

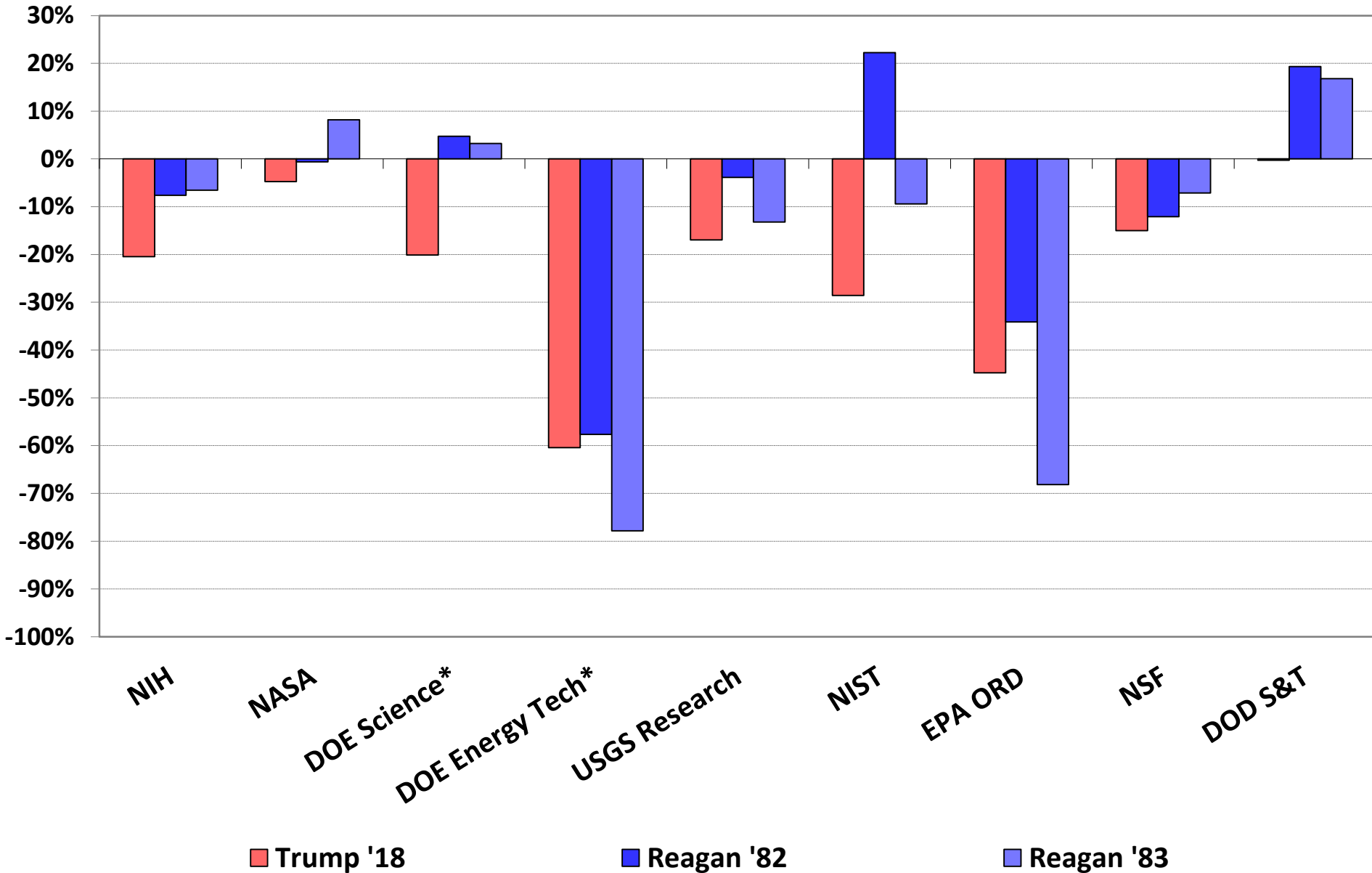
The Science Budget in 2018: Update and Outlook

Rush Holt
October 2, 2018



Trump '18 vs. Reagan '82 and '83

Proposed two-year percentage change in total budgets, inflation-adjusted



■ Trump '18

■ Reagan '82

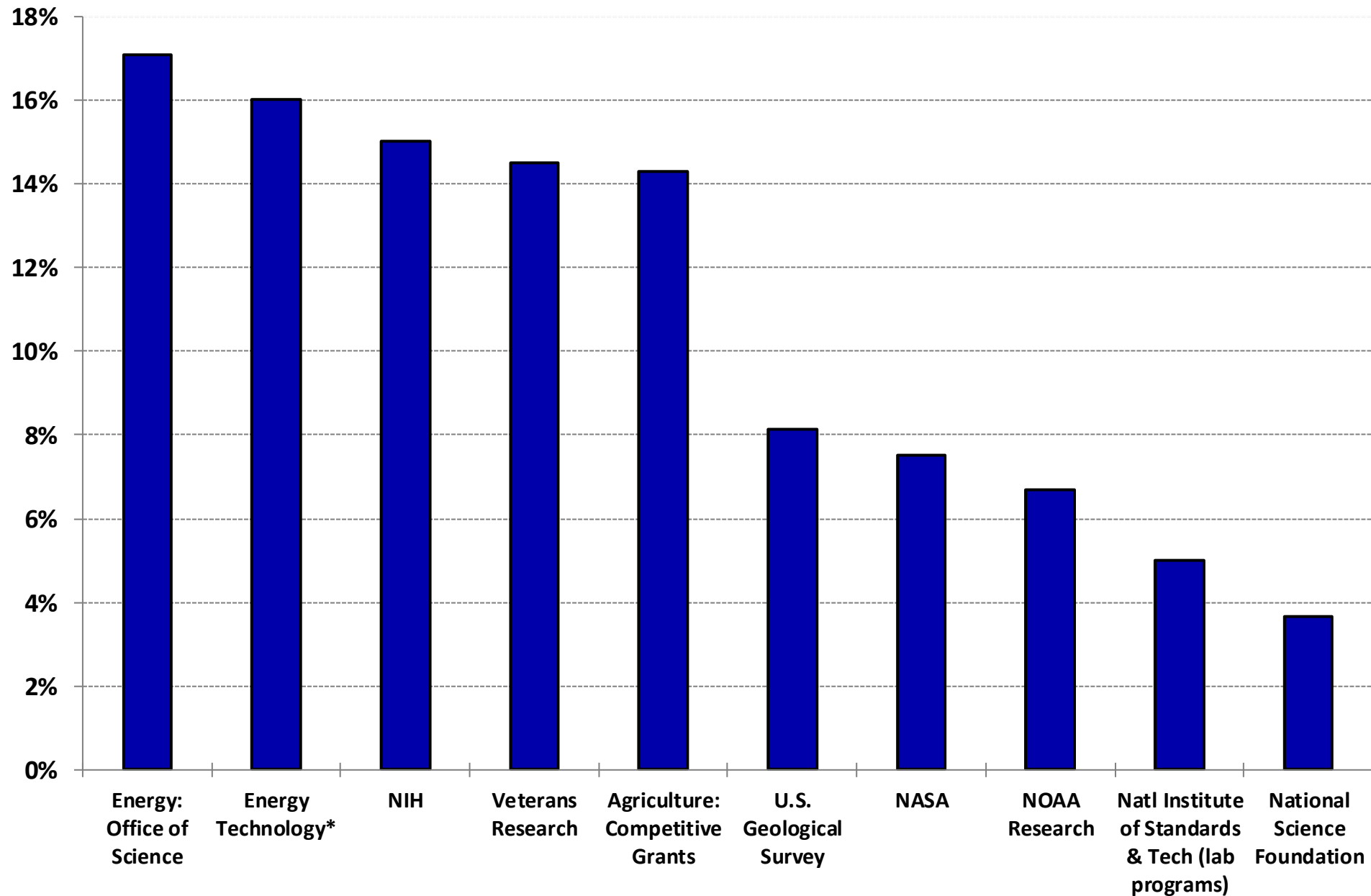
■ Reagan '83

*FY82 and FY83 figures are estimates.

