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## Report Fact Sheet

### Warning Signs: Effects of Proposed Federal Funding Cuts to Environmental and Climate Research and Development Programs

The President's FY 2018 budget proposes \$7.8 billion for federally funded climate and environmental (CE) R&D, a roughly \$2 billion or 21 percent reduction in CE R&D between FY 2017 and 2018, with significant reductions to most of the thirteen agencies in the federal climate and environment portfolio. The proposed cuts would, if they become law in 2018 funding, have significant impacts on U.S. capabilities, including dismantling programs that provide the scientific foundation for agencies to protect effectively the health, economic prosperity, and safety of Americans; breaking the continuity and integrity of longstanding and future observations and research infrastructure needed for climate and environment modeling; undermining our ability to detect and understand critical climate and environment trends and influences on natural resources; reducing our ability to train the next generation of scientists, resources managers, and decision makers who can work together to translate science into effective climate and environment policies and approaches; degrading the U.S. Global Change Research program; and diminishing the nation's ability to meet legal and international climate and environment commitments. As Congress continues deliberating on 2018 appropriations, the report "*Warning Signs: Effects of Proposed Federal Funding Cuts to Environmental and Climate Research and Development Programs*" informs policymakers and the broader community of the risks and impacts to our nation's economic, societal, and environmental security and leadership if these climate and environmental R&D cuts become a reality.

The 124-page report provides a summary of the proposed FY 2018 reductions (see Table 1 below) and an agency-by-agency detailed analysis. This report was funded by The Novim Group and developed by a group of science and policy leaders who have served in both Republican and Democratic administrations. It examines federally sponsored climate and environmental R&D, including the physical, life, engineering, and social sciences. It also looks at particularly important policy or operational programs critical to climate and environment observations and support for international agreements.

Although Congress has signaled a reluctance to go along with many of the proposed cuts as it tries to finalize 2018 appropriations, the report expresses concern that some of the proposed cuts may well be enacted. The report also warns that the administration's 2019 budget is likely to contain the same cuts as those proposed for 2018; therefore, the significant reductions to climate- and environment-related R&D programs are likely to be repeated.

The report examines the potential impacts of the proposed FY 2018 climate and environment R&D budget cuts, and includes a focus on the following five high-level themes:

1. **Investment and Capacity** Dramatic reductions in Federal CE R&D support would erode our ability to turn observations and modeling into understanding and innovation and will result in missed opportunities from past investments.
2. **Observations and Modeling** Potentially irreversible breaks in continuity and integrity of ongoing and future CE observations and research infrastructure needed for climate and environmental modeling.

3. **Adaptation and Assessments** Reductions or terminations to programs that translate CE R&D into impacts assessment and adaptation and resiliency approaches, including the ability to detect and understand trends and influences on natural resources and manage future energy, water, and food supply and consumption.

4. **Workforce** Reductions to programs that are training the next generation of climate and environment-related researchers, and scientists, resource managers, and decision makers who can work together to translate science into effective climate and environmental policies and approaches.

5. **International Commitments** Diminution of the United States' ability to meet legal and international climate and environmental commitments.

