



Testimony

Before the Committee on Science,
Space, and Technology, House of
Representatives

CLIMATE RESILIENCE

Opportunities to Improve Federal Planning and Implementation

Accessible Version

Statement of J. Alfredo Gomez, Director, Natural
Resources and Environment

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GAO Highlights

Highlights of [GAO-22-105688](#), a testimony before the Committee on Science, Space, and Technology, House of Representatives

Why GAO Did This Study

The increasing number of natural disasters in the U.S. and reliance on federal assistance to address them are sources of federal climate-related fiscal exposure. *Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks* has been on GAO's High-Risk List since 2013, in part because of the increasing costs of federal disaster response and recovery efforts. For example, from fiscal years 2015 through 2021, select appropriations for disaster assistance totaled \$315 billion.

GAO has previously found that enhancing climate resilience could help limit future costs. Enhancing climate resilience means taking actions to reduce potential future losses by planning and preparing for potential climate hazards. Agencies have taken some actions, including in the areas of climate resilience planning.

This testimony focuses on how Congress and federal agencies can improve climate resilience planning and implementation by applying principles of GAO's *Disaster Resilience Framework*. This testimony is based on findings and methodologies of GAO reports on climate resilience from May 2011 through September 2021.

What GAO Recommends

Since 2003, GAO has made 84 recommendations and suggested six matters for congressional consideration related to enhancing climate resilience and limiting the federal government's fiscal exposure to climate change. As of March 2022, 31 recommendations are not yet implemented.

View [GAO-22-105688](#). For more information, contact Alfredo Gomez at (202) 512-3841 or GomezJ@gao.gov.

March 8, 2022

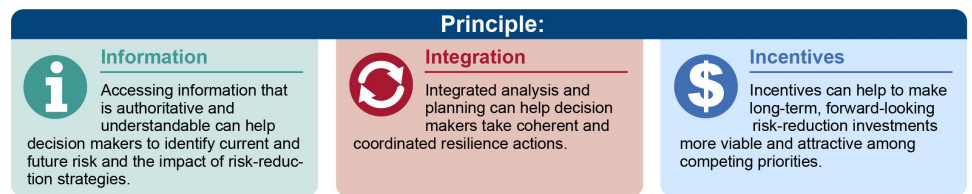
CLIMATE RESILIENCE

Opportunities to Improve Federal Planning and Implementation

What GAO Found

Disaster costs are projected to increase as certain extreme weather events become more frequent and intense due to climate change, as observed and projected by the U.S. Global Change Research Program and the National Academies of Sciences, Engineering, and Medicine. GAO's Disaster Resilience Framework can serve as a guide for analyzing federal action to facilitate and promote resilience to natural disasters and the effects of climate change. The framework is organized around three guiding principles—information, integration, and incentives (see figure)—that can help Congress and federal agencies improve federal climate resilience planning and implementation.

Figure 1: GAO's *Disaster Resilience Framework* Principles



Source: GAO-21-275SP | GAO-22-105688

Information. Congress and federal agencies can help decision makers access climate information that is authoritative and understandable. For example, in November 2015, GAO reported that the federal government needs a government-wide approach for providing decision makers with authoritative climate information. GAO recommended that the Executive Office of the President (EOP) designate a federal entity to develop and update such information and designate a federal entity to create a national climate information system. EOP neither agreed nor disagreed with the recommendations and had not implemented them as of March 2022.

Integration. Congress and federal agencies can help decision makers integrate analysis and planning to take coherent and coordinated resilience actions. For example, in March 2021, GAO reported that the Department of Energy did not have a department-wide strategy to enhance the resilience of the electricity grid to the risks of climate change. GAO recommended that the department develop and implement such a strategy. The department agreed in principle with this recommendation, but its proposed actions do not fully address it.

Incentives. Congress and federal agencies can make risk-reduction investments more viable and attractive. For example, in September 2021, GAO identified a suite of policy options the Federal Highway Administration could take to incentivize states and localities to enhance the climate resilience of federally funded roads. GAO suggested that Congress direct the agency to implement one or more of these options, and to give it statutory authority to do so.

