<b>-2.1%</b>	<b>6.1%</b>	<b>73.5</b>	<b>1.9%</b>	<b>10.4%</b>
Def Adv Res Proj Agency**	2,753	2,916	2,973	2,873	-3.4%	-1.5%	2,896	-2.6%	-0.7%

\* R&D support in military personnel, construction, and other non-RDT&E programs.  
 \*\* Included in total R&D and other accounts above. House figure includes \$100 million in unspecified reductions.  
 FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent.  
 Budget Adjustment converts total obligational authority to budget authority.  
 Includes Overseas Contingency Operation funding.

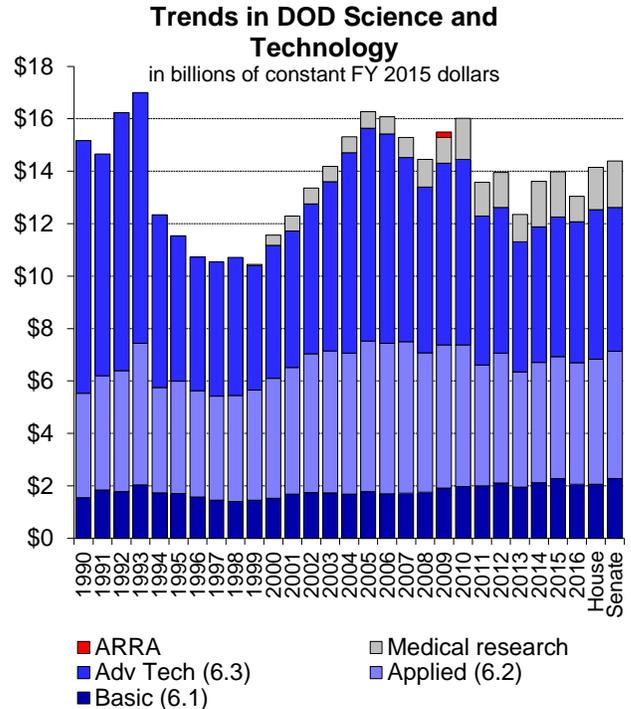
<sup>3</sup> See <http://www.aaas.org/news/defense-appropriations-senate-house-diverge-basic-research> for additional data.

agency some flexibility to apply the reduction, while the Senate directed the agency to use an unobligated balance from the prior year and levied reductions to several DARPA accounts in materials, biotechnology, communications, sensors, electronics, and aerospace.

As has been widely reported, Congressional Republicans have used war funding, dubbed Overseas Contingency Operations funding or OCO funding, as a means to get around the defense spending caps. Both the House and Senate bills take the Pentagon's \$51 billion OCO request and add at least \$35 billion to it, resulting in bills that achieve about a 4.0 percent defense spending increase in spite of the roughly flat caps under current law. Democrats have tried and failed to shift this funding back under the statutory caps while raising those caps, though President Obama's veto threat remains. It should be noted that most science and technology funding is still contained in the base budget, rather than the OCO budget.

Also adding to the controversy is the House's embrace of the National Sea Based Deterrent Fund, set up to allow the transfer of up to \$3.5 billion from other accounts outside the Navy for expensive replacement submarines. This allows the Navy to restrain its shipbuilding budget on paper, but opponents argue it will ultimately allow that budget to balloon as funds are diverted away from other DOD programs, including R&D.<sup>4</sup>

Historically, the DOD science and technology budget including medical research remained elevated during the height of operations in Iraq and Afghanistan, but declined by 22.9 percent between FY 2010 and FY 2013, the sequestration year. The past two appropriations cycles have seen a recovery from sequestration, however, and both House and Senate appropriations for FY 2016 would allow this recovery to continue. Current appropriations would exceed the pre-sequestration levels even accounting for inflation (see chart at right).



Source: DOD R-1, historical data, and appropriations. Medical Research is appropriated outside RDT&E title. © 2015 AAAS

<sup>4</sup> For more, see: <http://breakingdefense.com/2015/06/forbes-leads-house-battle-for-ohio-replacement-fund/>

## Department of Energy

**Spending Bill:** Energy & Water (H.R. 2028)

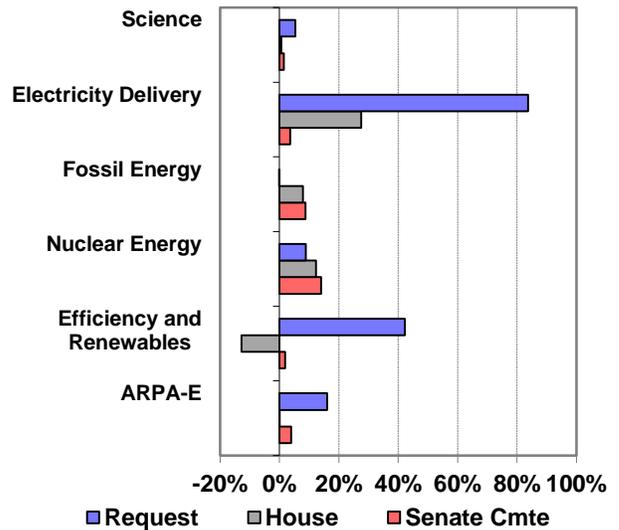
**Latest Approvals:** House on May 1; Senate Appropriations Committee on May 21

As in years past, the President’s energy R&D budget placed greatest priority on significant increases for next-generation low-carbon energy technology, particularly in energy efficiency, renewable energy, and grid modernization, and for the Advanced Research Projects Agency-Energy (ARPA-E). DOE’s manufacturing office would double in size and two new manufacturing institutes would be added, in addition to the current four. Within the Office of Science, the budget sought an overall 5.4 percent increase, with boosts for exascale computing, climate research, nuclear physics, and facility construction offsetting deep cuts to domestic fusion research (see graph below).

Past debates over energy technologies unsurprisingly resurfaced during appropriations, with greater Republican skepticism of funding for the Office of Energy Efficiency and Renewable Energy (EERE), and a preference for fossil energy R&D programs (see graph above). House appropriators would cut most renewable energy programs below FY 2015 levels, by up to 34.9