**Table 1: Summary of Agency Analysis<sup>1</sup>**

|   | <i>FY 2016<br/>Enacted</i> | <i>FY 2017<br/>Estimate</i> | <i>FY 2018<br/>Proposed</i> | <i>FY 17-18<br/>Dollar<br/>Change</i> | <i>FY 17-18<br/>Percent<br/>Change</i> |
|---|----------------------------|-----------------------------|-----------------------------|---------------------------------------|--|
| Department of Defense (DoD)   | 351                        | 332                         | 347                         | 15                                    | 5%                                     |
| Department of Energy (DOE)  | 315                        | 305                         | 124                         | -182                                  | -60%                                   |
| Department of Health & Human Services – National Institutes of Health (HHS-NIH) | 770                        | 792                         | 593                         | -199                                  | -25%                                   |
| Department of Homeland Security (DHS)   | 72                         | 66                          | 59                          | -7                                    | -10%                                   |
| Department of the Interior (DOI)  | 741                        | 741                         | 600                         | -142                                  | -19%                                   |
| Department of State<br>U.S. Agency for International Development (DOS-USAID)    | 693                        | 760                         | 102                         | -658                                  | -87%                                   |
| Environmental Protection Agency (EPA)   | 1,182                      | 1,114                       | 676                         | -438                                  | -39%                                   |
| National Aeronautics and Space Administration (NASA)                            | 1,927                      | 1,906                       | 1,754                       | -154                                  | -8%                                    |
| National Oceanic and Atmospheric Administration (NOAA)                          | 596                        | 721                         | 672                         | -49                                   | -7%                                    |
| National Science Foundation (NSF)   | 2,233                      | 2,248                       | 2,032                       | -216                                  | -10%                                   |
| Smithsonian Institution   | 766                        | 766                         | 766                         | 0                                     | 0%                                     |
| U.S. Army Corps of Engineers (USACE)  | 22                         | 22                          | 16                          | -6                                    | -27%                                   |
| U.S. Department of Agriculture  | 124                        | 128                         | 117                         | -11                                   | -9%                                    |
| <b>Total</b>  | <b>\$9,791</b>             | <b>\$9,903</b>              | <b>\$7,858</b>              | <b>-\$2,046</b>                       | <b>-21%</b>                            |

<sup>1</sup> Budget of the U.S. Government FY 2018; FY 2018 budget justifications; FY 2017 omnibus appropriations bill and reports; and FY 2018 agency spending plans. Totals may not add due to rounding.

Table 1 shows the budget data for the thirteen agencies involved in CE R&D. A significant number of programs are proposed for cuts of more than 50 percent, including the Environmental Protection Agency's (EPA) air and energy research, sustainable communities, water quality research and support grants, and regional science and technology programs; the U.S. Agency for International Development's (USAID) Clean Technology Fund, Strategic Climate Fund, and Global Climate Change Initiative; the Fish & Wildlife Service's Landscape Conservation Cooperatives and Science Support; and the Department of Energy's (DOE) atmospheric system research, terrestrial system research, subsurface biogeochemical research, climate model development and validation, regional and global model analysis, earth system modeling, integrated assessment, and data management programs.

Since the late 1980s, most of the agencies in Table 1 have contributed to the U.S. Global Change Research Program (USGCRP) and worked to improve the coordination and prioritization of federal global change research. The USGCRP was codified into law in 1990<sup>2</sup> to increase the effectiveness and productivity of federal global change research, with the requirement to report to the Congress every four years on the environmental, economic, health and safety consequences of climate change. The agency analysis below highlights the reductions and terminations impacting the USGCRP contributions<sup>3</sup>. Given the concerted efforts of the agencies over the past thirty years to responsibly steward federal resources through careful coordination, the USGCRP portfolio has very little redundancy. As a result, cuts of the scale proposed will have a particularly devastating and long-lasting impact.

In addition to the impacts to the USGCRP, the following is a brief summary of the impacts and consequences of the President's FY 2018 CE R&D proposal by the five high-level themes mentioned above:

- **Loss of Investment and Capacity** The proposed cuts would result in a significant reduction in the number, size, and duration of CE R&D program awards (e.g., grants, contracts, etc.) in both intramural (i.e., occurring in laboratories or other facilities and major instruments owned by agencies, such as EPA laboratories, DOE National Laboratories, Department of the Interior (DOI) field installations, and NASA satellites) and extramural CE R&D programs (i.e., occurring in laboratories and facilities not owned by agencies, such as universities and private-sector and not-for-profit laboratories). They will also have a significant impact on research facilities and infrastructure. For example, reductions in the National Science Foundation (NSF) budget will result in approximately 800 fewer awards, adversely impacting the careers of an estimated 2500 individuals (senior scientists, post-doctoral students, graduate and undergraduate students), and a reduction of nearly 50 percent to the academic research fleet (supported by several Federal agencies) by 2030 absent further investment. Proposed cuts to EPA would eliminate entirely EPA's support to universities and industry. For the National Institutes of Health (NIH), the 2018 budget would reduce the number of new National Institute of Environmental Health Sciences (NIEHS) research awards to universities by 20 percent, reduce the average size of new NIEHS awards by 20 percent, reduce the success rate for all new NIH awards from 18 percent in FY2016 to 14 percent, and reduce intramural NIEHS research by at least 20 percent. These cuts would result in a dramatic reduction of Federal support of environmental health sciences research, including research to improve the understanding of hazardous contaminants that are dangerous to humans. If sustained, such reductions will result in a loss of new knowledge, the possible closure of Federal labs and academic centers, and a decline in the education and training of the next generation of environmental scientists. Reductions of 17 percent to the National Oceanic and Atmospheric Administration's (NOAA) Oceanic and Atmospheric Research programs and 18 percent to the U.S. Geological Survey's (USGS) CE R&D will result in dramatic reductions in climate research carried out by NOAA and USGS laboratories and at academic institutions across the country. At the same time, the budget proposes to eliminate NOAA education programs related to environmental literacy and all the U.S. Fish and