March 8, 2022

Chairwoman Johnson, Ranking Member Lucas, and Members of the Committee:

Thank you for the opportunity to discuss our work on climate resilience and federal agency climate adaptation planning and implementation. The rising number of natural disasters and increasing reliance on federal assistance to address them is a key source of federal climate-related fiscal exposure. From fiscal years 2015 through 2021, select appropriations for disaster assistance totaled \$315 billion.¹

Disaster costs are projected to increase as certain extreme weather events become more frequent and intense due to climate change, as observed and projected by the U.S. Global Change Research Program and the National Academies of Sciences, Engineering, and Medicine. Calendar year 2021 was the seventh consecutive year in which the United States experienced 10 or more weather and climate disaster events that cost more than \$1 billion in overall damages each. Over the past 5 years, the cost of such disasters in the United States has averaged almost \$150 billion each year, according to the National Oceanic and Atmospheric Administration National Centers for Environmental Information.²

Limiting the Federal Government's Fiscal Exposure by Better Managing Climate Change Risks has been on GAO's High-Risk List since 2013, in part because of concerns about the increasing costs of disaster response

¹This total includes \$240 billion in select supplemental appropriations to federal agencies for disaster assistance and approximately \$75 billion in annual appropriations to the Disaster Relief Fund for fiscal years 2015 through 2021. It does not include other annual appropriations to federal agencies for disaster assistance. Of the supplemental appropriations, \$97 billion was included in supplemental appropriations acts that were enacted primarily in response to the COVID-19 pandemic.

²National Oceanic and Atmospheric Administration National Centers for Environmental Information, "U.S. Billion-Dollar Weather and Climate Disasters" (2022), accessed February 18, 2022, <https://www.ncdc.noaa.gov/billions/>. Note that these data are not direct costs to the federal government and are produced using a detailed methodology reflecting overall U.S. economic damages, including insured and uninsured losses to residential, commercial, and government/municipal buildings.

and recovery efforts.³ We identified five areas in which government-wide action is needed to reduce federal fiscal exposure to climate change, including, but not limited to, the federal government's roles as (1) insurer of property and crops; (2) provider of disaster aid; (3) owner or operator of infrastructure; (4) leader of a strategic plan to coordinate federal efforts; and (5) provider of data and technical assistance to decision makers.

Enhancing climate resilience to help limit the federal government's fiscal exposure to climate change could reduce the need for far more costly steps in the future.⁴ Enhancing climate resilience means taking actions to reduce potential future losses by planning and preparing for potential climate hazards, such as extreme rainfall, sea level rise, and drought.⁵ Since 2003, we have made 84 recommendations and suggested six matters for congressional consideration related to enhancing climate resilience and limiting the federal government's fiscal exposure to climate change. As of March 2022, 31 recommendations were not yet implemented.

³See GAO, *High Risk Series: An Update*, [GAO-13-283](#) (Washington, D.C.: February 2013), and *High Risk Series: Dedicated Leadership Needed to Address Limited Progress in Most High-Risk Areas*, [GAO-21-119SP](#) (Washington, D.C.: Mar. 2, 2021).

⁴For example, see GAO, *Climate Change: Opportunities to Reduce Federal Fiscal Exposure*, [GAO-19-625T](#) (Washington, D.C.: June 2019), and *Climate Change: Selected Governments Have Approached Adaptation through Laws and Long-Term Plans*, [GAO-16-454](#) (Washington, D.C.: May 12, 2016); and National Research Council of the National Academies, *America's Climate Choices: Panel on Adapting to the Impacts of Climate Change*, *Adapting to the Impacts of Climate Change* (Washington, D.C.: 2010).

⁵The National Academies of Sciences, Engineering, and Medicine defines resilience as the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. We reported in May 2016 that two related sets of actions can enhance climate resilience by reducing risk. These are climate change adaptation and pre-disaster hazard mitigation. In general, the term "adaptation" is used by climate change professionals, and "pre-disaster hazard mitigation" is employed by the emergency management community, often to speak about the same thing: becoming better prepared for climate change impacts. Adaptation is defined as adjustments to natural or human systems in response to actual or expected climate change. Pre-disaster hazard mitigation refers to actions taken to reduce the loss of life and property by lessening the impacts of adverse events. It applies to all hazards, including terrorism and natural hazards such as health pandemics or weather-related disasters. In this report, we use the term "climate resilience" for consistency and to encompass both sets of actions as they relate to addressing climate risks. GAO, *Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources*, [GAO-20-127](#) (Washington, D.C.: Oct. 23, 2019).

