FAA

Report AV2024011
December 13, 2023

FAA Addresses Resiliency in IIJA Aviation Programs but Lacks Data and a Framework for Prioritizing Climate Change Projects

U.S. Department of Transportation
Office of Inspector General

Highlights

FAA Addresses Resiliency in IIJA Aviation Programs but Lacks Data and a Framework for Prioritizing Climate Change Projects

Self-initiated

Federal Aviation Administration | AV2024011 | December 13, 2023

What We Looked At

Extreme weather events, including those potentially caused by effects of climate change, are a source of major disruptions to the National Airspace System (NAS). In November 2021, Congress passed the Infrastructure Investment and Jobs Act (IIJA) authorizing $25 billion to the Federal Aviation Administration (FAA) to fund programs to address aging aviation infrastructure. Specifically, it funded the Airport Infrastructure Grant program, Airport Terminal Program, and the Facilities and Equipment program. Also, in November 2021, President Biden issued Executive Order (EO) 14052, which directed agencies tasked with implementing IIJA to take steps, such as prioritizing as appropriate and to the extent consistent with law, building resilient infrastructure projects that help combat climate change. As part of our IIJA funding oversight and given the policy emphasis on climate change and resiliency, we initiated this audit. Our objective was to assess FAA's plans for prioritizing resiliency into IIJA aviation programs.

What We Found

FAA has taken steps to address resiliency in discretionary IIJA aviation programs. For example, FAA incorporates resiliency and climate change in its project selection criteria for these programs. However, FAA has not established a mechanism for collecting and reporting data on the extent to which IIJA-funded projects address FAA's and the Department of Transportation's (DOT) strategic goals on climate and sustainability. Also, FAA does not have a framework to prioritize projects that address climate change in its standards. As a result, FAA and airports are not required to consider climate change impacts when proposing infrastructure projects. However, in September 2021, FAA entered into an interagency agreement with DOT's John A. Volpe National Transportation Systems Center (Volpe) for a 5-year study to identify the climate change risk to airport systems. Yet, the results of this study, which is currently scheduled to conclude in 2026, will not be available for many projects that receive funding before the study's end.

Our Recommendations

We made two recommendations to improve FAA's prioritization of resiliency and climate change in IIJA aviation programs.

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U. S. Department of Transportation
Office of Inspector General

Memorandum

Date: December 13, 2023

Subject: ACTION: FAA Addresses Resiliency in IIJA Aviation Programs but Lacks Data and a Framework for Prioritizing Climate Change Projects | Report No. AV2024011

From: Nelda Z. Smith
Assistant Inspector General for Aviation Audits

To: Federal Aviation Administrator

Extreme weather events, including those potentially caused by effects of climate change, are a source of major disruptions to the National Airspace System (NAS). For example, in 2022, Hurricane Ian made landfall in Florida with maximum sustained winds of 150 miles per hour, heavy rainfall, and catastrophic storm surges. The hurricane resulted in Orlando[1] and Tampa International Airports, ceasing commercial flight operations. More broadly, the 2014 National Climate Assessment[2] stated that 13 of the Nation's 47 largest airports have at least 1 runway that could be vulnerable to a moderate to high storm surge or a rise in sea levels.

In November 2021, Congress passed the Infrastructure Investment and Jobs Act (IIJA)[3] authorizing about $660 billion in transportation funding, including $25 billion to the Federal Aviation Administration (FAA). IIJA provides funding for three separate aviation programs to address aging aviation infrastructure—the Airport Infrastructure Grant (AIG) program, Airport Terminal Program (ATP), and the Facilities and Equipment (F&E) program. Also, in November 2021, President Biden issued Executive Order (EO) 14052,[4] which directed agencies tasked with implementing IIJA to take steps, such as prioritizing as appropriate and to the

[1] Orlando International ceased commercial operations but remained open for emergency operations.
[2] Third National Climate Assessment, U.S. Global Change Research Program. The U.S. Global Research Program is a Federal program mandated by Congress to coordinate Federal research and investments in understanding the forces shaping the global environment, human and natural, and their impacts on society.
[3] Public Law Number (Pub. L. No.) 117-58, November 15, 2021.
[4] Implementation of the Infrastructure Investment and Jobs Act, Executive Order 14052, 86 Federal Register (Fed. Reg.) 64335 (Nov. 18, 2021).

extent consistent with law, building resilient infrastructure projects that help combat climate change.

As part of our IIJA funding oversight and given the policy emphasis on climate change and resiliency, we initiated this audit. Our objective was to assess FAA's plans for prioritizing resiliency into IIJA aviation programs.

We conducted this audit in accordance with generally accepted Government auditing standards. Exhibit A details our scope and methodology. Exhibit B lists the organizations we visited or contacted, and exhibit C lists the acronyms used in this report.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please contact me or Jay Borwankar, Program Director.

cc: The Secretary
DOT Audit Liaison, M-1
FAA Audit Liaison, AAE-001

Results in Brief

FAA has taken steps to address resiliency in discretionary programs.

