



Miami-Dade Transportation
Planning Organization

URBAN AIR MOBILITY

Policy Framework and Strategic Roadmap



Executive Summary

November 2023



**Miami-Dade Transportation
Planning Organization**

INTRODUCTION

Urban Air Mobility (UAM) is a rapidly evolving industry that will revolutionize the transportation of people and goods. To stay ahead of the ever-changing mobility landscape, the Miami-Dade Transportation Planning Organization (TPO) is conducting an evaluation of UAM technology and developing a policy framework to help guide the integration of this technology into the County's existing transportation network.

UAM WORKING GROUP

This report supports the ongoing efforts of the Miami-Dade County UAM Working Group, a collaborative effort involving state, county, and local officials, as well as representatives from various private industry and infrastructure firms. The group has conducted extensive research on various policy frameworks, Concepts of Operations (ConOps), vertical takeoff and landing (VTOL) aircraft technology, and other industry publications. This information 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.



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.

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.

AIRCRAFT

More than 100 UAM aircraft, or VTOL, are in development around the world being produced by over 200 private companies, known as original equipment manufacturers (OEMs). These aircraft are powered by lithium-ion batteries, hydrogen fuel cells, or hybrid-electric. Although designs and specifications vary greatly, defining features of VTOL aircraft generally include advanced propulsion systems, vertical takeoff and landing capabilities, highly automated operating systems, and the potential for quieter and more efficient transportation within urban areas.

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. Anticipated vertiport locations include at existing airports, on the rooftops of buildings and parking garages, and at ground level in both urban and suburban areas.



Energy Infrastructure

With most industry players relying on all-electric aircraft (i.e., eVTOL 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 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 compatible 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.

LITERATURE REVIEW

Building on the research of the UAM Working Group, a literature review was conducted to lay the foundation for an UAM policy framework.

KEY TAKEAWAYS OF LITERATURE REVIEW

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 enable scaled UAM operations 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 around the timeline for UAM to obtain mass-market affordability.



UAM AND MIAMI-DADE COUNTY

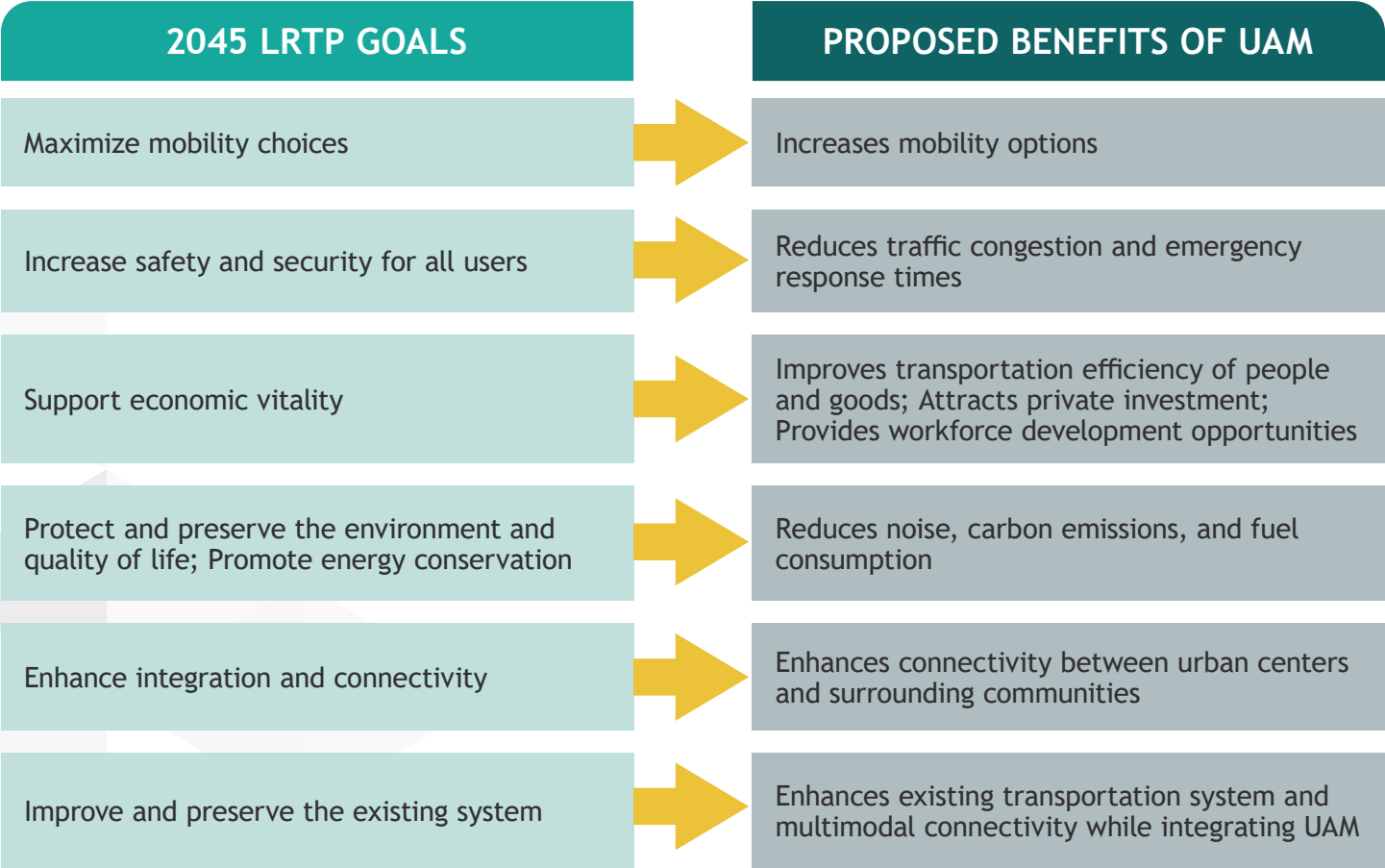
UAM is proposed to offer additional mobility options with increased frequency and efficiency. Especially during periods of rapid growth, effective and efficient transportation systems are vital to the long-term prosperity of regions.



