Department of Commerce 2021 Climate Action Plan for Adaptation and Resilience

Photo courtesy of Brenda Altmeier, NOAA

August 27, 2021

SUBJECT: Policy Statement for Climate Change Adaptation and Resilience

The Department of Commerce is committed to fulfilling the vision set forth in Executive Order (E.O.) 14008, *Tackling the Climate Crisis at Home and Abroad*, through emulable leadership and action to integrate equitable climate considerations into all aspects of the Department's missions, policies, operations, facility management, real property, acquisitions, and use of resources.

As directed by E.O. 14008, the Department of Commerce's 2021 Climate Action Plan for Adaptation and Resilience highlights the important role the Department of Commerce plays in advancing climate adaptation and resilience. The actions captured in this Plan, as well as the broader work of the Department to address the climate crisis, support the Department's mission to create the conditions for economic growth and opportunity.

Global climate change is both a long-term challenge and a reality today; between short-term variability and long-term trends, it will affect a range of Departmental services, operations, programs, and assets. A changing climate will also result in financial, operational, and regulatory risks and opportunities across diverse industries and sectors at local, regional, national, and international levels.

With a substantial portion of the United States gross domestic product dependent on weather and climate, supporting economic growth and resiliency and equitably managing risks and opportunities requires reliable and timely climate information and services and the capacity to apply this information in decision-making. The Department, through its scientific and economic bureaus, is uniquely situated to develop and deliver these services to help the private sector, local, regional, Tribal, and state governments and resource managers plan for and make decisions to adapt to climate change.

The Department shall consider current and projected climate change impacts and use the best available science and information when undertaking planning, setting priorities for scientific research and investigations, and making decisions regarding the Department's resources, programs, policies, and operations.

As we execute on this Plan and our broader climate work, I ask for your support, leadership, and commitment to the Department's vision for success in enhancing preparedness for and resilience to the climate crisis, including areas that have co-benefits for mitigation and environmental justice by:

- Utilizing the Department's power of procurement to create equitable economic opportunities and invest in and maintain climate-ready and resilient facilities, products, and services;

- Providing climate science and services to the Federal Government and other stakeholders to support climate adaptation and resilience, including advanced measurements, tools and standards for climate consideration and decision support;
- Assisting federal agencies, local governments, regional entities, states, and indigenous communities in understanding climate variability and integrating climate information and resiliency into their near-term and long-term strategies and actions, including economic development and natural resources stewardship; and
- Promoting the advancements of a climate-resilient economy and sustainable growth to create market opportunities (both domestic and abroad), new businesses, advanced technologies, and quality jobs.

Gina Raimondo

Secretary of Commerce

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Background

The mission of the United States (U.S.) Department of Commerce (subsequently referred to as "the Department") is to create the conditions for economic growth and opportunity. The Department has approximately 47,012 employees working across every U.S. state and territory and in more than 86 countries worldwide, providing U.S. based companies and entrepreneurs invaluable tools through programs such as the Decennial Census, the National Weather Service, the National Marine Fisheries Service, and the Foreign Commercial Service. The Department is headquartered in Washington, D.C. and has thirteen bureaus and operating units (subsequently referred to as "OUs"), including: the Office of the Secretary (OS); Office of the Inspector General (OIG); Bureau of Industry and Security (BIS); Bureau of Economic Analysis (BEA); U.S. Economic Development Administration (EDA); U.S. Census Bureau (Census); International Trade Administration (ITA); Minority Business Development Agency (MBDA); National Institute of Standards and Technology (NIST); National Oceanic and Atmospheric Administration (NOAA); National Telecommunications and Information Administration (NTIA); National Technical Information Service (NTIS); and the U.S. Patent and Trademark Office (USPTO). The Department's facilities have diverse missions and operations ranging from large, complex research laboratories at NIST campuses to small NOAA weather stations. NOAA, NIST, and NTIA have facilities owned by the federal government and under their custody and control. Other OUs occupy facilities leased by the OUs and the OUs retain authority over facility operations; or the OUs occupy a facility under an occupancy agreement (OA) with the General Services Administration (GSA) that includes delegated facility responsibilities.

Executive Order (E.O.) 14008, *Tackling the Climate Crisis at Home and Abroad*, requires that each Federal agency develop a Climate Action Plan for Adaptation and Resilience. By policy and example, Federal climate leadership integrates climate change adaptation and resilience across agency programs and the management of Federal procurement, real property, lands and waters, and financial programs. In line with the directive from the White House Council on Environmental Quality, this document includes a summary of Department efforts to enhance climate literacy, an overview of Department climate vulnerability assessments, Department actions to enhance climate adaptation and resilience, and five priority actions the Department will undertake. This document is not comprehensive of the Department's work on climate, but rather highlights the integration of equitable climate considerations into aspects of the Department's missions, policies, operations, facility management, real property, acquisitions, and use of resources.

Why Is Climate Adaptation & Resilience Planning Important for the Department of Commerce?

The Department has a longstanding role in the creation of jobs that will sustain economic growth, the stewardship of environmental data, the protection of life and property from environmental hazards and in predicting changes in climate, weather, oceans, and coasts, and conserving and managing coastal and marine ecosystems and resources. This traditional role is now augmented by a whole of government approach focused on providing communities and businesses with the information, products, and services they need to prepare for, adapt, and prosper in a changing environment.

Climate change has a direct impact on the Department's mission and will result in financial, operational, and environmental risks to the Department's facilities, operations, lands and waters, and property as well as risks to the partners and customers it serves. However, it also presents opportunities for the

Department to lead by example by promoting climate-resilient growth and investment across diverse industries and sectors at local, regional, national, and international levels.

To continue to drive economic growth and ensure that U.S. businesses remain competitive, the Department will promote trade, economic and business development, innovation, entrepreneurship, accurate supply chain information, best practices, standards, and performance metrics that consider climate change and are resilient and adaptable as change continues to occur. The Department will also ensure it is positioned to help companies turn the emerging demand for climate-friendly technologies into a competitive advantage for U.S. manufactures and entrepreneurs.

The Department plays a substantial role in providing accurate and actionable data and predictions that inform and support private-sector climate adaptation and mitigation efforts. These efforts help drive the formulation of a vibrant U.S. private-sector ocean/coastal, weather, water, and climate data enterprise, including the Blue Economy, which is dependent on timely and coordinated provision of government-generated environmental data, model output, and forecasts. To make these assurances, the Department must continue to employ and train a highly skilled and knowledgeable workforce that can address climate change risks and create dynamic and emulable solutions.