### FY 2016 Energy Program Budgets

percent change from FY15, nominal dollars

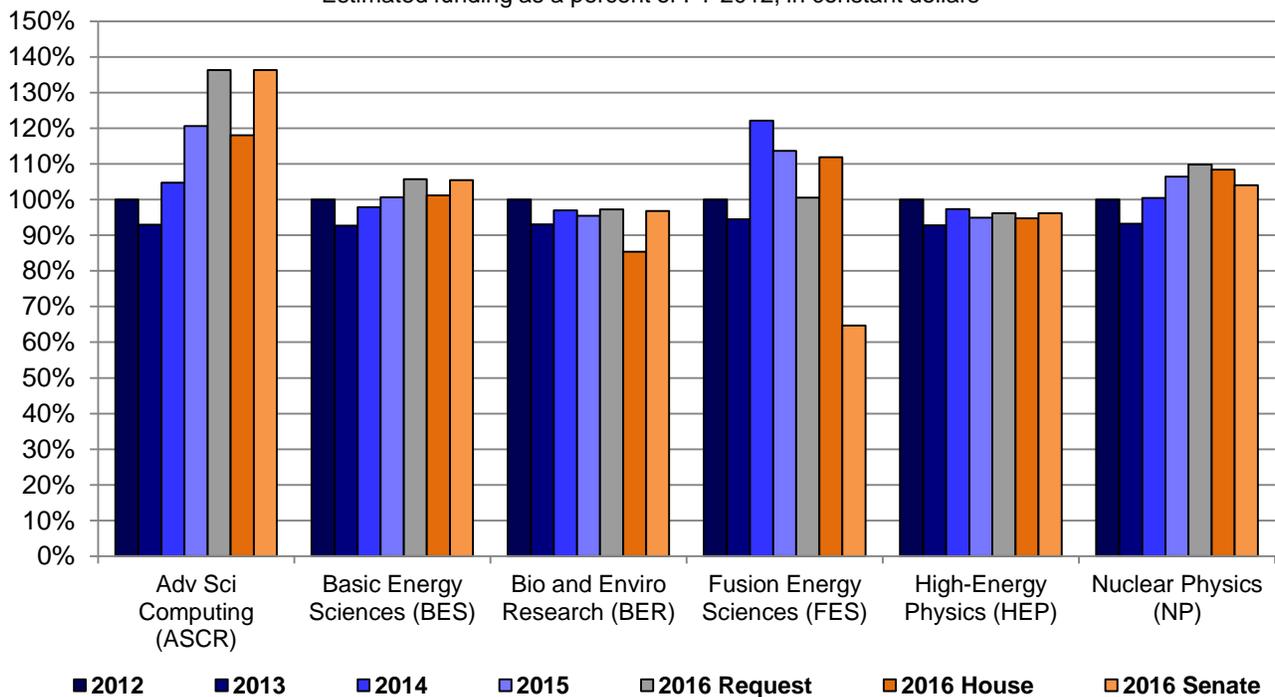


Figures include non-R&D. Inflation is 1.6 percent. © 2015 AAAS

percent in the case of solar energy. Senate appropriators would take a somewhat more moderate approach, cutting deep into DOE’s wind technology program but flat-funding bioenergy and hydrogen activities and granting at least modest increases to others elsewhere. Both chambers would provide increases for

### DOE Office of Science Program Budgets

Estimated funding as a percent of FY 2012, in constant dollars



Source: AAAS analyses of agency budget documents and appropriations bills and reports. Figures include non-RD. © 2015 AAAS

FY 2016 Appropriations

manufacturing programs above the rate of inflation, but not by nearly as much as requested. House appropriators in particular would grant a significant boost for smart grid R&D, cybersecurity, and other grid-related activities.

There was greater agreement among appropriators on DOE’s fossil energy program, with increases of around eight percent in both chambers. The particular focus in Congress is on more efficient technology for coal-based systems, compared to an Administration request that emphasized carbon capture and sequestration. Appropriators also granted large relative increases for DOE’s unconventional fossil resources budget, more than doubling the program’s funding from FY 2015 levels in each chamber, and saving it from a zeroing out proposed

by the Administration.

It’s a similar story for nuclear energy R&D, with appropriators granting larger increases for the program overall (while the Administration sought an increase in net budget authority for the Office of Nuclear Energy, this apparent increase includes an \$80 million rescission of prior budget authority that lowered net authority in FY 2015, and in reality multiple nuclear technology programs were facing reductions). Appropriators in both the House and Senate spared certain activities from proposed cuts, instead boosting support for advanced technology, including small modular reactor R&D and activities to extend the life of existing reactors. The fuel cycle R&D program, to deal with spent fuel and waste, is a bigger priority for the Administration, but was cut by

Department of Energy Appropriations (budget authority in millions of dollars)									
Program / Account*	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
Office of Science	5,131	5,067	5,340	5,100	-4.5%	0.6%	5,144	-3.7%	1.5%
<i>Adv Sci Computing Res</i>	463	541	621	538	-13.4%	-0.6%	621	0.0%	14.8%
<i>Basic Energy Sci</i>	1,663	1,733	1,849	1,770	-4.3%	2.1%	1,844	-0.3%	6.4%
<i>Bio and Enviro Res</i>	594	592	612	538	-12.1%	-9.1%	610	-0.4%	3.0%
<i>Fusion Energy</i>	496	468	420	468	11.3%	0.0%	270	-35.7%	-42.2%
<i>High Energy Physics</i>	775	766	788	776	-1.5%	1.3%	788	0.0%	2.9%
<i>Nuclear Physics</i>	555	595	625	616	-1.4%	3.5%	592	-5.3%	-0.6%
Energy Programs									
<i>Energy Effic &amp; Renew Energy</i>	1,825	1,914	2,723	1,669	-38.7%	-12.8%	1,950	-28.4%	1.9%
<i>Elect Deliv &amp; Reliability</i>	144	147	270	188	-30.6%	27.6%	152	-43.6%	3.6%
<i>Nuclear Energy</i>	878	833	908	936	3.1%	12.3%	950	4.7%	14.0%
<i>Fossil Energy R&amp;D</i>	551	561	560	605	8.0%	7.9%	610	8.9%	8.8%
<i>ARPA-E</i>	280	280	325	280	-13.8%	0.0%	291	-10.5%	3.9%
Atomic Energy Defense	16,958	17,606	18,867	18,624	-1.3%	5.8%	18,821	-0.2%	6.9%
NNSA	11,204	11,399	12,565	12,329	-1.9%	8.2%	12,263	-2.4%	7.6%
Weapons Activities	7,790	8,180	8,847	8,713	-1.5%	6.5%	8,882	0.4%	8.6%
<i>Science Campaign</i>	369	412	390	413	6.0%	0.2%	390	0.0%	-5.5%
<i>Engineering Campaign</i>	150	136	131	131	0.0%	-3.4%	131	0.0%	-3.4%
<i>Inertial Confn Fusion</i>	512	513	502	511	1.7%	-0.4%	511	1.7%	-0.4%
<i>Adv Sim &amp; Computing</i>	569	598	623	605	-2.9%	1.2%	623	0.0%	4.2%
<i>Readiness Campaign</i>	55	--	--	--	--	--	--	--	--
<i>Adv Manuf Campaign</i>	--	107	130	114	-12.5%	6.2%	111	-14.5%	3.8%
Defense Nuclear Nonprolif	1,942	1,615	1,940	1,908	-1.7%	18.1%	1,706	-12.1%	5.6%
<i>Nonproliferation R&amp;D</i>	461	393	419	423	0.9%	7.6%	419	0.0%	6.6%
Naval Reactors	1,102	1,234	1,375	1,323	-3.8%	7.2%	1,300	-5.5%	5.4%
<b>Total DOE R&amp;D Estimate</b>	<b>11,994</b>	<b>11,751</b>	<b>12,462</b>	<b>11,853</b>	<b>-4.9%</b>	<b>0.9%</b>	<b>11,992</b>	<b>-3.8%</b>	<b>2.0%</b>
<b>DOE R&amp;D by Function</b>									
Defense	4,964	4,750	4,674	4,768	2.0%	0.4%	4,729	1.2%	-0.4%
General Science	4,724	4,680	4,900	4,680	-4.5%	0.0%	4,720	-3.7%	0.9%
Energy	2,306	2,321	2,889	2,406	-16.7%	3.7%	2,543	-12.0%	9.6%
* Discretionary budgets (includes non-R&D components)									
FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent.									