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<sup>2</sup> <https://www.govtrack.us/congress/bills/101/s169>

<sup>3</sup> This is not meant to be a recreation of the USGCRP crosscut. Agencies develop the USGCRP crosscut based on specific definition and will be reported some time in 2018 in the annual USGCRP "Our Changing Planet" report.

Wildlife Service programs for youth. The budget also eliminates NASA's Office of Education that supports the Space Grant program, a unique activity within each state. The proposed termination of the DOI Landscape Conservation Collaboratives and termination of four Climate Adaptation Science Centers will result in a significant impact on cost-effective resource management options and, because these are collaborations with universities, the cuts will also have a significant impact on the training of students.

- **Observations and Modeling** Long-term, continuous, and consistent observational records are essential for testing hypotheses quantitatively and are a cornerstone of CE R&D modeling activities. These records are dependent on a variety of research observing networks and facilities, including satellites, ocean buoys, long term ecological research, streamgage and groundwater monitoring, the academic research fleet, marine laboratories, and field stations. Most of these networks and facilities are being stressed significantly by the FY 2018 budget proposals. For example, four key NASA CE satellite missions (i.e., PACE, OCO-3, CLARREO, and RB1) would be terminated. These missions are part of a coordinated approach for initiating and enabling long-term global observations of the land surface, biosphere, atmosphere, cryosphere, and oceans and provide the continuation of key measurements needed for understanding critical earth system processes. These programs were also designed to overlap with earlier missions, enabling calibration of the data and ensuring a continued flow of vital information. Cuts to NSF's support to the National Center for Atmospheric Research may result in eliminating or significantly scaling back programs in atmospheric chemistry, climate and global dynamics, computational and information systems, climate modeling, earth observing, high-altitude observing, meteorology, and its research applications program. For NOAA, the FY 2018 Budget would terminate several surface and marine observations carried out by the National Weather Service including the tsunami warning system and mid-range weather outlook. For DOE, cuts to climate modeling that range from 58 percent to complete program termination will slow progress towards using exascale computers for models with greater certainty of predictions and at regional scales, where such information can inform planning and adaptation strategies. The likely result of these cuts at NOAA, NSF, NASA, and DOE will be to cede U.S. leadership in climate modeling over the next few years to other countries, and the loss of modeling capabilities to help local leaders incorporate climate change into their planning. This has both national security and economic implications for our country.

- **Adaptation and Assessments** The loss of the critical measurements mentioned above will limit the ability of governments, businesses, and citizens to improve their decision-making processes for both short and long-term environmental issues. These types of global data are critical for addressing societal challenges in food, water, and energy security. They inform decisions on how best to mitigate and adapt to the effects of environmental change for the general well-being of society. NOAA provides competitive funding to assist communities in their efforts to strengthen their resilience in the face of severe weather and other environmental changes. Many of these efforts to support adaptation and assessments will be weakened via the FY 2018 budget proposals. Energy and water are interdependent—energy use is water-intensive and water treatment and delivery is energy-intensive. In addition, the food supply is entirely dependent upon the availability and quality of water and energy. DOE has been a leader in integrated assessments of this energy-water nexus using data, modeling, and analysis to improve understanding and inform decision-making about energy and water for a broad range of users and at multiple scales. In the FY 2018 budget, the DOE energy-water nexus program is being cut by 87 percent, and put on the path to termination by the end of the fiscal year, reducing the national capacity to prepare for and meet coming increased demand for food, energy, and water. The information, modeling, and tools produced by the USGS are used by the government and private sector to support adaptive management efforts, such as managing forests during severe droughts; anticipating changes in permafrost, glaciers, and wildfire patterns in the Arctic; and understanding flood-related risk. The cuts to these programs will severely impact the nation's ability to adapt and respond to our changing environment, including extreme weather events.

