



Advanced Air Mobility in Virginia

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Mark Flynn, Moderator, Counsel, Virginia Municipal League

- Preparing Communities for AAM
- Public Policy for AAM



Tracy Tynan, Director, Virginia Unmanned Systems Center

- What is Advanced Air Mobility (AAM)?
- How Will AAM be Used in Virginia?
- What is a Vertiport?



Tom McMahon, Advisor, Virginia Unmanned Systems Center

- AAM Getting Ready for Takeoff
- AAM Manufacturing



What is Advanced Air Mobility (AAM)?



Small/Medium Unmanned Aircraft Systems (UAS)



Urban Air Mobility



Regional Air Mobility (RAM)

- Emerging air transportation system that moves people and cargo
- Operations in places previously not served or underserved by aviation – local, regional, intraregional, and rural and urban
- Revolutionary aircraft systems
 - Non-traditional power sources – electric, solar and hydrogen – less expensive and greener than traditional jet fuel
 - Fixed-winged and rotary aircraft with piloted or automated operations
 - Vertical Take Off and Landing (VTOL) utilizing “vertiports”
 - Innovative design will enable new complex missions in civilian and defense environments
 - Faster, cheaper, and safer than operations by ground vehicles and traditional helicopters and fixed-winged aircraft

How will Advanced Air Mobility be used?



Small/Medium Unmanned Aircraft Systems (UAS)

- Local missions for aerial work or cargo delivery (food, packages)
- Takeoff/landing infrastructure range none to specialized
- Electric vertical take-off and landing (eVTOL) aircraft



Urban Air Mobility

- "Local" missions up to ~75 miles around metropolitan areas
- Largely novel "vertiport" infrastructure
- eVTOL, potentially electric conventional take-off and landing (eCTOL) and electric short take-off and landing (eSTOL) aircraft
- 1 to ~6 passengers or equivalent cargo



Regional Air Mobility (RAM)

- "Intraregional" missions up to ~500 miles
- Primarily utilize existing (smaller) airports
- eCTOL and eSTOL aircraft
- Up to 19 passengers or equivalent cargo

How is UAS being used in Virginia?



Small/Medium Unmanned Aircraft Systems (UAS)

- Package delivery by Wing in Christiansburg and DroneUp on Eastern Shore; Apple Blossom Fly-In
- Increased situational awareness for Virginia State Police and other public safety agencies
- Power generation and distribution network inspection for Dominion Energy
- Hundreds of other applications



How will UAM be used in Virginia?



Urban Air Mobility

- Uber-like, on-demand air service with comparable fares for faster commuting to nearby cities and airports while avoiding traffic
- Emergency air transportation from rural communities to regional medical trauma centers
- Flights from Richmond to Tysons Corner for work and shopping



How will RAM be used in Virginia?



Regional Air Mobility (RAM)

- Cargo delivery to Richmond by FedEx, UPS
- Military transport from Pentagon to Hampton Roads
- Commercial air service between unserved markets: Richmond to McLean, Virginia Beach and Blacksburg



Conventional Aircraft vs. eVTOL Noise Comparisons



Source: Joby Aviation

What is a Vertiport?

Vertiport design guidelines under development—Initial draft engineering brief released in Feb 2022

Many potential locations

- Greenfield sites
- Rooftops
- Parking garages
- Barges
- New overpasses / cloverleaves?
- Etc.

Many siting considerations

- Multi-modal connectivity
- Noise
- Utilities (electric grid)
- Proximity of other vertiports
- Equity
- Etc.



What is a Vertiport?



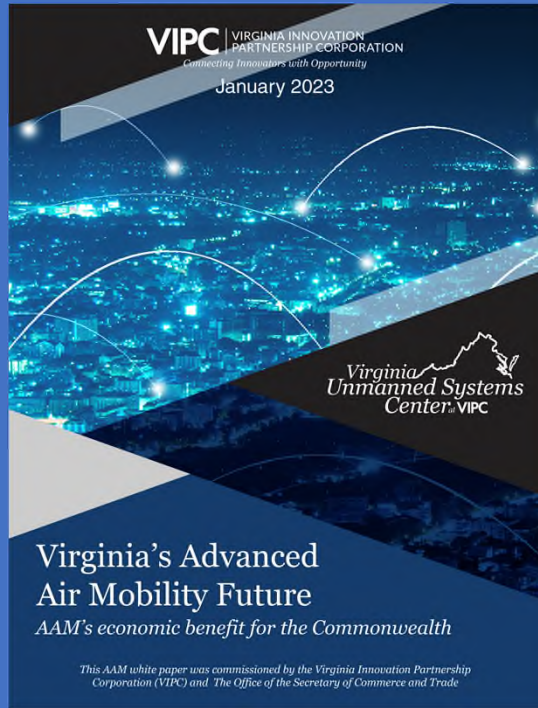
- First public use FAA-designated Vertiport established at Perkins Blackstone Airport
- Electra.aero has proposed flying from Tyson's Corner Mall in Vienna to State Capitol in Richmond
- There is a Vertiport for military use at the Pentagon in Arlington