Based on FY 2018 budget figures and historical budget documents, analyses, and reports. May 2017 | AAAS

Science Agency Budget Increases Since January 2017

Percent change from FY 2016 - FY 2018, nominal dollars

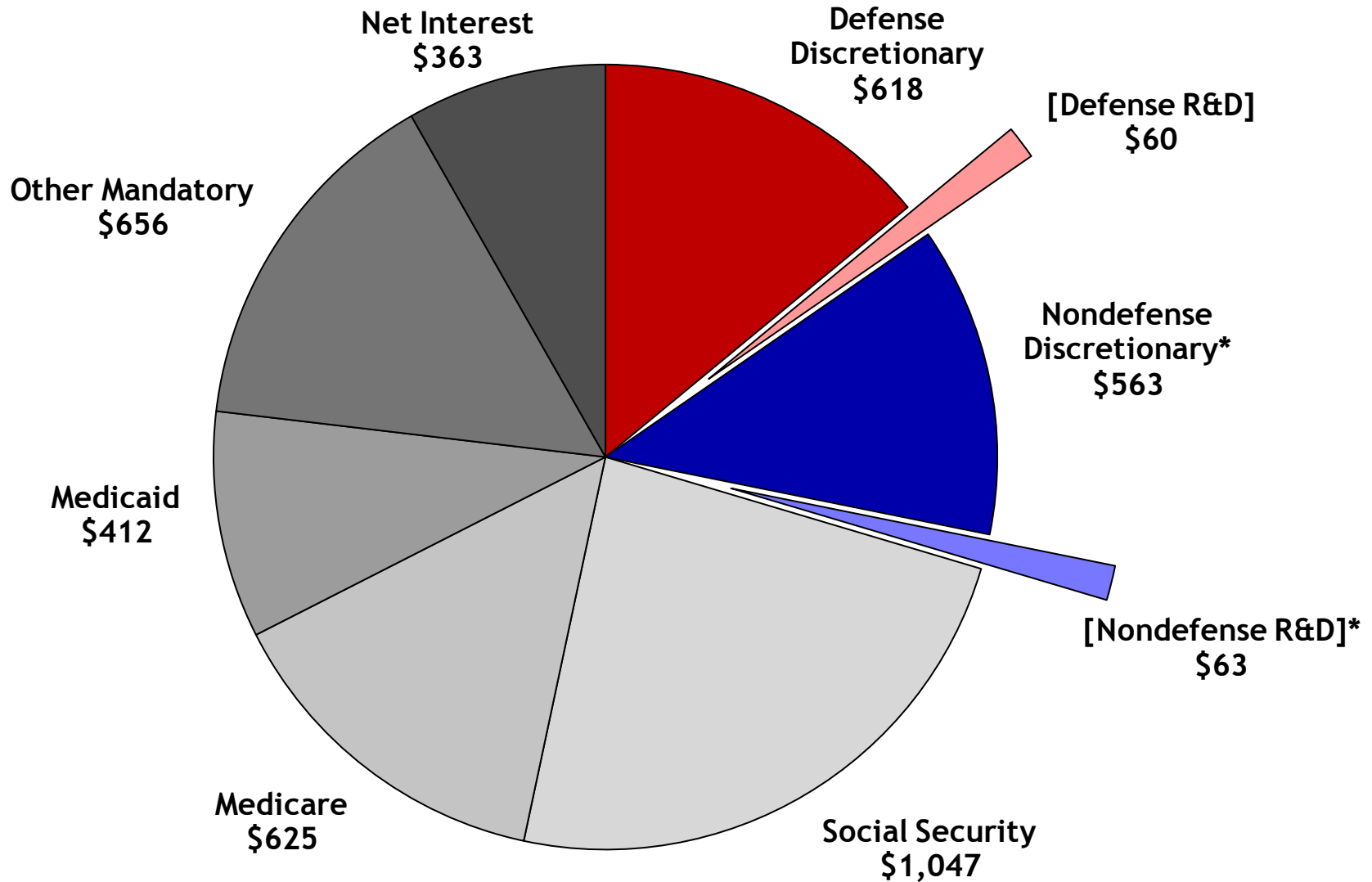


Source: agency budget documents and appropriations. Note: inflation is 3.3% over this time. | AAAS 2018

Composition of the Proposed FY 2019 Budget

Total Outlays = \$4.4 trillion

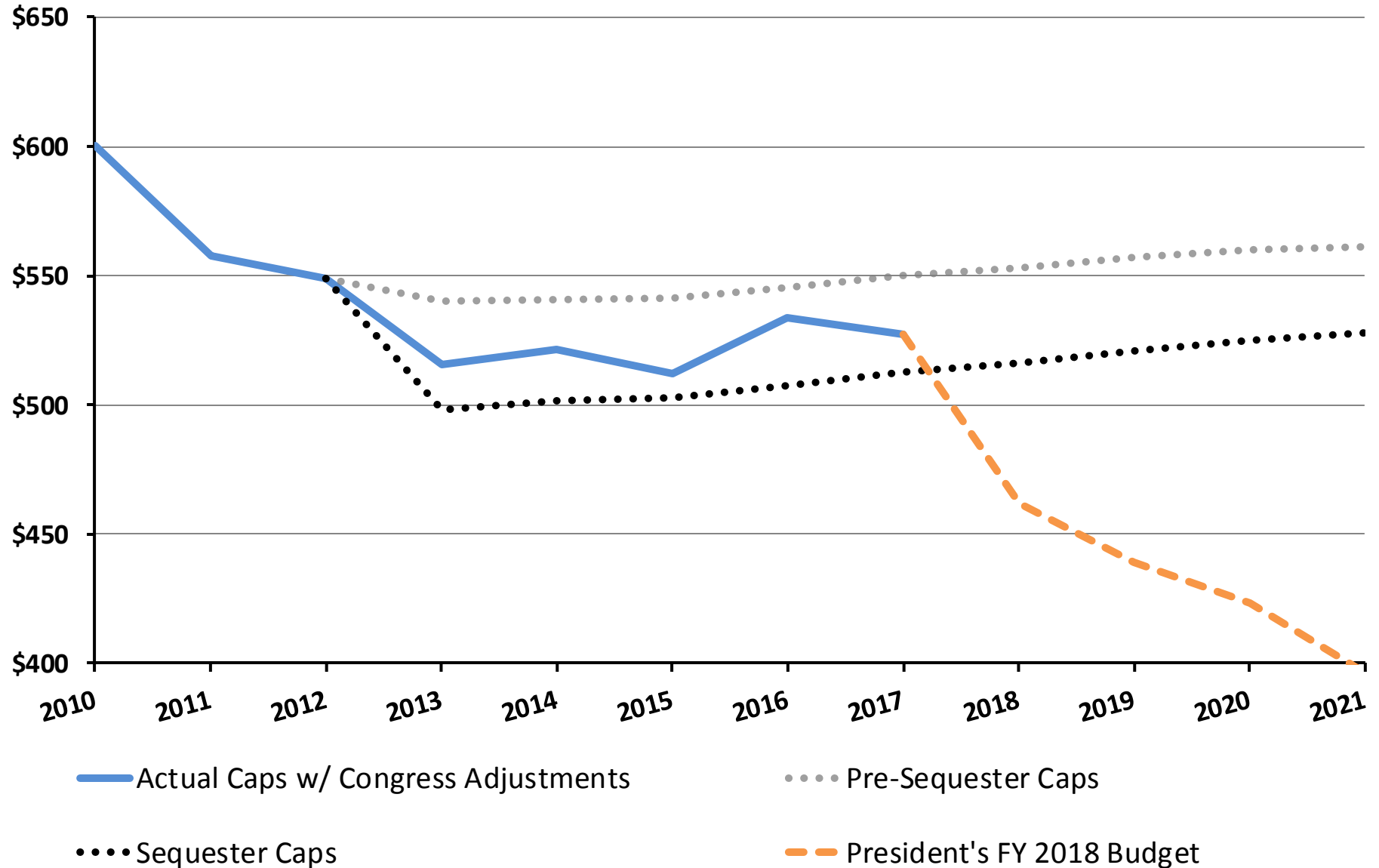
outlays in billions of dollars



*Totals do not include last-minute additions of several billion dollars in response to passage of the Bipartisan Budget Act of 2018.
Source: *Budget of the United States Government FY 2019*. Projected deficit is \$984 billion. © AAAS 2018