Efforts to Enhance Climate Literacy into the Management Workforce

As a member of the National Climate Task Force (NCTF), designated in E.O. 14008, the Secretary of Commerce and heads of OUs are committed to further integrate climate change adaptation and resilience into all aspects of the Department's planning and operations through transparent decision-making and management of resources, both human and capital. Through the NCTF, Department-level town-halls, meetings with Department and OU leadership, and enhanced training for employees on climate change adaptation and resilience, the Secretary has set a standard for climate literacy within the Department. OUs have additional programs to increase staff literacy and capacity for services delivery. For example, NOAA's National Weather Service (NWS) hosts the Professional Development Series in Climate Services, which includes online distance learning modules on climate variability and changes, NWS climate data and products, and climate communication and outreach practices. Through these efforts, the Secretary and Department leadership have illustrated how the Department is well prepared to partner with the private sector and other governmental entities on adaptation and resilience efforts, and to advance clean technologies and support net-zero transitions that will ultimately lead to good-paying, sustainable jobs as the world fights climate change.

In addition, and in line with the Government Performance and Results Act of 1993 (Pub. L. 103-62), the Department will publish a new Strategic Plan by February 2022. The first milestone was an outline submitted to the Office of Management and Budget (OMB) on June 4, 2021. The Department is currently in Phase 1 of strategic planning: defining the planning approach, examining learning needs, and developing an initial draft outline. The Performance Excellence Team within the Office of the Secretary is currently meeting with OUs to understand their policy priorities, including how they are considering climate in their missions, programs, and operations.

Climate Vulnerability Assessment

The Department conducted a climate vulnerability assessment in 2011 and updated the assessment in 2014, as part of its *Climate Change Adaptation Strategy*, in accordance with Executive Order 13653, *Preparing the United States for the Impacts to Climate Change*. The Department plans to conduct an update to its climate vulnerability assessment, focusing on new or enhanced vulnerabilities and where further adaptation planning and/or mitigation is needed to continue mission operations, including those external to the Department.

Key vulnerabilities identified in previous assessments that remain, include:

i. Infrastructure, Facilities, and Operations Management

The Department and its thirteen OUs control facilities and infrastructure (personal and real property) across all fifty states, the territories, and overseas to facilitate the execution of its missions and operations. As a result of this geographical diversity, the Department's facilities and infrastructure are vulnerable to the full range of climate change impacts. The 2014 assessment found that:

- All the Department's facilities could be vulnerable to extreme weather events, including increased precipitation and extreme heat, which would increase the risk of flooding and increase cooling loads on building heating, ventilation, and air conditioning (HVAC) systems.
- The Department's coastal facilities could be vulnerable to rising sea levels, stronger and more frequent storms (e.g., hurricanes), while facilities in the Southwest could be vulnerable to increased wildfire risk and drought conditions. The Department's coastal facilities and infrastructure such as piers and warehouses could become inaccessible or unusable due to sea level rise, inundation, increased storms, and shoreline erosion.
- The availability of water, fuel, and other utilities needed at land-based facilities in support of NOAA ships and aircraft could be jeopardized due to increased demand caused by extreme weather events. Functionality of systems and equipment, e.g., cooling and heating, and electronics on NOAA platforms is at risk due to the potential for exceeding operating parameters and capacities designed for current weather conditions.

Three of the Department's OUs have agency-owned property. Other OUs occupy facilities leased by the OUs and the OUs retain authority over facility operations; or the OUs occupy a facility under an occupancy agreement (OA) with GSA that includes delegated facility responsibilities. Therefore, while the Department will need to take steps to minimize the risk to its facilities and operations from climate variability and change, it will also need to coordinate closely with GSA to ensure all of the Department's facilities and infrastructure are resilient in a changing climate. To minimize risks to its own facilities and operations, the Department prioritize climate-resilient and sustainable design for major renovation projects, as well as operation and maintenance of existing facilities to the maximum extent possible.

The Department has also identified and studied the potential impacts of a changing climate on its real property inventory to the maximum extent practicable.

ii. Economic Growth

Climate change will affect the Department's ability to foster U.S. competitiveness that drives new business development and creates quality jobs. As the Department develops tools, systems, policies, and technologies critical to transforming our economy, it will need to consider climate change so that these products and services will continue to promote a strong, resilient economy in a changing climate. The 2014 vulnerability assessment also noted that:

- Disruptions in ports, other transportation infrastructure, and supply chains would greatly impact the Department's ability to promote U.S. exports and drive economic growth.
- Climate change impacts on the Department's primary customer base--U.S. businesses, workers, and communities--would affect the Department's ability to foster business and economic development.
- Climate change impacts on U.S. businesses and communities would increase the interest in climate-friendly and sustainable technologies to help them minimize their economic and business risks and to capitalize on new, entrepreneurial opportunities in a changing climate.
- The increased demand for climate change adaptation-related technologies and the associated increase in patent application filings would impact the Department's ability to process such applications in a timely manner, having a direct impact on U.S. competitiveness and economic growth.

To continue to drive economic growth and ensure that U.S. businesses remain competitive, the Department will promote trade, economic and business development, innovation, entrepreneurship, accurate supply chain information, best practices, standards, and performance metrics that consider climate change. The Department will also ensure it is positioned to help companies turn the emerging demand for climate-friendly technologies into a competitive advantage for U.S. manufacturers and entrepreneurs.

iii. Science and Information

U.S. buildings, infrastructure, and communities have the potential to suffer catastrophic loss due to extreme events such as hurricanes, tornadoes, wildfires, earthquakes, droughts, and flooding. At present, the necessary metrics, tools, and standards needed to ensure structural and community resilience are limited to enable communities to recover rapidly from these disasters with minimal loss of life, damage to buildings and infrastructure lifelines, and disruption to commerce.

The Department is home to four of the Nation's premier science and information agencies: NOAA, NIST, the U.S. Census Bureau, and BEA. The Nation relies on accurate and reliable scientific, economic, and demographic information provided by these agencies to make informed decisions and manage risk. Through the work of these agencies, the Department can continue to generate and communicate new, cutting edge, scientific understanding of technical, economic, social, and environmental systems in a changing climate. Climate change will increase demand for climate, weather, economic, ecological, and demographic data, as well as the information and services the Department provides. The 2014 assessment also noted that:

- Governmental and nongovernmental entities and the private sector will look to the Department to provide a better understanding of climate change and to develop advanced measurements and standards for environmental monitoring to assess how physical and biological processes may be altered by climate change to enhance weather, water, and climate reporting and forecasting.

- Government and nongovernmental entities and the private sector will need accurate ecological, economic, social, and demographic data from the Department that considers potential effects of climate change so that they can effectively assess their own vulnerabilities and be prepared for the variability that climate change may bring to improve our understanding of the U.S. economy, society, and environment in order to make informed decisions.
- There will be an increased demand for Department-produced tools to help governmental and nongovernmental entities and the private sector transform this science and data into effective decision making that minimizes their risks to climate change will increase as more climate and other science and data becomes available.

