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OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

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M-24-03

MEMORANDUM FOR HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Shalanda D. Young 

SUBJECT: Advancing Climate Resilience through Climate-Smart Infrastructure Investments and Implementation Guidance for the Disaster Resiliency Planning Act

In order to make the Nation's infrastructure investments resilient to the effects of climate change, Federal agencies need to take coordinated action. Such action ensures communities benefit from these investments for decades to come.

Executive Order (E.O.) 14008, *Tackling the Climate Crisis at Home and Abroad*, sets forth the Biden-Harris Administration's commitment to ensuring infrastructure investments increase the Nation's climate resilience¹, while also promoting environmental justice and equity. On December 5, 2022, President Biden signed into law the Disaster Resiliency Planning Act (Pub. L. No. 117-221) ("DRPA"), which requires the Office of Management and Budget ("OMB") to establish guidance regarding agencies' incorporation of natural disaster resilience into real property asset management and investment decisions. Consistent with E.O. 14008 and the DRPA, this memorandum provides guidance to Federal agencies² on the incorporation of assessments of natural hazard and climate risk information as part of each Federal agency's real property³ asset management and investment decisions.

Our Nation and its communities face increasing levels of hazard exposure due to the effects of climate change.⁴ Investing in "climate-smart infrastructure," as discussed in Section 1

¹ For the purposes of this memorandum, the term "climate resilience" refers to resilience against climate-induced or climate-related natural hazards and impacts; and the term "resilience" means the ability to prepare for threats and hazards, adapt to changing conditions, and withstand and recover rapidly from adverse conditions and disruptions.

² For the purposes of this guidance, consistent with DRPA § 2(2), the terms "Federal agency" and "agency" have the meaning given the term "agency" at 5 U.S.C. 306(f). Section 306(f) provides that agency means an Executive agency defined under 5 U.S.C. 105, but does not include the Central Intelligence Agency, the Government Accountability Office, the United States Postal Service, and the Postal Regulatory Commission.

³ For the purposes of this guidance, the term "real property" has the meaning given the term in 26 CFR 1.856-10. DRPA, § 2(4).

⁴ See, e.g., S. Rep. No. 117-117, at 2 (May 24, 2022) (recognizing the increasing frequency of "extreme weather and climate-related events" as necessitating DRPA; also stating that the DPRPA "would provide a legislative solution to the open GAO recommendation" in GAO-21-596); Government Accountability Office, *Federal Real Property Asset Management: Additional Direction in Government-Wide Guidance Could Enhance Natural Disaster Resilience*,

of this memorandum, and proactively managing risks posed by climate change, expands economic opportunities for American workers, and promotes fiscal stewardship. Consistent with the Administration’s implementation priorities for the Inflation Reduction Act of 2022 (Pub. L. No. 117-69), investments in climate-smart infrastructure also contribute to ensuring that agencies are investing public dollars effectively and efficiently. *See* E.O. 14082, *Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022*, at Sec. 2(a).

This memorandum has two primary sections. The first section provides climate-smart infrastructure technical best practices to Federal agencies for Federal financial assistance programs for infrastructure. The second section provides guidance to agencies on incorporating natural hazard and climate risk information into Federal real property management as required by the DRPA. *See* DRPA, § 3. Agencies should implement this memorandum in a manner that is consistent with their existing statutory authorities and other applicable law.

SECTION 1 – CLIMATE-SMART INFRASTRUCTURE

Section 1 provides climate-smart infrastructure technical best practices that Federal agencies can voluntarily adopt as part of their financial assistance programs for infrastructure. While these best practices are not required, agencies are strongly encouraged to adopt them consistent with their own determinations on how this memorandum is best applied to their financial assistance programs for infrastructure. Agencies should consult with the Office of Management and Budget and the National Climate Task Force’s Climate-Smart Infrastructure Interagency Working Group, as needed, for technical and implementation support.

This memorandum does not alter statutory requirements related to Federal financial assistance for infrastructure, such as the Build America, Buy America Act (“BABA”) provisions under sections 70901 to 70927 of the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58) (“IIJA”). This memorandum is intended to supplement, but not replace or supersede, related guidance issued by OMB on Federal financial assistance programs for infrastructure, such as OMB’s guidance on application of Buy America preferences required by section 70914 of BABA.⁵

To support agency implementation of this memorandum, Appendix 1 provides a summary and diagram of the climate-smart infrastructure technical best practice steps outlined in this section of the memorandum.

I. Definitions

In this section of the memorandum, the term “infrastructure” encompasses public infrastructure projects in the United States, which includes, at a minimum, the structures, facilities, and equipment for: roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and

GAO-21-596 (Washington, D.C., Sep. 14, 2021) (recognizing the need to address risks presented by “climate-related events” and concluding that “[d]irecting agencies to consider natural disaster risk and climate data when making investment decisions could enhance the overall resilience of agencies’ asset portfolios”).

⁵ See 88 FR 57750 (Aug. 23, 2023) (establishing 2 CFR part 184).

intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property.⁶

In this section of the memorandum, the term “nature-based solutions” refers to actions that protect, sustainably manage, or restore natural or modified ecosystems to address societal challenges, simultaneously providing benefits for people and the environment.⁷ Often, these solutions use long-standing conservation approaches, including protection or conservation of natural areas, reforestation, restoration of marshes or other habitats, or sustainable management of farms, fisheries, forests, or other resources. Nature-based solutions include other similar terms used by Federal agencies, such as green infrastructure, natural and nature-based features, natural climate solutions, and natural infrastructure.