10.8 percent during appropriations.

So far appropriators have not seen fit to grant the Office of Science its requested increase, with only sub-inflation increases in both chambers. There has been some surprising variation in appropriations decisions so far, however. While the Senate would match the requested increase for advanced computing overall, the House would levy a small cut after years of increases in that program (see, for instance, the graph on page 9 for recent years). In addition, neither chamber would meet the full \$208.6 million request for exascale computing, with the House providing \$99 million and the Senate, \$157.9 million.

Climate science activities within the Biological and Environmental Research (BER) Program were again targeted for cuts in the House, where appropriators would allocated BER a 9.1 percent cut, while the biological side of the program continues to enjoy some support. Senate appropriators mostly adopted the proposed cuts to the Fusion Energy Sciences (FES) domestic research program, while also recommending the United States pull out of ITER, the international fusion energy project under construction in France, resulting in a 42.2 percent reduction to FES overall. On the other hand, House appropriators would provide the requested \$150 million for ITER in FY 2016 and boost domestic research funding by 17.6 percent above the request, rendering the fusion science budget flat from FY 2015 levels. DOE's Energy Frontier Research Centers program requested \$110 million in FY 2016; House appropriators granted \$97.8 million, while Senate appropriators did not specify an amount.

## National Institutes of Health

**Spending Bill:** Labor, HHS, and Education (H.R. 3020; S. 1695)

**Latest Approvals:** House Appropriations Committee on June 24; Senate Appropriations Committee on June 25

Over the past decade, since the end of the budget doubling, NIH purchasing power has dropped by more than 20 percent, and it has typically been a challenge for NIH appropriations to even get back to inflation. But this year, while the spending caps have constrained appropriations elsewhere, NIH has proven to be an exception, reflecting bipartisan support among subcommittee leadership in both chambers.

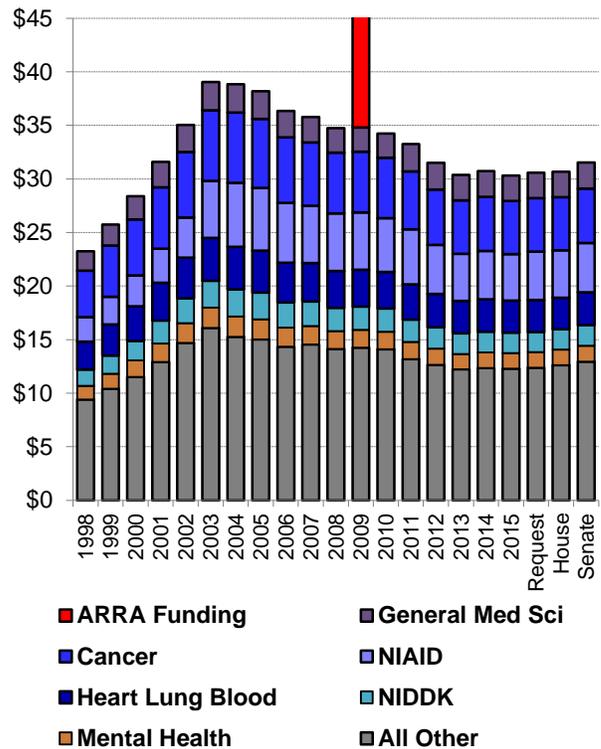
The Administration had requested a \$1 billion or 3.3 percent increase from FY 2015 programs levels (excluding one-time Ebola funding, which amounted to \$238 million). Appropriators in both chambers have topped this request so far: the House by \$100 million, for a 3.6 percent increase above FY 2015; and the Senate by a full \$1 billion, for a total increase of \$2 billion above FY 2015. The latter figure would amount to a 6.6 percent increase for NIH, the largest single-year increase since the end of the agency's budget doubling over a decade ago. Such a sum would fully return NIH to pre-sequester spending levels (see graph).

Administration priorities in the request included increased investments in Alzheimer's research, the BRAIN Initiative, and the Big Data to Knowledge program, along with new initiatives in precision medicine and antibiotic-resistant bacteria. Other research priorities in the vast NIH portfolio include the biology of single cells, cellular imaging, the cell nucleus, cancer treatments, and vaccine development.

While appropriators have generally embraced these priorities, the House and Senate bills are not uniform. In the House bill, several individual institutes would receive only sub-inflation increases, and most would receive less than requested. Nearly a third of the \$1.1 billion House increase would be directed to the National Institute on Aging (NIA). The Senate Committee adopted a similar stance on NIA, though there is also more funding left over for the other ICs, including large relative increases for the National Center for Advancing Translational Sciences and the National Institute of Allergy and Infectious Diseases (see table on the following page).

The House Committee has also granted an additional \$25 million above the request for the BRAIN Initiative, while

**NIH Budget in Appropriations**  
(Constant 2015 dollars in billions)



Source: AAAS data, agency budget documents and appropriations. Excludes Ebola-related funding in FY 2015. © 2015 AAAS

the Senate would match the request at \$135 million total funding. The lower Senate figure itself is more than double current FY 2015 funding.

Both committees also continue to ensure NIH is a net recipient of Public Health Service evaluation funding transfers. These transfers, established in 1970, allow a "tap" on certain health agency budgets to fund health system evaluation. NIH has been a net contributor to these evaluation funds, resulting in a loss of millions of dollars. Last year appropriators adjusted these transfers to turn NIH into a net recipient, and they do so again in FY 2016 appropriations, adding an extra \$1 billion to the NIH appropriation (this extra funding is reflected in the graph above and the table on the next page).

The NIH budget request had estimated a success rate for new research project grant (RPG) awards of 19.3 percent, the highest rate in five years and much improved from the FY 2013 sequestration-year rate of 16.7 (though still well below the 30 percent rates seen regularly over a decade ago). With appropriations as positive as they have been for NIH, it's likely the agency will ultimately improve on its estimate in FY 2016.