The Department plays an essential role for advancing the nation's weather, water, and climate science to improve understanding of the changing risk from climate change, including coastal inundation, heat waves, droughts, and extreme events and storms. Understanding future risk will enable better vulnerability assessments and target where economic and adaptation strategies are needed. NOAA, NIST, the U.S. Census Bureau, and BEA will continue to support and enhance their scientific, information, and service capabilities to meet the needs of Federal and non-Federal partners in a changing climate.

iv. Environmental Stewardship

Environmental stewardship is a major mission of the Department which works to support climate change adaptation, develop sustainable and resilient fisheries, conserve habitats and species, and support communities in ways that are environmentally and economically sustainable, among other stewardship objectives. Climate change presents new challenges to the Department's stewardship mission to ensure that our ocean and coastal species, habitats, ecosystems, maritime cultural resources, and communities are resilient and sustainable. The 2014 assessment also noted that:

- Many climate impacts such as rising sea levels, increased flooding, higher average air and water temperatures, increased droughts, storms, and ocean acidification, will transform and/or result in the direct loss of coastal habitats and directly affect coastal and marine ecosystems, such as within our National Marine Sanctuaries, challenging the ability of the Department's existing natural resource management systems that are designed for relatively static conditions.
- Climate change may allow pathogens, parasites, and invasive species to flourish in new areas and spread more rapidly with possible cascading effects through marine and coastal ecosystems, also challenging the Department's existing natural resource management systems.
- Climate-driven changes in ocean and coastal conditions will impact the distribution and abundance of fish stocks and fisheries, increasing the demand for information, tools and actions that promote adaptation of marine resources and the industries/communities that depend on them.
- Many climate change impacts such as rising sea levels and increased extreme storm events will threaten coastal communities, placing lives and properties at risk, increasing the need for the Department to help these communities adapt to climate change so that they will be economically and environmentally sustainable.
- Climate-driven changes in ocean and coastal conditions will increase the demand for NOAA action for the protection and recovery of threatened and endangered species under the Endangered Species Act, Marine Mammal Protection Act, and other Federal and NOAA mandates.

- Climate-driven changes, such as in precipitation and temperature, will affect water supply and availability for communities and natural resources. These changes will have major impacts on the Department's environmental stewardship mandates and will significantly increase the demand for NOAA products and services needed by government and nongovernmental entities to prepare for and respond to changing water conditions (quantity and quality).

Climate change challenges the Department's ability to foster and sustain healthy and resilient communities and ecosystems and manage the Nation's coastal and ocean resources to sustain jobs and economic activities. There has been progress in some areas since the 2014 assessment. For example, NOAA has conducted climate vulnerability assessments for major fish stocks and protected species (marine mammals and sea turtles) in most regions. Climate vulnerability assessments have also been completed for coastal habitats and fishing communities in the Northeast region. More information on these efforts is available at this link: https://www.fisheries.noaa.gov/national/climate/climate-vulnerability-assessments. The Department will continue to adjust how it manages species, habitat, and ecosystems in a changing climate to achieve its environmental stewardship mission goals.

Through providing weather, water, and climate information and products on all timescales, the Department enables communities in all locations across the United States to be resilient to climate-related risks, including extreme heat, precipitation/drought, agriculture, commerce/transportation, and severe weather. Further, the Department is increasingly focusing on service provision targeted to reach minority and socially vulnerable communities as part of this effort.

v. International Engagement

International climate impacts affect the Department's mission to create opportunities for economic growth and opportunity.

ITA works to improve the global business environment and help U.S. industry compete in all regions of the world. As identified in the Department's response to the National Security Administration's (NSA) *International Climate Strategy Plan*, ITA will develop strategies to address climate impacts on international trade, investment, and export promotion using innovative, high-quality, in-depth trade analyses. ITA also provides country level market analysis such as Country Commercial Guides which often include analysis of climate-related opportunities and barriers to export for U.S. industry.

NOAA also provides critical climate data and services to international partners to promote disaster risk resilience and effective climate adaptation strategies abroad, which support increased economic stability. For example, through ongoing participation in Regional Fisheries Management Organizational (RFMOs), NOAA will, as appropriate and necessary, introduce measures to integrate climate change impacts into decision-making processes and support the development of more resilient, adaptive approaches to the management of shared marine resources affected by climate change.

Actions to Enhance Climate Adaptation and Resilience with Climate-Ready Sites and Facilities

The Department's facilities are an integral part of its mission and a significant investment to operate, maintain, repair, and modernize. These essential assets are vulnerable to severe impacts due to climate change. Currently, facility investments focus on site-specific mission needs and facilities-need priorities.

The planning criteria identify risks due to climate change and environmental conditions, opportunities to increase adaptation and resilience, and the estimated rough order of magnitude costs for these projects. The Department continues to apply and integrate climate change risk-based assessment to anticipate the potential consequences of climate change on its facilities. The resulting needs and priorities will be used to inform investment decisions. Below are specific actions NOAA and NIST are taking to enhance climate resilience with climate-ready sites and facilities.

NOAA is currently conducting a phased approach to facility planning that develops risk-based investment decisions. Phase 1 includes refreshing the multi-phased climate risk assessment and facility prioritization completed in 2016 to identify top-tier NOAA facilities most at risk to climate change. The update will review the prioritization method, update facility vulnerabilities, and identify long-onset threat events such as mean sea level rise and more acute events, such as wind, tidal surge, floodwater inundation, wildfires, and increased heat. Phase 2 will develop guiding principles and adaptation/resilience strategies to further inform current and future facility planning and investment activities such as:

- A layered approach with a range of solutions that have minimal cost, such as: backup generators that can be elevated; storm-resistant windows that can be added to existing structures to provide the first line of fundamental protection; basic power redundancy/backup power supply; and stormwater management.
- Incorporating adaptation strategies into capital and maintenance project planning and design to inform budget requests.
- Incorporating an evaluation of location factors to include facility location effect on minority and low-income communities.

Phase 3 includes leading by example through planning, designing, constructing, maintaining, and operating new facilities with net-zero emissions of carbon dioxide and other greenhouse gases, using a source-energy definition, and minimizing scope-3 embodied carbon emissions. The Department will further commit to meeting its net-zero emissions performance standards with minimal or no use of carbon offsets.

Additional areas where NOAA is leading by example to enhance climate-ready sites and facilities includes its ship design for Class A and B vessels. The vessels use a blue drive with an energy storage system that ensures continuity of power and reduces greenhouse gas emissions. This hybrid technology reduces overall maintenance and fuel use. Additionally, based on location risk factors, NOAA's new pier structures and onshore support facilities are designed to withstand Category 5 hurricane force impacts for NOAA ships tied to the structures. The new pier design includes climate-resilient floating pier structures versus fixed structures, when possible. New or replacement pier projects will also include new ship support utilities and a focus on energy conservation efforts such as utilizing low-emitting diode (LED) lighting, considering renewable energy project implementation, such as geothermal heating and cooling systems and electrical generation via solar and/or wind-electric generation. Pier projects will also assess opportunities for implementing a "living shoreline" to minimize shoreline damages caused by wave erosion and sea-level rise.

