



**Federal Aviation
Administration**

*Safely Integrating
Advanced Air Mobility
in the
National Airspace*

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Advanced Air Mobility (AAM)

 DELTA





UNITED 











American Airlines 











BOEING





- First electric vertical takeoff and landing (eVTOL) aircraft expected to be FAA certified in 2025
- Predicted to be a \$30B market by 2030
- New venture capital funded manufacturers backed by traditional operators
- Initial business cases
 - Air taxi (airport to city pair)
 - Cargo (small market to hubs)
 - Medical transport
- Initial operations look like traditional helicopter/GA piloted aircraft, but plan rapid shift to autonomous
- Unique, yet-to-be-built “ecosystem” needs to support vertiports, charging, routes, & automation

Balancing the Pace of Innovation and Safe Operations



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Safety Focused Approach – “Wholistic” Method

- Whole of government approach needed to support integration of new class of aircraft, flying in constrained airspace, needing new support infrastructure, and accelerating to autonomous operations environment
- Updating a regulatory framework to address the unique aspects of new hybrid, non-traditional aircraft
- The FAA created a programmatic portfolio approach called Innovate28 that integrates all cross-agency-efforts toward user initial entry into service goals
- DOT-led AAM interagency working group developing national strategy for AAM, identifying key national issues for implementation: security, power/energy, infrastructure, community impacts, spectrum, and supply chain. Request For Information published in the Federal Register (comment period closed Aug 2023)

Ecosystem Enablers

- Aircraft Safety Rulemaking
 - **Recognition of pilot in command experience** in military/air carrier operations (final rule Sep 2022)
 - Update to **air carrier definitions** (Effective Sep 2023)
 - **Airman certification standards** (comment period closed Feb 2023 – Final Rule in Work)
 - Notice of proposed rulemaking (NPRM), which proposes special federal aviation regulations (SFAR) for **integration of powered-lift operations** and associated pilot certification (comment period closed Aug 2023 anticipated Final Rule in the Fall of 2024)
 - For **type certification**, the FAA is accepting established means of compliance as well as developing new means depending on unique design features/characteristics of vehicle
- Planning & Portfolio Management
 - Urban Air Mobility Concept of Operations v2.0 (May 2023)
 - AAM Implementation Plan (Jul 2023)
 - Planning integrated simulations/testing in partnership with DOD, NASA
- Airports
 - Interim guidance published September 2022 through **Engineering Brief #105; refined performance-based guidance planned through Advisory Circular in 2025**

Airworthiness Criteria Updates

- **Aircraft Performance & Continued Safe Flight**

- Established two levels of performance (essential performance vs increased performance)
 - “Essential performance” establishes the minimum safety objectives for issuance of a type certificate
 - “Increased performance” recognizes an elevated level of safety similar to the performance expectations of Category A rotorcraft
- “Increased performance” requires the ability to continue flight to the planned destination or planned alternate
- Revision and addition of definitions for “controlled emergency landing” and “continued safe flight and landing”

- **Birdstrike**

- Removal of requirement for bird deterrent devices

- **Aeroelasticity**

- Modification and development of aeroelasticity criteria related to “whirl flutter” and aeromechanical stability

- **Structures**

- Clarification of structural durability requirements when applying fail-safe design principles



Powered-Lift SFAR

- Notice of Proposed Rulemaking (NPRM) published in June 2023
- Complements other rulemaking activities
- Employs a Special Federal Aviation Regulation (SFAR) approach to set initial requirements and enable the FAA to gather additional information toward determining the most appropriate permanent rulemaking path in the future for these powered-lift aircraft
- Integration of Powered-Lift; Pilot Certification and Operations SFAR is moving through the final rulemaking internal processes with our intent of publishing the final rule fall 2024.
- Integrated with aircraft certification activities currently underway, other policy development, and operational certification efforts
- Intent is to have necessary regulatory elements in a place to support planned entry into service.