FAA incorporates resiliency and climate change in its project selection criteria for discretionary IIJA programs. For example, under ATP, FAA provides favorable consideration to projects that, among other things, replace aging infrastructure and improve energy efficiency, which could include resiliency and climate change features. Additionally, according to FAA, all IIJA-funded projects achieve resiliency benefits through compliance with local building codes and FAA guidance. Yet, building codes and FAA standards generally address the effects of known weather patterns and may not address future climate change effects.

FAA lacks data and a framework for prioritizing projects that address climate change.

FAA has not established a mechanism for collecting and reporting data on the extent to which IIJA-funded projects address FAA's and the Department of Transportation's (DOT) strategic goals on climate and sustainability. As a result, FAA cannot know the full extent of IIJA funding's impact on meeting these strategic goals. Moreover, FAA does not have a framework to prioritize projects that address climate change in its standards.[5] For example, FAA has not updated its standards pertaining to long-term airport planning, building resilient infrastructure, or addressing climate change risks to reflect IIJA's emphasis on resilience and climate change. In particular, FAA has not updated its Advisory Circular (AC) on airport long term master planning[6] to include requirements or procedures for airports to consider climate change impacts or resiliency. As a result, FAA and airports are not required to consider climate change impacts when proposing infrastructure projects. However, in September 2021, FAA entered into an interagency agreement with DOT's John A. Volpe National Transportation Systems Center (Volpe) for a 5-year study to identify the climate change risk to airport systems. One of the key potential outcomes of the study is to develop a framework that airports can use to assess their infrastructure's resilience and prioritize future investments needed to improve resiliency. Yet, the results of this study, which is currently scheduled to conclude in 2026, will not be available for many projects that receive funding before the study's end.

[5] FAA's standards are in its advisory circulars which contain FAA's guidance or requirements for planning and executing aviation infrastructure projects.
[6] AC 150/5070-6B: Change 2 to Airport Master Plans, FAA, January 2015.

We are making recommendations to improve FAA's prioritization of resiliency and climate change in IIJA aviation programs.

Background

IIJA defines resilience as "the ability to anticipate, prepare for, or adapt to conditions or withstand, respond to, or recover rapidly from disruptions" stemming from weather events and natural disasters.[7] It also provides FAA with a total of $25 billion over 5 years—fiscal years 2022 to 2026—and funds three programs to address concerns over aging aviation infrastructure:

- Airport Infrastructure Grant Program (AIG) is a $15 billion formula grant program for airport-related maintenance and improvement projects such as runway and taxiway improvements. Under AIG, IIJA provides funding to airports based on a statutory formula[8] and airports select airport-proposed, FAA-approved projects. In fiscal year 2022, FAA announced[9] around $329 million in AIG grants for about 200 projects.
    - The FAA Contract Tower[10] (FCT) Competitive Grant Program, which is included in AIG, provides $100 million in competitive discretionary grants[11] for airport-owned control towers. These grants can be used to sustain, construct, repair, improve, rehabilitate, modernize, replace, or relocate non-approach control towers, as well as acquire and install air traffic control, communications, and related equipment to be used in those towers. In fiscal year 2022, FAA awarded $20 million to 20 FCT projects.
- Airport Terminal Program (ATP) is a $5 billion competitive discretionary grant program for airport terminal development projects. IIJA requires FAA to consider airport terminal projects in seven categories to: increase

[7] IIJA amended 23 U.S. Code (U.S.C.) § 101 with this definition.
[8] IIJA allocates the majority of AIG funding per 49 U.S.C. § 47114(c) which provides funding to primary commercial airports based on the number of passenger boardings at the airport in the prior calendar year and to cargo airports based on total annual landed weight.
[9] According to FAA, announced projects have received congressional approval and will be awarded a grant once all statutory and administrative requirements are finalized.
[10] Contract towers are owned by airports, but air traffic control services and employees are provided by private companies rather than by FAA personnel. The FCT Competitive Grant Program only includes airport-owned towers that participate in the contract tower program or the contract tower cost share program.
[11] Competitive discretionary grant programs are programs under which a Federal awarding agency may exercise judgement or discretion in determining the recipient and/or amount of the award under a competitive application process.

capacity, replace aging infrastructure, comply with the Americans with Disabilities Act,[12] improve access for disadvantaged populations, improve energy efficiency, improve safety through terminal relocation, and encourage competition. In fiscal year 2022, FAA announced the intent to fund about $969 million for 85 airports under ATP.

- Facilities and Equipment (F&E) provides $5 billion in funding for improving or replacing aging air traffic control facilities and equipment. Accordingly, FAA has a "30/30" goal to replace 30 FAA-owned air traffic control towers by 2030 using IIJA funding for this purpose. FAA developed an annual "spend plan," as required by IIJA, for $1 billion of F&E funding per year for fiscal years 2022 and 2023.