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.

GOALS OF 2045 LRTP AND PROPOSED UAM BENEFITS

It is critical that UAM is consistent with the transportation goals of Miami-Dade County as highlighted in the 2045 Long Range Transportation Plan (LRTP) and is incorporated into future multimodal planning efforts such as the ongoing update of the 2050 LRTP.



KEY CONSIDERATIONS

Several considerations have been identified as the highest priorities in the planning of an integrated UAM network in Miami-Dade County. These key considerations serve as the underlying principles of this study and its recommendations.

Airspace	<ul style="list-style-type: none"> • Protection of airspace over sensitive areas • Coordination with the FAA and existing airports
Charging / Fueling Infrastructure	<ul style="list-style-type: none"> • Electrical grid capacity and any required enhancements • Fueling safety and logistics for hybrid-electric and hydrogen-powered aircraft
Data and Network	<ul style="list-style-type: none"> • Connectivity, coverage, and capacity of communications networks • Data collection and public privacy
Economy / Funding	<ul style="list-style-type: none"> • Funding sources for UAM infrastructure • Economic vitality • Fostering an environment that attracts private investment
Land Use and Zoning	<ul style="list-style-type: none"> • Protection of noise-sensitive land uses • Increased connectivity
Noise and Visual Pollution	<ul style="list-style-type: none"> • Impacts associated with noise and volume of operations • Public engagement
Social Equity	<ul style="list-style-type: none"> • Equal access to UAM and equity in vertiport siting decisions • Prevention of disproportionate impacts to historically marginalized communities
Sustainability	<ul style="list-style-type: none"> • Integration of UAM in multimodal transportation network, including first- and last-mile transportation • Promotion of clean energy and environmental sustainability
OEMs and Operators	<ul style="list-style-type: none"> • Collaboration with the private sector • Local proofs of concept
Vertiport Infrastructure	<ul style="list-style-type: none"> • Vertiport siting requirements, including surrounding land uses and airspace for the safe takeoff and landing of aircraft • Physical characteristics, safety areas, and support facilities
Consistency with objectives, regulations, and guidance	<ul style="list-style-type: none"> • Local: Alignment with goals of LRTP and SMART Program • State/Regional: Alignment with similar planning documents (e.g., FDOT AAM Roadmap, MDAD AAM Strategic Plan) • Federal: Alignment with FAA regulations and guidance

STRATEGIC ROADMAP

POLICY FRAMEWORK RECOMMENDATIONS

This study's recommendations provide an initial framework and roadmap for the advancement of UAM in Miami-Dade County, and are intended to serve as valuable resources for policymakers, planners, and other stakeholders to promote an UAM network that complements existing transportation systems while increasing mobility choices and supporting sustainable, equitable, and livable communities.

IMPLEMENTATION PRIORITIES

Implementation priorities were shaped by key considerations, industry research, stakeholder engagement, and feedback from the Study Advisory Group. These priorities were also developed for consistency with federal guidance, the Florida Department of Transportation's (FDOT) AAM Roadmap, and the Miami-Dade Aviation Department's (MDAD) AAM Strategic Plan. These priorities represent specific action items for Miami-Dade County, its agencies, and local municipalities.