A key lesson learned from the climate vulnerability assessment from 2014 was the need to engage, communicate, and collaborate with NOAA's stakeholders at all levels of leadership, management, and operations as well as working with stakeholders in the communities, counties, states, and other federal agencies to understand severe impact recovery plans and to assess NOAA site-specific operational continuity.

NIST's mission includes resilience research on the impact of multiple hazards on buildings and communities and on post-disaster studies that can provide the technical basis for improved standards, codes, and practices used in the design, construction, operation, and maintenance of buildings and infrastructure systems. NIST leads several national efforts within its Engineering Laboratory to develop guidance and tools to help communities improve the resilience of their buildings and infrastructure systems. The Community Resilience Program, part of NIST's broader disaster resilience work, complements efforts by others in the public and private sectors. NIST focuses on research, community planning and guidance and stakeholder engagement.

Actions to Enhance Climate Adaptation and Resilience with Climate-Ready Products and Services

There is an increasing public demand for environmental information and forecasts of weather, water, and climate phenomena. These products are produced by DOC and drive a significant and growing part of National Gross Domestic Product (GDP), and mitigate economic and human loss due to an increasing number of major disasters every year (in 2020 there was an unprecedented $22 billion spent as a result of natural disasters). In addition, DOC environmental data and services underpin a private-sector U.S. weather, water, and climate enterprise estimated to be worth over $7 billion a year.

Concerns about the effects of climate change are likely to increase consumer demand for data and products, adoption of more sustainable and environmentally friendly business practices, and increased demand for clean energy. The Department, along with the Departments of Interior and Energy, recently announced a shared goal to deploy 30 gigawatts (GW) of offshore wind in the United States by 2030, while protecting biodiversity and promoting ocean co-use. Meeting this target will trigger multiple capital investments in projects on both U.S. coasts, create tens of thousands of good-paying union jobs, with more than 44,000 workers employed in offshore wind by 2030 and nearly 33,000 additional jobs in communities supported by offshore wind activity. It will also generate enough power to meet the demand of more than 10 million American homes for a year and avoid 78 million metric tons of CO2 emissions.

The Department's efforts to enhance climate resilience in real assets extends beyond its own physical infrastructure to focused community-based resilience efforts using NOAA climate products and services. For example, with 190 facilities from the Caribbean to Eastern Pacific, NWS has a widely distributed footprint and provides forecasts, warnings, decision support, and extreme climate and weather resilience services directly to communities. Partnerships with state and local governments, as well as commercial, non-governmental, and faith-based organizations amplify education, outreach, and build resilience to extreme events throughout society.

The Department is also committed to helping turn demand for clean energy and sustainable production pathways into a competitive advantage for U.S. manufacturers. Specific ways the Department is enhancing climate adaptation and resilience with climate-ready products and services are detailed in the priority actions below.

Priority Climate Adaptation and Resilience Actions

The Department's Chief Sustainability Officer will be responsible for carrying out the climate adaptation and resilience activities described in this plan and coordinating with each OU's Chief Sustainability

Officer, the representative to the White House Environmental Justice Interagency Council, and other agency officials, as appropriate, to plan, implement, and report their different actions.

The White House Council on Environmental Quality's *Instructions for Preparing Draft Climate Action Plans under Executive Order 14008* asks federal agencies to include five priority actions in the agency Climate Action Plan. In accordance with these Instructions, the Department has identified the following priority actions to advance climate adaptation and resilience. These actions are not comprehensive of the entire breadth of climate work within the Department but highlight critical elements to the Department's larger climate portfolio.

1. Foster and enhance the resilience of vulnerable communities against the key climate risks of extreme heat, drought, wildfires, flooding, coastal inundation and impacts to fisheries.
2. Support the development of climate-ready infrastructure via the development of forward-looking building standards.
3. Improve the ability to process patent application filings for climate change adaptation-related technologies in a timely manner.
4. Improve current analyses and systematically update projections on the impacts of climate change on the national economy as new data is available.
5. Further embed climate considerations into the Economic Development Administration's grant making, through investment priorities, grant criteria, application evaluation, and economic development planning.

Priority Action Item #1: Foster and enhance the resilience of vulnerable communities against the key climate risks of extreme heat, drought, wildfires, flooding, coastal inundation, and impacts to fisheries.
Lead Office/Bureau: NOAA
Risks/Opportunities: Climate change impacts such as rising sea levels, increased coastal storms, flooding, higher air and water temperatures, increased droughts, wildfires, and ocean acidification, are impacting habitats, ecosystems, industries, and communities. Communities across the U.S. are experiencing complex challenges resulting from insufficient capacity and readiness to prepare for and manage the effects of a rapidly changing climate.
Scale: National/Regional/Local
Timeframe: Ongoing. Timeframes for specific milestones listed below.
Implementation Methods: **(1) Engaging with Partners/Providing Technical Assistance --** NOAA will engage with partners to plan for and adapt to climate change, including by offering training, delivering fit-for-purpose information, implementing habitat restoration and nature-based approaches for resilience, and helping decision-makers to prioritize adaptation measures. ● *Habitat Restoration and Nature-Based Solutions:* With over 100 staff throughout the country, the Office of Habitat's Conservation's Restoration Center is a recognized center of excellence providing project design, permitting, construction, and monitoring expertise to local partners. Fisheries biologists, engineers, and other experts will work directly with coastal communities to overcome technical hurdles and shape effective solutions that maximize resource benefits, the health of our living marine resources, and community resilience. NOAA will continue to work with

partners on nature-based approaches and to conduct outreach and engagement under the President's Conserving and Restoring America the Beautiful.

- *Engagement with Communities to Support Climate Change Adaptation.* Many NOAA programs already engage with communities to increase resilience and support climate-smart planning and development. For example:
    - The Sea Grant network in 34 coastal states and territories includes more than 500 extension professionals delivering science-based climate information in coastal communities.
    - The 34 Coastal Zone Management Programs support community engagement and capacity building, planning, and implementation in support of climate adaptation.
    - The National Coastal Resilience Fund (NCRF), a partnership between NOAA's Office for Coastal Management and the National Fish and Wildlife Foundation, funds projects to restore and expand natural infrastructure to protect coastal communities while also enhancing habitat.
    - The Regional Integrated Sciences and Assessment Program undertakes targeted research within a network of 11 regional programs that support the development of knowledge, expertise, and abilities of decision makers to plan for and adapt to climate variability and change.
    - Regional Climate Centers, in partnership with Regional Climate Services Directors, provide climate data and information to six regions encompassing the entire United States, providing sector-specific and value-added data products and delivering effective regional climate services to support evidence-based decision making.
    - The National Integrated Drought Information System (NIDIS) provides drought early warnings for key regions of the country and supports research to better understand and predict drought and its impacts.
    - NOAA's Weather Forecast Offices, River Forecast Centers, and National Centers, including the Climate Prediction Center, provide operational forecasts for every U.S. county and territory.