FY 2016 Appropriations

National Institutes of Health Appropriations (budget authority in millions of dollars)									
Total by Institute	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
Cancer	4,932	4,950	5,098	5,082	-0.3%	2.7%	5,204	2.1%	5.1%
Allergy and Infect Diseases	4,401	4,359	4,615	4,513	-2.2%	3.5%	4,710	2.1%	8.1%
<i>Ebola Funding (Supplemental)</i>		238							
Heart, Lung, and Blood	2,989	2,998	3,072	3,035	-1.2%	1.2%	3,136	2.1%	4.6%
General Medical Sciences	2,367	2,371	2,434	2,439	0.2%	2.9%	2,511	3.2%	5.9%
Diabetes, Digest, and Kidney 1/	1,884	1,900	1,938	1,921	-0.9%	1.1%	1,975	1.9%	4.0%
Neurological Disorders	1,589	1,605	1,660	1,656	-0.2%	3.2%	1,695	2.1%	5.6%
Mental Health	1,420	1,463	1,489	1,512	1.5%	3.4%	1,520	2.1%	3.9%
Child Health & Human Dev	1,283	1,287	1,318	1,306	-0.9%	1.5%	1,345	2.1%	4.6%
Nat Ctr for Adv Translational Sci	634	635	660	643	-2.6%	1.2%	699	5.9%	10.1%
Office of the Director 2/	1,303	1,414	1,443	1,552	7.6%	9.8%	1,524	5.6%	7.8%
Aging	1,172	1,199	1,267	1,518	19.8%	26.6%	1,548	22.2%	29.1%
Drug Abuse	1,018	1,029	1,047	1,051	0.3%	2.2%	1,069	2.1%	3.9%
Environmental Health Scis	666	668	682	676	-0.9%	1.2%	696	2.1%	4.3%
<i>Superfund 3/</i>	77	77	77	77	0.0%	0.0%	77	0.0%	0.0%
<i>NIEHS Total</i>	743	745	759	753	-0.8%	1.1%	773	1.9%	3.8%
Eye	676	684	695	698	0.4%	2.0%	710	2.1%	3.7%
Arthritis / Musculoskeletal	520	522	533	528	-1.0%	1.2%	544	2.1%	4.3%
Human Genome	498	499	515	506	-1.9%	1.2%	526	2.1%	5.4%
Alcohol Abuse and Alcoholism	446	447	460	456	-0.8%	1.9%	469	2.1%	4.9%
Deafness and Communication	404	405	416	412	-0.9%	1.7%	425	2.1%	4.8%
Dental Research	398	400	407	405	-0.5%	1.2%	415	2.1%	3.8%
National Library of Medicine	337	337	394	341	13.4%	1.2%	402	2.1%	19.4%
Biomed / Bioengineering	327	330	337	338	0.3%	2.5%	344	2.1%	4.3%
Minority Health / Disparities	268	269	282	272	-3.2%	1.2%	287	2.1%	6.8%
Nursing Research	141	141	145	143	-1.3%	1.2%	148	2.1%	4.7%
Complementary and Int Health	124	125	128	128	0.1%	2.3%	130	2.1%	4.4%
Buildings and Facilities	128	129	129	133	2.9%	2.9%	129	0.0%	0.0%
Fogarty International Center	68	68	70	69	-1.3%	1.2%	71	2.1%	4.7%
NLM Program Evaluation Funds	8	0	0	0	--	--	0	--	--
<b>Total NIH Budget (Excl. Ebola)</b>	<b>30,078</b>	<b>30,311</b>	<b>31,311</b>	<b>31,411</b>	0.3%	3.6%	<b>32,311</b>	3.2%	6.6%
<i>NLM Program Evaluation Funds</i>	-8	0	0	0			0		
<i>Training &amp; Overhead</i>	-819	-823	-835	-855			-878		
<b>Total NIH R&amp;D (Excl. Ebola)</b>	<b>29,251</b>	<b>29,488</b>	<b>30,476</b>	<b>30,556</b>	0.3%	3.6%	<b>31,434</b>	3.1%	6.6%
Conduct of R&D	29,115	29,351	30,332	30,423	0.3%	3.7%	31,305	3.2%	6.7%
R&D Facilities & Equipment	136	137	145	133	-8.4%	-3.1%	129	11.0%	-5.8%
1/ Includes up to \$150 million each year in mandatory diabetes research funds. 2/ Trans-NIH initiatives are consolidated in OD. 3/ Transfers from the Dept. of the Interior. FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent									

## NASA

**Spending Bill:** Commerce, Justice, Science (H.R. 2578)

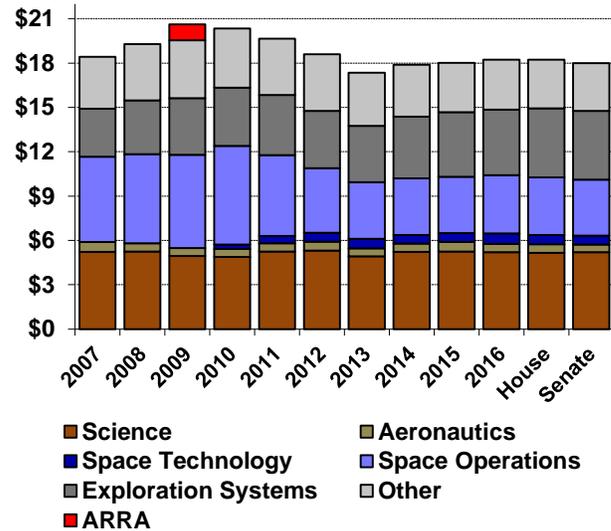
**Latest Approvals:** House on June 3; Senate Appropriations Committee on June 11

The President’s total budget request for NASA was matched by the House, whereas the Senate was less generous overall but more favorable to certain Administration science priorities. Key issues that surfaced during appropriations hearings included another requested increase for earth science and the decrease for planetary science. The Administration’s recently-proposed asteroid retrieval mission remains controversial, while the long-standing dispute continues between Congress and the Administration over funding the Space Launch System rocket and the Orion crew capsule versus the Commercial Crew Program.

NASA’s Science Mission Directorate (SMD) was a focal point of dispute during House appropriations proceedings. Within SMD, the Earth Science program would be cut by 13.6 percent below the President’s request, with funding shifted elsewhere to achieve the “balanced portfolio” called for by House Science Committee Chairman Lamar Smith (R-TX).<sup>5</sup> SMD remains a source of tension given claims that Earth Science has received a disproportionate increase and that climate science is better left to NOAA and USGS. These debates have had less of an impact on funding levels in the Senate, however, as Earth Science received an

### NASA Budgets, FY 2007-2016

in billions of constant FY 2015 dollars



"Other" includes support, construction, OIG, and education programs. FY 2016 is the request. © 2015 AAAS

appropriation near the request (see graph on the following page for recent funding trends).