Limits on NONDEFENSE Spending

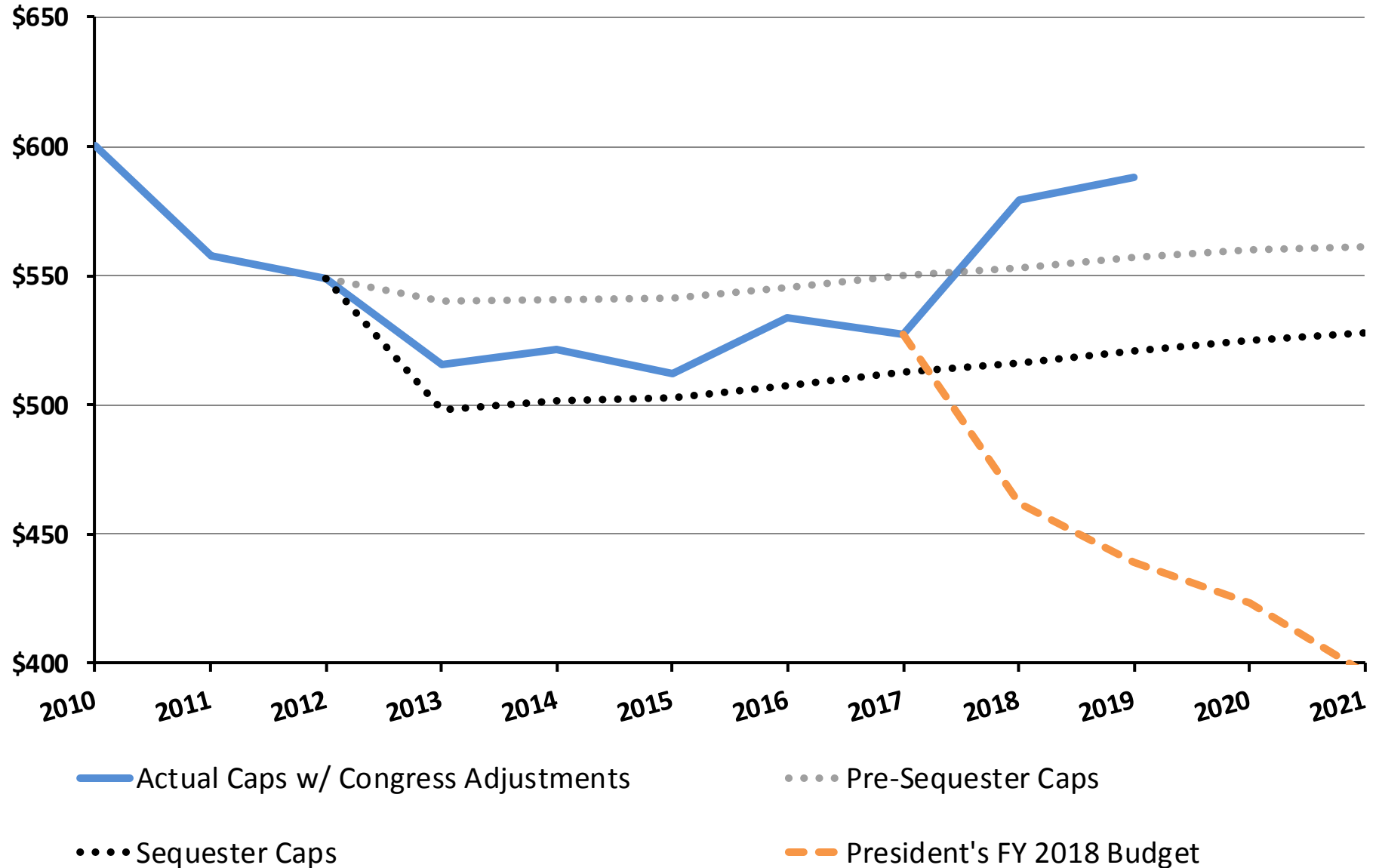
Billions of constant 2018 dollars



*Current caps last through 2021. Based on past and current budget resolutions, the Budget Control Act and subsequent legislation, and the FY 2019 OMB summary tables. © AAAS 2018

Limits on NONDEFENSE Spending

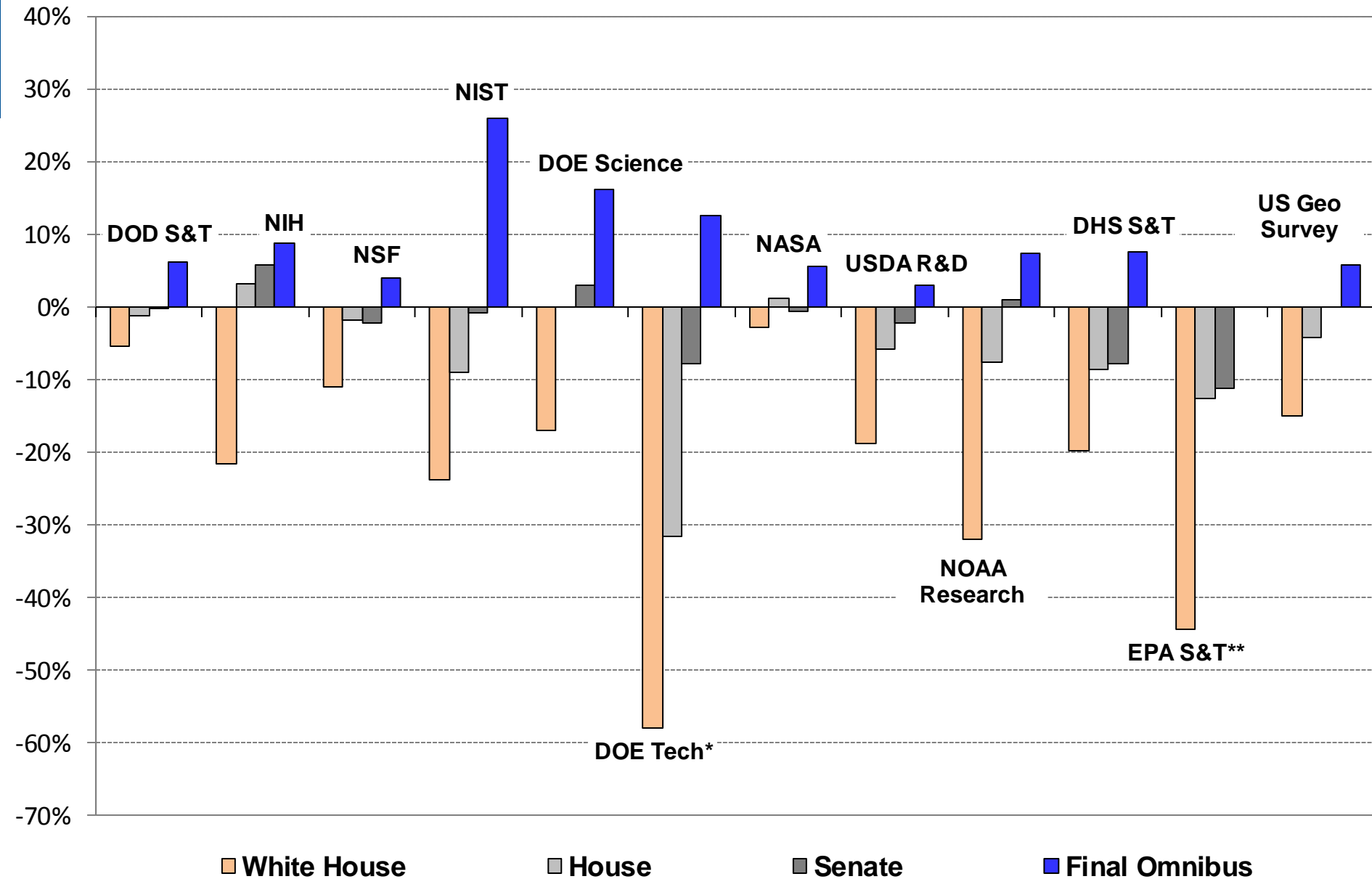
Billions of constant 2018 dollars



*Current caps last through 2021. Based on past and current budget resolutions, the Budget Control Act and subsequent legislation, and the FY 2019 OMB summary tables. © AAAS 2018