- **Workforce** Federal research funding fuels our ability to conduct important research and educate and train the next generation of scientists and engineers. Reduced academic research funding will have short-term impacts on individual projects, but will have longer-term impacts on the technical workforce. Students' decisions to follow a career path are impacted by their perceptions of future funding and support of the field or industry. Given the time investment required for training for skilled jobs in climate and environment fields, shortages in the workforce cannot be recovered overnight. If proposed reductions in R&D funding in the

climate and environment agencies are implemented, fewer undergraduates will have the opportunity to gain hands-on research experiences that have been shown to prepare them for scientific careers. Graduate students may also be forced to leave school without earning their degrees given the lack of financial support to carry out the research required for degree completion. According to the American Geosciences Institute,<sup>4</sup> the geoscience community is already facing a shortage of 135,000 geoscientists by 2022, including exploration geophysicists, hydrologists, petroleum geologists, and economic geologists. This shortage will only become more pronounced with reductions in research and research training support. Cuts at NSF will reduce support for up to 2,500 individuals, including senior scientists, post-doctoral students, graduate and undergraduate students. A 22 percent cut at NIH will dramatically reduce the number of workers trained in hazardous materials-related activities. These workforce cuts are occurring as some of the greatest economic competitors of the U.S. are moving aggressively into the green economy, for example mitigation and adaptation strategies and adopting renewable energy sources.

- **International Commitments** The Department of State—U.S. Agency for International Development would be impacted by the largest decrease in both dollars (\$658 million) and percentage (87 percent) of all the climate and environment programs highlighted in this report. While the DOS-USAID does not fund CE R&D programs, it does support diplomatic and financial mechanisms to help influence, shape, and implement international CE policies and agreements. This happens through two significant processes: (1) supporting international efforts to provide the latest science related to CE policy issues, and (2) funding efforts to help implement international climate and environment agreements. The proposed DOS-USAID reductions and terminations threaten the nation's ability to meet these legal and international climate commitments, many of which have resulted from more than twenty years of U.S. leadership and complex negotiations with allies and other nations around the world. This would likely result in distrust towards the U.S. on any subsequent international agreements. Reductions to key NASA satellite programs will also impact ongoing international commitments the U.S. has with other countries on climate and environment observational systems, the open sharing of data, and the ability to monitor key measurements that are critical parts of international climate and environment agreements. The EPA also has a range of CE R&D efforts supporting international agreements that are targeted for reductions or terminations. Funding reductions would also reduce NASA, NSF, DOE, DOI, and NOAA's research support for the interagency U.S. Global Change Research Program (USGCRP). This will hinder the nation's ability to contribute to major international negotiations regarding changing climate conditions and the necessary and appropriate adaptation measures that must be undertaken. The proposed 2018 budget would: reduce support for Clean Air Allowance Trading Programs; all-but-eliminate the U.S. Greenhouse Gas Reporting Program; diminish EPA's capacity to prepare the statutorily mandated annual Inventory of U.S. Greenhouse Gas Emissions and Sinks; end several environmental partnership programs, including: ENERGY STAR, and the Global Methane Initiative; reduce EPA's ability to set National Ambient Air Quality Standards (NAAQS) for ambient pollutants; and eliminate U.S. government funding for the Multilateral Fund for the Implementation of the Montreal Protocol on stratospheric ozone.

Novim, a nonprofit scientific research organization committed to its role as an independent, non-advocacy source of data, providing clear options to the most urgent problems facing humanity, conducted the study and is releasing this report.

For a copy of the complete report, please visit: <https://www.novim.org/projects/budget/>

Or email [budgetreport@novim.org](mailto:budgetreport@novim.org)

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<sup>4</sup> <http://sites.agu.org/careers/files/2014/10/Predicted-Workforce-Shortage.pdf>