This section uses the meaning of “natural infrastructure” provided in section 11103(3) of the IJA, which defines natural infrastructure to mean “infrastructure that uses, restores, or emulates natural ecological processes” and: (i) “is created through the action of natural physical, geological, biological, and chemical processes over time;” (ii) “is created by human design, engineering, and construction to emulate or act in concert with natural processes;” or (iii) “involves the use of plants, soils, and other natural features, including through the creation, restoration, or preservation of vegetated areas using materials appropriate to the region to manage stormwater and runoff, to attenuate flooding and storm surges, and for other related purposes.” *See* IJA, § 11103(3); *see also* 23 U.S.C. 101(a)(17).

In this section of the memorandum, the term “climate-smart infrastructure” refers to infrastructure and natural infrastructure, as defined above, that:

(1) Incorporate current and future climate change risk in planning, siting, design, and operation of the infrastructure system. Approaches for incorporating climate change risk should make use of climate change projections and emission scenarios that are reflective of the infrastructure system’s anticipated service life. This includes consideration of the infrastructure system owner’s and beneficiaries’ risk tolerance, and also consideration of climate change risks posed to the individuals, communities, local governments, organizations, or other entities served by the infrastructure system, over its anticipated service life.

(2) Maximize sustainability over the system’s anticipated service life. This can be accomplished through incorporating sustainable design principles and operational practices, such as improved energy efficiency and procurement of reused, salvaged, and alternative or low-embodied carbon materials.

⁶ Compare section 70912(5) of the Infrastructure Investment and Jobs Act (Pub. L. No. 117-58).

⁷ See White House Council on Environmental Quality, White House Office of Science and Technology Policy, White House Domestic Climate Policy Office, 2022. Opportunities for Accelerating Nature-Based Solutions: A Roadmap for Climate Progress, Thriving Nature, Equity, and Prosperity. Report to the National Climate Task Force. Washington, D.C.

II. Increasing Climate Resilience of Federally Funded Infrastructure

Federal agencies are strongly encouraged to include, or incorporate by reference, the best practices described in this section in notices of funding opportunities (“NOFOs”)⁸ for Federal financial assistance programs for infrastructure to support meeting climate resilience and energy efficiency goals.

1. *Recommended Best Practices for Financial Assistance Programs to Increase Climate Resilience of Infrastructure*

Federal agencies are strongly encouraged to help prospective financial assistance recipients use evidence-based information, decision-support tools and best-available climate data, including resources provided by other Federal agencies, to identify and reduce current and future climate risks over a prospective infrastructure project’s anticipated service life. Examples and a recommended guide on selecting climate information are described below and in Appendix 1.

For each Federal financial assistance program for infrastructure, Federal agencies are strongly encouraged to establish processes, consistent with applicable law, that:

- a. Support prospective recipients with the resources needed to assess future natural hazard and climate risk or utilize an existing risk assessment that identifies current and future climate risks to the proposed infrastructure project (for example, by providing methods or resources to conduct resilience or climate adaptation planning, recommended methods and decision support tools and technical methods for site-specific climate vulnerability assessments, or by directing technical assistance to prospective applicants paired with funding announcement release);
- b. Include the latest consensus-based building and energy codes and where appropriate, and identify high-performance standards⁹ to increase the resilience of buildings;
- c. Help prospective financial assistance recipients address and propose actions or designs that reduce climate risks in their financial assistance application (for example, through adopting the latest consensus-based codes, using above-code design, retrofitting or strengthening existing assets, siting projects in lower-risk locations, incorporating design features that allow for future adaptation, or using nature-based solutions to reduce potential site exposures). Proposed actions should be considered over the expected service life of the system and all project phases (for example, siting, design, long-term operations and maintenance, and long-term monitoring and evaluation);
- d. Include a technical evaluation of proposed actions to reduce current and future climate risk in an agency’s evaluation of prospective projects (for example, by including criteria that evaluate whether the application identifies potential climate exposures to the

⁸ See definition of the term notice of funding opportunity at 2 CFR 200.1, which means a formal announcement of the availability of Federal funding through a financial assistance program from a Federal awarding agency, and may include any paper or electronic issuance that an agency uses to announce a funding opportunity.

⁹ For the purposes of this memorandum, high performance standards include certifications, definitions, and standards that when adopted during new construction or retrofits help buildings achieve greater energy efficiency or resilience.

proposed infrastructure project using recommended data sources and decision support tools); and

- e. Consider removing barriers for underserved communities, including by exploring program flexibilities (for example, expanded Federal cost-share) and providing resources for underserved communities to meet the objectives described in this section. Avoid program designs that cause undue administrative and technical burden on prospective applicants from underserved communities.

Agencies can support prospective applicants with identifying suitable climate change information by incorporating the best practices described in this section in their NOFOs and other program documents. Natural hazard and climate risk information, including information on the applicant's risk tolerance and how critical the project is to its beneficiaries (for example, a community's primary transportation evacuation route), can be used by prospective applicants to inform design and decision making over the project's anticipated service life. Agencies are strongly encouraged to ensure that infrastructure projects receiving Federal financial assistance document how their planned project design and operations are intended to be resilient to project-relevant current and future climate risks. The Office of Science and Technology Policy (OSTP) [Guide for Federal Agency Climate Adaptation Planners on Selecting Climate Information to Use in Climate Risk and Impact Assessments](#) (2023) currently provides a suitable technical basis for agencies to further develop climate scenario identification and selection methods and practices for their respective programs and prospective applicants' needs, and provides examples of Federal tools and resources that are currently suitable for conducting assessments of natural hazard and climate risk. As climate science, information, tools and conditions continue to evolve, agencies are encouraged to evaluate new information and update methods and practices, as appropriate and needed.

2. Recommended Best Practices for Financial Assistance Programs to Support Sustainable Infrastructure

Federal agencies are encouraged to help prospective financial assistance recipients identify actions to reduce embodied carbon and climate change impacts comprehensively, including incorporating design decisions that increase energy efficiency, electrification and the use of clean energy; optimizing salvage, reuse, and low-embodied carbon materials; siting decisions to minimize disruptions to land use; protecting or restoring natural ecosystems; and applying [systems thinking design principles](#) that deploy an [integrative design process](#).