The administration is taking some actions to implement recent climate-related executive orders, including Executive Order 14008 on *Tackling the Climate Crisis at Home and Abroad*, Executive Order 14030 on *Climate-Related Financial Risk*, and Executive Order 14057 on *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, and we are monitoring implementation of these emerging efforts.⁶ Executive Order 14008, signed January 27, 2021, states that the administration’s policy is to deploy the full capacity of the federal government to combat climate change and implement a government-wide approach that increases resilience. The order directs agencies to (1) publicly submit plans that describe steps they can take with regard to their facilities and operations to bolster adaptation and increase resilience to the impacts of climate change and (2) submit annual progress reports.

Executive Orders 14030 and 14057 require agencies to consider and report on additional climate resilience activities. Specifically, Executive Order 14030 requires agencies to report on actions they are taking to integrate climate-related financial risk into their procurement processes. Executive Order 14057 requires agencies to develop, implement, and update their Climate Adaptation and Resilience Plans and to conduct climate adaptation analysis and planning for climate-informed financial and management decisions and program implementation. In October 2021, the White House announced the release of more than 20 of these Climate Adaptation and Resilience Plans and invited public comments.

We have reported that the federal government has primarily funded disaster resilience projects in the wake of disasters—when damages have already occurred and opportunities to pursue future risk reduction may conflict with the desire for immediate restoration of critical infrastructure.⁷ In October 2019, we issued the Disaster Resilience Framework to serve as a guide for analysis of federal actions to facilitate and promote resilience to natural disasters and changes in the climate.⁸

⁶*Tackling the Climate Crisis at Home and Abroad*, 86 Fed. Reg. 7619 (Feb. 1, 2021); *Climate-Related Financial Risk*, 86 Fed. Reg. 27967 (May 25, 2021); *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability*, 86 Fed. Reg. 70935 (Dec. 13, 2021).

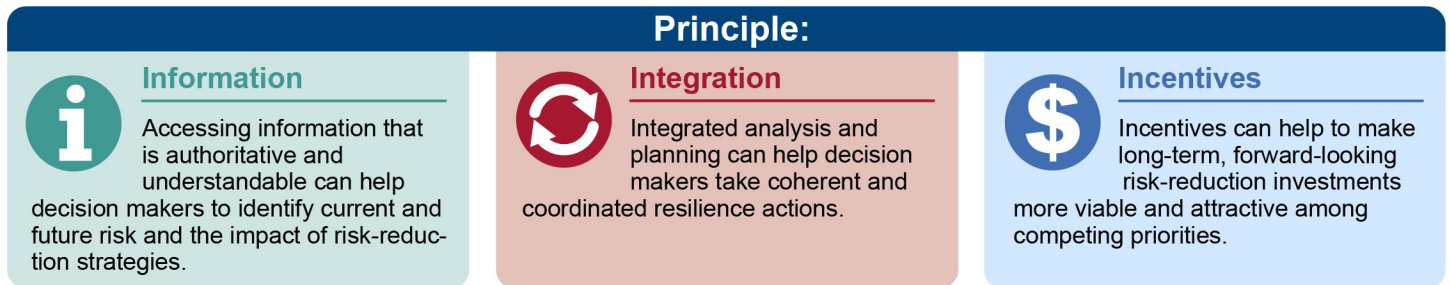
⁷See GAO, *Disaster Resilience Framework: Principles for Analyzing Federal Efforts to Facilitate and Promote Resilience to Natural Disasters*, [GAO-20-100SP](#) (Washington, D.C.: October 2019), and, for example, *Hurricane Sandy: An Investment Strategy Could Help the Federal Government Enhance National Resilience for Future Disasters*, [GAO-15-515](#) (Washington, D.C.: July 30, 2015).

⁸[GAO-20-100SP](#).

According to the *Disaster Resilience Framework*, investments in disaster resilience are a promising avenue to address federal fiscal exposure because such investments offer the opportunity to reduce the overall impact of disasters.

The *Disaster Resilience Framework* is organized around three guiding principles: information, integration, and incentives (see fig. 1).

Figure 1: GAO’s Disaster Resilience Framework Principles



Source: GAO-21-275SP | GAO-22-105688

Note: For more information on the Disaster Resilience Framework, see [GAO-20-100SP](#).

These principles can be applied to any federal effort to help federal agencies and policymakers consider what types of actions to take if they seek to promote and facilitate disaster risk reduction. Specifically, agencies and the oversight community can apply the framework as a tool to identify and analyze options for incorporating climate risks into ongoing planning and program implementation.⁹ Users of the *Disaster Resilience Framework* can consider its principles to analyze any type of existing federal effort or identify gaps in existing federal efforts.