The House’s cut to Earth Science would offset an increase for Planetary Science, which received \$196 million or 14.4 percent more than the requested amount. This large relative boost builds on previous House efforts to shore up funding for a robotic mission to Jupiter’s

NASA R&D Appropriations (budget authority in millions of dollars)									
Program / Account	2014	2015	2016 Pres.	2016 Percent Change			2016 Senate	2016 Percent Change	
				House	Pres.	FY15		Pres.	FY15
Science	5,148	5,243	5,289	5,238	-1.0%	-0.1%	5,295	0.1%	1.0%
<i>Earth Science</i>	1,825	1,784	1,947	1,683	-13.6%	-5.7%	1,932	-0.8%	8.3%
<i>Planetary Science</i>	1,346	1,447	1,361	1,557	14.4%	7.6%	1,321	-3.0%	-8.7%
<i>Astrophysics</i>	678	731	709	736	3.7%	0.7%	731	3.0%	0.0%
<i>James Webb Telescope</i>	658	645	620	620	0.0%	-3.9%	620	0.0%	-3.9%
<i>Heliophysics</i>	641	636	651	642	-1.4%	0.9%	650	-0.2%	2.2%
Aeronautics	566	651	571	600	5.0%	-7.8%	525	-8.2%	-19.3%
Space Technology	576	596	725	625	-13.8%	4.9%	600	-17.2%	0.7%
Exploration	4,113	4,375	4,506	4,759	5.6%	8.8%	4,731	5.0%	8.2%
Space Operations	3,774	3,813	4,004	3,957	-1.2%	3.8%	3,856	-3.7%	1.1%
Other*	3,469	3,333	3,435	3,350	-2.5%	0.5%	3,282	-4.4%	-1.5%
<b>Total NASA Budget</b>	<b>17,646</b>	<b>18,010</b>	<b>18,529</b>	<b>18,529</b>	<b>0.0%</b>	<b>2.9%</b>	<b>18,290</b>	<b>-1.3%</b>	<b>1.6%</b>
<b>Total R&amp;D Estimate</b>	<b>11,754</b>	<b>12,145</b>	<b>12,329</b>	<b>12,406</b>	<b>0.6%</b>	<b>2.2%</b>	<b>12,318</b>	<b>-0.1%</b>	<b>1.4%</b>

\* Includes Education, Cross-Agency Support, Construction and Environmental Compliance and OIG.  
FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent

<sup>5</sup> See Smith’s statement: <http://science.house.gov/sites/republicans.science.house.gov/files/documents/HRG-114-SY16-WState-S000583-20150416.pdf>

moon Europa, a high-priority mission in the Planetary Science Decadal Survey.<sup>6</sup> The House also maintains support for Mars exploration, for which they provided \$448 million compared to a request of \$411.9 million, and included \$250 million for the development of a Mars 2020 rover. The Senate Committee provides the requested amount for the Mars Rover 2020 mission as well. Meanwhile, House appropriators continue to voice concerns over NASA’s Asteroid Redirect Mission (ARM), though they did acknowledge its usefulness in developing new rocket propulsion technology. Vocal opposition to ARM was absent from the Senate proceedings.

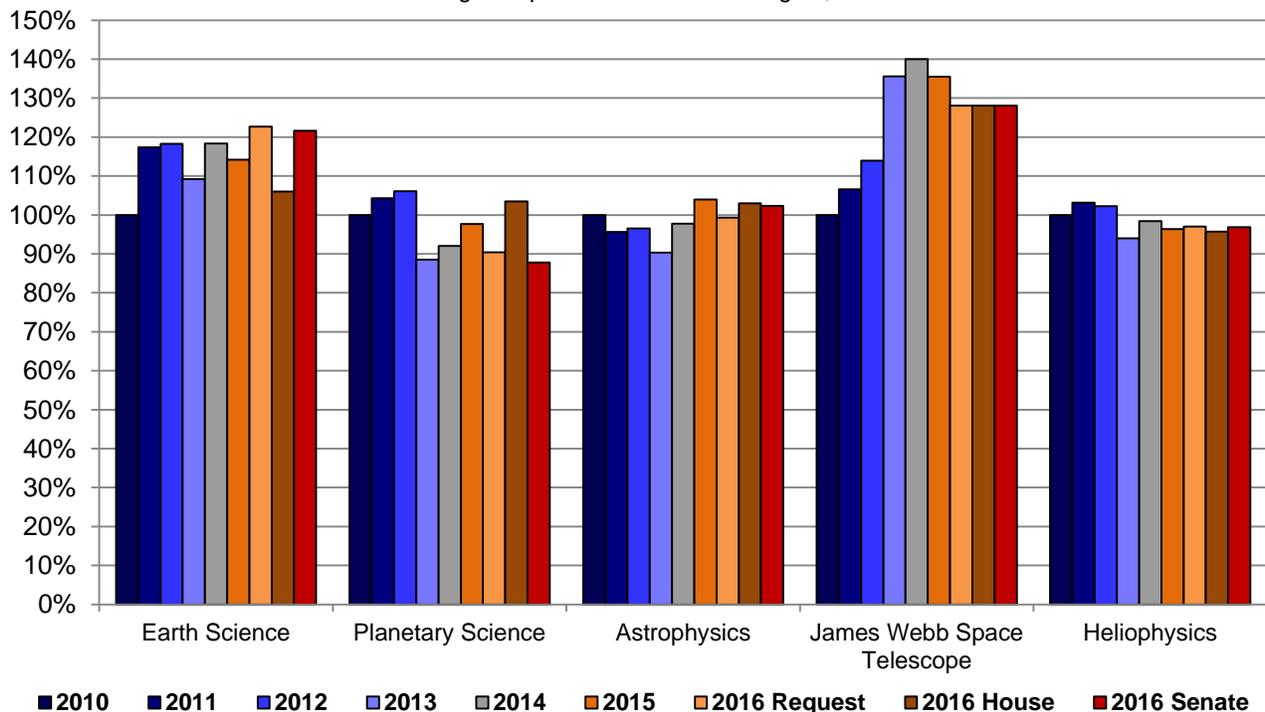
Appropriators continue to fund federal development efforts for next-generation spaceflight. Echoing the House, the Senate Committee included additional funds above the request for the Space Launch System, and would grant an even larger increase than the House and the Administration for the Orion crew vehicle. But appropriators also continue to provide less than NASA wants for its public-private spaceflight partnership program, which NASA argues is necessary to end the nation’s continued reliance on Russia for transporting

astronauts to the International Space Station. The program received at least 19.6 percent less than requested in both chambers, though current appropriations would still amount to significant increases above FY 2015 levels.

Within the Space Technology Mission Directorate, Senate appropriators acknowledged the Small Business Innovation Research (SBIR) program’s importance for commercializing results of federal research. A program initiated last year to promote the development of nanosatellite launch orbital capabilities also received further support in the Senate Committee. Like NASA’s Commercial Crew Program, Space Technology has fallen substantially short of the request, but would still end up near or above current-year funding.

