

URBAN AIR MOBILITY STUDY

Interim Progress Report: State of the Industry

November 2022



INTRODUCTION

This document serves as an Interim Progress Report as part of an overall effort being led by the Miami-Dade Transportation Planning Organization (TPO) to study Urban Air Mobility (UAM) and its integration and applicability into the region's transportation network. The final report is anticipated to be released in June 2023. UAM is anticipated to revolutionize the transportation of people and goods within urban and suburban environments. To stay ahead of the rapidly evolving mobility landscape, the Miami-Dade TPO Governing Board passed resolution # TPO 16-2022 on May 5, 2022, authorizing the assessment of UAM technology and policy framework requirements for the eventual integration of UAM into the County's transportation network. Having formerly kicked off on August 1, 2022, the study's expected duration is ten months.

To date, the project team has partnered with the Miami-Dade County UAM Working Group to conduct an extensive review of current technologies, industry literature, concepts of operations (ConOps), and future applications. Additionally, Miami-Dade County's transportation network and future infrastructure projects were analyzed to help identify UAM integration opportunities within the County's existing system. The review is summarized within this Interim Progress Report and documented in Technical Memorandum #1, which was delivered to the Miami-Dade TPO on September 30, 2022.





UAM WORKING GROUP

Miami-Dade County's UAM Working Group was established with the objectives of exploring the emerging industry and helping prepare the County for UAM operations. The working group is comprised of representatives from public agencies and private industry including the Miami-Dade TPO, the Miami-Dade Aviation Department (MDAD), PortMiami, the Florida Department of Transportation (FDOT), the University of Miami, consulting firms, and eVTOL and UAM manufacturers infrastructure firms. The group has conducted extensive research on various policy frameworks, Concepts of Operations (ConOps), electric vertical takeoff and landing (eVTOL) aircraft technology, and other industry publications. The information gathered was critical in understanding the current state of the market as well as emerging policies and best practices that are aiding other regions and countries in preparing for UAM integration. In partnership with the Miami-Dade TPO and project team, a broad overview of the UAM Working Group's research is highlighted within this document.

UAM ECOSYSTEM

Although UAM has existed for many years with the use of traditional helicopters, emerging technologies in electrification, automation, and big data will facilitate on-demand urban air transportation that is more frequent and efficient than ever before. As such, effective planning for an integrated UAM system requires an understanding of aircraft technology, infrastructure needs, airspace management, and industry stakeholders.

ADVANCED AIR MOBILITY

UAM is a subset of Advanced Air Mobility (AAM). AAM encompasses use cases not specific to operations in urban and suburban environments such as regional air mobility, emergency response and medical services, and the use of drones for infrastructure inspection.



INFRASTRUCTURE

The identification of and planning for required infrastructure is paramount to the successful integration of UAM into Miami-Dade County's transportation network. Infrastructure associated with UAM are highlighted below.



Vertiports

Vertiports are dedicated areas for the landing and takeoff of VTOL aircraft. Vertiports are expected to be sited in a number of locations such as at existing airports, on the rooftops of buildings and parking garages, on elevated platforms, and at ground level in both urban and suburban areas.



Energy Infrastructure

OEMs have converged on three primary approaches to VTOL aircraft energy sources: lithium-ion batteries, hydrogen fuel cells, and hybrid-electric. With most industry players relying on all-electric aircraft, adequate charging stations and electrical grid capacity are critical to accommodate a fleet of eVTOL aircraft. As operations scale up, dozens of charging stations may place new demands on the electrical grid and a rise in longer-haul VTOL operations may increase the need for hydrogen-related infrastructure.



Safety and Security

Although safety and security standards are largely undefined, recent federal guidance provides interim direction related to vertiport design and operational safety. Cybersecurity and land use planning are also pertinent considerations.



Airspace

While initial piloted UAM operations are likely to utilize existing helicopter routes and air traffic control (ATC) services, NASA and the FAA are working to develop airspace management technologies to provide routine airspace access for UAM operations.



STAKEHOLDERS AND RESPONSIBILITIES

Although the FAA is primarily responsible for legacy aviation matters, state, regional, and local stakeholders must take active roles in shaping policy and engaging the community to support the integration of UAM into Miami-Dade County's existing transportation network. The following stakeholders are key to bringing a safe and efficient UAM system to market:

- Federal Agency NASA: Supports public-private engagement while conducting research to foster the growth of UAM
- Federal Agency FAA: Governs aircraft certification, the National Airspace System (NAS), and infrastructure requirements
- Federal and State Legislators: Promote policy development to enable and regulate the UAM industry such as those related to the infrastructure, safety, and investment needed to bolster an UAM ecosystem
- Local Governments: Promote local policy and planning decisions—especially zoning, land use, and transportation planning efforts—to foster an efficient, sustainable, and equitable UAM ecosystem; Develop proactive community engagement strategies to promote public perception of UAM
- OEMs and Private Industry: Drive eVTOL aircraft and market development while ensuring the safety of UAM users and the public





LEGISLATION

As with many new technologies and innovations, legislation has not been able to keep pace with advancements in the UAM industry. **Table 1** highlights active and pending federal and state legislation related to UAM.