My statement today focuses on how Congress and federal agencies can improve federal climate resilience planning and implementation by

⁹The invitation for this testimony specifically asked about best practices that agencies could adopt to identify climate vulnerabilities and incorporate climate risks into their ongoing planning and program implementation. There is tremendous variability in program design and implementation across the federal government. The *Disaster Resilience Framework* can help agencies and the oversight community analyze opportunities to improve climate resilience using a consistent set of principles and questions that are flexible enough to apply to the diverse federal enterprise. The framework itself is not a “best practice” to be implemented, but a tool to identify and analyze the many ways to enhance the climate resilience of federal activities. Not all parts of the framework will be relevant for every federal effort; some of the principles or concepts are likely to be more relevant in the analysis of certain federal efforts than others.

pursuing opportunities related to the three guiding principles of the Disaster Resilience Framework. My statement is based on the findings and methodologies of GAO reports on climate resilience from May 2011 through September 2021.

We conducted the work on which this statement is based in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

The three guiding principles of the Disaster Resilience Framework—information, integration, and incentives—can help inform the climate resilience planning efforts of federal agencies.

Guiding Principle: Information

Congress and federal agencies can improve federal climate resilience planning and implementation by helping decision makers access information that is authoritative and understandable to identify current and future risks and the impact of risk-reduction strategies. Our past work shows how improvements are necessary across the entire federal government and within specific programs.

For example, the federal government needs a government-wide approach for providing federal, state, local, and private sector decision makers with (1) the best available climate-related information, and (2) assistance with translating climate-related data into accessible information. As a result, we recommended in November 2015 that the Executive Office of the President

- designate a federal entity to develop and periodically update a set of authoritative climate observations and projections for use in federal decision-making, which other decision makers could also access; and

- designate a federal entity to create a national climate information system with defined roles for federal agencies and nonfederal entities with existing statutory authority.¹⁰

The Executive Office of the President neither agreed nor disagreed with our recommendations and had not implemented them as of March 2022.

In addition, our past work has shown that the federal government needs a comprehensive approach to improve the resilience of the facilities it owns and operates and the land it manages. We have found that this approach involves the following actions:

- **Incorporate climate change resilience into agencies' infrastructure and facility planning processes.** For example, in April 2013, we reported that infrastructure such as National Aeronautics and Space Administration centers are vulnerable to observed and projected climate change impacts, which vary depending on geographic location (e.g., coastal centers are vulnerable to sea-level rise). We made several recommendations, including that the Executive Office of the President work with agencies to identify the best available climate-related information for infrastructure planning, and update this information over time.¹¹ The Executive Office of the President did not comment on this recommendation and had not implemented it as of March 2022.
- **Account for climate change in National Environmental Policy Act analyses and work with relevant professional associations to incorporate climate change information into structural design standards.** For example, we recommended in November 2016 that the Department of Commerce convene federal agencies to provide the best available forward-looking climate information to standards-developing organizations.¹² The Department of Commerce neither agreed nor disagreed with this recommendation and had not implemented it as of March 2022.