For each Federal financial assistance program for infrastructure, agencies are strongly encouraged to establish processes that:

- a. Support prospective recipients with the resources needed to incorporate climate-smart materials in projects (for example, sourcing low-embodied carbon materials, and confirming applications include documentation of product-specific Type III (third-party verified) Environmental Product Disclosure ("EPD")). These practices support the implementation of the [Federal Buy Clean Initiative](#), created by the Buy Clean Task Force established by E.O. 14057 and the December 2021 [Federal Sustainability Plan](#);
- b. Help prospective financial assistance recipients reduce the levels of embodied carbon from the extraction, production, transport, and manufacturing of the construction material through procurement specifications;

- c. Help prospective financial assistance recipients provide a product-specific Type III (third-party verified) EPD that offers visibility into a product’s environmental impacts through its entire lifetime in a standard, comparable format. This should be accomplished in coordination with suppliers of products and materials used in construction, specifically concrete, steel, asphalt, and flat glass. Where appropriate and consistent with law, agencies can include an award term requiring recipients and subrecipients to include a preference for products and materials that have lower embodied carbon; and
- d. Support prospective recipients with the resources needed to incorporate most recent energy codes and high-performance standards in projects through efficiency, electrification, and clean energy technology.

Tools provided in Appendix 1 of this memorandum can help applicants propose projects that minimize material usage, explore use of alternative materials, and consider more sustainable low-embodied carbon products.

3. Recommended Best Practices for Financial Assistance Programs to Leverage Nature-Based Solutions to Increase Climate Resilience of Infrastructure

Federal agencies are strongly encouraged to help prospective financial assistance recipients incorporate nature-based solutions in infrastructure siting, design, construction, operation, and maintenance. Further, agencies are strongly encouraged to help prospective applicants use nature-based solutions in project design, unless alternatives are demonstrated to be more beneficial to society when the full range of benefits are considered, or nature-based solutions are not technically suitable or feasible for project goals. This is consistent with E.O. 14072, which encourages use of “nature-based solutions to improve the resilience of our lands, waters, wildlife, and communities” in the face of climate change. Incorporating nature-based solutions in infrastructure financial assistance opportunities supports the implementation of the [White House Nature-Based Solutions Roadmap](#).¹⁰

For each Federal financial assistance program for infrastructure, Federal agencies are strongly encouraged to establish processes, consistent with applicable law, that:

- a. Support prospective financial assistance recipients with the resources needed to identify, design, and evaluate the costs and benefits of nature-based solutions (or example, through methods or resources to compare different types of nature-based solutions, providing recommended methods and decision support tools for performing comprehensive benefit-cost analyses, or providing direct technical assistance to help prospective applicants design projects paired with funding announcement release);
- b. Help prospective financial assistance recipients identify and propose nature-based solutions that address the identified climate risks in their financial assistance application. Actions to address risks should be considered over the lifetime of natural infrastructure, including project siting, design, long-term operations and maintenance, and monitoring and evaluation (for example, through designs appropriate for a given geographic region and climate, siting projects in areas that maximize their benefits by minimizing risks to

¹⁰ See [White House Nature-Based Solutions Roadmap](#) for [examples and resources](#) of nature-based solutions agencies can use in their financial assistance programs.

long-term operations, or adopting adaptive systems or designs to maintain performance over time for future modification);

- c. Include a technical evaluation of nature-based solutions in proposed projects to reduce natural hazard and climate risk (for example, through including criteria that evaluate whether the application identifies natural infrastructure, such as green stormwater infrastructure, recreational parks, or living shorelines to minimize potential climate exposures or increase the energy efficiency of hard structures, or increase the resilience of a surrounding community from hazard and climate impacts); and
- d. Consider removing barriers for underserved communities, including by exploring program flexibilities (for example, expanded Federal cost-share) and providing resources for underserved communities to meet the objectives described in this section. Avoid program designs that cause undue administrative and technical burden on prospective applicants from underserved communities.

4. Recommended Best Practices for Financial Assistance Programs to Increase Climate Resilience, Improve Energy Efficiency, and Increase the Presence of Low Embodied Carbon Materials in Buildings

Federal agencies should strongly encourage adopting best practices that ensure financial assistance opportunities support new construction, major rehabilitations, and retrofitted buildings that are climate resilient, more energy efficient and result in the increased use of low-embodied carbon materials. For financial assistance programs that fund and finance new construction or substantial rehabilitation of buildings, where appropriate, agencies are strongly encouraged to incorporate the latest consensus-based codes and high performance-standards for new construction; and for major rehabilitations and retrofits, agencies are strongly encouraged to incorporate high-performance building standards to improve energy efficiency, increase the use of low-embodied carbon materials, and increase climate resilience.. This should be consistent with agency implementation plans developed under the National Initiative to Advance Building Codes (NIABC).

5. Alignment with the Federal Flood Risk Management Standard

Agency actions implementing the Federal Flood Risk Management Standard (“FFRMS”) supports the climate-smart infrastructure objectives of this memorandum. Consistent with Executive Order 14030, which reestablished the FFRMS originally established under Executive Order 13690, agencies should follow the existing 2015 “Guidelines for Implementing Executive Order 11988, Floodplain Management, and Executive Order 13690, Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input.”¹¹

For Federal financial assistance programs for infrastructure where the FFRMS applies, agencies should use the [FFRMS Floodplain Determination Job Aid](#) (August 2023) and separate

¹¹ See https://www.fema.gov/sites/default/files/documents/fema_implementing-guidelines-EO11988-13690_10082015.pdf

decision support tool after it is published. This memorandum does not replace or supersede processes for agency actions established by Executive Order 13690.