Advanced Air Mobility (AAM) Infrastructure

- Many Vertical Takeoff and Landing (VTOL) and Short Takeoff and Landing (STOL) aircraft operators intend to use existing infrastructure for initial operations, as well as new purpose-built infrastructure.
- As operators explore that interest, questions arise as to what standards to use in the siting, design, and operation of vertiports and supporting infrastructure.
- To support the development of vertiport standards, FAA began a multi-year research project on vertiport design and operation in 2019.

VERTIPORT



AAM Infrastructure-Related Guidance

- In September 2022, FAA released EB 105, Vertiport Design.
 - This is an early effort at prescriptive interim design guidance for vertiports, based on limited performance and design data for the types of aircraft that will use these facilities.
 - Planned 2024 update based on results from operational testing
- FAA will develop a performance-based AC on vertiport design in 2025.
 - The future AC will address autonomy, different propulsion methods and alternative fuel sources, high tempo facilities, and instrument flight rules (IFR) capability.



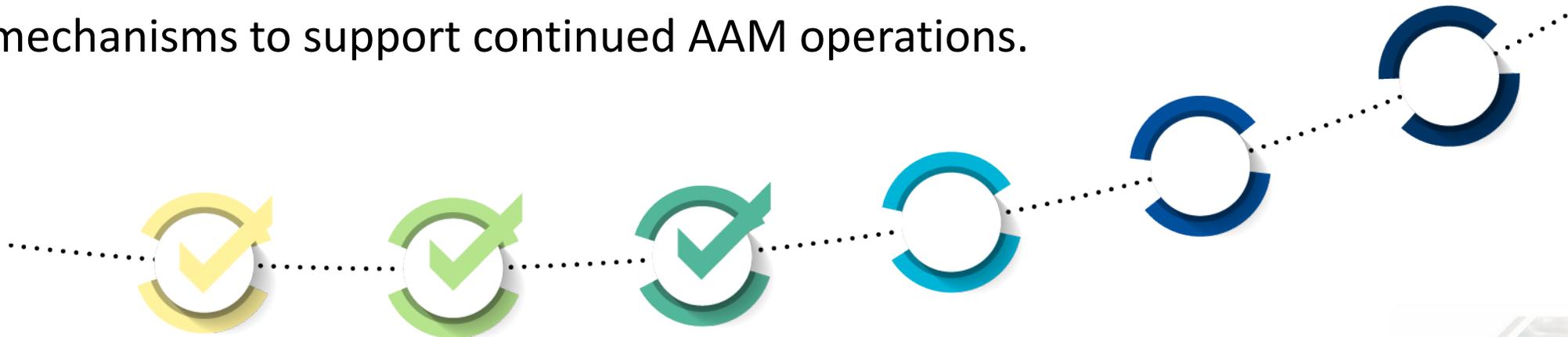
The FAA Innovate28 Program

- The Innovate28 Program was established by the FAA to enable Advanced Air Mobility (AAM) operations in the near-term, including an Integrated Master Schedule and expected operational evolution.
- The FAA is utilizing a staggered approach to allow time to receive feedback on the following releases individually:
 - May 2023 featured the release of the Urban Air Mobility (UAM) Concept of Operations (ConOps) version 2.0, which describes the technical roadmap for enabling UAM, an urban-focused subset of AAM, from initial operations to a mature state of operations.
 - June 2023 will focus on the release of the Notice of Proposed Rulemaking publication, which proposes a Special Federal Aviation Regulation for the integration of power-lift for pilot certification and operations.
- Innovate28 will also conduct outreach, webinars, and sponsor listening sessions with industry, local and state governments, airport authorities and support community outreach.
- The I28 FAA AAM Implementation Plan will be a living document that will be updated as the team learns from initial implementation, further research and testing, and input from the federal AAM Interagency Working Group activities.