What is a Vertiport?



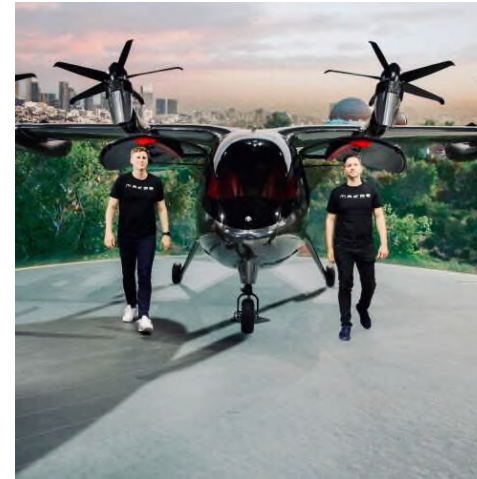
Vports to Create the First International Advanced Air Mobility Corridor Between Syracuse, NY and Québec



VIPC report forecasts \$16 billion Advanced Air Mobility industry to transform transportation in Virginia



\$2.8 billion in local,
state, and federal tax
revenues



17,000 full-time
aerospace industry
and other jobs to all
regions of the
Commonwealth



By 2045, about 7.7
million passengers
per year, or over
21,000 passengers
per day

Social and Economic Impacts of AAM



People are willing to spend up to 60 minutes for their daily commute



AAM increases daily commute radius to 200 miles



AAM leapfrogs infrastructure projects to deal with transportation deserts



AAM unites geographically constrained areas and lessen the burden on ground infrastructure



AAM brings housing options, closer to economic centers, and closes social divides.