III. Incorporating Uniform Best Practices for Building Construction and Rehabilitation to Increase Climate Resilience

Consistent with the goals of the National Initiative to Advance Building Codes, Federal agencies are encouraged to identify the latest consensus-based building and energy codes and high-performance building standards, benchmarking protocols, and associated implementation best practices for new construction, major rehabilitations, and retrofits that can be incorporated into Federal financial assistance programs for infrastructure. Federal agencies are encouraged to include the latest consensus-based building and energy codes and high-performance standards in Federal financial assistance programs for infrastructure – including prioritizing the usage of low-embodied carbon materials - to improve energy efficiency and increase the climate resilience of infrastructure projects.

IV. Providing Technical Assistance Resources to Prospective Federal Assistance Applicants to Assess Climate Risk of Infrastructure

Federal agencies are strongly encouraged to ensure potential financial assistance applicants have the necessary technical information and resources to address the technical best practices described in Section 1.II of this memorandum. In particular, agencies should ensure prospective applicants from underserved communities have the necessary technical assistance resources, including direct technical assistance, in accessing financial assistance opportunities and addressing the climate-smart infrastructure best practices described in Section 1.II.

When preparing NOFOs, agencies are strongly encouraged to follow best practices such as writing announcements in plain language, using consistent structure, providing definitions and terms, identifying common technical assistance resources to include in similar types of announcements (for example, those that target similar types of applicants or infrastructure categories), offering multiple public education and engagement opportunities, providing assistance with grant preparation and administration, and where appropriate, supporting applicants' project design.

Agencies are strongly encouraged to utilize available resources to assist prospective financial assistance applicants with technical assistance. These resources can include, but are not limited to:

- Providing program-specific, tailored methods, data, and decision support tools necessary to conduct an assessment of future climate and natural hazard risk to the prospective infrastructure project and its intended beneficiaries.
 - Agencies should prioritize providing only the most relevant data sources and tools to prospective applicants. It is recommended that agencies provide a brief description of recommended tools and explanations of how they can be used to support specific elements of an application.

- Examples can be found in the OSTP [Guide for Federal Agency Climate Adaptation Planners on Selecting Climate Information to Use in Climate Risk and Impact Assessments](#) (2023) and Appendix 1 of this memorandum.
- Providing information and resources necessary to engage and support underserved communities, as defined in E.O. 13985, with infrastructure project design, construction, operations, and maintenance.
- Recommending nature-based solution design criteria and project examples, consistent with the [White House's Nature-Based Solutions Roadmap](#).
- Identifying partnerships with technical and professional associations and stakeholder organizations that can support application preparation, project development, and peer information exchange between Federal financial assistance recipients.

V. **Sharing Climate-Smart Infrastructure Best Practices and Reporting Expected Benefits and Costs**

Federal agencies are strongly encouraged to develop internal processes to track financial assistance awards for infrastructure that are designed to advance climate adaptation and enhance climate resilience, energy efficiency, and the use of low-embodied carbon materials. Additionally, agencies are encouraged to develop mechanisms that facilitate peer learning and sharing of project results across recipients and subrecipients and ensure lessons from Federally-funded projects inform future funding cycles.

Agencies are encouraged to use existing products or reports from awarded projects (for example, project application narratives, quantitative and qualitative data from benefit-cost analyses performed, or recipient progress reports). Agencies are discouraged from increasing recipient reporting requirements in response to the goal of this section.¹²

To accomplish the goals of this section, agencies are encouraged to:

- Develop and publish case studies of funded projects as best practice examples of climate-smart infrastructure. These should reflect the range of eligible applicants, eligible projects, sector(s), and geographic extent of an agency's financial assistance programs for infrastructure; and
- Report aggregated qualitative or quantitative information on awarded projects during years when an agency's infrastructure financial assistance program issues new awards, as a supplement to their annual Climate Adaptation Plan (CAPs) progress report. These summary reports should be scoped in a manner that reflects the sector(s) and geographic extent of an agency's financial assistance program. CEQ and OMB will provide further information on including this summary report in annual Climate Adaptation Plan progress reports.

¹² In the situation where agencies are currently updating their performance and reporting processes to account for climate adaptation benefits of programs, these reporting processes are at the discretion of agencies and they should seek to minimize additional administrative burden on applicants and recipients.

The following information can be described in the summary report (examples of existing agency reporting requirements for this information are provided in Appendix 1):

- Estimated direct and indirect project costs;
- For projects where benefit-cost analyses were performed and data are available, estimated direct benefits due to increasing resilience to natural hazard or climate risks (for example, avoided physical damage, avoided loss of service, avoided loss of natural habitat), or return on investment from sustainable practices (for example, cost savings from minimized material use or cost savings from lower energy bills);
- Descriptions of expected additional benefits due to the funded project (for example, habitat restoration, economic development, energy cost savings, increased recreational opportunities, increased opportunities to build social capital, improved public health);
- Estimated reduction of energy consumption and energy waste and other benefits from using low-embodied carbon materials in infrastructure project design and construction; and
- Descriptions and examples of benefits expected to accrue to underserved communities.

SECTION 2 – GUIDANCE FOR INCORPORATING NATURAL HAZARD RISK AND CLIMATE RESILIENCE INFORMATION IN AGENCY REAL PROPERTY MANAGEMENT

I. Disaster Resiliency Planning Act

The DRPA provides that OMB must establish guidance requiring agencies to incorporate natural disaster resilience into real property asset management and investment decisions. The DRPA is consistent with the Administration’s policy and existing actions agencies are taking to increase adaptive capacity and build resilience against the impacts of climate change, as described in E.O. 14008.¹³ The DRPA is consistent with existing agency actions that safeguard Federal investments against the effects of climate change, as described in E.O. 14057. The guidance presented in this section fulfills the requirement provided in DRPA.