Four recent EOs—two adopted before the passage of IIJA, one adopted on the day of IIJA's passage, and one adopted after—outline a policy emphasis on climate change in connection with resilience. EO 14008[13] directed Federal agencies to develop plans to increase the resilience of their facilities and operations to the impacts of climate change. EO 14030[14] directed the development of a Governmentwide strategy regarding financing needs associated with achieving net-zero greenhouse gas emissions by 2050. As noted above, EO 14052 prioritized, as appropriate, resiliency to climate change effects in the implementation of IIJA. Lastly, EO 14057[15] directed Federal agencies to develop and enhance tools that assess climate change impacts.

As part of its implementation of the Administration's goals and priorities in EOs, DOT included a goal for climate and sustainability in its fiscal year 2022 Strategic Plan (DOT's Strategic Plan)[16] and in its fiscal year 2023 annual performance plan (DOT's Performance Plan).[17] This goal—to tackle the climate crisis by ensuring that transportation plays a central role in the solution—requires all Operating Administrations (OA) under DOT to build more resilient and sustainable transportation systems to benefit and protect communities (as well as to substantially reduce greenhouse gas emissions and transportation-related pollution). DOT's Strategic and Performance plans also include a performance indicator[18] or goal for all OAs to "reduce transportation emissions in support of net-zero emissions" by 2050.

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[12] 42 U.S.C. § 12101.
[13] Tackling the Climate Crisis at Home and Abroad, Executive Order 14008, 86 Fed. Reg. 7619 (Feb. 1, 2021).
[14] Climate-Related Financial Risk, Executive Order 14030, 86 Fed. Reg. 27967 (May 25, 2021).
[15] Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, Executive Order 14057, 86 Fed. Reg. 70935 (December 13, 2021).
[16] U.S. Department of Transportation Strategic Plan Fiscal Years 2022-2026.
[17] U.S. Department of Transportation Fiscal Year 2023 Performance Plan, revised as of July 7, 2022.
[18] Performance indicators are quantitative metrics that measure progress toward a strategic objective.

To administer the AIG and ATP programs, FAA is using the Agency's well-established Airport Improvement Program (AIP) policies and procedures. When airports accept AIP funds, they are required to adhere to certain obligations called grant assurances that require them to maintain and operate facilities safely and efficiently. One of the grant assurances requires airport owners to carry out projects in accordance with policies, standards, and specifications contained in FAA ACs for AIP projects. ACs cover items such as pavement design,[19] lighting,[20] electrical and construction improvements.[21]

Under AIP, FAA identifies airport development projects for funding from plans developed and projects proposed by planning agencies, States, and airports, such as airports' master plans and capital improvement plans (CIP).[22] FAA defines an airport master plan as a comprehensive study of an airport that typically describes the short-, medium-, and long-term development plans to meet future aviation demand, generally over a 20-year period. According to FAA, an airport's master plan should contain a CIP, which is a list of proposed projects within a 1-to-5-year timeframe, which airports provide to FAA. In turn, FAA reviews airport sponsors' CIPs to assess whether the airport's projects meet the criteria for inclusion on FAA's Airports Capital Improvement Plan (ACIP)[23] to be eligible for AIP funding. FAA prioritizes potential AIP projects listed in the ACIP using the National Priority Rating (NPR), a quantitative measure from 1 to 100,[24] used to rank project importance, with safety being one of the top priorities. FAA assigns funding to AIP projects starting with the highest priority projects and working towards the lowest. However, unlike the AIP—which is also a formula grant program—under the IIJA AIG program, airports can select projects to receive funding regardless of where their priority is ranked on the NPR.

[19] Advisory Circular 150/5320-6G: Airport Pavement Design and Evaluation, FAA, June 2021.
[20] Advisory Circular 150/5345-46E: Specification for Runway and Taxiway Light Fixtures, FAA, March 2016.
[21] Advisory Circular 150/5370-10H: Standard Specifications for Construction of Airports, FAA, December 2018.
[22] Capital improvement plans contain a list of an airport's proposed projects that are submitted to FAA.
[23] The ACIP is a plan for funding development over a rolling 3-year period. The ACIP contains potential projects that are AIP eligible, justified, and have reasonable project timing.
[24] According to FAA, projects with higher numerical values are more consistent with FAA goals and objectives.

FAA Has Taken Steps To Address Resiliency in Discretionary Programs Through Project Selection Criteria

FAA has incorporated climate change and resiliency into their selection criteria for discretionary grant programs—ATP and FCT —and F&E and selected some projects that address these issues.