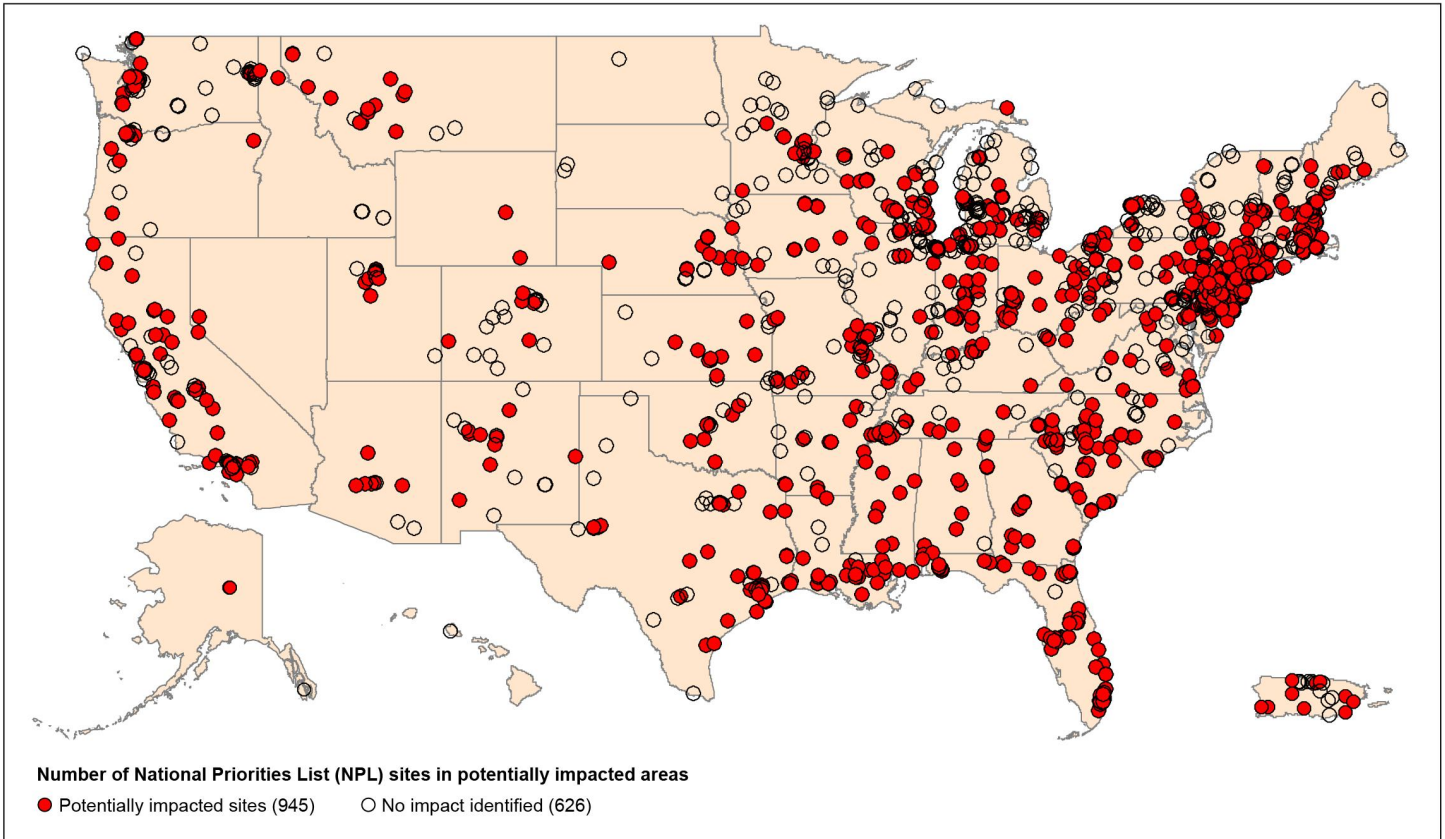
¹⁰GAO, *Climate Information: A National System Could Help Federal, State, Local, and Private Sector Decision Makers Use Climate Information*, [GAO-16-37](#) (Washington, D.C.: Nov. 23, 2015).

¹¹GAO, *Climate Change: Future Federal Adaptation Efforts Could Better Support Local Infrastructure Decision Makers*, [GAO-13-242](#) (Washington, D.C.: Apr. 12, 2013).

¹²GAO, *Climate Change: Improved Federal Coordination Could Facilitate Use of Forward-Looking Climate Information in Design Standards, Building Codes, and Certifications*, [GAO-17-3](#) (Washington, D.C.: Nov. 30, 2016).

Our work on specific federal programs also shows the need for improvements in the provision and use of climate information. For example, in October 2019, we reported that available federal data suggested that about 60 percent (945 of 1,571) of all nonfederal Superfund National Priorities List (NPL) sites—which contain some of the most seriously contaminated sites—are located in areas vulnerable to the impacts of climate change such as flooding, storm surge, wildfires, and sea level rise (see fig. 2).¹³

Figure 2: Nonfederal Superfund National Priorities List Sites Vulnerable to Climate Change Impacts



Sources: GAO-21-555T | GAO-22-105688

Notes: This map includes nonfederal NPL sites located in areas that may be impacted by flooding, storm surge, wildfires, or sea level rise. Nonfederal NPL site data are as of March 2019. This map does not display all 1,571 active and deleted nonfederal NPL sites GAO analyzed, which also include six sites in American Samoa, the Federated States of Micronesia, Guam, the Northern Mariana

¹³GAO, *Superfund: EPA Should Take Additional Actions to Manage Risks from Climate Change*, [GAO-20-73](#) (Washington, D.C.: Oct. 18, 2019).