II. Implementation Guidance for Agency Incorporation of Natural Hazard and Climate Risk Information in Real Property Management as required by the Disaster Resiliency Planning Act

For the purposes of this guidance, as described in DRPA, “real property” has the meaning given the term in 26 CFR 1.856-10.¹⁴ That regulation defines the term to mean land and

¹³ See, e.g., S. Rep. No. 117-117, at 2 (May 24, 2022) (recognizing the increasing frequency of “extreme weather and climate-related events” as necessitating the OMB guidance required by DRPA; also stating that the DPRA “would provide a legislative solution to the open GAO recommendation” in GAO-21-596); Government Accountability Office, *Federal Real Property Asset Management: Additional Direction in Government-Wide Guidance Could Enhance Natural Disaster Resilience*, GAO-21-596 (Washington, D.C., Sep. 14, 2021) (recognizing the need to address risks presented by “climate-related events” and concluding that “[d]irecting agencies to consider natural disaster risk and climate data when making investment decisions could enhance the overall resilience of agencies’ asset portfolios”).

¹⁴ DRPA, § 2(4).

improvements to land. Local law definitions are not controlling for purposes of determining the meaning of the term real property under this guidance.

Agencies are directed to incorporate natural hazard and climate vulnerability assessments and resulting information as part of their real property risk management processes. Evidence increasingly shows that climate change alters the intensity, duration, frequency, and geographic distribution of some natural hazards (for example, temperature extremes, drought, extreme storms, coastal and inland flooding, wildfire, wildfire smoke, and hurricanes). Therefore, climate-related risks need to be considered alongside natural hazard risks. Addressing natural hazard and climate risk information includes conducting climate exposure assessments as required for agency Climate Adaptation Plans (CAPs). Incorporating natural hazard and climate risk information in real property asset management includes identifying information about current and future (projected) natural hazard and climate risks over the expected service life of an asset or portfolio of assets and considering how critical an asset is for an agency's mission or programs. This guidance is intended to complement existing requirements for risk management and consideration of natural hazard and climate risk information described in Circular A-11, Capital Programming Guide (relevant sections included in Appendix 2 of this memorandum).

Consistent with processes described in Circular A-11 and the Capital Programming Guide, agencies should:

1. Identify location- and mission-relevant information about current and future natural hazard and climate exposure to an agency's real property.

Agencies are directed to collect information about the impacts of natural hazards and identify forward-looking climate projections to understand potential exposures on an agency's real property assets. This includes understanding exposure from direct physical impacts of hazards and, where relevant, information about expected exposure to assets or infrastructure systems that affect an agency's operations at a facility (for example, transportation to and from a facility, facility workforce housing, or workforce impacts due to natural hazard exposures). Because of the long service life of Federal real property, agencies should identify the exposure to both expected natural hazard and climate risk. Agencies are recommended to:

- Use the climate exposure assessment tool provided for preparing agency CAPs. This tool provides agency-specific climate exposure information.
 - Consult the OSTP [Guide for Federal Agency Climate Adaptation Planners on Selecting Climate Information to Use in Climate Risk and Impact Assessments](#) (2023) on recommended steps to identify and select climate scenarios appropriate for their real property management needs. For climate-projections, multiple greenhouse gas emissions scenarios should be used to consider the range of potential exposures to account for uncertainty in future emissions trajectories.
- Consult the climate adaptation and resilience resources and tools described in the climate-smart infrastructure section of the appendix for additional natural hazard and climate exposure assessment tools.

2. Assess real property sensitivity to both natural hazard and climate impacts, and when combined with agencies' adaptive capacity and previously described exposure, assess real property vulnerability.

Agencies are directed to assess real property sensitivity to impacts of natural hazards and expected changes in climate and assess agency adaptive capacity to characterize the vulnerability posed by the exposures described in Step 1. This includes assessing the quality of a facility or other relevant real property data (for example, facility location and condition) to describe the relationship between the hazard and climate exposure and the sensitivity of an agency's real property. Assessments of natural hazard and climate vulnerability should cover the time period over the full service life of the real property, or use a default of mid-century (2050) and late-century (2085) time periods.

Assessments of climate exposure to agencies' facilities and assets conducted in preparation for an agency's CAP should be used in response to this guidance. The "2023-2027 Instructions for the Federal Climate Adaptation Plans," issued on September 21, 2023, presents a methodology and tool for conducting a risk assessment of climate hazard exposure to Federal buildings. These methods and resources should be used in response to requirements for this section. Additionally, any information collected in response to this guidance should inform agencies' future year CAPs.¹⁵ Flood risk information identified in agencies' implementation of requirements for the FFRMS should also be used in response to this guidance.

After considering the results of the natural hazard and climate exposure assessments prepared for an agency's CAP, agencies may also use their own climate vulnerability assessment methods and tools, or other tools procured for this analysis. Regardless of whether the assessment methods, tools, or data were developed by Federal agencies, agencies are responsible for understanding the quality of natural hazard and climate risk information and assessments, consistent with OMB's guidance under the Information Quality Act.¹⁶ Appendix 2 of this memorandum shares best practices for acquiring and evaluating data and tools underlying these assessments.

3. Incorporate natural hazard and climate risk information in agency real property risk management processes as described in Circular A-11

Natural hazard and climate risk information assembled in response to this guidance should be incorporated into agency real property risk management processes and investment decisions. This includes integrating natural hazard and climate risk

¹⁵ The results of these assessments may also be reported in response to climate-related financial risk elements of Circular A-136.