IMPLEMENTATION PRIORITIES	KEY CONSIDERATIONS											
	Airspace	Charging / Fueling	Data and Network	Economy / Funding	Land Use and Zoning	Noise and Visual Pollution	Safety and Security	Social Equity	Sustainability	OEMs and Operators	Vertiport Infrastructure	Consistency
Develop UAM local proof of concept in Miami-Dade County	●	●	●	●	●	●	●	●	●	●	●	
Incorporate UAM into Miami-Dade TPO transportation planning efforts	●	●		●	●	●	●	●	●		●	●
Identify strategic partnerships with government agencies and private organizations in the critical path to UAM integration	●	●	●	●	●	●	●	●	●	●	●	
Identify initial use cases and operating locations	●	●			●	●	●			●	●	●
Develop and initiate educational outreach programs						●	●	●	●	●		●
Identify utility needs and electrical grid capacity to support VTOL operations, especially in rural and underserved communities		●						●	●	●	●	●
Update county and municipal zoning, land use plans, and building codes to accommodate vertiports, VTOL operations, and other UAM-related infrastructure		●			●	●	●	●	●		●	●
Develop workforce training programs				●				●	●	●	●	
Develop emergency response procedures and train personnel		●					●				●	●
Promote the installation of VTOL charging/fueling infrastructure		●		●					●	●	●	
Endorse the review and development of standalone (off-Airport) vertiports, charging/fueling facilities, and other infrastructure	●	●	●		●	●	●	●	●	●	●	
Support the deployment of initial UAM services in select locations consistent with the recommendations of MDAD AAM Strategic Plan	●	●			●	●	●			●	●	●
Explore infrastructure and policy considerations for autonomous UAM operations	●		●				●			●	●	●
Refine county and municipal zoning, land use plans, and building codes to accommodate high-frequency off-Airport VTOL operations		●			●	●	●	●	●		●	●
Promote the development of additional UAM infrastructure to support scaled operations and local/regional transportation goals		●	●	●			●	●	●	●	●	
Integrate UAM services into Miami-Dade County's public transportation network, with emphasis on the SMART Program corridors	●	●	●	●	●	●	●	●	●	●	●	

IMPLEMENTATION TIMELINE

This Policy Framework assigns implementation timeframes to each priority. While these timeframes represent the periods in which the majority of effort should occur, these recommendations should be continuously reviewed, updated, and prioritized based on emerging technologies, funding availability, and the regulatory environment. Upon securing an OEM's committed contract, a timeline is recommended as follows:

IMPLEMENTATION PRIORITIES	PHASE I			PHASE II			PHASE III				
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Phase I - Priorities to Implement Before Securing an OEM											
Develop UAM local proof of concept in Miami-Dade County											
Incorporate UAM into Miami-Dade TPO transportation planning efforts*											
Identify strategic partnerships with government agencies and private organizations in the critical path to UAM integration											
Identify initial use cases and operating locations*											
Develop and initiate educational outreach programs*											
Identify utility needs and electrical grid capacity to support VTOL operations, especially in rural and underserved communities											
Update county and municipal zoning, land use plans, and building codes to accommodate vertiports, VTOL operations, and other UAM-related infrastructure*											
Develop workforce training programs											
Incorporate UAM into long range transportation plans and comprehensive plans, with emphasis on the SMART Program corridors*											
Develop emergency response procedures and train personnel*											
Phase II - Priorities to Implement After Securing an OEM											
Promote the installation of VTOL charging/fueling infrastructure											
Endorse the review and development of standalone (off-Airport) vertiports, charging/fueling facilities, and other infrastructure											
Support the deployment of initial UAM services in select locations consistent with the recommendations of MDAD AAM Strategic Plan											
Explore infrastructure and policy considerations for autonomous UAM operations*											
Refine county and municipal zoning, land use plans, and building codes to accommodate high-frequency off-Airport VTOL operations*											
Promote the development of additional UAM infrastructure to support scaled operations and local/regional transportation goals											
Integrate UAM services into Miami-Dade County's public transportation network, with emphasis on the SMART Program corridors											
Phase III - Continuation of AAM Connectivity											
Develop a regional and state AAM network											