Islands, and the U.S. Virgin Islands, though they are included in the counts above. Additional information on all sites GAO analyzed can be viewed at <https://www.gao.gov/products/GAO-20-73>. Storm surge data are not available for Alaska and Pacific islands other than Hawaii, wildfire data are not available outside the contiguous United States, and sea level rise data are not available for Alaska.

We found that the Environmental Protection Agency (EPA) had taken some actions to manage risks at these sites but could do more to provide information to decision makers on the risks to nonfederal NPL sites. Specifically, we recommended that EPA's Director of the Office of Superfund Remediation and Technology Innovation provide direction on how to identify and use information on the potential impacts of climate change effects in risk assessments and risk response decisions at nonfederal NPL sites. At the time, EPA disagreed with this recommendation. However, in June 2021, the agency issued a memorandum providing additional direction on how to identify and use climate-related information in risk assessments.¹⁴

Guiding Principle: Integration

Congress and federal agencies can improve federal climate resilience planning and implementation across the entire federal government and within specific programs by helping decision makers integrate analysis and planning to take coherent and coordinated resilience actions. We have previously recommended many ways to reduce federal fiscal exposure by better coordinating and directing federal climate resilience efforts toward common goals and developing a more strategic approach to targeting federal resources.¹⁵ For example, we recommended that entities within the Executive Office of the President, including the Office of Management and Budget, do the following:

- Develop a strategic plan to guide the nation's efforts to adapt to climate change. This plan should (1) include clear priorities that reflect the full range of climate-related federal activities, and (2) establish

¹⁴[GAO-20-73](https://www.gao.gov/products/GAO-20-73).

¹⁵[GAO-21-119SP](https://www.gao.gov/products/GAO-21-119SP).

clear roles, responsibilities, and working relationships among federal, state, and local governments, as we recommended in May 2011.¹⁶

- Use information on potential economic effects from climate change to help identify significant climate risks and craft appropriate federal responses, as we recommended in September 2017.¹⁷
- Provide information to Congress on fiscal exposures related to climate change in conjunction with future reports on climate change funding, as we recommended in April 2018.¹⁸

The Executive Office of the President, the Office of Management and Budget, and federal agencies have some related efforts under way in response to recent executive orders, but they have yet to fully implement our recommendations.

As we reported in our January 2021 High Risk update, Congressional action is necessary to enable the federal government to reduce its fiscal exposure to climate change risks through investment in climate resilience projects that help communities prepare for hazards such as sea level rise.¹⁹ Currently, the federal government makes ad hoc investments and does not have a strategy for prioritizing projects that could have the most impact.

For example, we have suggested that Congress consider the following actions:

- **Establish a federal organizational arrangement to periodically identify and prioritize climate resilience projects for federal investment.** As we reported in October 2019, various types of entities that could lead such a federal effort include task forces, special

¹⁶GAO, *Climate Change: Improvements Needed to Clarify National Priorities and Better Align Them with Federal Funding Decisions*, [GAO-11-317](#) (Washington, D.C.: May 20, 2011).

¹⁷GAO, *Climate Change: Information on Potential Economic Effects Could Help Guide Federal Efforts to Reduce Fiscal Exposure*, [GAO-17-720](#) (Washington, D.C.: Sept. 28, 2017).

¹⁸GAO, *Climate Change: Analysis of Reported Federal Funding*, [GAO-18-223](#) (Washington, D.C.: Apr. 30, 2018).

¹⁹GAO-21-119SP.

councils, interagency offices, or interagency working groups led by agency and department heads or program-level staff.²⁰

- **Establish a pilot program focusing on climate migration that has leadership from a defined federal organizational arrangement.** This action is essential because no federal agency has the authority to lead federal assistance for climate migration, and therefore various agencies have provided support for climate migration efforts on an ad hoc basis, as we reported in July 2020.²¹ Such a pilot would identify and provide assistance to climate migration projects for communities that express interest in relocation as a resilience strategy.²²

Our past work has also identified the need to improve federal climate resilience planning within specific federal programs. For example, in June 2019, we found that the Department of Defense (DOD) generally did not consider climate projections in master planning for installations or in individual project designs because DOD lacked guidance on how to do so.²³ Some installations, such as the Naval Station Norfolk, Virginia, have included climate considerations in their master plan because of disruptions in operations due to frequent flooding (see fig. 3).