Select Science & Tech Agencies/Programs in FY 2018 Appropriations

Estimated percentage change from FY 2017 enacted levels, nominal dollars



*Includes renewables and efficiency, nuclear, fossil, grid research, ARPA-E. **Flat in omnibus.
Based on the FY 2018 budget request, the FY 2017 omnibus, and current appropriations. | AAAS

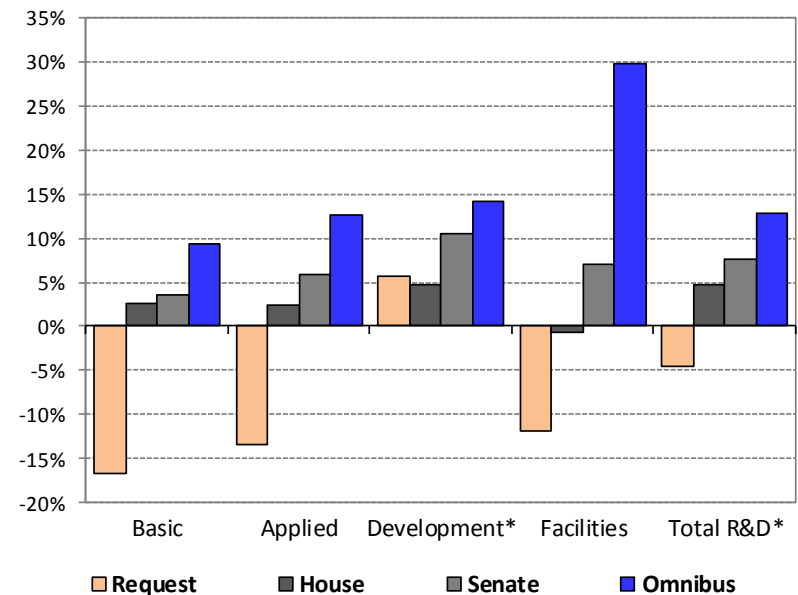
FY 2018 Omnibus Notes



- Adopted last March
- ~11% increase for research spending
 - Largest in 15 years
- All-time high for research and total R&D
- Emergent priorities:
 - Exascale computing; fusion research; user facilities
 - Weather research
 - Defense materials and manufacturing
 - NIH initiatives including opioids
 - NASA: planetary science and exploration
 - Several energy programs saved/boosted
 - Competitive agricultural research grants
 - Natural hazards research and monitoring
- Climate research, manufacturing programs protected
- Gun violence research permitted
- More than \$3 billion for opioids research, surveillance, response (CDC, NIH, SAMHSA, Justice, FDA, etc)
- Also modest increases for NEH, NEA

Estimated R&D by Type in FY 2018 Appropriations

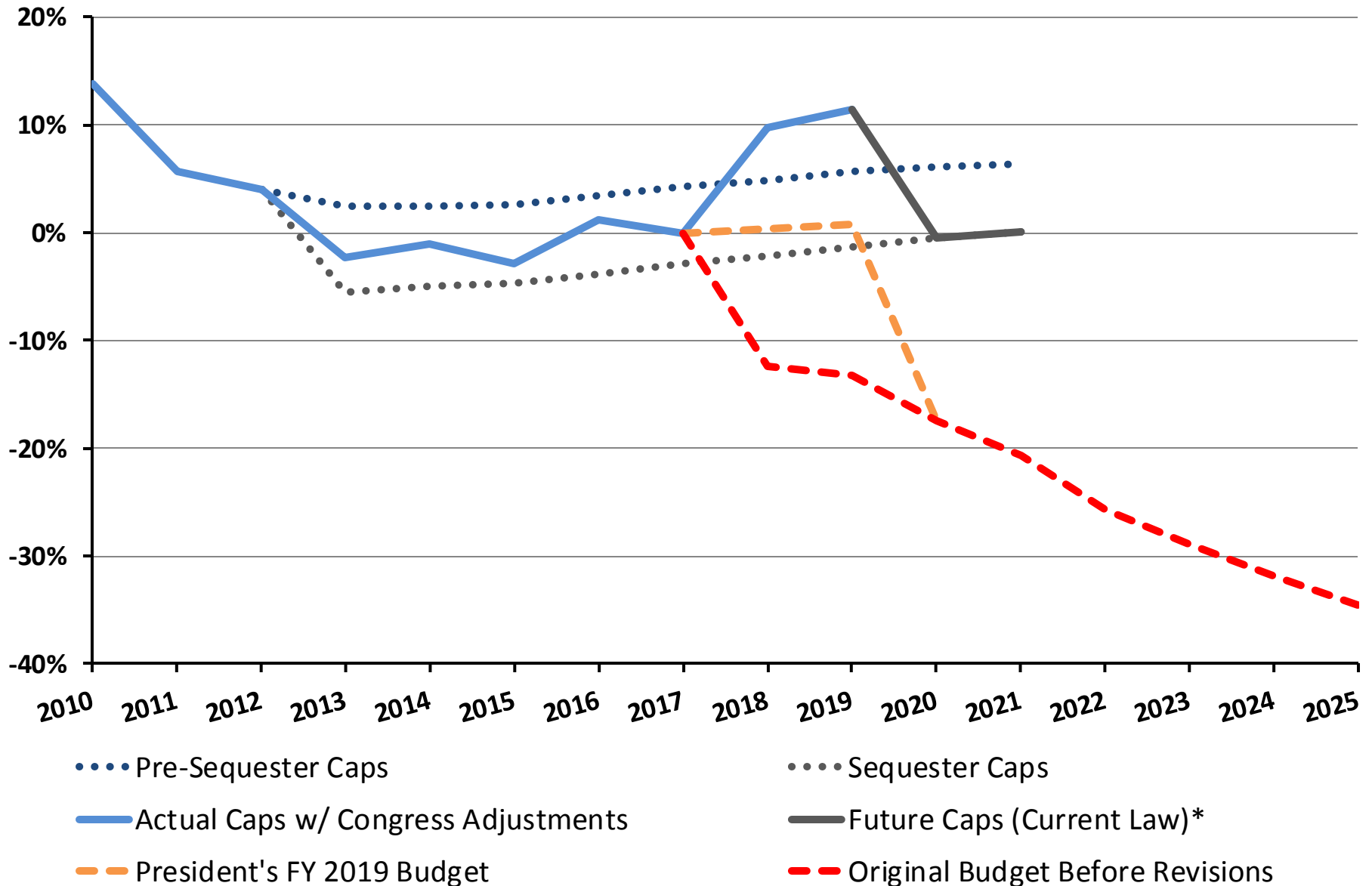
percent change from FY 2017 estimates, nominal dollars



*Using old definition, including DOD 6.7 account as R&D. The new official definition excludes this account from R&D. Based on OMB and agency data, and AAAS estimates from FY 2017 and FY 2018 appropriations. © 2018