Although both chambers would keep Aeronautics Research Mission Directorate funding below FY 2015 levels, the Senate noted the importance of the program’s research into safe integration of unmanned aerial systems with the National Airspace System.

**NASA Science Mission Directorate Budgets**  
 Estimated funding as a percent of FY 2010 budgets, in constant dollars



Source: AAAS analyses of agency budget documents and appropriations bills and reports. Figures include non-R&D. © 2015 AAAS

<sup>6</sup> See <http://www.nap.edu/catalog/13117/vision-and-voyages-for-planetary-science-in-the-decade-2013-2022>

## National Science Foundation

**Spending Bill:** Commerce, Justice, Science (H.R. 2578)

**Latest Approvals:** House on June 3; Senate Appropriations Committee on June 11

The majority of the National Science Foundation’s (NSF) R&D is housed within the Research & Related Activities (R&RA) budget. The Administration had slated R&RA for a \$253 million or 4.3 percent boost above the FY 2015 funding level, and a 5.2 percent boost in NSF’s total budget, but such increases have been rejected by appropriators so far: NSF would receive only a sub-inflation increase in the House and flat funding in the Senate.

Although the House does provide a small increase for the overall R&RA account, a provision in the committee report directs NSF to ensure that Engineering, Mathematical and Physical Sciences, Computer and Information Science and Engineering, and Biological Sciences comprise no less than 70 percent of the funding within R&RA, meaning that the remaining two directorates – Geosciences and Social and Behavioral Sciences – would be significantly cut, by at least 14.7 percent below FY 2015 levels according to AAAS estimates (see chart on the following page). The four favored directorates have been dubbed “core science” by

House Committee Chairman John Culberson (R-TX), though he has suggested during hearings that extra funding could be available should a broader deal on discretionary spending be reached. Meanwhile, the Senate departed from House efforts to cut social science and geoscience: the Senate bill does not include the 70 percent funding clause, though NSF’s research account would remain flat-funded in FY 2016.

A directly relevant America COMPETES reauthorization bill, passed this spring by the House, also adopts directorate-level funding, thereby facilitating steep cuts to the social and behavioral sciences and geosciences.<sup>7</sup>

For cross-foundation investments, the House provided \$146 million to expand neuroscience and cognitive science activities at NSF, including the BRAIN Initiative. This represents a \$46 million increase above FY 2015, and includes \$3 million for the establishment of a National Brain Observatory working group. On the political front, Rep. Mike Honda (D-CA) recently assumed the ranking member post in the House appropriations subcommittee governing NSF after Rep. Chaka Fattah (D-PA) stepped down following his indictment. Fattah has been a vocal supporter of neuroscience research funding, and it’s not yet clear what if any impact this leadership change will have on neuroscience appropriations going

National Science Foundation R&D Appropriations (budget authority in millions of nominal dollars)									
Program / Account	2014	2015	2016 Pres.	2016 House	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
Research and Related Activities (R&RA)	5,775	5,934	6,186	5,984	-3.3%	0.8%	5,934	-4.1%	0.0%
<i>Biological Sciences (BIO)*</i>	721	731	748	780	4.3%	6.7%	731	-2.3%	0.0%
<i>Computer and Info Sci and Eng (CISE)*</i>	893	922	954	995	4.3%	7.9%	922	-3.4%	0.0%
<i>Engineering (ENG)*</i>	833	892	949	990	4.3%	10.9%	892	-6.0%	0.0%
<i>Geosciences (GEO)*</i>	1,321	1,304	1,365	1,088	20.3%	-16.6%	1,304	-4.5%	0.0%
<i>Mathematical and Physical Sci (MPS)*</i>	1,268	1,337	1,366	1,424	4.3%	6.6%	1,337	-2.2%	0.0%
<i>Social, Behavioral, and Econ Sci (SBE)*</i>	257	272	291	232	20.3%	-14.7%	272	-6.6%	0.0%
<i>Integrative Activities*</i>	433	425	459	425	-7.4%	0.0%	425	-7.4%	0.0%
<i>Office of Internatl Sci and Engineering*</i>	48	49	51	49	-4.9%	0.0%	49	-4.9%	0.0%
<i>Arctic Research Commission*</i>	1	1	1	1	-4.7%	0.0%	1	-4.7%	0.0%
Major Research Equip & Facils (MREFC)	200	201	200	200	-0.1%	-0.4%	200	0.0%	-0.2%
Education & Human Resources (EHR)	832	866	963	866	10.0%	0.0%	866	10.0%	0.0%
Other 1/	324	344	374	345	-8.0%	0.2%	344	-8.2%	0.0%
<b>Total NSF Budget</b>	<b>7,131</b>	<b>7,344</b>	<b>7,724</b>	<b>7,394</b>	<b>-4.3%</b>	<b>0.7%</b>	<b>7,344</b>	<b>-4.9%</b>	<b>0.0%</b>
<b>Total Estimated NSF R&amp;D</b>	<b>5,800</b>	<b>5,999</b>	<b>6,309</b>	<b>6,077</b>	<b>-3.7%</b>	<b>1.3%</b>	<b>6,031</b>	<b>-4.4%</b>	<b>0.5%</b>

\*Appropriators do not allocate funding by directorate. However, the House Committee has said that the MPS, CISE, ENG, and BIO directorates shall receive at least 70 percent of R&RA funding, and that IA, OISE, and ARC are to remain flat from FY 2015 levels. The R&RA appropriation has thus been allocated proportionally under these constraints for illustrative purposes.  
1/ Includes Agency Operations, National Science Board and OIG funding.  
FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent.

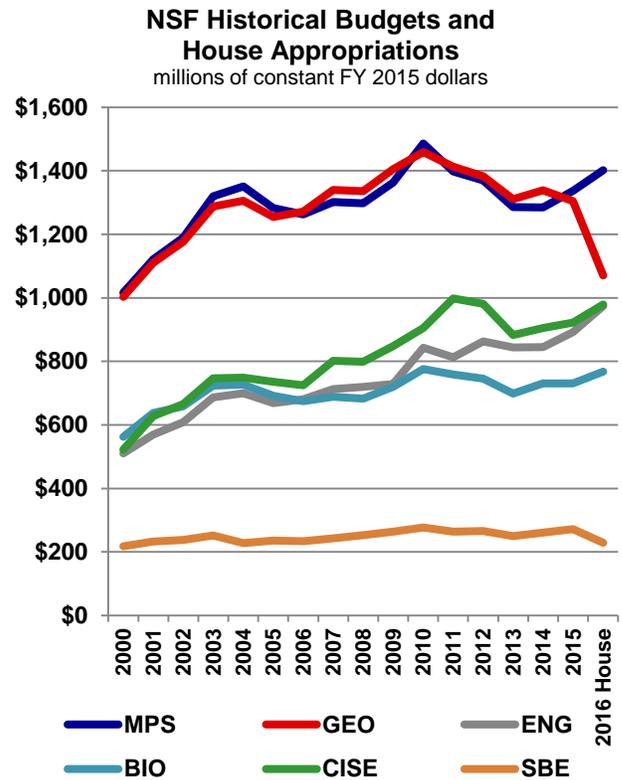
<sup>7</sup> See <http://www.aaas.org/news/science-agency-budgets-america-competes-2015>

forward.