AAM Reality Index

OEM (stock ticker)		ARI	Funding (\$M)	Use Case	Vehicle Type	Propulsion	Operation	Vehicle	First Flight	EIS	Country
Joby Aviation (NYSE: JOBY)	↔	8.7	\$2,251.3	Air Taxi	Vectored Thrust	Electric	Piloted	-	2018	2025	USA
Beta Technologies	↑	8.6	\$796.0*	Cargo, Regional, Air Taxi	Conventional / Lift + Cruise	Electric	Piloted	CX300 / Alia-250	2020 / 2022	2025 / -	USA
Volocopter	↔	8.6	\$761.0*	Air Taxi	Multicopter / Lift + Cruise	Electric	Piloted	VoloCity / VoloRegion	2021 / 2022	2024 / 2026	Germany
Archer (NYSE: ACHR)	↔	8.1	\$1,096.3	Air Taxi	Vectored Thrust	Electric	Piloted	Midnight	2023	2025	USA
Ehang (NASDAQ: EH)	↔	8.1	\$160.4	Tourism, EMS, Firefighting	Multicopter/Lift + Cruise	Electric	Autonomous	EH216-S / VT-30	2018 / 2021	2023 / -	China
Wisk (Boeing)	↑	7.8	Corporate backed	Air Taxi	Vectored Thrust	Electric	Autonomous	Generation 6	-	-	USA
Elroy Air	↔	7.4	\$50.0	Cargo	Lift + Cruise	Hybrid	Autonomous	Chaparral C1	2023	2024	USA
AutoFlight	↔	7.2	\$200.0	Air Taxi	Lift + Cruise	Electric	Piloted	Prosperity I	2022	2026	China
Eve Holding (NYSE: EVEX)	↔	7.2	\$377.4	Air Taxi	Lift + Cruise	Electric	Piloted	Eve	2024	2026	Brazil
Pipistrel (Textron)	↔	7.2	Corporate backed	Cargo	Lift + Cruise	Hybrid	Autonomous	Nuuva V300	2024	2025	USA
Aerofugia	↑	7.1	\$38.0	Tourism, Cargo, EMS	Vectored Thrust	Electric	Piloted	AE200	2023	2028	China
Vertical Aerospace (NYSE: EVT)	↑	7.0	\$347.8	Air Taxi, Cargo, EMS	Vectored Thrust	Electric	Piloted	VX4	2023	2027	UK
Lilium (NASDAQ: LILM)	↔	6.8	\$1,342.3	Regional, Cargo, Biz Av	Vectored Thrust	Electric	Piloted	Jet	2024	2026	Germany
Airbus	↔	6.5	Corporate backed	EMS, Tourism, Air Taxi	Lift + Cruise	Electric	Piloted	CityAirbus NextGen	2024	-	France
Supernal	↔	6.5	Corporate backed	Air Taxi	Vectored Thrust	Electric	Piloted	S-A1	2024	2028	South Korea
Alaka'i Technologies	↔	6.2	\$60.0	Air Taxi, Cargo, EMS	Multicopter	H2 Fuel Cell	Piloted	Skai	2022	2024	USA
Ascendance Flight Technologies	↑	6.2	\$71.3	Regional, Cargo	Lift + Cruise	Hybrid	Piloted	Atea	2024	2027	France
Overair	↔	6.2	\$170.0	Air Taxi	Vectored Thrust	Electric	Piloted	Butterfly	2023	2027	USA
REGENT	↔	6.2	\$50.0*	Regional	Augmented Lift	Electric	Piloted	Viceroy	2024	2025	USA
Eviation	↔	6.1	\$200.0	Regional, Cargo, Biz Av	Conventional	Electric	Piloted	Alice	2022	2027	USA
eAviation (Textron)	↔	5.9	Corporate backed	EMS, Air Taxi, Cargo	Vectored Thrust	Electric	Piloted	Nexus	2024	2030	USA
SkyDrive	↔	5.9	126.6	Air Taxi, Tourism, EMS	Multicopter	Electric	Piloted	SKYDRIVE	2024	2026	Japan
Dufour Aerospace	↑	5.8	\$11.0*	EMS, Regional	Vectored Thrust	Hybrid	Piloted	Aero3	-	-	Switzerland
Honda Motor Company	↔	5.5	Corporate backed	Air Taxi	Lift + Cruise	Hybrid	Piloted	-	2023	2030	Japan
Electra	↔	5.2	\$134.0	Regional, Cargo	Augmented Lift	Hybrid	Piloted	EL-2 Goldfinch	2023	2028	USA
Heart Aerospace	↔	5.1	\$85.0	Regional	Conventional	Electric/Hybrid	Piloted	ES-30	2026	2028	Sweden
Jaunt Air Mobility	↔	4.4	\$3.1	Air Taxi, Cargo	Lift + Cruise	Electric	Piloted	Journey	2024	2027	USA
Volkswagen	↔	3.6	Corporate backed	Air Taxi	Lift + Cruise	Electric	Autonomous	V.MO	2023	-	Germany

The ARI is based on five elements: the funding received by the company, the team that leads the company, the technology readiness of their vehicles, the certification progress of their vehicles, and the production readiness towards full scale manufacturing.

Source: 2023 SMG Consulting LLC

August 2023 Release



AAM Getting Ready for Takeoff

Joby Aviation	\$2.2 billion from \$2.1 billion (public offering with SK Telecom dated June 30, 2023)
Archer	\$1.09 billion from \$856 million (capital raise with Stellantis and PIPE investors dated August 14, 2023)
Ehang	\$160.4 million from \$142.0 million (private placement with Lee Soo Man, founder of K-pop and SM Entertainment, dated July 14, 2023)
Wisk	Corporate backed from \$775.0 million (100% owned by Boeing)
Aerofugia	\$38 million from Corporate backed (capital raise from China Control Fund, Yuanhe Origin, Honghua Airlines and Sky Sky dated June 29, 2023)
Lilium	\$1.3 billion from \$1,15 billion (public offering and capital raise with PIPE investors and Tencent dated July 31, 2023)
Ascendance Flight Technologies	\$71.3 million from \$34.5 million (Series A and funding from the French Strategic Plan "France 2030" dated June 19, 2023)