- **ATP.** In the Notice of Funding Opportunity (NOFO) for ATP, FAA states that the Agency is looking to award projects that promote energy efficiency and increase climate resilience. According to the NOFO, FAA "seeks to fund projects under ATP that reduce greenhouse gas emissions and are designed with specific elements to address climate change impacts." Further, the NOFO specifies that FAA will give "favorable consideration" to eligible projects in seven categories, as required under IIJA. In particular, two of the seven categories—replace aging infrastructure and improve energy efficiency—can include projects that address resiliency and climate change. In the application for ATP funding, airport sponsors select which of the categories their proposed project falls under. Airport sponsors can check more than one category. According to our analysis of FAA's data for fiscal year 2022, for 88 of 91 projects (roughly 97 percent), airports selected one or both of these particular categories to describe their projects.

- **FCT**. Unlike ATP, the NOFO for the FCT competitive grant program under AIG does not specify favorable consideration will be given to projects that contain features that address climate change and resiliency. However, the NOFO does state that FAA will consider how well projects advance the Administration's priorities that address climate change and resiliency, such as in EO 14008 in its funding decisions. For fiscal years 2022 and 2023, 8 of 53 contract tower projects (15 percent), specified energy efficiency in the project description that could lead to reduction in greenhouse gases.

- **F&E.** According to FAA, the Agency factors resiliency and climate change into the design of all F&E projects. In particular, FAA has identified three types of F&E projects that address resiliency and climate change—(1) power system sustainment, (2) unstaffed infrastructure sustainment, and (3) end-of-useful life mechanical system replacement. According to FAA, power system sustainment projects help ensure resilience from power disruptions, including during extreme weather events. Similarly, unstaffed infrastructure sustainment projects will replace buildings or

shelters that protect NAS equipment, making them more resilient, particularly to extreme weather and climate events. Lastly, end-of-useful life mechanical systems replacement projects can reduce the likelihood of catastrophic systems failure and lower greenhouse gas emissions. Based on our analysis of 531 planned fiscal year 2023 F&E IIJA-funded projects, roughly 68 percent of the projects are for power system sustainment and about 6 percent are for unstaffed infrastructure sustainment or end-of-useful life mechanical system replacement.

Under ATP, for example, FAA approved a project at an airport in Missouri to replace an old passenger terminal constructed on a flood plain in the 1950s. According to airport officials, over the years, the terminal has been exposed to floods and has structural deficiencies. Airport officials indicated that the new terminal is being designed to be more resilient against future severe weather events, including flooding and high winds potentially caused by climate change. Specifically, it will be constructed above the flood plain and will be able to withstand 118 mile per hour winds, while also lowering greenhouse gas emissions through energy efficient lighting and heating.

For both the ATP and FCT programs, FAA's NOFOs state IIJA programs will be implemented "in alignment with the priorities in EO 14052," which emphasizes building resilient infrastructure projects that help combat climate change. However, FAA's ability to prioritize these goals is impeded because FAA and airports are not required to consider climate change impacts when proposing infrastructure projects. Additionally for the F&E program, it is not clear from FAA's documentation the extent to which these projects will anticipate potential changes in future weather patterns due to climate change as suggested under EO 14008, which requires agencies to develop plans to increase the resilience of their facilities and operations to the impacts of climate change.

According to FAA, IIJA-funded projects incorporate resiliency through airports' compliance with current local building codes, and FAA standards. A 2020 Federal Emergency Management Agency (FEMA) study[25] supports the idea that modern building codes[26] lead to increased resiliency to natural hazards such as weather impacts. The study estimated that post-2000 construction using modern building codes avoided $1.6 billion in yearly losses from natural disasters. FEMA's study states that over the last 2 decades, updates to modern codes have increasingly emphasized improving property protection to reduce losses from natural hazard

[25] FEMA, *Building Codes Save: A Nationwide Study–Losses Avoided as a Result of Adopting Hazard-Resistant Building Codes,* November 2020.

[26] FEMA defines modern building codes as "I-Codes"—those developed by the International Code Council, an association of international business safety professionals. Modern codes are the two most recent editions of the I-Codes (2015 and 2018). According to FEMA, buildings constructed to modern codes withstand the effects of natural hazard events better than those not built to these codes.

events. However, FAA does not play a role in developing local building codes. Consequently, FAA has no control over when building codes are updated to address future climate change effects.

As an example, officials we met with from an airport in New York are using ATP funding to upgrade its main terminal building to comply with current building codes. Airport officials stated that building inspectors found code violations[27] in several locations of the airport's terminal building with electrical equipment. Additionally, according to airport officials, the project is expected to reduce greenhouse gas emissions and ensure continuous, efficient use of the main terminal in case of loss of power by replacing an old air conditioning system and installing a new generator powered by natural gas which will assist in meeting net-zero emissions goals.

In addition, according to FAA, resiliency will also be built into IIJA projects because airports receiving IIJA funds are required to comply with AIP processes on meeting FAA standards, as contained in ACs. Under Federal law,[28] an airport may apply for AIP funds if the airport's development project complies with the standards prescribed by FAA.