Limits on NONDEFENSE Spending

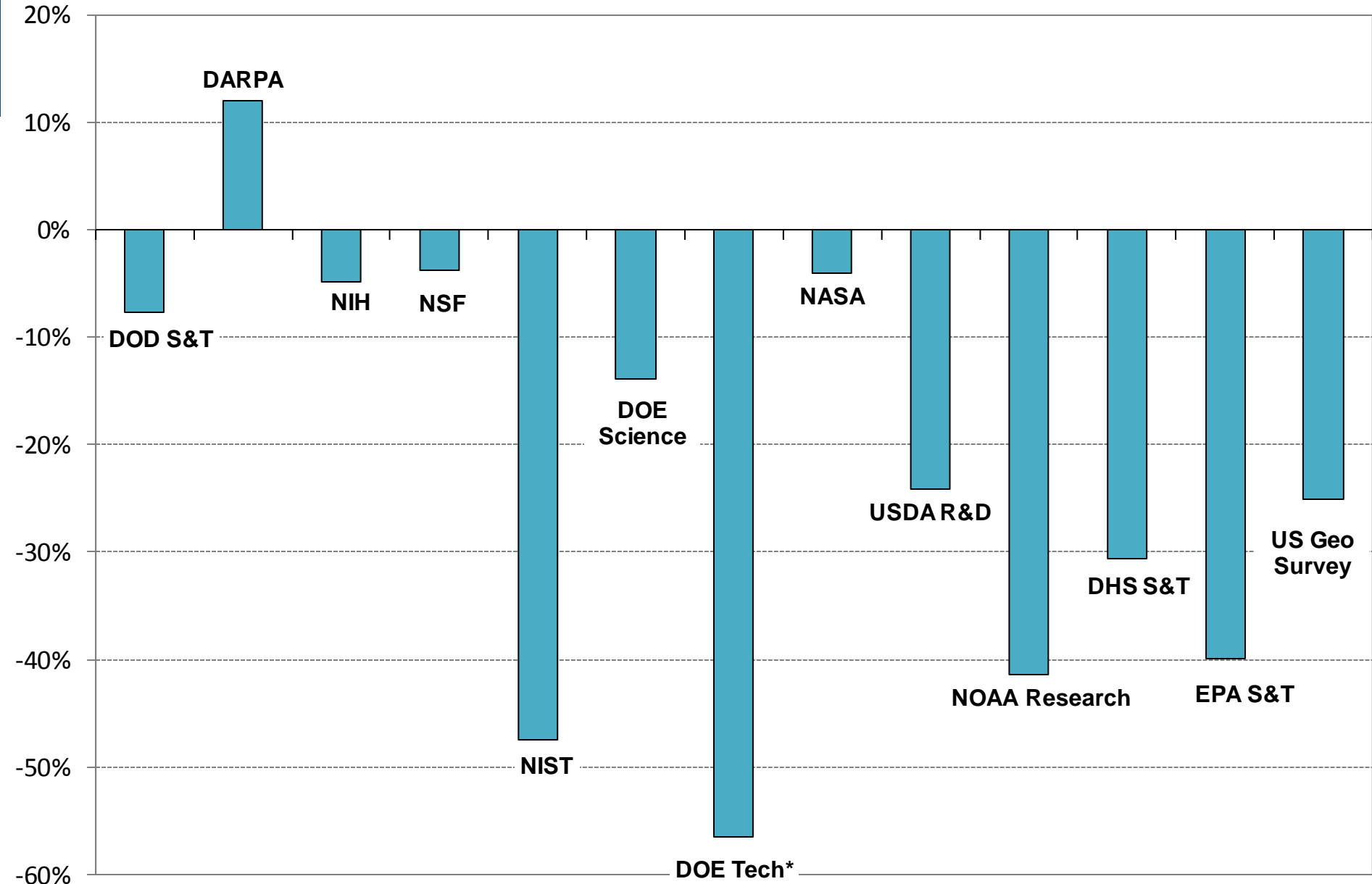
Estimated percent change from 2017, inflation adjusted



*Current caps last through 2021. Based on past and current budget resolutions, the Budget Control Act and subsequent legislation, and the FY 2019 OMB summary tables. © AAAS 2018

Select Science & Tech Agencies and Programs in the FY 2019 Budget

Estimated percentage change from FY 2018 enacted omnibus, nominal dollars



*Includes renewables and efficiency, nuclear, fossil, grid research, cybersecurity, ARPA-E. | AAAS

Quick Notes on FY19 Proposed Budget



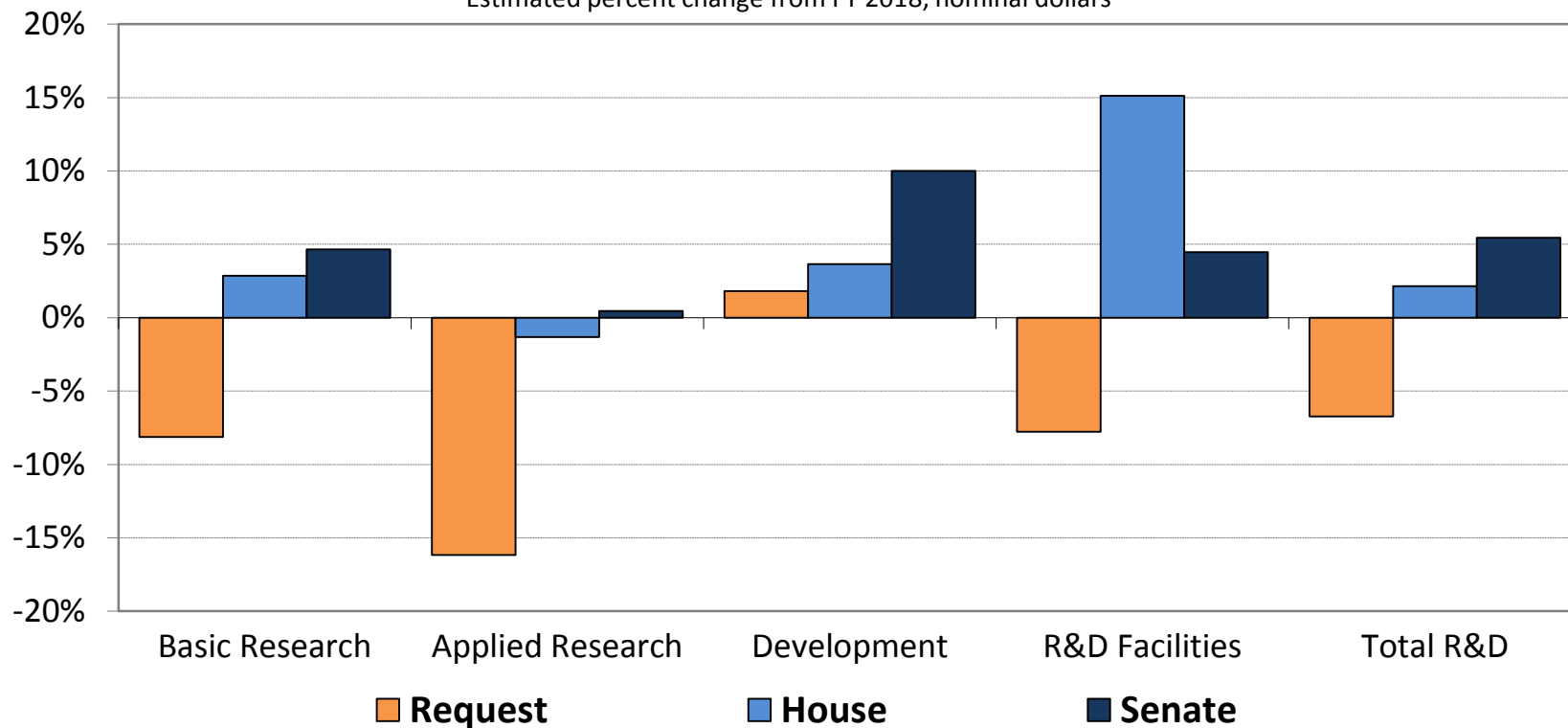
- **NIH:** Consolidates AHRQ, NIOSH, NIDILRR to bring NIH to 30 institutes; \$750m for opioids research
 - Salary capped at 90%, lowered to \$152k from \$187k
- **DOE:** Another big increase for exascale computing
 - Technology: ARPA-E terminated (again), deep cuts for efficiency and renewables (again); small modular reactors, advanced coal
- **NSF:** research cut 3%; two vessels instead of three; “10 Big Ideas”
 - Success rate, awards to drop; social science targeted
- **NASA:** WFIRST terminated, Science cut by 5% (especially Earth Science); moon projects and commercial space
- **USDA:** Pretty much everything would be reduced at least somewhat; several lab closures
- Multiple agencies: Climate and environment broadly targeted
- Coming soon: the return of trillion-dollar deficits?