Milestone(s):

- In fiscal year (FY) 2021-2022, technical assistance will be provided to over 300 projects and 100 communities to implement and monitor restoration solutions to increase ecosystem resilience.
- In FY 2021-2022, develop new training series on topics such as how to incorporate habitat restoration into relocation planning and other climate adaptation approaches.
- In FY 2021-2022, a greater number of regions, communities, and tribes will be engaged with NOAA's regionally-based programs that deliver climate information, resilience training, and interdisciplinary research to assist adaptation planning.
- Inform climate-sensitive users through production and delivery of Quarterly Climate Impacts and Outlooks reports for 10 regions and sub-regions covering the entire U.S.

(2) Information/Tools/Services -- NOAA will strengthen its suite of information, tools, and services to bolster planning, preparedness, implementation, and awareness of climate adaptation techniques for increased resilience, including restoration.

- *Scientific Information/Tools.* NOAA provides a wide range of scientific support for planning to promote resilience through tools, maps, and guidance documents.
    - The Effects of Sea Level Rise Program develops tools to identify habitats vulnerable to sea level rise and inundation, anticipate where priority habitats (e.g., wetlands) will be in 50-

100 years, and design and implement restoration projects that provide shoreline protection.
    - The Office for Coastal Management's Digital Coast offers data, tools, and training for coastal communities to understand risks associated with and plan for the impacts of sea level rise and other coastal hazards. Foundational data sets, including The National Spatial Reference System (NSRS), the National Bathymetric Source (NBS), and the National Water Level Observation Network (NWLON) system, are critical to the development of tools to help communities understand these risks. The NOAA Restoration Atlas is an interactive application for exploring projects and serves as a resource for restoration practitioners and the public.
    - The U.S. Climate Resilience Toolkit (USCRT) helps municipal planners, resource and facility managers, utilities, and businesses find and use science data and information to build resilience plans for extreme events and climate-related hazards, and helps local municipal governments develop climate resilience plans using the USCRT's "Steps to Resilience" and other proven tools.
    - The National Water Model provides forecasts of water levels in thousands of rivers and streams nationwide, enabling effective preparation and mitigation of flooding hazards, as well as mapping of likely inundation zones.
    - Finally, NOAA adds value to basic data by aggregating and distilling it into value-added products. These range from baseline data like the U.S. Climate Normals to context-setting tools like Climate at a Glance and culminating in NOAA's leadership of the periodic National Climate Assessment, which frames broad trends and projections across the Nation's regions and many socio-economic sectors.
- *Education/Awareness.* Empowering students and educators through educational activities, particularly from underserved and vulnerable communities, is important to creating and fostering resilience, as informed citizens are better able to understand issues and take action to protect and restore their environments. NOAA programs like the National Estuarine Research Reserve System, National Marine Sanctuary System, Bay Watershed Education and Training Program, and National Sea Grant College network engage students, educators, and volunteers to foster stewardship and conservation. NOAA's climate.gov website provides authoritative, clear and timely climate science and information. This online resource raises climate and environmental literacy for educators and the public at large, empowering them to consider how our changing planet impacts our daily lives.

Milestone(s):

- Develop and enhance science-based maps, observing systems, models, training, and other tools and services that support effective, climate-resilient planning and management, including finalization of the NOAA Mitigation Policy, in FY 2021-2022.
- In FY 2021, NOAA programs are predicted to engage/reach more than 116,000 students and 29,000 educators.
- In FY 2021-2022, a greater number of communities will be trained with the USCRT.
- Compute and release detailed climate-monitoring data for the U.S. by the 5th business day of each month to be used in Climate-at-a-Glance, Monthly Climate Reports, the Annual State of the Climate Report, and the National Climate Assessment.
- Annual NOAA Execution of Integrated Annual Operating plans for Weather, Water, and Climate activities.

(3) Grants -- NOAA will execute a variety of competitive and partnership-based grant programs, across its mission lines, to advance the climate science that informs resilience measures, to support coastal and regionally based climate services, and for habitat restoration and planning/implementation of nature-based approaches to climate adaptation. NOAA uses grants as a critical and flexible tool to support long-term science partnerships through Cooperative Institutes, to conduct year-long and multi-year priority research and to facilitate research and information related to time-sensitive and to address short-term needs and priorities.

Milestone(s):

- Increased number of grant awards that support regional and community-based research, planning, restoration, and interdisciplinary work to better understand, identify, communicate and implement effective adaptation measures in response to various climate-related risks.

Performance metrics:

- Number of habitat acres/stream miles restored
- Number of volunteer/service hours of coastal community participation associated with habitat protection, restoration, education, and outreach
- Number of communities and extent of regions served with NOAA technical assistance (training, capacity building, extension, etc.) in support of building adaptation and resilience
- Number of maps, models, and other tools developed to support effective climate-resilient ecosystem management
- Number of people engaged/reached through education/awareness activities

Intergovernmental Coordination: NOAA has extensive collaborations with federal, state, and local governments, private sector, and nongovernment organizations to support climate preparedness and resilience of communities. These collaborations include regional landscape-scale conservation partnerships like the Gulf of Mexico Alliance, Great Lakes Restoration Initiative, and the Chesapeake Bay Program. It also includes reach into state and local governments through partnerships such as the American Association of State Climatologists and National Integrated Drought Information System activities through the Regional Drought Early Warning Systems and associated integrated products available through the U.S. Drought Portal. NOAA maintains partnerships with State and local emergency managers, Tribal governments, and through the Weather Ready Nation Ambassadors and Storm-Ready programs, builds partnerships with faith-based, academic and private-sector organizations which amplify warning and preparedness messages to communities at multiple scales. Interagency collaboration on climate change research, assessments and outreach occurs through the U.S. Global Change Research Program.

Resource Implications: NOAA can accomplish the initiatives identified for this action using existing resources. NOAA is requesting funding in FY 2022 to enhance coastal resilience through habitat restoration and to support NOAA's efforts to conserve at least 30 percent of the Nation's land and waters by 2030. This request includes funding for NOAA's Sea Grant College Program to increase coastal community understanding of risk factors and patterns for specific populations, develop key decision-making tools and applications, and address critical gaps in coastal processes and knowledge about communities impacted by changing coasts, including underserved or vulnerable communities. The FY 2022 request also includes funding to expand the NCRF to help coastal communities and ecosystems prepare for and recover from extreme weather events, climate hazards, and changing ocean conditions. Other requests focus on scaling regional data and information services provided through the Regional Climate Centers and Regional Climate Services Directors.

NOAA is also requesting additional funds in FY22 to enhance sub- seasonal to seasonal (S2S) climate forecasting capabilities, expand current integrated flood inundation mapping to the entire United States, expand products available to support wildfire prediction and mitigation, as well as enhanced social science and translation services to reach vulnerable and underserved communities. The FY22 request supports an expanded RISA program, a Climate-Smart Communities Initiative to leverage the Climate Resilience Toolkit, resources to address Tribal resilience issues pertaining to drought, and to help inform regional resiliency measures with more tailored climate change projections out to the year 2050.