Source: 2023 SMG Consulting LLC



Automotive OEMs, Going Vertical



PORSCHE



Mercedes-Benz



HONDA



TOYOTA

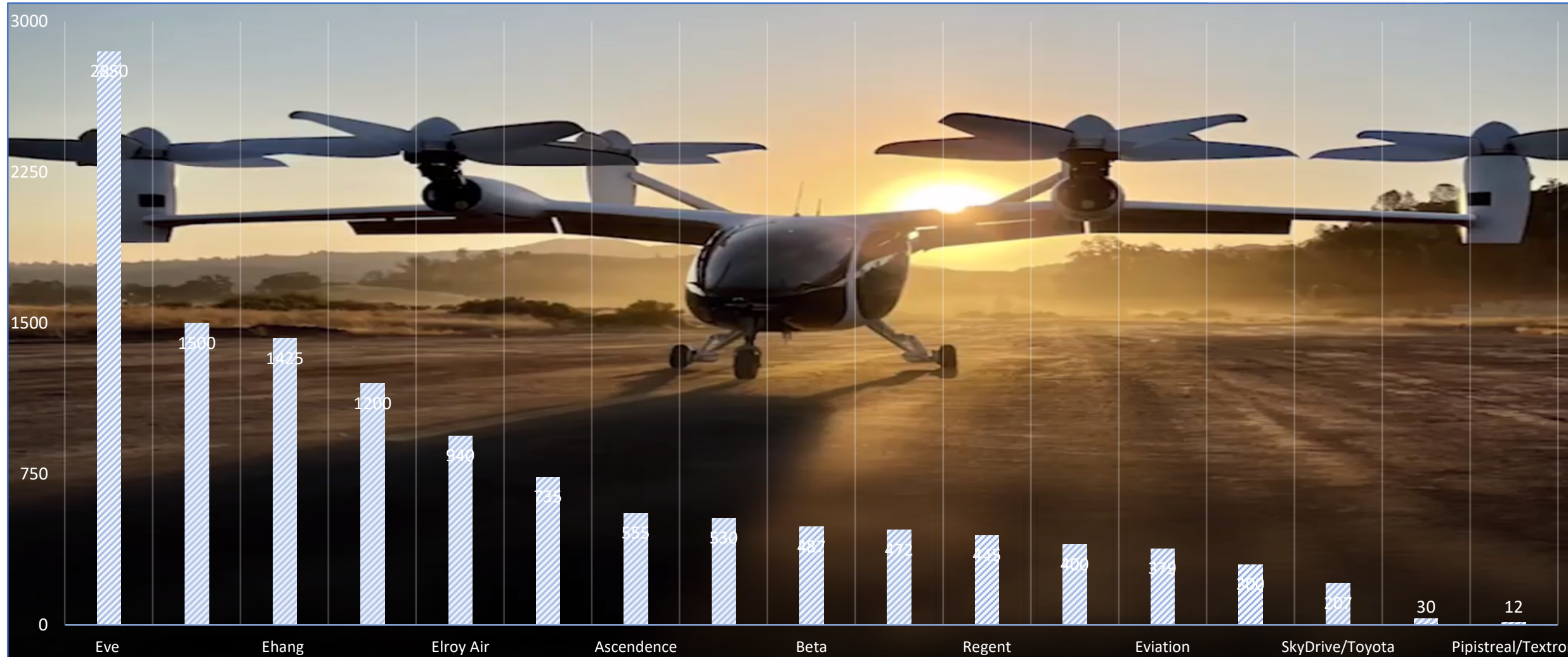


吉利汽车
GEELY AUTO



VIPC | VIRGINIA INNOVATION
PARTNERSHIP CORPORATION
Connecting Innovators with Opportunity

AAM Orders by Manufacturer



AAM Getting Ready for Takeoff



State	Funding	Initiatives
New York	\$113 million	Created FAA drone test site; 50-mile unmanned traffic management (UTM) system; indoor drone test facility; entrepreneur incubator; US-Canada AAM corridor
North Dakota	\$48 million	Built Vantis, a statewide UTM network enabling drone flights beyond visual line of sight (BVLOS); funded FAA test site and BEYOND programs
Georgia	\$40 million	Provided an incentive package for Archer Aviation to build a 350,000 square-foot factory on a 96-acre site capable of producing up to 650 AAM aircraft per year
Ohio	\$15 million	Established National AAM Center of Excellence; SkyVision, a ground-based detect-and-avoid radar UTM system for 200 square miles of airspace access and testing capabilities
North Carolina	\$9 million	Funded design and development of an urban AAM system and UTM network; appropriated funds for drone purchases by NCDOT; assisted BEYOND program
Virginia	\$2 million	Supported VIPC, which funded state economic impact study, demonstration projects, grants, Virginia AAM Alliance advisory group and assisted BEYOND at Virginia Tech drone test site; VIPC also invested in Electra short take-off and landing demonstrator aircraft