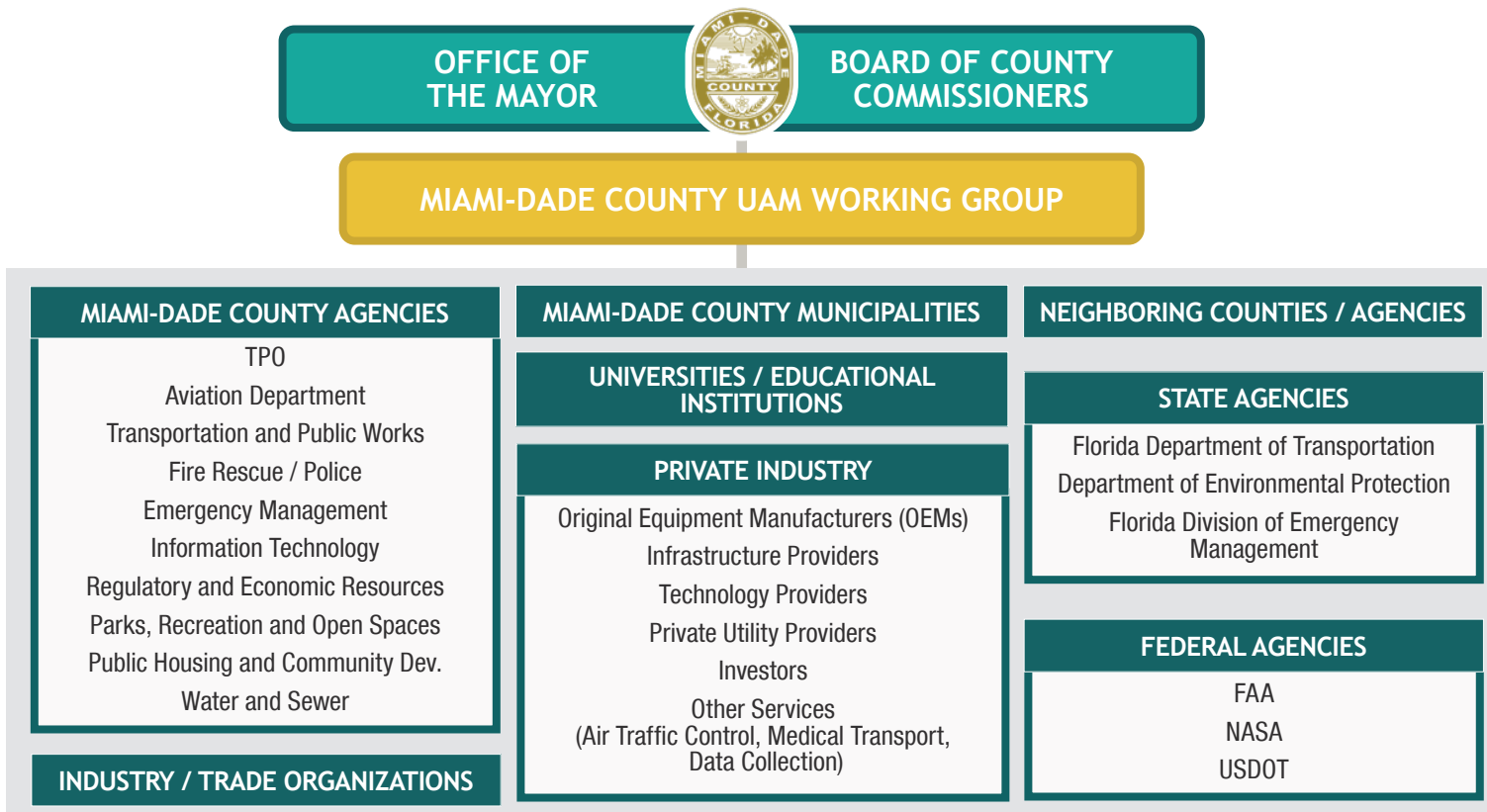
*Notes: Implementation priority is consistent with the recommendations of the FDOT AAM Roadmap and/or MDAD AAM Strategic Plan. Miami-Dade County should stay up to date on industry developments and market changes to determine appropriate revisions to these priorities and timeline.

FUNDING OPPORTUNITIES

Cost responsibility for UAM infrastructure will be dependent upon a variety of factors, including facility location, public or exclusive use of the vertiport, vertiport owner/sponsor, and the availability of public funding and private investment. It is expected that the initial investment for UAM development will be led by the private industry. Other funding opportunities may exist within the traditional public funding framework through federal, state, or local programs. Both public and private entities may also collaborate to form public-private partnerships (P3s). Given the significant infrastructure needs, complexity, and innovative nature of the UAM ecosystem, P3 opportunities may be advantageous funding mechanisms for the development of new infrastructure.

STAKEHOLDER COORDINATION

To ensure UAM implementation is carried out efficiently and effectively, it is recommended that Miami-Dade County establish a permanent working group to lead all UAM-related coordination efforts. The group's responsibilities include coordinating with all stakeholders, developing and strengthening relationships with partner agencies and private organizations, staying informed on developments related to UAM, informing UAM-related planning and policy, recommending responsible departments and agencies to lead implementation priorities, and championing overall UAM implementation in the County.



Note: This graphic represents stakeholders with which a high level of coordination is anticipated. This does not represent a comprehensive list of all stakeholders.