Challenges/Further Considerations:

- NOAA's and the Department's multiple programs that play complementary roles to foster and accelerate resilience at the regional and community level need to be better coordinated with one another, and with other programs in other Federal agencies, non-governmental organizations and the private sector.
- Climate change disproportionately impacts disadvantaged, minority, and elderly populations who, research shows, are more vulnerable and less able to adapt. These populations have challenges that require expertise, time, resources, and capacity to address. Breaking down these barriers requires deep trust-building and peer-to-peer learning with the community.
- Climate extremes work in concert with climate change to impact vulnerable groups. Heat waves, on top of a climate change-based increase in summer temperatures, can have detrimental impacts on inner cities and on activities like school sports practice. Improved data and product suites and outreach to inform those who could be impacted by this combination of effects will help them mitigate and adapt to these changing conditions.
- A healthy coastal environment has direct and indirect benefits to our society with our coasts and oceans providing a multitude of essential products and services such as food, energy, and jobs. Climate impacts in the United States are occurring most acutely along our coasts, where 40% of the U.S. population currently live and work, placing a disproportionate segment of our society and supply chains at increasing risk from hazards such as hurricanes, storm surge, and sea level rise.
- Healthy coastal habitats, such as marshes and coral reefs, protect ecosystems and communities from storms and are a key source of livelihoods from tourism and fishing.

Highlights of Accomplishments to Date:

- Climate.gov: The site's readership has grown to almost 1 million visits per month; its contents are often cited and reused by mainstream news media; it was recently cited by Facebook as one of the world's top three most authoritative sources of climate science information; and it has won two Webby Awards (the web's highest honor).
- RISA: For over 25 years, the NOAA Regional Integrated Sciences and Assessments (RISA) teams have built sustained relationships between decision-makers and researchers that support collaborative and equitable adaptation to climate risks, including storms, droughts, floods, extreme heat, forest fires, and more. As an example, The NE RISA team co-created a heat vulnerability index with the NYC Department of Health and Mental Hygiene. This heat index helps city decision makers target their support toward NYC's most heat vulnerable neighborhoods.
- USCRT: Over the last 6 years, the U.S. Climate Resilience Toolkit (USCRT) has been used by communities and businesses across the nation in providing science-based consultation services and in helping local, Tribal, and state governments develop and implement climate resilience plans. Working together, this partnership has supported over 30 municipal governments.

- Combined excessive heat and humidity have a potentially deadly impact on those participating in sporting events in locations of high heat and humidity. The Carolinas RISA and the Southeast Regional Climate Centers have developed and expanded a wet-bulb global temperature dataset for much of the southeastern U.S., where these conditions are prevalent. This data is used by public schools, universities, and professional sports facilities, in concert with local temperatures, to identify and mitigate harmful heat conditions.
- *Mission Iconic Reefs* is an unprecedented effort to restore seven ecologically and culturally significant coral reefs within Florida Keys National Marine Sanctuary. Working with multiple partners, the effort has already leveraged nearly $10 million for research, site preparation, capacity building, and restoration activities. The seven sites represent the diversity and productivity of Florida Keys coral reefs and span a variety of habitats and human uses.
- Habitat Restoration: To slow the high rate of wetland loss in Louisiana, NOAA, in partnership with Louisiana, made significant on-the-ground progress in implementing two large-scale wetlands restoration projects increasing protection for Louisiana's property and fisheries by restoring Louisiana's natural first line of defense from coastal storms.

Discussion: U.S. communities and businesses increasingly depend upon NOAA as a premier provider of climate resilience information, data, decision support tools, and on-the ground advice and services. NOAA's programs (including those that focus on habitat protection and restoration) are critical to resilience building, national security, and economic vitality; the protection of life and property; the sustainable use of our resources; and the preservation and resilience of our natural environment.

Priority Adaptation Action #2: Support the development of climate-ready infrastructure via the development of forward-looking building standards

Lead Office/Bureau: NOAA and NIST will jointly lead this effort, with NOAA and NIST working together and with other federal and non-federal entities, as needed, to identify and utilize the appropriate climate data for application in building standards. As this effort progresses, NOAA and NIST anticipate that their roles will be further clarified as NOAA develops additional data, projections, and/or decision support tools for NIST application in adaptive, forward-looking building standards.

Risks/Opportunities: The climate is changing at an increasingly rapid pace. Climate change will impact the built environment, and standards based on the assumption of a stable climate system will expose many federal and non-federal investments to significant, but avoidable, risk. By considering future conditions, the Department, via NOAA and NIST, will provide national leadership to inform federal and non-federal investments in resilience.

Scale: National/Regional/Local. The project will identify and establish authoritative climate data and projections that will be used to develop standards, building codes, and voluntary standards implemented by various levels of government across the nation and demonstrate leadership in supporting climate resilience.

Timeframe: Start: FY 2021 and ongoing. The initial phase of this work will be completed within 1-2 years. Consistent with Congressional direction, however, this action will be ongoing as NIST utilizes NOAA data to support the stakeholder community consensus standard-setting process led by standards development organizations and, as NOAA supports NIST in the utilization of these data and in the development of new information, as needed, to account for increasingly extreme weather events and other climate change challenges.

Implementation Methods: NOAA will identify and, where needed, develop an authoritative set of forward-looking climate information that meets the requirements defined by the building science community with NIST engagement, which are not static due to the infrastructure and building community's consideration of functional recovery goals – the concept that building and infrastructure

standards move beyond life safety only and support functional restoration in a timely manner following a disruption. NOAA will model future extremes and establish the research approaches and plans required to generate the improvements to this climate prediction information required to support the needs of building code, engineering standards and zoning decision makers. NIST will engage the primary building code and standards developing organizations, the civil engineering community, and other relevant stakeholders to ascertain scientific and engineering requirements. This work will clarify where existing NOAA science can be incorporated now as well as those areas where NOAA data, models, mapping, and tools must be advanced or developed to meet the requirements.

Performance Metrics:

- Number of building code and standard revisions reflecting authoritative, forward-looking information about a changing climate as tracked by monitoring the inclusion of forward-looking design standards produced by relevant standards development organizations (e.g., American Society of Civil Engineers).
- The initiation of at least one demonstration project with a Standards Development Organization that links engineering requirements for a specific hazard (e.g., hurricanes) to available climate change information.
- Number of workshops or other official coordinated efforts and related products (e.g., reports) that bring together climate scientists and engineers to advance progress on this interdisciplinary effort.
- Number of scientific publications and other technical guidance documents describingresearch results for the application of climate science data and/or projections to the provision of infrastructure design standards.