Progress Check

	House Committee	Senate Committee	House Floor	Senate Floor
Defense	X	X	X	X
Energy & Water	X	X	X	X
CJS	X	X		
Interior	X	X	X	X
Agriculture	X	X		X
Labor-HHS	X	X		X
Homeland Security	X	X		
Veterans	X	X	X	X
Transportation -HUD	X	X		X

R&D by Type in FY 2019 Appropriations So Far

Estimated percent change from FY 2018, nominal dollars



AAAS estimates based on OMB, agency, and Congressional data. © 2018 AAAS

- Basic research estimate: \$39+ billion, increases of 3-5%
- Total R&D estimate: \$145-\$150 billion, increases of 2-6%
- Would push total research spending to all-time high (or close to it), keep it consistent with historical average as a share of GDP

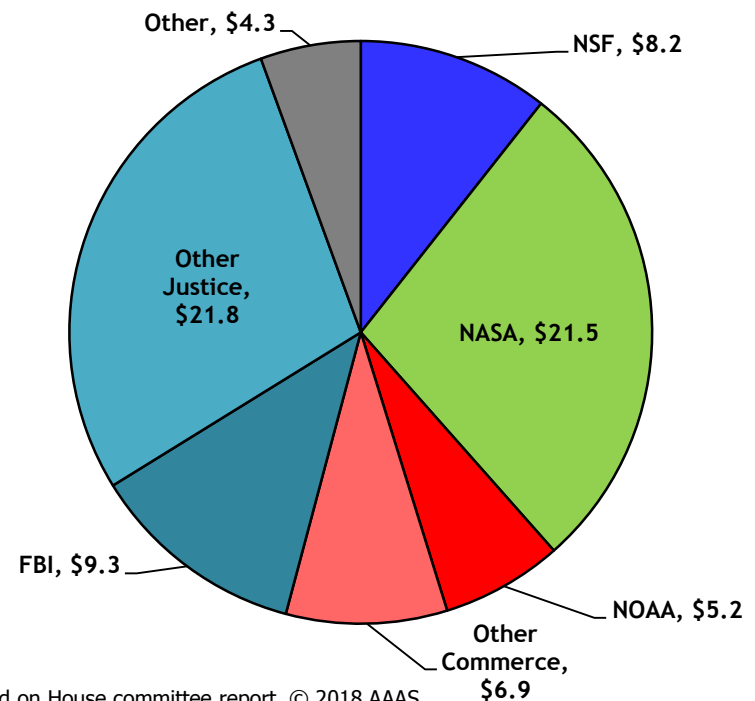
Commerce, Justice, Science Subcommittee

	House	Senate
Chair	John Culberson (TX)	Jerry Moran (KS)
Ranking Member	Jose Serrano (NY)	Jeanne Shaheen (NH)

- National Science Foundation
 - So far:** +5% in House, +4% in Senate; all-time funding high both
 - “Ten Big Ideas” supported, but with eye to preserving other core research programs as well
 - Support for astronomy, plant genomics, EPSCoR, computing and many other areas
- NASA: recent priority
 - So far:** +4% in House, +3% in Senate
 - Science getting somewhat larger increases – differing for Heliophysics, Planetary Science, Astrophysics
 - Earth Science, education programs mostly protected
 - Also supportive of increases for exploration, lunar program
- Department of Commerce:
 - NOAA so far:** very mixed bag for research programs. Sea Grant protected; House would eliminate climate research; mixed elsewhere
 - NIST so far:** fairly limited changes; \$10 million cut to Manufacturing USA in House

FY 2019 House CJS Composition

budget authority in billions of dollars



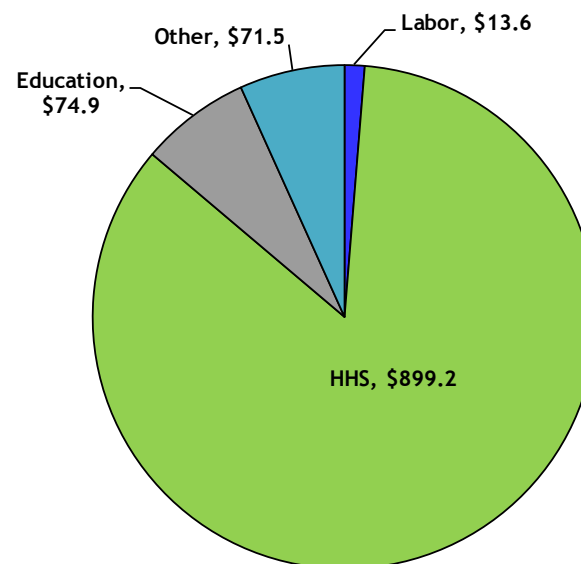
Based on House committee report. © 2018 AAAS

Labor, HHS, Education Subcommittee

	House	Senate
Chair	Tom Cole (OK)	Roy Blunt (MO)
Ranking Member	Rosa DeLauro (CT)	Patty Murray (WA)

- Deep divisions over public health programs, education, labor - but everybody loves NIH!
 - Likely another \$1.25 billion+ increase in FY 2019: Recent priorities:
 - Alzheimer's
 - Cancer
 - Opioids
 - Precision medicine
 - Brain mapping
 - Trans-NIH Down's Syndrome initiative
 - Indirect Costs and Salary Cap proposals have been rejected to date
- Other programs in this bill (BioShield, BARDA, CDC, Institute of Education Science, etc) have *generally* seen flat or modestly increased funding
 - CDC: House would establish new Infectious Disease Rapid Response Reserve Fund

FY 2019 Senate Labor-HHS Bill Composition
budget authority in billions of dollars



Based on Senate committee report. © 2018 AAAS

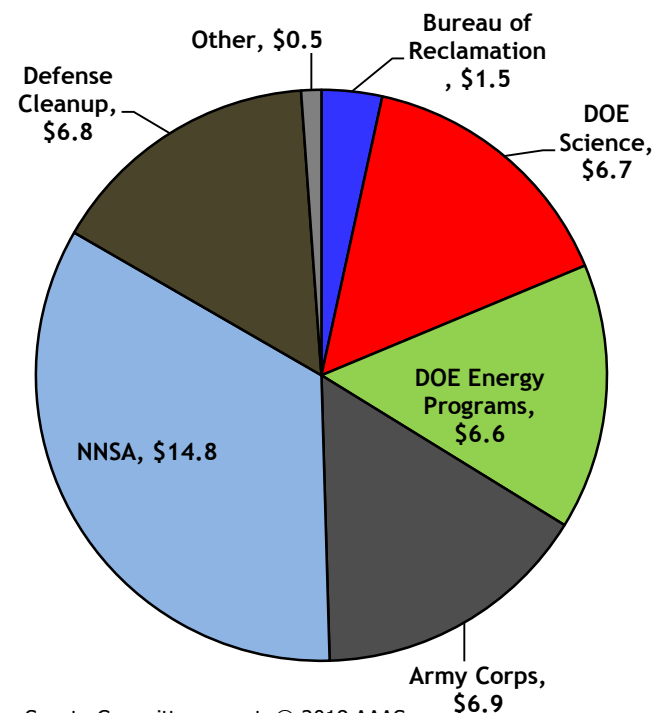
Energy & Water Subcommittee

	House	Senate
Chair	Mike Simpson (ID)	Lamar Alexander (TN)
Ranking Member	Marcy Kaptur (OH)	Dianne Feinstein (CA)

- Office of Science: big increases in FY19
 - FY19 so far:** House +5%, Senate +6%
 - Advanced computing/exascale/quantum has become major shared priority with large increases (up to 21% in Senate)
 - 10-year authorizing legislation
 - Also new collaboration with VA
 - Flat or moderate increases for assorted user facilities
 - Major* differences over domestic fusion + ITER
 - Other physics programs fare OK
- Technology programs:
 - ARPA-E saved again
 - Mixed funding outcomes for renewables, nuclear, fossil programs so far
 - Sizable plus-ups for advanced reactor R&D
 - Manufacturing programs protected with new innovation hubs on the horizon?

FY 2019 Senate E&W Composition

budget authority in billions of dollars



Based on Senate Committee report. © 2018 AAAS

Other Notes on FY 2019



- **Department of Defense:** mixed bag for basic research programs
 - -2% in House, +19% in Senate
 - University initiatives: -6% in House, +6% in Senate
 - DARPA: at least 10% boost in both chambers