¹⁶ See OMB "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies," 67 FR 8452 (Feb. 22, 2002); OMB Memorandum M-05-03, Memorandum for the Heads of Executive Departments and Agencies: Issuance of OMB's "Final Information Quality Bulletin for Peer Review" (2004), available at <https://www.gpo.gov/fdsys/granule/FR-2005-01-14/05-769>; and OMB Memorandum M-19-15: Memorandum for the Heads of Executive Departments and Agencies: Improving Implementation of the Information Quality Act (2019), available at <https://www.whitehouse.gov/wp-content/uploads/2019/04/M-19-15.pdf>.

information into agencies' responses to capital programming requirements described in the Capital Programming Guide included among the supplementary materials in Part 7 of OMB Circular A-11, including:

- Requirements in Section I.5.5 on risk management;
- Risk identification processes described in Appendix 5;
- The Post-Implementation Review (PIR) described in Section III.3.3.2, also related to risk management;
- Asset disposition methodologies described in Section III.4; and
- Program management considerations and vulnerability assessments described in Appendix 13 on climate considerations.

4. Report on agency activities in response to climate vulnerability assessments in Climate Adaptation Plans

Agencies required to submit CAPs under E.O. 14008, 14030, and 14057 must include in their initial CAPs, and in subsequent annual progress reports, a description of their activities addressing the requirements of this section. As described in the “2023-2027 Instructions for the Federal Climate Adaptation Plans,” agencies are required to report on activities incorporating natural hazard and climate risk information as part of their real property management and investment decisions. These reports must include, at a minimum, the following:

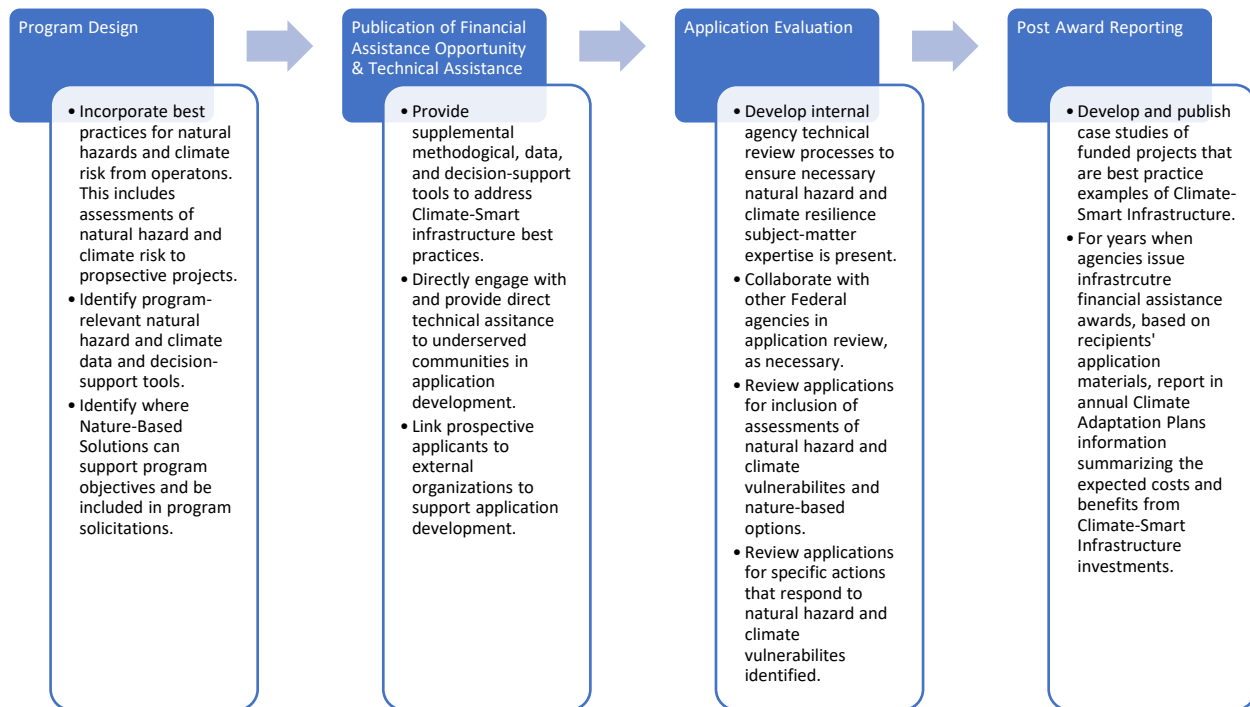
- Information on natural hazard and climate vulnerability assessments for real property managed by the agency;
- Information on risk posed by the assessed natural hazard and climate exposures to the agency's operations or programs for significantly at-risk real property;¹⁷ and
- Information on changes to agency asset management and investment decisions as a result of incorporating natural hazard and climate risk information in real property management decisions. This should cover actions planned or taken to mitigate identified risks, including answering questions such as:
 - Will retrofits include architectural and engineering design modifications, or non-structural modifications that increase the resilience of Federal real property?
 - What operational practices are required at critical or climate-sensitive assets to avoid reduction in services or functions? If any, what changes are needed to protect employee working conditions for those who must physically report to work at high-risk facilities (for example, exposure to extreme heat, particulate matter, flooding)?
 - Will climate sensitive assets be repurposed, or will their functions be relocated to a lower-risk property?
 - How are real property asset management decisions investing in low-risk areas and divesting assets from locations that will be at risk in the future?

¹⁷ Aggregated vulnerability assessment results information is encouraged to be submitted for CAPs and subsequent publication. Agencies should avoid publishing site-level vulnerability assessment results, particularly for sensitive sites or for sites where the vulnerability assessment results would potentially result in adverse effects to agency operations and employees.

Agencies are required to address the reporting requirements of this section in their draft and final CAP submissions, following the “2023-2027 Instructions for the Federal Climate Adaptation Plans” issued on September 21, 2023, to CEQ and OMB by February 29, 2024 and in subsequent annual CAP submissions.