Intergovernmental Coordination: Leveraging the NIST-led interagency National Windstorm Impact Reduction Program (NWIRP) and NOAA's ongoing work with other federal agencies to facilitate climate resilient infrastructure planning, NOAA and NIST anticipate identifying other key federal agencies with which to collaborate to ensure that any standards developed are useful and adaptive to other agencies' needs. NOAA and NIST will coordinate with GSA and DOD to consider other federal agency building and performance standards. Moreover, the standards produced will be used by state and local governments to set building codes and so consultation with these non-federal users, including the International Code Council (ICC), American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), and American Society of Civil Engineers (ASCE), will be essential to the successful development of forward-looking building standards.

Resource Implications: At the direction of Congress, NOAA and NIST have begun this work. Included in the FY 2022 President's budget request for NIST is an increase for climate and energy. Of this request, a portion is dedicated to support building resiliently for a changing climate by investing in ten new staff, equipment for structural testing, and grants and contracts for data collection. This increase builds on the current NIST investments in programs such as community resilience, fire risk reduction, windstorm impact reduction, and disaster and failure studies.

Included in the FY 2022 President's budget request for NOAA is an increase for climate-related activities to support the collection of climate data and the development of forward-looking climate projections, such as those that may be utilized by NIST to support the development of building standards. NOAA anticipates that some portion of these funds will support initial work with NIST on this effort. In addition, NOAA's development of new data or modeling in support of this action and in NOAA's ongoing efforts to support NIST will require additional resources.

Challenges/Further Considerations: While there are some structures already in place at NIST and NOAA to support research and interagency coordination, strengthening the interdisciplinary engagement of the climate science and engineering expertise from across these two distinct fields and garnering support to include climate change and building code research amongst their research objectives requires thoughtful consideration of current resource constraints. Accounting for the accelerated pace of climate change, particularly along the coasts, coupled with the historically slow pace of the adoption and execution of new building standards, NOAA and NIST must accelerate this work to achieve its goals.

Highlights of Accomplishments to Date: On January 26, 2021, NIST convened a one-day virtual workshop between stakeholders in the building codes and standards community and stakeholders in the climate science community. NOAA participated in the workshop at which stakeholders discussed climate science data, models, and tools in the context of the planning needs of the building regulatory community and identified gaps. NIST is leveraging its NWIRP interagency Windstorm Working Group as a forum to exchange information with the NOAA climate community and other federal agencies and collaborate with the American Society of Civil Engineers on a multi-year climate change initiative that brings together Engineers and Climate Scientists to conduct formal assessments of climate science and civil engineering applications to make recommendations that support the development of forward-looking Civil Engineering design standards. NIST also met with leadership from the International Code Council (ICC) in February of 2021 to discuss the confluence of building codes, climate change, and resilience. NIST will continue to engage with ICC to bring climate science to the consensus building code adoption process, including consideration of international efforts through the Global Resiliency Dialogue, a multinational effort to address evolving climate risks in codes and standards. NOAA is leveraging its considerable climate data holdings and its ongoing efforts with other federal agencies, including working with the Department of Defense to co-develop a Regional Sea Level Database to provide a consistent and authoritative approach to account for changing sea levels and flood exposure at 1,774 DoD installations worldwide. These data are now required to be used in the planning for all DOD built infrastructure, enabling DOD infrastructure planning to consider future, scenario-driven sea level rise using a standardized and authoritative set of data.

Discussion: NOAA and NIST are uniquely suited within the Department to play vital, complementary roles in preparing our Nation for climate change in the development of standards recommendations for the built environment. At the direction of Congress, NOAA will identify climate data and projections and will support the utilization by NIST of a consistent and authoritative set of climate information, including the development of new information that NIST needs in their codes and standards engagements. This effort shall serve to aid both federal and non-federal bodies to develop standards, building codes, and voluntary standards that account for increasingly extreme weather events and other climate change challenges. Additionally, this effort aims to demonstrate the Department's unique capacity to employ climate science to inform the Nation's plans for the built environment, including achieving equitable resilience outcomes for vulnerable communities and facilitating the durability of our Nation's climate-ready infrastructure investments. By developing forward-looking building standards that are informed by climate science and can be understood and utilized by local governments and civil engineers, NOAA and NIST will enable federal and non-federal decision makers to better adapt to climate change to offset the destabilizing forces of changing conditions on our Nation's infrastructure.

Priority Action #3: Improve the ability to process patent application filings for climate change adaptation-related technologies in a timely manner.

Lead Office/Bureau: U.S. Patent and Trademark Office (USPTO)

Risks/Opportunities: The increased demand for climate change adaptation-related technologies and the associated increase in patent application filings would impact the Department's ability to process such applications in a timely manner, having a direct impact on U.S. competitiveness and economic growth.

Scale: National

Timeframe: Ongoing. Timeframes for specific milestones listed below.

Implementation Methods:

USPTO continues to make available its Patent Prosecution Highway (PPH) and "Track 1" prioritized examination programs to provide opportunities for fast-tracked examination of patent applications. Each of these programs is available upon request from applicants, provided they meet the prescribed requirements, follow the prescribed procedures, and pay any necessary fees. The programs are administered through existing fast-track examination processes at the USPTO. Additionally, when certain requirements are met, USPTO prioritizes examination on patent applications relating to inventions which will materially enhance the quality of the environment or contribute to the development or conservation of resources.

USPTO continues to consider additional opportunities to enhance the efficiency and timeliness of its application processing including for applications in technologies addressing climate change mitigation or adaptation. Recently, the USPTO formed an internal Climate Working Group (CWG) that will be broadly considering climate change including in relation to processing of applications in technologies addressing climate change.

Key Milestones:

- USPTO received 12,074 petitions to use "Track 1" for prioritized examination in FY2019 and 13,451 in FY 2020.
- USPTO received 7,948 PPH petition requests in FY 2019 and 8,344 PPH petition requests in FY 2020 (of 8,344 PPH petition requests, 728 were climate-related).

Performance Metrics:

- Number of "Track 1" applications received per year.
- Continue to examine applications with grantable PPH requests in an expedited manner.
- In a timely manner, process certain patent applications related to the quality of the environment or the development or conservation of resources.

Intergovernmental Coordination: In 2014, the USPTO launched updated PPH pilots with 17 global partners to further streamline the PPH process for users of the program in applicable countries. The USPTO now has PPH programs in place with 36 other patent offices around the world, representing dozens of major U.S. trading partners.

Resource Implications: The PPH also allows the USPTO to leverage work already done by another office in examining the same invention; thus, this helps reduce duplication of work and increase USPTO processing efficiency. To date, the PPH has produced efficiency gains of approximately a full production unit (a reflection of the efficiency of patent examiners) per application. In addition, the PPH allowance rate-- the percentage of applications determined to be patentable--is greater than the overall USPTO allowance rate. Both metrics translate into thousands of dollars of potential cost savings for applicants from using the PPH.