Updating infrastructure to modern building codes can improve resiliency, but according to a multinational 2021 study involving researchers from the United States, Australia, New Zealand, and Canada,[29] building codes are generally based on historical weather conditions. According to the 2018 Fourth National Climate Assessment,[30] infrastructure currently designed for historical climate conditions will be more vulnerable to future weather extremes and climate change. Thus, infrastructure built to meet existing building codes and FAA standards may not withstand future climate change effects.

FAA Lacks Data and a Framework for Prioritizing Projects That Address Climate Change

FAA has not established a mechanism for collecting and reporting data on the extent to which selected IIJA projects address FAA's and DOT's strategic goals on

[27] Per National Electrical Code 2017, Article 110.26 (E) (1), violations included having water pipes mounted above electrical panels, where a water leak can create a hazardous environment and risk of property damage.
[28] 49 U.S.C. § 47105(b)(3).
[29] Delivering Climate Responsive Resilient Building Codes and Standards, Findings from the Global Resiliency Dialogue Survey of Building Code Stakeholders in Canada, Australia, New Zealand, and the United States, November 2021, the Australian Building Codes Board, the National Research Council of Canada, the New Zealand Ministry of Business, Innovation, and Employment, and the International Code Council (based in the United States).
[30] Fourth National Climate Assessment, U.S. Global Change Research Program.

climate and sustainability.[31] The Agency also lacks a framework to prioritize projects that address climate change impacts on aviation infrastructure. Finally, FAA and Volpe are working on a study aimed at identifying the climate change risk to airport systems and developing a framework that would enable airports to conduct resiliency assessments of their infrastructure, but it will not be completed until 2026.

FAA Does Not Measure Whether IIJA Projects Help FAA and DOT Progress in Meeting Climate Goals

Although FAA has selected projects in categories that are likely to address resiliency and climate change goals, the Agency is not collecting data on how these IIJA projects are contributing to meeting DOT goals on climate change and sustainability. However, DOT's Strategic and Performance plans include a performance indicator[32] or goal for all OAs to "reduce transportation emissions in support of net-zero emissions" by 2050 and use the reduction of greenhouse gases as one indicator of DOT's progress under its climate and sustainability strategic goal. The lack of data on how IIJA aviation projects reduce greenhouse gas emissions will hinder FAA's ability to measure what progress is being achieved towards DOT's goal.

Additionally, FAA's guiding plans and documents align with DOT's strategic goal on climate change and sustainability. Specifically, FAA's fiscal year 2022–2026 strategic plan (FAA's Strategic Plan)[33] describes actions the Agency will take in support of DOT's climate and sustainability strategic goal. For example, FAA's Strategic Plan contains key activities to reduce greenhouse gas emissions that can be traced back to DOT's overall goal to reduce emissions. Similarly, and in line with DOT's goal, FAA's 2021 Aviation Climate Action Plan[34] includes the goal of net-zero greenhouse gas emissions from the U.S. aviation sector by 2050. Nevertheless, FAA is not collecting data on how IIJA aviation projects reduce greenhouse gas emissions to measure its progress in meeting these goals or activities.

[31] According to FAA, airport sustainability is a broad term that encompasses a wide array of practices applicable to planning, designing, building, and operating airport facilities with benefits such as reduced energy consumption, reduced greenhouse gas emissions, and cost savings. Per FAA, to ensure that infrastructure can operate in a sustainable manner, it must also be resilient to be able to address threats from severe weather.
[32] Performance indicators are quantitative metrics that measure progress toward a strategic objective.
[33] FAA Fiscal Years 22-26 Flight Plan 21: The FAA Strategic Plan for the 21st Century.
[34] United States 2021 Aviation Climate Action Plan, Federal Aviation Administration.

In addition to the performance indicators pertaining to climate change and sustainability goals in the DOT and FAA strategic plans and guidance, in June 2022, the Office of the Secretary of Transportation (OST) issued guidance[35] on incorporating the climate change and sustainability priorities in executing discretionary grant programs. Subsequently updated in January 2023, this guidance provides standardized NOFO language to implement the Department's policy priorities including those pertaining to climate change and sustainability. For example, in line with OST's guidance for fiscal years 2022 and 2023, FAA's fiscal year 2023 ATP and FCT NOFOs include a new section on project performance and program evaluation. Accordingly, ATP and FCT grant recipients may be required to participate in an evaluation of IIJA-funded discretionary grant programs, such as an analysis of impacts or outcomes, in which applicants may be required to collect and submit relevant data elements.[36] However, FAA is not requiring airports to track and submit relevant data on the reduction of greenhouse gases. FAA officials told us the Agency is not tracking this information because IIJA does not explicitly mandate such tracking. Additionally, FAA officials told us that DOT has not established a mechanism for collecting and reporting this data for IIJA projects. Consequently, if FAA conducts an evaluation of the program's effectiveness in reducing greenhouse gases, without requesting this data upfront, airports may not be prepared to provide this information which would impede the evaluation.