Appendix 1: Supplemental Information for Implementing Section 1 – Climate-Smart Infrastructure

Incorporating climate-smart infrastructure practices into financial assistance programs for infrastructure: summary of encouraged steps for agencies



Example Tools for Accessing Natural Hazard and Climate Risk Information

In addition to these examples, agencies are strongly encouraged to consult the [guide for federal agency climate adaptation planners on Selecting Climate Information to Use in Climate Risk and Impact Assessments](#) (2023) Table 4: Suggested Federal Resources for Understanding Future Climate Scenarios and Effects, which includes a listing tools with descriptions

Additionally, examples of best practices and principles in developing and delivering effective climate services can be found in [NSTC's Federal Framework and Action Plan for Climate Services](#).

Examples for Climate Risk Information Tools

- [Fifth National Climate Assessment \(NCA5\)](#): The Nation's most authoritative source on climate change and its impacts. NCA5 summarizes key information about climate vulnerability, impacts, and adaptation by sector and region.
- [NCA5 Atlas](#): The interactive online NCA5 Atlas provides the latest localized temperature and precipitation projections for the United States. This tool allows users to explore different climate variables to highlight local climate projections, and can be used by adaptation planners, climate impact researchers, regional organizations, local educators, and more.

- [Climate Mapping for Resilience and Adaptation \(CMRA\)](#): CMRA allows users to explore communities' current exposure to five hazards (extreme heat, coastal flooding, inland flooding, drought, and wildfire) and overlay hazards with key future climate variables.
- [Climate Risk and Resilience Portal \(ClimRR\)](#) (Argonne National Laboratory, FEMA): ClimRR allows users to examine simulated future climate conditions at mid- and end-of-century for a range of climate risks.
- [Sea Level Rise Viewer \(NOAA\)](#): The interactive viewer includes data representing future sea level rise scenarios and shows community-level impacts from coastal flooding or sea level rise. The viewer also includes simulations of how future flooding might impact local landmarks.
- [U.S. Climate Resilience Toolkit \(CRT\)](#): The CRT was created to provide additional tools, data, and stories for a broad range of users.
- [Drought.gov](#): Drought.gov consolidates drought monitoring information, tools, and maps at national, state, and local levels. It presents drought forecasts and outlooks.
- [Heat.gov](#): Heat.gov is a centralized place for information, tools, and data about extreme heat risk and resilience. It also links to extreme heat forecasts and outlooks.
- [Climate and Economic Justice Screening Tool \(CEJST\)](#): CEJST tool an interactive mapping tool that was created to help identify disadvantaged communities that will benefit from programs in the Justice40 initiative. CEJST brings together public datasets on the following burden categories: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.
- [Climate and Resilience Evaluation Tool \(CREAT\)](#) (EPA): CREAT is a tool that assists water sector utilities in assessing climate-related risks to utility assets and operations.

Examples for Natural Hazard Risk Information Tools

- [National Risk Index \(FEMA\)](#): The National Risk Index is a dataset and online tool to help illustrate the U.S. communities historically most at risk for 18 natural hazards. The National Risk Index is intended to help users better understand the historic baseline of their natural hazard risk of their communities.
- [Wildfire Risk to Communities tool \(USDA Forest Service\)](#): Wildfire Risk to Communities resource with interactive maps, charts, and resources to help communities understand, explore, and reduce wildfire risk. The risk assessment tool provides interactive maps describing risk to homes, wildfire likelihood, exposure, and information about vulnerable populations.

Example Tools and References to Support Reducing Embodied Carbon from Infrastructure

- [Federal Buy Clean Initiative](#) outlines the ambition of the Federal Government to prioritize the use of American-made, lower-embodied carbon construction materials in Federal procurement and Federally-funded projects.
- [EPA Interim Determination \(2022\)](#): This determination supports DOT and GSA Inflation Reduction Act programs for the procurement of low-embodied carbon materials and products.
- [General Services Administration Interim IRA Low Embodied Carbon Material Requirements \(2023\)](#)

- Department of Transportation [policy statement on Buy Clean Initiative](#) (2022) to address the embodied carbon within the engineering, design, construction, procurement, maintenance, and disposal of transportation projects.

Tools

- [BEES \(Building for Environmental and Economic Sustainability\) software \(NIST\)](#): BEES is a software package that measures the environmental performance of building products. It is based on consensus standards and is designed to be practical, flexible, and transparent.
- [BIRDS \(Building Industry Reporting and Design for Sustainability\) software \(NIST\)](#): BIRDS evaluates the sustainability of both the materials and the energy used by a building over time.
- [PlanWorks \(DOT FHWA\) tool](#): PlanWorks provides information at the key decisions in long-range planning, programming, corridor planning, and environmental review to show when and how to engage partners and stakeholders.
- US DOT [Federal Highway Administration’s Sustainable Pavements](#) and [LCAPave tools](#): Sustainable Pavements is a collection of publications and resources on current practices and state of knowledge on sustainable pavement, and LCAPave tool provides a structured evaluation methodology used to analyze and quantify the environmental impacts of existing products or processes.
- [Life Cycle Perspective and EPD tools \(GSA\)](#): This resource provides an overview of concepts associated with incorporating life cycle perspective in facilities management, including life cycle environmental impacts (such as impacts from air pollution, water intake, and energy consumption) and life cycle costs, which are the initial investment costs and future costs.
- [SF Tool Product Search \(GSA\)](#): This resource recommends environmentally preferable products for a variety of construction products.
- [GREET Building LCA Module \(anl.gov\)](#): This tool is an Excel-based resource designed to provide life cycle analysis – including embodied carbon, air pollution, water intake, and energy consumption – of new building materials.

Examples of Information to be Reported in Summary Reports in Agency Climate Adaptation Plan

Federal agencies are encouraged to include the following elements in summary reports discussed in Section 1.V, “Sharing Climate-Smart Infrastructure Best Practices and Reporting Expected Benefits and Costs.” This section provides examples of types of information that can be reported for each element. Reported metrics should be customized by agencies for program objectives and based on available information received from recipients’ application materials.