Challenges/Further Considerations:

The "Track 1" program expedites the examination of patent applications related to sustainable/climate-ready and other technologies, within existing resources and processes, to reduce the time it takes to patent these technologies to an average of one year. As with the PPH, earlier patenting enables inventors to secure funding, create businesses, and bring vital sustainable technologies into use much sooner. In addition, patent applications are normally taken up for examination in the order they were filed. Applications on inventions which will materially enhance the quality of the environment or contribute to the development or conservation of resources may be advanced out of turn for examination when a petition is filed, and certain other requirements are met. This is another means to obtain an office decision on a patent application earlier than for other technologies. USPTO continues to consider additional opportunities to enhance the efficiency and timeliness of its application processing including for applications in technologies addressing climate change. The PPH permits an applicant to fast track examination of a patent application at the USPTO when a partner office that is examining a patent application determines that the claims in a corresponding foreign patent application are patentable. Through the PPH, applicants can substantially reduce the amount of time they ordinarily must wait to obtain a patent.
Highlights/Accomplishments to Date: The USPTO met its agency priority goal for patent pendency in 2020 and continues to manage pendency effectively. Therefore, the USPTO does not see any vulnerabilities with respect to processing patent applications related to climate change technologies.

Priority Action #4: Improve current analyses and systematically update projections on the impacts of climate change on the national economy as new data is available.
Lead Office/Bureau: U.S. Census Bureau
Risks/Opportunities: Climate change impacts on the Department's primary customer base, U.S. businesses, workers, and communities, would affect the Department's ability to foster business and economic development.
Scale: National
Timeframe: Ongoing
Implementation Methods: The U.S. Census Bureau is currently performing work in several areas that may foster understanding of climate change and adaptation: industrial water use, industrial energy use, the effects of climate-related disasters, and measuring community resilience to climate change.
Key Milestones: See Highlights/Accomplishments to Date
Performance Metrics: See Highlights/Accomplishments to Date
Intergovernmental Coordination: Given increasing interest in the relationship between the environment, households and businesses, the U.S. Census Bureau has formed a research working group, ENERG (Environment, Natural disasters, Energy Research Group), to coordinate efforts across multiple divisions within the Bureau. ENERG's goals are to foster collaboration within the Bureau and with other federal agencies and academic partners, to facilitate important research using confidential Census microdata, and to identify data gaps which can be filled with Census Bureau data on households and businesses. ENERG has been the vehicle through which Census has engaged with other cross-agency efforts, such as the U.S. Global Change Research Program as well as interagency working groups on the social cost of greenhouse gases.
Resource Implications: N/A
Challenges/Further Considerations:
Highlights/Accomplishments to Date:

- The Distributional Effects of Climate Change: Several researchers at the Census Bureau, in collaboration with coauthors in academia, are exploring how linked survey, Census, and administrative data can be leveraged to better understand the distributional effects of climate change. Of particular interest are the social and economic effects of climate-related natural disasters (such as hurricanes, forest fires and flooding); the distribution of exposure to extreme temperatures, flood risk and air pollution across income and sociodemographic characteristics such as race and ethnicity; and the labor market impacts of transitioning away from fossil fuels and other climate mitigation efforts. These strands of research are intended to produce not only academic papers and presentations, but also public facing data products which can be used by stakeholders interested in issues of climate and environmental justice. Additionally, outreach to academic and federal agency partners is ongoing to develop new research on the effect of natural disasters on the nation's communities and businesses.
- Measuring Community Resilience: The Census Bureau has begun developing new small area estimates of community resilience to natural disasters. Experimental versions of these estimates have been produced and disseminated focusing on the Covid-19 pandemic (https://www.census.gov/data/experimental-data-products/community-resilience-estimates.html). Work is currently underway to extend these estimates to other challenges facing communities, such as hurricanes, forest fires and other climate-related natural disasters, as well as sea level rise, extreme temperatures, and other effects of climate change.
- Industrial water use: Given recurring drought conditions in areas of the country and concern that climate change may shift precipitation patterns away from historical norms, information on who and the location of (large) water-using businesses is increasingly important to inform public debate and help ensure that limited supplies can meet the demands of a growing population and economy. Such data had been collected and published by the Census Bureau on a quinquennial basis from 1954 to 1983 before funding was eliminated. The Census Bureau included a few basic questions to the 2017 Economic Census, asking facilities in several dozen water-intensive industries about their water intake, use, recirculation, and primary source. These data are currently being validated and will be combined with other (internal and external) data on these facilities, industries, and geographic locations to examine the determinants of industrial water use and water efficiency, as well as the impact of water intake and use on various facility-level outcomes. Planning is underway to collect similar data in the 2022 Economic Census.
- Industrial energy use: Economists at the Census Bureau are currently exploring topics in industrial energy use, which have relevance to climate change in that many proposed adaption policies address the quantity and types of energy used. Much of this research, using microdata from the Manufacturing Energy Consumption Survey, is still in its infancy.

Priority Action #5: Further embed climate considerations into the Economic Development Administration's grant making, through investment priorities, grant criteria, application evaluation, and economic development planning.
Lead Office/Bureau: EDA
Risks/Opportunities: Climate change impacts on the Department's primary customer base, U.S. businesses, workers, and communities, would affect the Department's ability to foster business and economic development.
Scale: Regional/Local
Timeframe: Already started, full implementation likely to take approximately 2 years
Implementation Methods: There are four key components to this action:

- Including climate considerations in EDA's investment priorities. This has been completed through #6: https://www.eda.gov/about/investment-priorities/
- Including specific requests related to climate resilience in relevant application forms, that ask infrastructure projects to consider climate resilience in their project design
- Relevant application reviewers (e.g., environmental officers, engineers, construction managers) are briefed on climate-related Administration guidance and apply relevant standards when evaluating applications, including key climate-related information supplied by grantees in EDA's Environmental Narrative Template and used in EDA's environmental review of projects.
- Including information (including tools and resources) in the CEDS Content Guidelines that encourages climate resilience be incorporated in the resilience section of each Comprehensive Economic Development Strategy (CEDS)

Key Milestones: Vary by program

Performance Metrics:

- How many projects (and total dollar amount of funding) map to the investment priority on climate
- Whether relevant NOFOs include language specific to climate considerations
- What percentage of environmental officers, engineers and construction managers are briefed on the new climate-related Administration guidance and corresponding changes to EDA's Environmental Narrative Template
- What percentage of infrastructure projects provided climate-related information in their Environmental Narrative as part of the grant application process
- Based on a survey conducted by third party partners whether CEDS plans have been updated since the new language in the CEDS Content Guidelines were updated include language explicitly on climate considerations

Intergovernmental Coordination: Like everything EDA does, the impacts of this initiative will depend on execution by State, Tribal, and/or local governments, along with EDA's other grantees.

Resource Implications: This can be accomplished with existing employees

Challenges/Further Considerations: N/A

Highlights/Accomplishments to Date: As referenced above, the investment priorities have been updated. The rest of the actions build on previous efforts by EDA to incorporate resilience more broadly (of which climate resilience was one sub-type) into their work.