Table	1	– Active	and	Pending	AAM/U	AM Le	egislation	(U.S.	and	Florida)
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LEGISLATION	STATUS	SUMMARY						
UNITED STATES (U.S.) LEGISLATION								
AAM Coordination and Leadership Act (S.516)	Awaiting President's signature	Directs the U.S. Department of Transportation (DOT) to establish an AAM interagency working group to plan and coordinate efforts related to the safety, infrastructure, physical security, cybersecurity, and federal investment necessary to bolster the AAM ecosystem in the U.S.						
Drone Infrastructure Inspection Grant Act (H.R. 5315)	Passed in House on 9/13/2022; Awaiting Senate vote	Authorizes a grant program to state, local, and tribal governments to purchase drones for infrastructure inspection and to community colleges/universities to support drone education and workforce training programs.						
Advanced Aviation Infrastructure Modernization Act (H.R. 6270)	Passed in House on 6/13/2022; Awaiting Senate vote	Authorizes a grant program to state, local, and tribal governments; transit agencies; port authorities; and Metropolitan Planning Organizations (MPOs) to plan the infrastructure needed to facilitate AAM operations and construction for public use vertiports.						
STATE OF FLORIDA LEGISLATION								
Use of Drones by Government Agencies Bill (CS/SB 44)	Approved by Florida Governor on 6/29/2021	Expands the authorized use of drones by law enforcement agencies and other entities for specified purposes. Requires the Department of Management Services to publish a list of approved drone manufacturers meeting specified security standards and to establish minimum security standards for governmental agency drone use.						
Drones Bill (CS/HB 659)	Approved by Florida Governor on 6/29/2020	Adds exception to prohibited drone uses for managing and eradicating invasive exotic plants or animals on public lands and suppressing and mitigating wildfire threats.						
Unmanned Devices Bill (CS/HB 1027)	Approved by Florida Governor on 6/26/2017	Authorizes operation of personal delivery devices within a county or municipality under certain circumstances, exempting personal delivery devices from certain registration and insurance requirements and creating the "Unmanned Aircraft Systems Act."						

Sources:

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www.congress.gov (accessed September 2022). www.flsenate.gov (accessed September 2022).

KEY TAKEAWAYS OF CASE STUDIES REVIEWED

OPPORTUNITIES

- UAM can provide additional mobility options while increasing the capacity and efficiency of an urban transportation system
- UAM can help reduce congestion within an urban core while strengthening connectivity between urban and rural areas
- Dedicated UAM routes can improve the delivery of emergency services
- UAM and eVTOLs can help reduce carbon emissions and noise pollution associated with automobiles
- UAM and associated infrastructure can provide opportunities for economic growth through transit-oriented development, workforce development, and improved access to population and employment centers

CHALLENGES

- Technology and investment have drastically outpaced rules and regulations for eVTOL development and UAM operations
- There is inadequate data and guidance to support comprehensive planning efforts for UAM infrastructure and technologies
- Existing battery storage and charging technologies do not support a dense UAM system
- An automated traffic management system is required to accommodate a variety of users and ensure the safety and efficiency of all eVTOL aircraft

- The public may express concerns over UAM, particularly as it relates to safety, noise, security, privacy, social equity, and environmental impacts
- Without promoting an integrated UAM system as an affordable transportation option for all, UAM has the potential to become an exclusive method of transportation for the wealthy. Based on current technologies and the emerging nature of the industry, however, uncertainty exists about whether UAM can obtain mass-market affordability.

PROPOSED ACTIONS

- Establish working groups of relevant stakeholders including representatives from government agencies at all levels, private industry, and the general public
- **Develop community engagement strategies** including public focus groups, educational seminars, open house meetings, and job training programs targeted at marginalized communities
- Incorporate UAM into local planning efforts such as land use planning and zoning, emergency services, economic development, and long-range transportation planning
- Promote interagency data sharing to leverage real-world data collection, observe changing industry trends, and inform local planning and development decisions



UAM AND MIAMI-DADE COUNTY

Especially during periods of rapid growth, effective and efficient transportation systems are vital to the long-term prosperity of regions. UAM is proposed to offer additional mobility options with increased frequency and efficiency. However, the proposed benefits of an UAM ecosystem within Miami-Dade County can only be maximized when complementing, not replacing, existing transportation systems. It is critical that UAM is incorporated into long-range multimodal planning efforts such as the existing 2045 Long Range Transportation Plan (LRTP), as well as the upcoming update of the 2050 LRTP initiated in October 2022, Transportation Improvement Program (TIP), Transit Development Plan (TDP), and the Strategic Miami Area Rapid Transit (SMART) Program.



Miami-Dade County is **home to 2.7 million residents.** According to the U.S. Census Bureau, the County's population is expected to **increase to 3.4 million**, or 26%, by 2045.

Figure 1 – Goals of 2045 LRTP and Proposed UAM Benefits

2045 LRTP GOALS	PROPOSED BENEFITS OF UAM
Maximize mobility choices	Increases mobility options
Increase safety and security for all users	Reduces traffic congestion and emergency response times
Support economic vitality	Improves transportation efficiency of people and goods; Attracts private investment
Protect and preserve the environment and quality of life; Promote energy conservation	Reduces noise, carbon emissions, and fuel consumption
Enhance integration and connectivity	Enhances connectivity between urban centers and surrounding communities
Improve and preserve the existing system	Enhances existing transportation system and multimodal connectivity while integrating UAM