- Element 1: Estimated direct and indirect project costs – examples:
 - Capital expenditures, operating and maintenance expenditures, residual value and remaining service life, and costs of innovative technologies and techniques. ([DOT 2023](#), Section 6 pages 30-33)
 - Project equipment, labor, materials, acquisition costs ([FEMA 2020, Section 2-2 page 25 and Section 3 page 30](#))

- Element 2: Estimated direct benefits due to increasing resilience to natural hazard or mitigated climate risks for projects where benefit-cost analyses were performed and data are available – examples:
 - Operating cost savings ([DOT 2023](#), Section 5.3 page 18)
 - Reduction of expected property damage due to future disasters, reduction of expected casualties from future disasters, value of reduced displacement caused by future disasters, reduced vulnerability of infrastructure to outages ([HUD 2016](#), page 40)
 - Avoided loss of function, displacement costs, facility replacement value, loss or rent, loss of building income ([FEMA 2009](#), Section 2.7 page 27, Appendix A page 74)
 - Increased reliability and continuity of utility services ([DOE 2019](#), pages 3-5)
- Element 3: A description of expected co-benefits due to the funded project – examples:
 - Safety benefits, health benefits, facility amenity benefits ([DOT 2023](#), Section 5.6 page 23 and Section 5.7 pages 24-26)
 - Ecosystem service benefits ([FEMA 2021](#), [FEMA 2022](#) Section 3 pages 9-10)
 - Economic revitalization including direct effects on local or regional economy net opportunity costs ([HUD 2016](#), page 41)
- Element 4: Estimated reduction of energy consumption and waste and other benefits from using low-embodied carbon materials in infrastructure project design and construction – examples:
 - Number of projects awarded that incorporate low-embodied carbon requirements into scopes of work
 - Total number of EPDs collected and description of how EPDs are utilized ([EPA 2022](#))
 - Amount procured of each low-embodied carbon material (cubic meters, metric tons, etc.) ([EPA 2022](#))
 - Estimated reduction of energy consumption and waste and other benefits due to low-embodied carbon materials procured
- Element 5: Descriptions and examples of benefits expected to accrue to vulnerable¹⁸ and/or underserved communities – examples:
 - Benefits expected to directly support low- and moderate-income persons and/or households, greater housing affordability ([HUD 2016](#), page 18, page 31, pages 32-33)
 - Technical assistance for energy reliability planning in low-income communities ([DOE 2023](#))
 - Technical assistance for low- and moderate-income community energy resilience planning ([DOE 2017](#))

¹⁸ A “vulnerable population” is a group or community whose circumstances present barriers to obtaining or understanding information or accessing resources ([HUD 2016](#), pg. 11)

Appendix 2: Supplemental Information for Implementing Section 2. Guidance for Incorporating Natural Hazard Risk and Climate Resilience Information in Agency Real Property Management

Relevant sections from Circular A-11, Capital Programming Guide

Agencies should incorporate results from natural hazard and climate vulnerability assessments in real property investment decisions in response to this guidance. This includes agencies' responsibilities outlined in the [Capital Programming Guide](#), provided in Circular A-11. Specific sections include:

- Planning and Budgeting, Section I.5.5 Risk Management, and the companion Appendix 5, Risk Management: Incorporating natural hazard and climate risk information as part of existing risk management processes.
- Management In-Use, Section III.3.3.2 Post-Implementation Review (PIR) and III.4. Asset Disposition, evaluations of risk should consider natural hazard and climate vulnerability and incorporate in decision models outlined.
- Appendix 13, Climate Considerations, natural hazard and climate vulnerability assessments conducted under this guidance should be informed by the resources described in the appendix and the results of the assessment can be integrated into the example checklist provided, with an emphasis on the vulnerability assessment section.

Technical Supplement on Best Practices for Acquiring and Evaluating Data and Tools Related to Guidance for Agency Real Property Natural Hazard and Climate Vulnerability Assessments

Agencies may not always have access to the necessary data, models, and decision-support tools from Federal sources to characterize natural hazard and climate risk to their real property portfolios. As a result, agencies may be interested in using data and information of non-Federal origin. A range of these data and information products are available from academic, non-governmental organization, and for-profit sources. This supplement shares best practices for acquiring, evaluating, and disseminating data and tools underlying these assessments, consistent with guidance under the Information Quality Act.

Transparency and Reproducibility

Methods, models, and processes used to produce, analyze, and visualize data and information products should be described thoroughly enough that an independent expert can reproduce and assess the strengths, weaknesses, and appropriate uses of the data, models, and decision tools, as well as the assumptions and uncertainties inherent in their assessments; the sensitivity of their conclusions to those assumptions and uncertainties; and the probabilities associated with best, worst, or likely scenarios that they present. Transparency helps to advance the state of the science by allowing researchers to build on existing efforts. As appropriate, agencies are encouraged to further transparency by making public source codes used in producing and analyzing data.

Peer Review

The primary mechanism for assuring data and information quality is scientific peer-review. OMB's [Information Quality Bulletin for Peer Review](#) provides guidance for peer review for

scientific information likely to have a significant impact of public or private sector decision making.

No cost to non-U.S. Government users

If data and information are to be re-distributed to the public by the U.S. Government (USG) (for example, to inform decision-making by non-USG actors), it must be possible to make the data and information available at no cost to the public. Any other arrangement would present an unacceptable conflict with the Administration's equity goals, as this would create barriers to access for some information users.

Consistency with provider-imposed terms of use

Agencies should ensure that any use of non-USG data and information is consistent with any terms of use imposed by the creator or provider of the data. For example, if data are made available for research purposes only, then other uses would not be acceptable. The USG would not re-distribute data to the public having any use restrictions, since the USG cannot be responsible for enforcing restrictions on how data and information are used by other parties.