AAM Getting Ready for Takeoff



State	Funding	Initiatives
Florida	\$831,250+	Lilium received tax incentives from City of Orlando to develop its first vertiport; Supernal (Hyundai) has market development agreement with City of Miami
Arkansas	Undetermined	State formed Future Mobility Advisory Council to attract AAM business; Walmart-funded drone delivery and AAM service for rural health clinics; Bentonville to Tulsa air corridor
South Carolina	Undetermined	SkyDrive (Toyota) to develop state AAM ecosystem; Boeing and Lockheed plants and suppliers provide potential growth of state's aviation manufacturing capabilities
Tennessee	Undetermined	Memphis-Shelby County Airport supports BEYOND; drone and counter-drone research conducted at Department of Energy's Oak Ridge National Laboratory
Texas	Undetermined	Volatus to build a vertiport at an environmentally sustainable airport near Austin; TxDOT's Urban Air Mobility Advisory Committee recommended creating an AAM research "sandbox"; Texas A&M-Corpus Christi funds Lone Star drone test site



AAM Industry News: Getting Ready for Takeoff



Virginia AAM Economic Development Growth



Some things communities can be doing today to prepare for AAM



Gather data about today's transportation patterns, ambient noise landscapes, and weather



Understand current airspace usage in their jurisdictions



Review existing heliport and airport facilities for AAM suitability



Begin identifying new vertiport location opportunities, both through new development and through partnership with existing infrastructure



Begin stakeholder conversations (e.g., community leaders, business community) to provide information on AAM as well as understand concerns



Explore potential public/private partnership structures and opportunities for UAM Understand electric grid capacity and what needs to be done to facilitate broader transportation electrification, including AAM



Identify their point person to lead the AAM conversation and open a dialogue with industry and the associations that are here to assist in this process



The Community Air Mobility Initiative (CAMI) provides resources for state and local decision makers in support of the responsible integration of AAM.

CAMI Resource Library: www.communityairmobility.org



Components of Public Acceptance for AAM & UAM

Public acceptance hinges on balancing benefits against adverse impacts, earning trust, and integrating successfully

A resource prepared by:

The Community Air Mobility Initiative (CAMI)

Supporting the responsible integration of the third dimension at the state and local level.

Q3 2020 | A. M. Dietrich

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Advanced & Urban Air Mobility Impact and Timing

Significant investment in new technologies is driving the creation of a new and disruptive industry that is poised to transform travel.

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Urban Air Mobility (UAM) Operations Overview

Covering the types of operations, barriers to success and anticipated regulations.

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Community Benefits of Urban Air Mobility (UAM)

A brief description of potential benefits of UAM to cities and surrounding areas and how communities can prepare today

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Legal Considerations for Urban Air Mobility Part 1: Aviation Law

A basic description of some of the U.S. aviation law considerations that impact the development of air mobility in metropolitan areas, and some of the unanswered questions

The materials in this resource provide general information and do not constitute legal advice. This material is based on the most current information at the time it was written, and it is possible that the laws or other circumstances may have changed since then. The reader should consult with knowledgeable legal counsel to determine how applicable laws apply to specific facts and situations.

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eVTOL Aircraft: What they are & why they matter

New electric vertical takeoff and landing (eVTOL) aircraft are enabling aviation to be more closely integrated with our communities

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What is Urban Air Mobility (UAM)?

UAM uses three-dimensional transportation to better serve the needs of our communities.

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Considerations for Municipalities

- Land use regulation of siting vertiports, other landing areas
- Building code, fire code, electric code
- Use in public safety by local governments
- Constructing & operating vertiports
- Equity in access to electric aviation
- Local airports as vertiports, STOL ports, charging stations, repair & maintenance stations.
- One area local governments won't have a role – the flying part of electric aircraft regulated by FAA.



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Advanced Air Mobility in Virginia

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