²⁰[GAO-20-127](#).

²¹GAO, *Climate Change: A Climate Migration Pilot Program Could Enhance the Nation's Resilience and Reduce Federal Fiscal Exposure*, [GAO-20-488](#) (Washington, D.C.: July 6, 2020).

²²[GAO-20-488](#).

²³GAO, *Climate Resilience: DOD Needs to Assess Risk and Provide Guidance on Use of Climate Projections in Installation Master Plans and Facilities Designs*, [GAO-19-453](#) (Washington, D.C.: June 12, 2019).

Figure 3: Flooding at Naval Station Norfolk, Virginia



Source: GAO-19-453 | GAO-22-105688

We made eight recommendations to help DOD improve its climate resilience planning. For example, we recommended that the military departments update criteria for installation master planning to require climate risk assessments, as well as plans to address those risks. We also recommended that DOD issue guidance on incorporating climate projections into installation master planning and facilities project designs.²⁴ DOD concurred with all eight of our recommendations and updated its guidance accordingly.

In addition, our past work has identified the need to improve federal climate resilience planning within specific federal programs. For example, in March 2021, we found that the Department of Energy (DOE) has efforts under way to work with utilities and has initiated preliminary efforts to develop tools for resilience planning, but it does not have a plan to guide

²⁴[GAO-19-453](#).

those resilience planning efforts.²⁵ We made two recommendations, including that DOE establish a plan to guide the agency's efforts to develop tools for resilience planning.²⁶ DOE agreed in principle with this recommendation, but its proposed actions do not fully address it.

In another March 2021 report, we found that DOE identified climate change as a risk to energy infrastructure, including the electricity grid, but it did not have an overall strategy to guide its efforts to enhance grid resilience to climate change.²⁷ While DOE had taken some actions to enhance grid resilience, such as establishing a partnership with utilities to plan for climate change, we found the agency could take additional actions. We recommended that DOE develop and implement a strategy on enhancing the resilience of the electricity grid to the risks of climate change.²⁸ DOE agreed with this recommendation and has taken some actions towards it.²⁹

Guiding Principle: Incentives

Congress and federal agencies can improve federal climate resilience planning and implementation by making long-term, forward-looking risk-reduction investments more viable and attractive among competing

²⁵GAO, *Electricity Grid: Opportunities Exist for DOE to Better Support Utilities in Improving Resilience to Hurricanes*, [GAO-21-274](#) (Washington, D.C.: Mar. 5, 2021).

²⁶We also recommended that the Secretary of Energy take steps to better leverage the National Laboratories' emerging grid resilience efforts and technologies by developing a formal mechanism to share this information with utilities. DOE agreed in principle with this recommendation, but its proposed actions do not fully address it.

²⁷GAO, *Electricity Grid Resilience: Climate Change Is Expected to Have Far-reaching Effects and DOE and FERC Should Take Actions*, [GAO-21-346](#) (Washington, D.C.: Mar. 5, 2021).

²⁸We also recommended that the Chairman of the Federal Energy Regulatory Commission direct staff to take steps to identify and assess climate-related risks to the electricity grid, and plan a response, including identifying actions to address the risks and enhance the resilience of the grid to climate change. The commission neither agreed nor disagreed with our recommendation.

²⁹In their draft comments on [GAO-21-346](#), DOE neither agreed nor disagreed with our recommendation. In a June 4, 2021, follow-up letter, DOE agreed with our recommendation and detailed the agency's plans to implement it.

priorities. For example, we have suggested Congress consider the following actions:

- **Require that climate resilience be incorporated into the planning of all drinking water and wastewater projects that receive federal financial assistance.** In January 2020, we found that doing so could help ensure such projects adequately address risks from climate change.³⁰
- **Provide direction to the Federal Highway Administration to implement one or more options to enhance the climate resilience of federally funded roads.** Specifically, in our September 2021 report, we identified and analyzed several policy options, such as expanded federal grants or additional funding requirements, to incentivize states and localities to enhance the climate resilience of federally funded roads and reduce federal fiscal exposure (see table 1).³¹ Implementing a suite of options that address many of the key principles and questions identified in the Disaster Resilience Framework would be the most effective approach, according to knowledgeable stakeholders and our analysis. However, Federal Highway Administration officials said they need additional authority from Congress to implement some of the options we identified and that Congress should give the agency the authority in statute to ensure the agency implements Congress' preferred policy options.