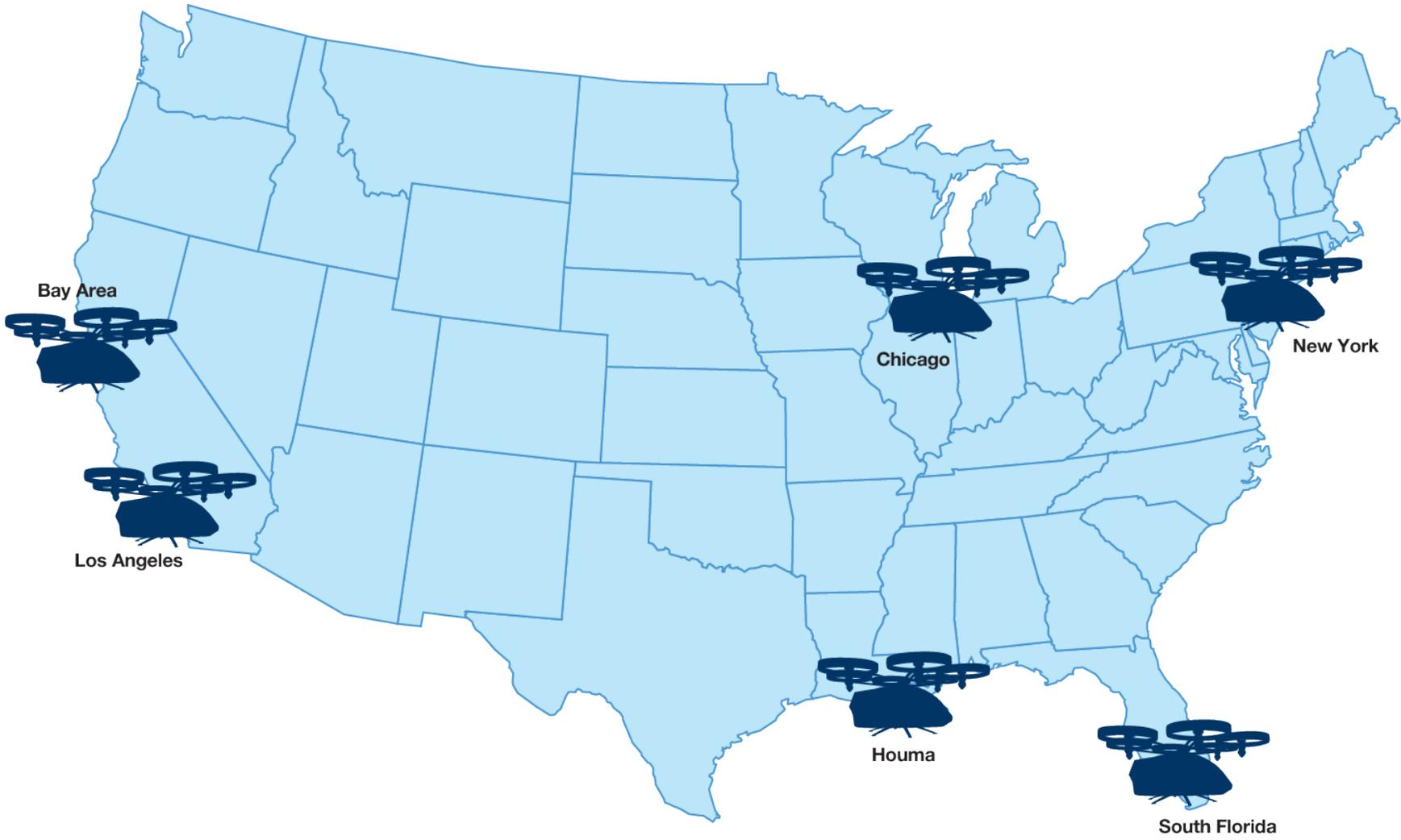


Innovate28 Goals for Near-term Operations

- Define the safest and most efficient routes while minimizing the impact on air traffic facilities and area residents.
- Be responsive to AAM industry plans for initial commercial operations commensurate with manufacturer and operator capabilities.
- Develop a repeatable process to allow ease of implementation at other locations.
- Plan for permanent and scalable processes, procedures, infrastructure, and mechanisms to support continued AAM operations.