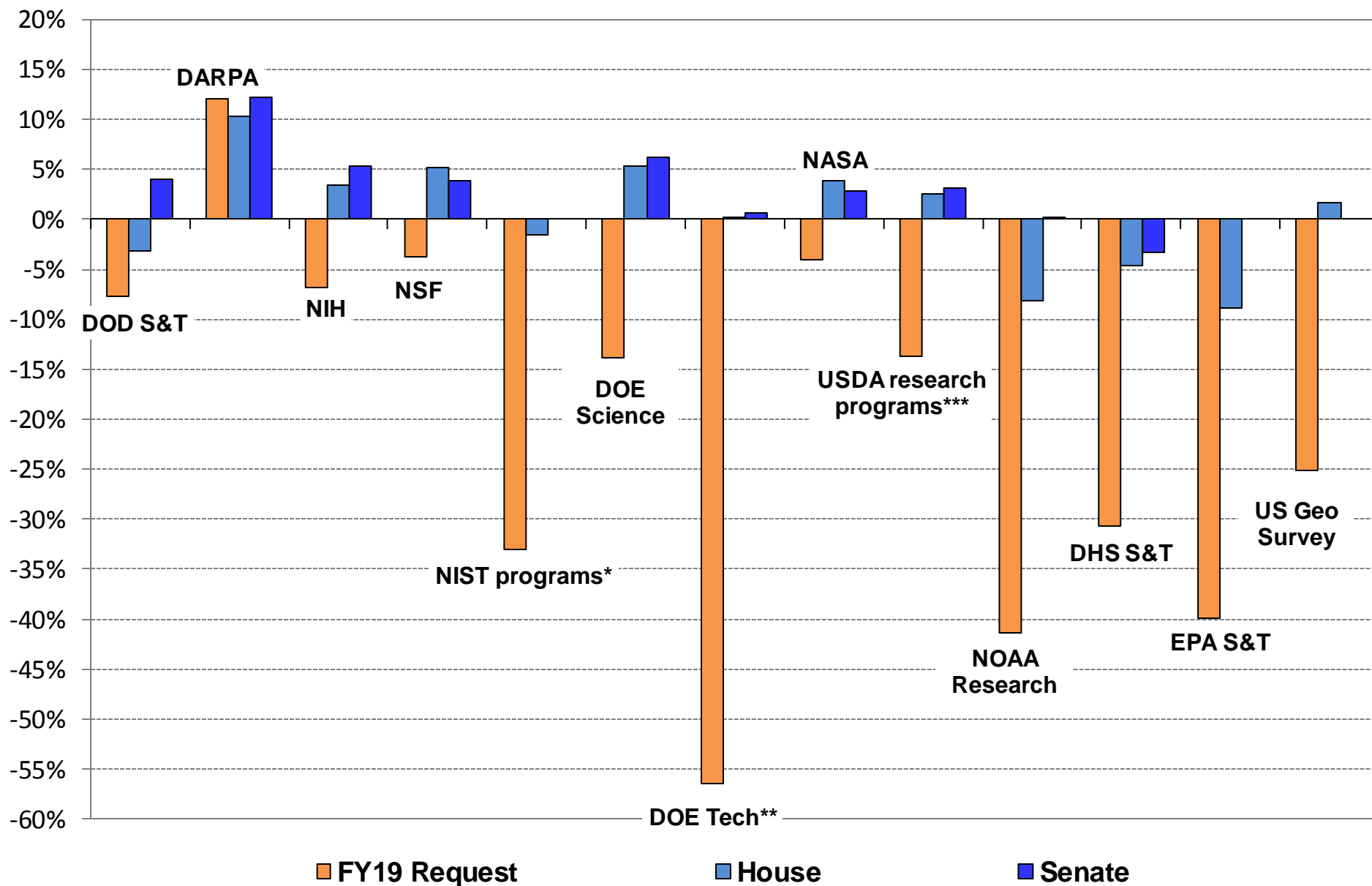
- **Department of Agriculture:**
 - Competitive grants: +4% in House, +1% in Senate
 - Flat or moderate increases for most formula funds/capacity grant programs
 - Intramural lab closures rejected

- **EPA Science & Tech:** 9% cuts in House across most research areas, minimal changes in Senate
- **U.S. Geological Survey:** +2% in House, flat in Senate
- For both: mixed changes but White-House proposed cuts generally rejected

- **DHS:** Modest reductions to S&T Directorate but University Programs, Centers of Excellence protected and flat-funded. Split opinion on new Countering WMD Office.

Select Science & Tech Agencies/Programs in FY 2019 Appropriations (So Far)

Estimated percentage change from FY 2018 enacted omnibus, nominal dollars



*Includes labs and industrial technology, excludes construction; flat in Senate. **Includes renewables and efficiency, nuclear, fossil, grid research, cybersecurity, ARPA-E. ***Includes ARS, NIFA, ERS, NASS, Rangeland Research, excludes ARS construction. | AAAS

Where Are We Headed?

- Good progress; conference reports for several bills done in September??
 - Some appropriations won't be fully finalized until later in the fall given midterms, requiring a partial CR
- FY 2020 and 2021: cap negotiations one more time
 - Who controls Congress next year?
 - Will widening deficit impact the negotiations?
- Next U.S. presidential election in 2020
- How likely is it that the discretionary budget – and thus, research spending – keeps growing?

AGENDA

To-do list grows as clock ticks toward November

Geof Koss, E&E News reporter
E&E Daily: Friday, April 27, 2018



Congress has a long to-do list after recess, including spending bills. UpstateNYer/Wikipedia

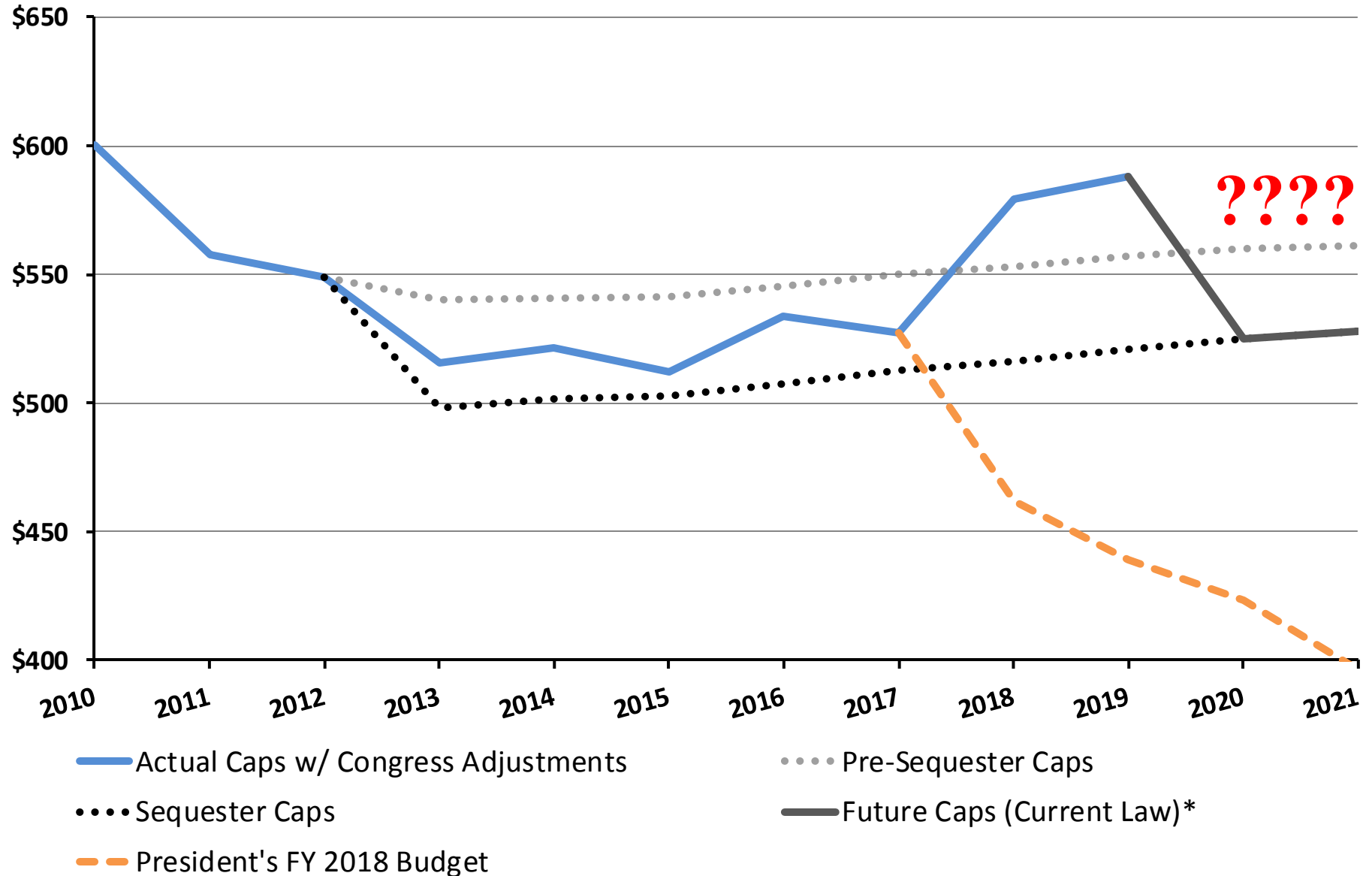
As the clock ticks toward November, Congress' legislative ambition once again finds itself on a crash course with election-year realities.