³⁰GAO, *Water Infrastructure: Technical Assistance and Climate Resilience Planning Could Help Utilities Prepare for Potential Climate Change Impacts*, [GAO-20-24](#) (Washington, D.C.: Jan. 16, 2019).

³¹GAO, *Climate Resilience: Options to Enhance the Resilience of Federally Funded Roads and Reduce Fiscal Exposure*, [GAO-21-436](#) (Washington, D.C.: Sept. 22, 2021). We also reported that each option we identified has strengths and limitations. For example, adding climate resilience requirements to formula grant programs could compel enhanced resilience but make it more challenging for states to use federal highway funds.

Table 1: Options to Further Enhance the Climate Resilience of Federally Funded Roads

Options
Integrate climate resilience into Federal Highway Administration policy and guidance.
Update design standards and building codes to account for climate resilience.
Provide authoritative, actionable, forward-looking climate information.
Add climate resilience funding eligibility requirements, conditions, or criteria to formula grant programs.
Expand the availability of discretionary funding for climate resilience improvements.
Alter the Emergency Relief (ER) program by providing incentives for, or conditioning funding on, pre-disaster resilience actions.
Expand the availability of ER funding for post-disaster climate resilience improvements.
Establish additional climate resilience planning or project requirements.
Link climate resilience actions or requirements to incentives or penalties.
Condition eligibility, funding, or project approval on compliance with climate resilience policy and guidance.

Source: [GAO-21-436](#). | GAO-22-105688

We also made one recommendation in September 2021 that the Department of Transportation consider these options when prioritizing climate resilience actions under Executive Order 14008.³² The Department of Transportation concurred with this recommendation.³³

We have similar work under way that uses our Disaster Resilience Framework to analyze options to enhance climate resilience planning, management decision-making, and program implementation across the federal government. Specifically, we have work under way on options to enhance the climate resilience of a suite of U.S. Department of Agriculture programs, including the Climate Hubs and the federal crop insurance program. We also recently started work identifying federal policy options to help enhance the climate resilience of Army Corps of

³²[GAO-21-436](#).

³³The Infrastructure Investment and Jobs Act, enacted in November 2021, directs the Secretary of Transportation to establish the Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation program to provide formula and discretionary grant funding to eligible recipients for transportation resilience improvements. Pub. L. No. 117-58, § 11405(a), 135 Stat. 429, 561 (codified at 23 U.S.C. § 176(a)-(b)). In addition, the act explicitly permits the use of Federal-Aid Highway Program funding provided through other programs, such as the Emergency Relief Program, for protective features, including those to mitigate the risk of recurring damage or the cost of future repair from extreme weather, flooding, and other natural disasters. Pub. L. No. 117-58, §§ 11105(2), 11106(3)(C), 11109(a)(1)(F) (codified respectively at 23 U.S.C. §§ 119(d)(2)(R), 125(d)(3), 133(b)(18)). Further, the act provides an overarching definition of “resilience” applicable to the Federal-Aid Highway Program. Pub. L. No. 117-58, § 11103(4) (codified at 23 U.S.C. § 101(a)(24)).

Engineers infrastructure for flood risk management. These and future analyses can provide insights into the progress that federal agencies are making and where additional action is needed. Further, as we stated in our September 2021 report on federally funded roads, this approach could help federal agencies, states, and other stakeholders work toward a common vision and ensure they consider a wide variety of opportunities to improve the climate resilience of federal programs and reduce federal fiscal exposure.

Chairwoman Johnson, Ranking Member Lucas, and Members of the Committee, this completes my prepared statement. I would be pleased to respond to any questions that you may have at this time.

GAO Contacts and Staff Acknowledgements

If you or your staff have any questions about this testimony, please contact Alfredo Gomez at 202-512-3841 or gomezj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement.

In addition to the individual named above, Joe Thompson (Assistant Director), Micah McMillan (Analyst in Charge), Holly Halifax, and Zoe Need made key contributions to this report. Other staff who made important contributions were Adrian Apodaca, Kevin Bray, Mark Braza, Janice Ceperich, Tara Congdon, Kathryn Godfrey, Susan Irving, Tracey King, Joe Maher, Celia Mendive, Tim Persons, Matt Voit, Jarrod West, and Kristy Williams.

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