Potential Initial Operations Locations



Key Innovate28 Activities

Aircraft Type Certification

Air Traffic Policy Review and Updates

Concept of Use (general and local)

Wake Separation Requirements

Hazardous Materials

- Fire/smoke procedures
- Cabin safety
- Emergency training
- Cargo requirements

Procedure Development

- Scoping
- Solution development
- Environmental review
- Safety Risk Management (SRM) process

Community Engagement

Cybersecurity

Site-Specific AAM Forecasting

Operational Certification

- Part 135 Operational Approval
- Operational Suitability (to establish aircraft type ratings, pilot training programs, maintenance programs, master equipment lists)

Local Vertiport Activities

- Determine vertiport locations
- Local zoning
- Construction
- Charging infrastructure

Physical and Operational Security

Site Selection

Crew Preparation

- Rulemaking for pilot training
- Train and certify crew

National Vertiport Activities

- Flight testing
- National guidance
- Rulemaking

Local ATC Activities

- Controller training
- Update Standard Operating Procedures (SOP) and Letters of Agreement (LOA)

➤ The list includes the FAA, other federal government agencies, FSLTT government, industry, and other stakeholder activities.



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ADVANCED AIR MOBILITY | AAM

International Collaboration

- A key priority in FAA is working with other Civil Aviation Authorities (CAA) to ensure to the greatest extent possible the harmonization of our regulations and policies to reduce redundancies and the burden on industry. We realize that complete harmonization may not always be possible; our goal is to **ensure the transferability of these new technologies across the globe.**
- A **joint FAA/EASA working group** is working on harmonizing our certification paths for eVTOL.
- Another effort is the **National Aviation Authorities (or NAA) Network**, established between Australia, Canada, New Zealand, the UK, and the United States that includes a working group focused on fostering cooperation on emerging challenges in aviation and aerospace while ensuring safety and enabling innovation.
- In Asia Pacific region, we collaborate with regional partners through agreements with **Korea and Japan**, we have chartered an **Asia-Pacific AAM workgroup** that addresses some of our greatest safety challenges with eVTOL certification.
- The FAA also championed the formation of the new **ICAO AAM Study Group** that is identifying the many facets of these new aviation technologies that the relevant ICAO technical panels must address to ultimately develop Standards and Recommended Practices (SARPs) for AAM in the future.



FAA Ongoing Engagement



We work with partners across the federal government to implement the AAM Coordination and Leadership Act to coordinate policy for integrating AAM operations.



AAM
Interagency
Working
Group



Office of
Science and
Technology
Policy

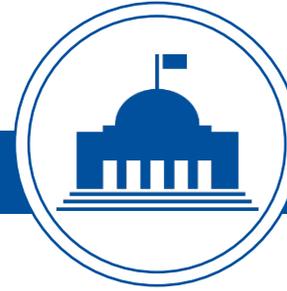


AGILITY PRIME



Joint test team with Agility Prime and NASA leverages knowledge and resources to collect performance data to develop policy and standards.

Federal Government and
Workforce Partners



We encourage state, local, and tribal communities to be informed about AAM technology and how these new operations will affect them. These meetings help us to better understand local sentiment about AAM operations.



Houma-Terrebonne
AIRPORT & INDUSTRIAL PARK



LA 2028



GREATER ORLANDO
AVIATION AUTHORITY



National Association of State Aviation Officials



LOS ANGELES WORLD AIRPORTS

Local/State/Tribal Governments and
Community Organizations



We engage with industry stakeholders, including aircraft manufacturers, operators, and airport/vertiport companies to understand their vision and implementation plans. Our current priority is U.S.-based eVTOL piloted-passenger manufacturers undergoing FAA certification. Examples include the following stakeholders:



TEXTRON



overair



ferrovial

BETA



Joby

Industry



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Summary

- AAM spans an array of concepts, from piloted to fully autonomous operations.
- We are building out an ecosystem to safely and efficiently enable the full range of a new way of flying so that it is beneficial and equitable to the public.
- Innovate 28 is a large agency-wide effort – partnering with others to establish the AAM infrastructure and ecosystem in key US sites.





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Questions?