The House also provided \$176.6 million for NSF's advanced manufacturing investments, matching the request and offering a slight increase above FY 2015. Senate appropriators provided \$15 million to bolster research in biomanufacturing as part of NSF's Advanced Manufacturing Initiative. A new cross-disciplinary initiative called Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS) was proposed in the FY 2016 budget at \$75 million, but it could be underfunded given the large cut to Geosciences mentioned above and the central role that directorate would play in INFEWS.

The Education and Human Resources (EHR) Directorate budget would remain the same as previous fiscal year in both chambers, and \$97 million below the President's request. Notably, the House would flat fund the Experimental Program to Stimulate Competitive Research (EPSCoR), rather than granting the increase sought by the Administration. EPSCoR was a subject of debate during House proceedings, with a failed amendment put forward by Reps. Bill Foster (D-IL) and Scott Garrett (R-NJ) seeking to prohibit funding for the program, which aims to broaden participation in science and engineering and avoid concentration of NSF research dollars throughout the states. Additionally, the Senate Committee supported the request to increase funding for the Innovation Corps (I-Corps) program but, like the House, would deny funding increases for EPSCoR and cybersecurity research.

Both chambers and the Administration keep the agency's Major Research Equipment and Facilities Construction budget at the FY 2015 level. NSF is not requesting funds to begin any new projects in FY 2016. However, appropriators declined a \$30 million request for funding to prepare for the planned NSF headquarters move from Arlington, VA to Alexandria, VA in 2017.



AAAS estimates based on NSF data, the FY 2016 request, and current appropriations. GEO and CISE have been adjusted for comparability. © 2015 AAAS

## Environmental R&D (EPA and USGS)

**Spending Bill:** Interior and Environment (H.R. 2822 and S. 1645).

**Latest Approvals:** House Appropriations Committee on June 16; Senate Appropriations Committee on June 18

The Interior & Environment bill covers the Department of the Interior (including the US Geological Survey, or USGS), the Environmental Protection Agency (EPA), and other related agencies. The bill is typically among the most divisive during appropriations, and also remains a target for controversial policy riders vigorously debated by both sides of the aisle. Such a dynamic was on display again this past June, when the bill was pulled from the House floor due to conflicts over an amendment dealing with the Confederate flag. The House would underfund Administration priorities dealing with climate change and the environment, while these programs would not fare much better in the Senate.

The Administration requested a 5.5 percent increase for EPA’s discretionary budget, but the House would instead significantly reduce it by 10 percent below FY 2015 levels

as Congressional Republicans continue to restrain the agency’s spending and limit its regulatory ability. EPA’s discretionary budget for Science & Technology stood at \$703.3 million, a 4.3 reduction over FY 2015. These top-line numbers are nearly identical in the Senate bill, which proposes flat or reduced funding across the agency’s S&T accounts.

Within EPA’s Safe and Sustainable Water Resources program, appropriators concluded that EPA’s research to determine whether there is a relationship between hydraulic fracturing activities and drinking water has been sufficient to date, and declined the requested \$3.7 million increase for these activities in FY 2016. However, the House and Senate do provide about \$4 million in extramural grants to fund water quality and intelligent water systems research conducted by nonprofit organizations who partner with the agency. The House encourages EPA to continue collaborative research efforts with the FDA on nanomaterials research, and both committees introduce a controversial provision that directs the agency to ensure validation and reproducibility of scientific findings.

Environmental R&D Appropriations (budget authority in millions of dollars)									
Program / Account*	2014	2015	2016 Pres.	2016 House**	Percent Change		2016 Senate	Percent Change	
					Pres.	FY15		Pres.	FY15
EPA Total Budget	8,200	8,140	8,592	7,324	-14.8%	-10.0%	7,597	-11.6%	-6.7%
Science and Technology	759	735	769	703	-8.6%	-4.3%	704	-8.5%	-4.2%
<i>Homeland Security</i>	39	37	38	37	-2.7%	0.0%	36	-4.9%	-2.3%
<i>Air, Climate and Energy</i>	99	92	100	88	-12.0%	-3.9%	90	-9.9%	-1.6%
<i>Safe and Sustainable Water</i>	120	107	111	103	-7.6%	-4.5%	105	-5.5%	-2.3%
<i>Sustainable Communities</i>	161	150	139	135	-2.9%	-9.9%	135	-2.9%	-9.9%
<i>Chem Safety and Sustainability</i>	137	127	141	127	-9.8%	0.0%	126	-10.5%	-0.8%
<i>National Priorities</i>	--	4	--	7	--	73.2%	4	--	0.0%
<b>Total EPA R&amp;D Estimate</b>	<b>538</b>	<b>521</b>	<b>528</b>	<b>492</b>	<b>-6.7%</b>	<b>-5.5%</b>	<b>492</b>	<b>-6.8%</b>	<b>-5.5%</b>
USGS Total Budget	1,032	1,045	1,195	1,045	-12.5%	0.0%	1,059	-11.4%	1.3%
<i>Ecosystems</i>	153	157	176	154	-12.6%	-1.9%	158	-10.4%	0.6%
<i>Climate and Land Use Change</i>	132	136	192	139	-27.6%	2.2%	136	-29.1%	0.0%
<i>Energy, Minerals, &amp; Enviro Health</i>	92	92	103	92	-10.7%	0.0%	96	-7.5%	3.5%
<i>Natural Hazards</i>	128	135	146	135	-7.6%	0.0%	138	-5.5%	2.3%
<i>Water Resources</i>	207	211	223	211	-5.2%	0.0%	213	-4.6%	0.6%
<i>Core Science Systems</i>	109	107	127	107	-15.5%	0.0%	112	-11.7%	4.5%
<b>Total USGS R&amp;D Estimate</b>	<b>649</b>	<b>666</b>	<b>761</b>	<b>659</b>	<b>-13.5%</b>	<b>-1.1%</b>	<b>671</b>	<b>-11.9%</b>	<b>0.7%</b>
<b>Total Interior R&amp;D Estimate</b>	<b>840</b>	<b>905</b>	<b>985</b>	<b>845</b>	<b>-14.2%</b>	<b>-6.6%</b>	<b>838</b>	<b>-14.9%</b>	<b>-7.4%</b>

\* Discretionary budgets (includes non-R&D components)  
 \*\* House figures reflect most recent amendments adopted on the House floor.  
 FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent

The House includes additional provisions that would prevent EPA from implementing regulations for large producers of greenhouse gases, as well as prohibit funding for the President's National Ocean Policy, an evolving initiative that identifies actions federal agencies can take to improve data collection and research in marine environments. Both committees also direct EPA to conduct government-wide reporting on expenditures for climate change.