While the work continues on a number of unfinished big-ticket agenda items, the approach of the Nov. 6 midterm elections means lawmakers will spend more time away from the Capitol — and just as much time protecting themselves from the political perils of legislating when in town.

"If you believe the conventional wisdom around here, it's done," Senate Energy and Natural Resources Chairwoman Lisa Murkowski (R-Alaska) said of the legislative outlook for the rest of the year, shaking her head.

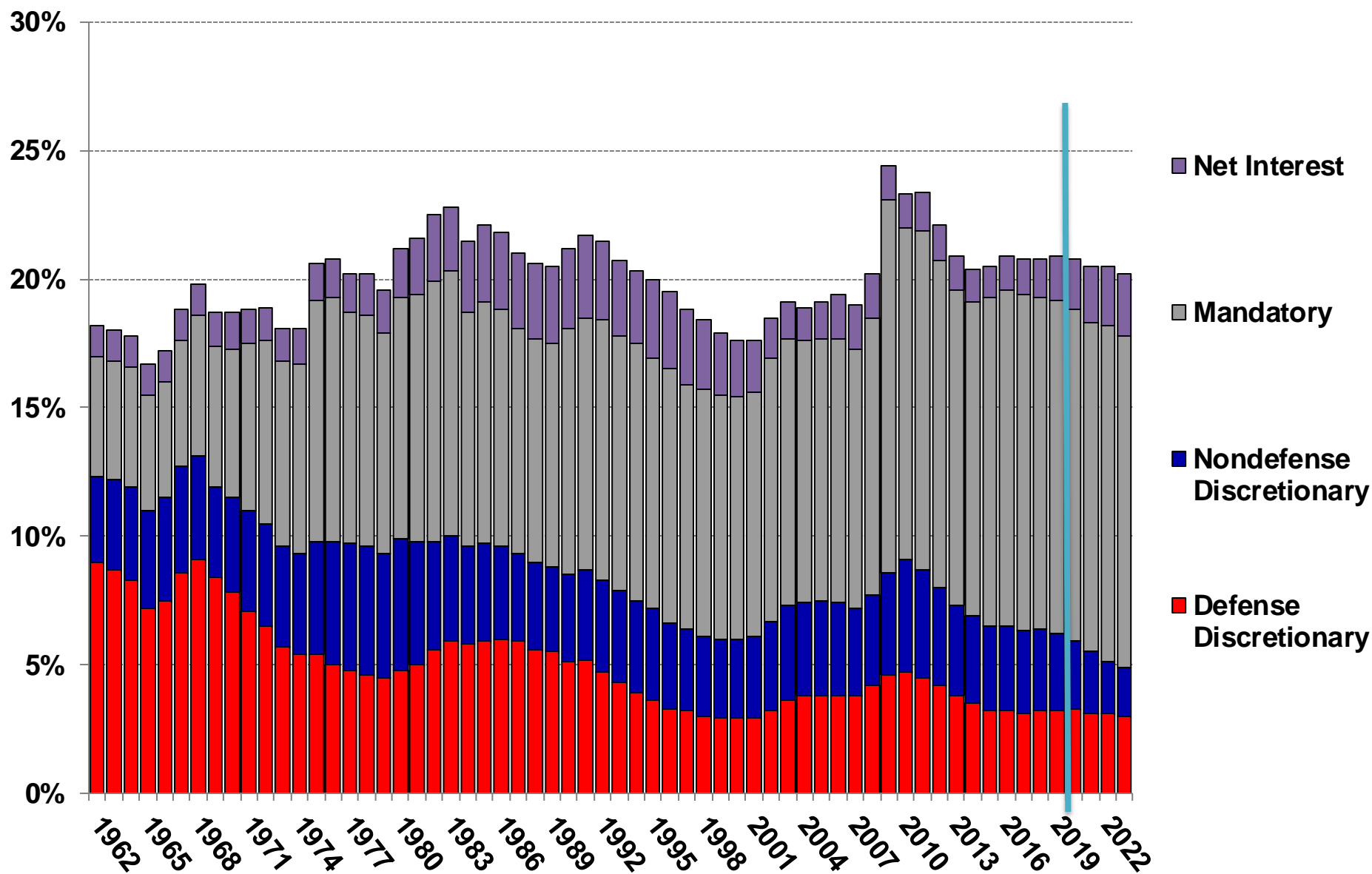
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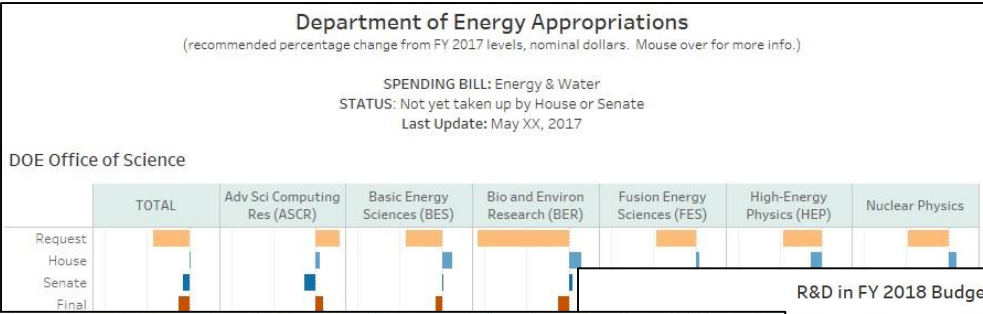
Billions of constant 2018 dollars



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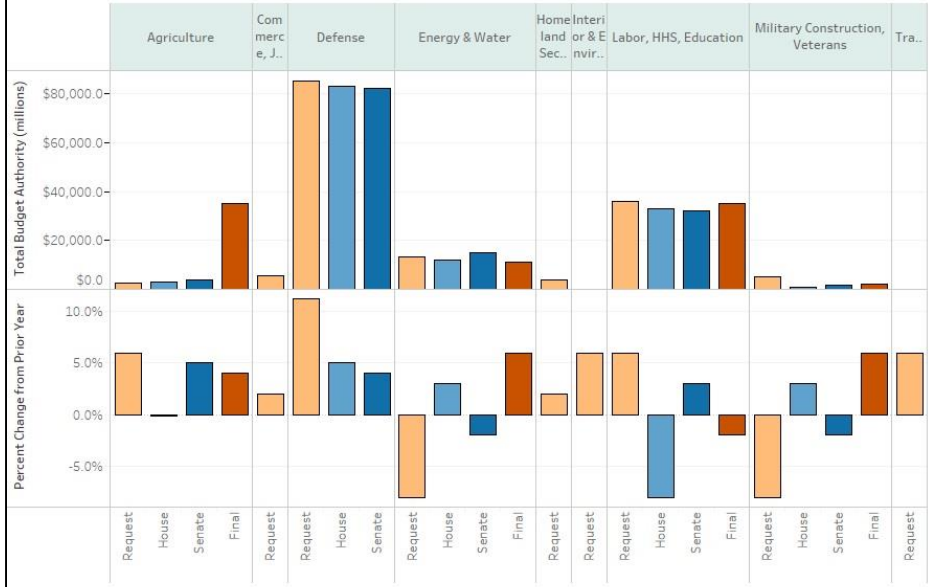
Federal Spending as a Percent of GDP, 1962 - 2023



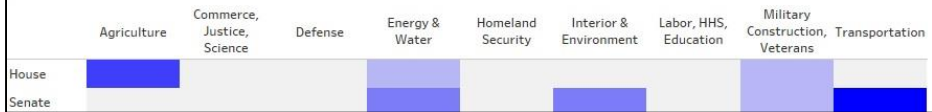


Federal R&D funding in Congress is allocated via several spending bills, authored by the appropriations subcommittees. Current AAAS estimates of R&D by select spending bill and subcommittee are shown below.

Last Updated: May XX, 2017



Spending Bill Progress



R&D in FY 2018 Budget and Appropriations

The President's budget request are displayed below; House and Senate estimates will be added once all are received. Mouse over for more info, or use the tabs above to view appropriations by agency or by Congressional subcommittee and spending bill.