When we met with FAA officials responsible for IIJA aviation program implementation, they expressed concern about how to determine reduction of greenhouse gas emissions in IIJA-funded projects. However, we found two examples of entities—Airports Council International (ACI) and FAA's Air Traffic Organization (ATO)—that have previously measured greenhouse gas emissions. FAA IIJA program officials could leverage this information in developing its own methodology to measure IIJA discretionary projects' contributions to meeting DOT's and FAA's strategic goals. For instance, FAA's U.S. Aviation Climate Action Plan, contains data from the ACI calculation of airport emissions.[37] Furthermore, according to FAA's ATO officials, ATO tracks the reduction in its energy consumption from implemented energy improvement projects in the Department of Energy's Compliance Tracking System. This includes IIJA projects that have energy improvement as part of their scope.

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[35] Implementing Process and Incorporating Administration Priorities for Discretionary Grant Programs and Other Priority Programs, DOT Office of Under Secretary for Policy, June 7, 2022.

[36] The evaluation could be an implementation assessment, an impact/outcomes analysis, a benefit/cost analysis, or a return on investment.

[37] ACI is an airport trade association with the objective of fostering cooperation among its member airports and other partners in world aviation. ACI's calculation of airport emissions was from its Long-Term Carbon Goal Study for Airports which included a survey of airports, regional workshops, interviews, and emissions data supplied by ACI member airports.

Lastly, in an FAA briefing on its Airport Climate Challenge program, [38] the Agency stated that one of the elements of the program is to "quantify greenhouse gas emissions reductions for a variety of airport projects eligible for funding." By not measuring contributions from IIJA-funded projects in meeting DOT strategic goals on climate change and sustainability, FAA is not able to determine the full extent of the impact of these projects on helping DOT and FAA achieve its strategic goals.

FAA Does Not Have a Framework for Prioritizing Projects That Address Climate Change

Airports receiving AIG and ATP grant funding are required to carry out projects in accordance with policies, standards, and specifications outlined in ACs. We reviewed the FAA AC on airport master plans[39] and confirmed it does not contain requirements or procedures for airports to consider climate change impacts or resiliency. Moreover, according to FAA, airports are not required to develop airport master plans but are encouraged to do so. As a result, airports can comply with FAA ACs and not make progress toward climate change goals. Additionally, we note that FAA has not updated ACs[40] for airport projects pertaining to building resilient infrastructure or addressing climate change risks since IIJA was passed in November 2021.

For instance, the FAA-sponsored 2021 study "Future Climate Scenarios for Runway Length"[41] identified that FAA's current methodology to calculate runway lengths for purposes of infrastructure development does not consider projected changes in hot day temperatures and/or frequency of wet runway conditions. The study examined required runway lengths calculated using future climate data with projected increases in hot day temperatures and precipitation, compared to required runway lengths calculated under FAA's current AC using historical weather data. As a result, in a particular scenario of temperature and precipitation change, the study estimated that at 8 of 30 airports studied[42] the required runway length based on operations of a particular aircraft model would increase by about

[38] According to FAA, the goal of the Airport Climate Challenge program is to contribute to achieving net-zero emissions by 2050 by accelerating airport greenhouse gas emission reductions through FAA programs such as the Voluntary Airport Low Emissions Program.
[39] Advisory Circular 150/5070-6B: Change 2 to Airport Master Plans, FAA, January 2015.
[40] ACs on Airport Pavement Design and Evaluation; Specification for Runway and Taxiway Light Fixtures; and Standard Specifications for Construction of Airports. See footnotes 19 through 21 for additional details on the ACs.
[41] "Future Climate Scenarios for Runway Length: Assessment of Future Temperature and Precipitation Trends," DOT/FAA/TC-21/43, November 2021.
[42] According to the study, it examined 30 of the busiest, most heavily trafficked continental U.S. airports.

500 feet compared to required runway lengths calculated using FAA's current AC with historical weather data.[43] Yet, FAA has not updated its AC on calculating runway lengths since this study was issued. According to an FAA official, the Agency plans to address issues identified in the study in an update to the AC and hopes to issue a draft in 2024.

In addition, in response to EOs 14008 and 14030, FAA entered into an interagency agreement with DOT's Volpe in September 2021 prior to IIJA's passage to conduct a 5-year study entitled "Resiliency at Vulnerable National Plan of Integrated Airport Systems (NPIAS) Airports with Climate Change and Severe Weather." According to the statement of work for the study, FAA does not have a formal process to evaluate airports for climate change vulnerabilities. Planned outcomes from this study include identifying the risk to airport systems due to climate change and severe weather and prioritizing future investments that will improve resilience. Among other goals, under the study, Volpe plans to:

- identify airport related assets that are vulnerable to flooding and erosion, and complete studies of vulnerable airports and
- advise on a Sustainability Resilience Pilot Program framework for airport resilience studies.

