Quick Take

Proposed White House Budget Could Constrain HPC Procurements and Use in Key Agencies

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HYPERION RESEARCH OPINION

The US White House recently released its proposed FY 2021 budget to Congress that seeks to impose a number of budget cuts on federal agencies, some of which are the largest purchasers and users of HPCs in the world. Notable reductions are proposed for NOAA (-31%), DOE's Office of Science (-17%), and NASA (-11%). On the plus side, two new advanced computing technologies, artificial intelligence (AI) and quantum information science (QIS) are earmarked for near doublings in budget and are spread across a number of US government agencies. As has happened in the recent past, Congress will almost certainly increase funding levels for some critical R&D, but competing financial priorities driven by the covid-19 economic fallout could limit the ability of Congress to adjust funding levels for activities not directly linked to near-term covid-19 policies and programs.

SITUATION OVERVIEW

The proposal sent to the US Congress calls for a $142.2 billion investment for FY 2021 federal R&D, an 8.8% decrease from the budget approved by Congress in FY 2020. The proposal reduces funding across a range of R&D types, as seen in Table 1, with the proposed cut for applied research targeted for largest dollar cut ($6.3 billion) and R&D facilities taking the largest cut by percentage (-36%).

TABLE 1

FY 2021 Budget Request for R&D by Type

	FY2020 Estimate	FY2021 Request	FY20-21 Change $	FY20-21 Change %
Basic Research	43,405	40,623	-2,781	-6.40%
Applied Research	46,872	40,469	-6,403	-13.70%
Development	67,773	65,968	-1,805	2.70%
R&D Facilities	6,004	3,817	-2,186	-36.40%

Note: All Amounts are in Millions of Dollars.

Source: The White House, 2020

An examination of the proposed budget shows that a number of leading HPC purchasers and users have been selected for major budget cuts in FY2021 including the NIH, DOE's Office of Science, and the Department of Defense, as seen in Table 2. Of the major HPC user agencies listed, DOE's National Nuclear Security Administration was the only agency selected for a budget increase (2% over the FY2020 budget, about $162 million).

TABLE 2

Proposed US Federal R&D Budget for Selected Agency/Bureau

Agency	Bureau	2020 Budget (Estimate)	2021 Proposed	Change 2020-2021	Percent Change 2020-2021
Commerce	National Institute of Standards and Technology	807	653	-154	-19%
	National Oceanic and Atmospheric Administration	978	678	-300	-31%
Defense	Research, Development, Test, and Evaluation	60,275	59,076	-1,199	-2%
Energy	Office of Science	6,924	5,760	-1,164	-17%
	Advanced Research Projects Agency--Energy	425	-311	-736	-173%
	National Nuclear Security Administration	7,723	7,885	162	2%
EPA	Science and Technology	473	299	-174	-37%
Health and Human Services	National Institutes of Health	39,907	36,965	-2,942	-7%
National Aeronautics and Space Administration	Science	7,019	6,261	-758	-11%
National Science Foundation	Research and Related Activities	6,033	5,613	-420	-7%

Note: All Amounts are in Millions of Dollars.

Source: The White House, 2020

Notable proposed budget details include:

- Proposed budget cuts for NIH will likely be greatly lowered in light of FY2020 and subsequent supplemental funding specially targeted for covid-19-related activities.

- DOE Office of Science funding for HPC Leadership Computing Facilities at Argonne and Oak Ridge National Laboratories could see near flat budgets, while NERSC could see its budget decline from $110 million to $85 million from FY2020 to FY2021. Likewise, DOE exascale funding is looking at a 10 percent budget cut, as Office of Science and NNSA supported exascale systems approach deployment.
- The DOE's Advanced Research Projects Agency-Energy targeted for a cut of 173% would not only eliminate the $425 million agency but also force it to return $311 million in previously appropriated funds to the U.S. Department of the Treasury.

The proposed budget targets two critical emerging technologies, AI and QIS, for increased funding spread across a wide range of government departments. Specifically:

Artificial Intelligence: The White House FY 2021 budget includes a significant increase designed to double U.S. investment in AI R&D to approximately $2 billion by 2022. Highlights of the AI request for select agencies include:

- $830 million for AI R&D and interdisciplinary research institutes at the National Science Foundation, a more than 70 percent increase over the FY 2020 budget.
- $125 million in AI research by the Department of Energy's Office of Science, a $54 million increase over FY 2020.
- $100 million for the Department of Agriculture to support applications of advanced technology, including AI, in agricultural systems.
- $50 million to the National Institutes of Health for new research on chronic diseases using AI and related approaches.
- $459 million for DARPA AI R&D, an increase of $50 million from FY 2020,
- $290 million for the Department of Defense's Joint AI Center, an increase from $242 million in FY 2020.

Quantum Information Science: The White House FY 2021 budget bolsters federal QIS R&D funding by nearly 50%, putting QIS R&D on the path to double to over $860 million by 2022. Select agency highlights include:

- National Science Foundation investment in QIS research would double to $230 million, an additional $120 million over FY 2020.
- The Department of Energy Office of Science spending on QIS research at the national laboratories and in industry would increase to $237 million, a nearly $70 million increase over FY 2020. Office of Science funding would include $25 million to support early state research for a quantum internet.

FUTURE OUTLOOK

The proposed White House budget is currently working its way through the US Congress, which has the final say on spending for FY 2021. In recent years, lawmakers have largely rejected White House proposed budget cuts and instead increased major science agency budgets, or at least held them flat. That may not be the case for FY2021 year, however, as Congress will be facing a range of new funding demands rising out of the economic concerns of the covid-19 crisis. As a result, government-sponsored R&D and the HPC procurements that support those efforts may be relegated to lower priority status, perhaps for more than this single budget cycle, unless directly linked to near-term covid-19 policies and programs.

About Hyperion Research, LLC

Hyperion Research provides data-driven research, analysis and recommendations for technologies, applications, and markets in high performance computing and emerging technology areas to help organizations worldwide make effective decisions and seize growth opportunities. Research includes market sizing and forecasting, share tracking, segmentation, technology and related trend analysis, and both user & vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). We provide thought leadership and practical guidance for users, vendors and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

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