USGS would receive only flat appropriations from the House and a sub-inflation increase from the Senate; both are well short of the request. The Administration had requested a large 41 percent boost for a range of activities in the USGS Climate and Land Use Change program in support of the President's Climate Action Plan, carbon sequestration, and resilience initiatives, but the program would receive an increase of only 2.2 percent in the House and flat funding in the Senate.

Elsewhere, the USGS Ecosystems program would receive a small cut in the House and a very small increase in the Senate, whereas the Administration had called for a 12 percent increase to advance ecological and drought research in the WaterSMART program, as well as studies related to hydraulic fracturing and wind and solar energy. Other USGS programs would remain flat in the House. Senate appropriators granted some increases for select programs at USGS, including critical minerals, volcano hazard monitoring stations, and the earthquake early warning system.

FY 2016 Appropriations

Appendix: Estimates of Congressional Action on FY 2016 R&D Budgets by Agency (current AAAS estimates of budget authority in millions of nominal dollars)									
	2014	2015	2016 Pres.	2016 House*	Percent Change		2016 Senate*	Percent Change	
					Pres.	FY15		Pres.	FY15
Defense (military)**	66,505	66,629	<b>72,165</b>	<b>70,667</b>	-2.1%	6.1%	<b>73,518</b>	1.9%	10.3%
<i>S&amp;T (6.1-6.3 + medical)</i>	13,431	13,982	<b>13,246</b>	<b>14,268</b>	7.7%	2.0%	<b>14,622</b>	10.4%	4.6%
<i>All Other DOD</i>	53,074	52,647	<b>58,919</b>	<b>56,399</b>	-4.3%	7.1%	<b>58,895</b>	0.0%	11.9%
Health and Human Services	30,669	30,934	<b>31,871</b>	<b>31,393</b>	-1.5%	1.5%	<b>32,648</b>	2.4%	5.5%
<i>Natl Institutes of Health</i>	29,251	29,488	<b>30,476</b>	<b>30,556</b>	0.3%	3.6%	<b>31,434</b>	3.1%	6.6%
<i>All Other HHS</i>	1,418	1,446	<b>1,395</b>	<b>837</b>	-40.0%	-42.1%	<b>1,215</b>	-12.9%	-16.0%
Energy	11,994	11,751	<b>12,462</b>	<b>11,853</b>	-4.9%	0.9%	<b>11,992</b>	-3.8%	2.0%
<i>Atomic Energy Defense</i>	4,964	4,750	<b>4,674</b>	<b>4,768</b>	2.0%	0.4%	<b>4,729</b>	1.2%	-0.4%
<i>Office of Science</i>	4,724	4,680	<b>4,900</b>	<b>4,680</b>	-4.5%	0.0%	<b>4,720</b>	-3.7%	0.9%
<i>Energy Programs</i>	2,306	2,321	<b>2,889</b>	<b>2,406</b>	-16.7%	3.7%	<b>2,543</b>	-12.0%	9.6%
NASA	11,754	12,145	<b>12,329</b>	<b>12,406</b>	0.6%	2.2%	<b>12,318</b>	-0.1%	1.4%
National Science Foundation	5,800	5,999	<b>6,309</b>	<b>6,077</b>	-3.7%	1.3%	<b>6,031</b>	-4.4%	0.5%
Agriculture	2,380	2,446	<b>2,884</b>	<b>2,411</b>	-16.4%	-1.4%	<b>2,408</b>	-16.5%	-1.6%
Commerce	1,552	1,507	<b>2,115</b>	<b>1,615</b>	-23.6%	7.2%	<b>1,684</b>	-20.4%	11.7%
<i>NOAA</i>	629	682	<b>912</b>	<b>747</b>	-18.1%	9.5%	<b>762</b>	-16.5%	11.7%
<i>NIST</i>	655	668	<b>888</b>	<b>689</b>	-22.3%	3.2%	<b>715</b>	-19.4%	7.1%
Transportation	797	796	<b>1,048</b>	<b>860</b>	-17.9%	8.1%	<b>865</b>	-17.5%	8.7%
Homeland Security	1,032	905	<b>569</b>	<b>577</b>	1.4%	-36.3%	<b>558</b>	-2.0%	-38.4%
Veterans Affairs	1,101	1,059	<b>1,114</b>	<b>1,114</b>	0.0%	5.2%	<b>1,114</b>	0.0%	5.2%
Interior	840	905	<b>985</b>	<b>845</b>	-14.2%	-6.6%	<b>838</b>	-14.9%	-7.4%
<i>US Geological Survey</i>	649	665	<b>761</b>	<b>659</b>	-13.4%	-0.9%	<b>671</b>	-11.9%	0.8%
Environment Protection Agency	538	521	<b>528</b>	<b>492</b>	-6.7%	-5.5%	<b>492</b>	-6.8%	-5.5%
All Other	1,604	1,849	<b>2,002</b>	<b>1,817</b>	-9.2%	-1.7%	<b>1,885</b>	-5.8%	2.0%
<b>Total R&amp;D (excl. Ebola)</b>	<b>136,565</b>	<b>137,446</b>	<b>146,382</b>	<b>142,129</b>	<b>-2.9%</b>	<b>3.4%</b>	<b>146,351</b>	<b>0.0%</b>	<b>6.5%</b>
Defense R&D	71,469	71,379	<b>76,839</b>	<b>75,434</b>	-1.8%	5.7%	<b>78,247</b>	1.8%	9.6%
Nondefense R&D	65,096	66,067	<b>69,543</b>	<b>66,694</b>	-4.1%	0.9%	<b>68,104</b>	-2.1%	3.1%
<b>By Character</b>									
Basic Research	32,086	32,292	<b>33,205</b>	<b>32,819</b>	-1.2%	1.6%	<b>33,491</b>	0.9%	3.7%
Applied Research	34,789	35,080	<b>35,843</b>	<b>34,873</b>	-2.7%	-0.6%	<b>36,025</b>	0.5%	2.7%
Development	67,049	67,865	<b>74,664</b>	<b>72,106</b>	-3.4%	6.2%	<b>74,416</b>	-0.3%	9.7%
Facilities & Equipment	2,616	2,393	<b>2,670</b>	<b>2,430</b>	-9.0%	1.5%	<b>2,418</b>	-9.4%	1.0%

\*All Senate figures and some House figures are appropriations committee marks only.  
 \*\*Includes Overseas Contingency Operation funding.  
 FY 2015 figures are current estimates. Inflation from FY15-16 is 1.6 percent.