As an outcome of the study, FAA plans to develop a framework that would assist airports and their consultants in conducting resilience assessments in a repeatable and effective manner. FAA envisions that the framework will also address threats such as extreme weather, flooding, storm surge, and high temperatures to projected impacts on performance of infrastructure such as resilience of pavement, drainage, electrical systems, and runway availability. FAA would then be able to prioritize resiliency investments at airports.

According to FAA officials, the Agency is considering developing criteria to integrate the framework from the Volpe study into its AC on airport master plans. IIJA provided funding for projects in fiscal years 2022 through 2026; however, the 5-year Volpe study is not scheduled to conclude until 2026. Because the results of the study will not be available until 2026, FAA will not be able to use the information gained from this study for many IIJA-funded projects approved prior to the study's end. As a result, while some IIJA-funded projects will achieve improved resiliency in connection with potential future effects of climate change, other projects could be vulnerable to future risks due to potential climate change effects, as these projects do not require airports to anticipate changes in weather patterns and their impacts.

[43] The runway length required at an airport is dependent upon several factors including the fleet mix of various types of aircraft at the airport.

Conclusion

FAA recognizes that climate change may lead to an increase in the intensity and frequency of severe weather events that will seriously impact some airports and could lead to disruptions in the NAS. While FAA considers resiliency in selecting IIJA projects, the Agency is not collecting data to measure progress against FAA and DOT climate goals. Such data can be used to inform decision makers on the efficacy of the steps FAA is taking to address this challenge. FAA also lacks a framework that airports and the Agency can use to make informed investment decisions on which projects would have the greatest impact on mitigating the disruptions resulting from climate change-related weather events, which creates risk for future NAS disruptions.

Recommendations

To improve FAA's prioritization of resiliency and climate change in Infrastructure Investment and Jobs Act (IIJA) aviation programs, we recommend that the Federal Aviation Administrator:

1. Develop and implement a methodology to measure IIJA discretionary projects' contributions to meeting DOT's and FAA's strategic goals to reduce greenhouse gas emissions from transportation.

2. Update FAA advisory circulars on long-term aviation infrastructure as necessary to address resiliency and climate change effects in airport infrastructure projects.

Agency Comments and OIG Response

We provided FAA with our draft report on October 11, 2023, and received its formal response on November 22, 2023. FAA's response is included in its entirety as an appendix to this report. FAA partially concurred with recommendation 1 and provided an acceptable planned action and completion date. FAA fully concurred with recommendation 2 and provided an appropriate planned action and completion date. Accordingly, we consider all recommendations resolved but open pending completion of planned actions.

Actions Required

We consider recommendations 1 and 2 resolved but open pending completion of planned actions.

Exhibit A. Scope and Methodology

This performance audit was conducted between July 2022 and October 2023. We conducted this audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

For our objective, we analyzed the requirements in Public Law 117-58, Infrastructure Investment and Jobs Act, dated November 15, 2021. Additionally, we reviewed four relevant EOs (14008, 14030, 14052, and 14057) dated between January 2021 and December 2021 directing Federal agencies to consider and promote resiliency, sustainability, climate-related financial risks, climate change, and the implementation of IIJA.

We also interviewed FAA officials in the Airports Financial Assistance Division, the Bipartisan Infrastructure Law Branch Team, the Office of the Associate Administrator for Airports, Airport Planning and Environmental Division, Office of Airports Planning and Programs, and Air Traffic Control Facilities and Engineering.

We interviewed FAA officials to understand the process used to develop guidance, determine the eligibility of a project, select projects, establish milestones, assess risks, and determine if a project incorporated resiliency and the effects of climate change in its design. In addition, we obtained from FAA detailed funding listing for each of the three major programs (AIG, ATP, and F&E).

We also analyzed FAA's data for the 2022 and 2023 allocations for AIG and approved FTC grants, project selections for ATP, and F&E funding. We determined the approximate number of projects that could potentially address resiliency, sustainability, or climate-related changes.

In addition, we contacted and interviewed two airports that received grant approval to use ATP funding in fiscal year 2022. We selected the two airports based upon information provided in project descriptions to comply with current building codes, provide energy efficiencies, or construct a new terminal built above a 100-year flood plain. These projects could address resiliency and climate change effects.

We reviewed key DOT and FAA documents that communicated Departmental and Agency strategies on climate and sustainability. Specifically, we analyzed DOT's strategic plan—DOT's roadmap on how to implement IIJA—to determine the Department's vision and long-term goals pertaining to climate and sustainability. We also reviewed FAA's Strategic Plan and confirmed that it

aligned with DOT's strategic goals for climate and sustainability. We analyzed DOT's fiscal year 2023 performance plan and identified the near-term actions to meet the Department's strategic climate and sustainability goals, as well as FAA's role in achieving those goals. We interviewed FAA officials to determine what greenhouse gas emissions data from IIJA projects are being collected and submitted to support Departmental and FAA strategic goals on climate change and sustainability. Further, we reviewed FAA and DOT's climate action plans, which discuss initiatives to combat climate change and bolster resiliency. We analyzed DOT's fiscal years 2022 and 2023 guidance on incorporating climate change and resiliency priorities into discretionary grant programs. We compared the fiscal year 2022 and 2023 Departmental guidance to the fiscal years 2022 and 2023 ATP and FTC NOFOs to determine how FAA addressed these key Administration priorities in the NOFOs.

To determine FAA's efforts related to a framework to prioritize climate change projects, we reviewed FAA's AC on airport master plans, statement of work for the Volpe study on "Resiliency at Vulnerable NPIAS Airports with Climate Change and Severe Weather" and the FAA-sponsored study "Future Climate Scenarios for Runway Length."

Exhibit B. Organizations Visited or Contacted

U.S. Department of Transportation

John A. Volpe National Transportation Systems Center

Federal Aviation Administration

Office of Airports

Air Traffic Organization

William J. Hughes Technical Center, NJ

Airports

Long Island MacArthur Airport, Islip, NY

Rosecrans Memorial Airport, St. Joseph, MO

Exhibit C. List of Acronyms

AC	Advisory Circular
ACI	Airports Council International
ACIP	Airports Capital Improvement Plan
AIG	Airport Infrastructure Grant
AIP	Airport Improvement Program
ATO	Air Traffic Organization
ATP	Airport Terminal Program
CIP	Capital Improvement Plan
DOT	Department of Transportation
EO	Executive Order
F&E	Facilities and Equipment
FAA	Federal Aviation Administration
FCT	FAA Contract Tower
FEMA	Federal Emergency Management Agency
IIJA	Infrastructure Investment and Jobs Act
NAS	National Airspace System
NOFO	Notice of Funding Opportunity
NPIAS	National Plan of Integrated Airport Systems
NPR	National Priority Rating
OA	Operating Administration
OIG	Office of Inspector General
OST	Office of the Secretary of Transportation

Exhibit D. Major Contributors to This Report

JAY **BORWANKAR**	PROGRAM DIRECTOR
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Appendix. Agency Comments

Federal Aviation Administration

Memorandum

Date: November 22, 2023

To: Nelda Z. Smith, Assistant Inspector General for Aviation Audits

From: Erika Vincent, Acting Director, Office of Audit and Evaluation, AAE-1

ERIKA S VINCENT Digitally signed by ERIKA S VINCENT Date: 2023.11.22 08:58:52 -05'00'

Subject: Federal Aviation Administration's (FAA) Response to Office of Inspector General (OIG) Draft Report: IIJA Aviation Programs Resiliency

The Federal Aviation Administration (FAA) is aggressively pursuing a wide range of efforts to address and mitigate the effects of global climate change. The agency is both in compliance with existing standards and has undertaken efforts to improve future airport designs to prevent service disruptions to the National Airspace System (NAS) for both Infrastructure Investment and Jobs Act (IIJA) and traditional discretionary grant projects.

The OIG report assesses several programs across the climate change spectrum and addresses issues regarding the collection of data related to greenhouse gas reduction which are imminently important to FAA's sustainability goals. However, the FAA's efforts are focused on resiliency of NAS equipment and infrastructure and mitigating the effects of global climate change.

The FAA offers these additional observations:

- The effects of climate change vary throughout the country. A federal standard that uses best-available climate data sets (including forecasts), information resources, and decision-support tools to assess the climate-related vulnerability and risk of projects could inform a uniform approach to incorporating evidence-based climate resilience measures or features in project construction.
- The FAA agrees with the 2020 Federal Emergency Management Agency study discussed in this report and believes it supports a position that modern building codes lead to increased resiliency to natural hazards such as weather impacts. The OIG additionally discusses a 2021 multinational report, which notes that to the extent that building codes are based on historical weather conditions, infrastructure built to meet them may not withstand future climate effects – a conclusion with which FAA agrees.

Upon review of OIG's draft report, the FAA partially concurs with recommendation 1 and concurs with recommendation 2 as written. Actions to implement recommendation 2 will be completed by September 30, 2025.

For recommendation 1, the agency can ensure that language in upcoming IIJA Notices of Funding Opportunity (NOFO) requests that airports estimate and commit to tracking the carbon dioxide reductions anticipated from the potential project. The FAA will leverage existing data sources and methodologies available from other federal agencies and develop a consistent approach to better measure the efficiency and effectiveness of IIJA contributions to the Department of Transportation's goals for reducing greenhouse gas emissions. Specifically, FAA commits to explore identification and use of appropriate tools, in consultation with the Environmental Protection Agency (EPA), to ensure emission calculations for projects, such as terminal projects that incorporate energy efficiency improvements, are accurately measured. These actions will be reflected in next airport IIJA NOFO scheduled to be published by September 30, 2024.

We appreciate this opportunity to respond to the OIG draft report. Please contact Erika Vincent at Erika.Vincent@faa.gov if you have any questions or require additional information about these comments.

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