Urban Air Mobility (UAM)Operations Overview

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

A resource prepared by:

The Community Air Mobility Initiative (CAMI)

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

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What Types Of Operations Are There?

From commercial service providers to emergency services, there are many users of eVTOL aircraft.

Small, electric vertical take off and landing aircraft (eVTOLs) promise to revolutionize our transportation networks, allowing rapid connectivity between places with few of the delays that ground-based transportation encounters.

Once there are certified production aircraft available, these will likely be used by three different types of organizations:

- **Transportation service operators** - like Uber or Lyft. These will lease or allow vehicles that meet their performance standards to be operated on a platform / network / infrastructure that they provide. They may also provide the first/last mile linkages to other forms of transportation that they or others operate.

- **Corporate and individual operators**. These will be large entities who lease/own and operate their own fleet of vehicles for their own needs, or private individuals who have the means and desire to lease/own and operate their own vehicle.

- **Public/emergency services**, where a city or other public entity may lease/own and operate a fleet of vehicles for the public good.

It will take time for there to be sufficient vehicles, personnel and infrastructure to support the 'air taxi' visions of the future, with eVTOL's operating thousands of times a day in dense urban areas.

In the 2020-2023 timeframe, it is expected that there will be a number of demonstration operations with predetermined A to A (sightseeing) or A to B flight routes. These may be with experimental aircraft and non commercial. The earliest commercial operations are likely to be route based (e.g., regional airport to a single downtown transportation hub, sightseeing in a national park, connecting two corporate campuses), or involve emergency use by replacing helicopters or supporting ambulance-based services in appropriate circumstances.

The technology and sophistication of eVTOL operations will evolve over time - starting with large cargo and delivery drones and moving to passenger carriage - allowing time for all stakeholders to adapt and accommodate.

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What Barriers Will Operators Encounter?

For UAM to become a go-to form of transportation, reliability and predictability will be key to generating and retaining customers. Many local factors that will influence the ability of the operator to provide vehicles in the right places and at the right times to meet the demand.

Weather Conditions and Information
Extremes of heat, cold, wind, visibility, and precipitation are all challenges for the ride quality and performance of eVTOL aircraft. These are small aircraft that will be susceptible to turbulence generally and specifically to the thermals and winds generated in the built urban environment. In very bad weather, eVTOL aircraft may have to be grounded. Operators will need access to just-in-time localized micro climate and weather data, as well as data from the aircraft, to enable them to reroute aircraft or adjust scheduling accordingly.

Availability of Infrastructure and Personnel
Air Taxi operations will be highly dependent on a marketable density of infrastructure, but not all cities will have locations suitable for constructing necessary eVTOL infrastructure in the optimum places. Operators will need to source and train thousands of pilots, ground, maintenance, and customer service personnel. Offices of Economic Development and Education have a role to play in supporting workforce development.

Turnaround Times
Turnaround time, or how long the aircraft must be on the ground between flights, will impact how many vehicles an operator needs to be able to accommodate the likely trip demand from customers. Cleaning, charging, maintenance, and passenger loading and unloading will all impact turnaround time. The longer the turnaround time, the more aircraft and the more vertiport landing zones will be needed to meet demand. The faster the turnaround time, the more through-traffic the vertiport will have to be able to handle.

Local Restrictions
Operational scheduling will be influenced by local air traffic control and environmental considerations such as noise restrictions, restrictions around time of operations, and the need to avoid sensitive areas. Sophisticated real time and highly customizable scheduling and prediction systems will be needed for transportation service providers to achieve the levels of reliable service that will lead to commercial success. Communities will have to balance the benefit of increased operations with their negative impacts in a unique "right-sized" approach.

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Who Regulates the Operations?

You can expect federal regulation. But many details will be left up to local jurisdictions. Trust will be key.

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Unlike getting into a car - where the failure modes are well known and the associated risks are ones the public is accustomed to - flying in a small aircraft is a larger unknown for almost all potential users. Key to acceptance of this technology will be the extent to which the passenger and the community trusts the vehicle and trusts the operator. Part of this trust is knowing that operations are properly regulated.

In the USA, the Federal Aviation Administration (FAA) will be responsible for certifying that a vehicle is airworthy - provided it is operated and maintained in accordance with its flight manuals. The FAA will specify what standards an operator of these aircraft - and their personnel - has to meet if the operator is providing public transportation services. Operators will also have to comply with air traffic laws and any transportation security screening and cyber security precautions that are deemed necessary.

Different types of aviation operations are covered by different sets of regulations today: airlines have different requirements than charter operators, and private users are subject to yet another set of requirements. Public entities like police and fire departments have additional flexibility. This paradigm will be expanded to cover eVTOL operations.

Safe eVTOL infrastructure will likely be subject to standards similar to those in place for heliports today, and these may have differences depending on whether the infrastructure is entirely private (e.g., corporate vertiports) or if it will have public access. These will provide a baseline, but local planners will be responsible for adapting and updating any local building, accessibility, and fire codes to insure that infrastructure construction is done appropriately. Zoning of vertiports and neighboring areas will also be a key tool for local decision makers to ensure appropriate land use.

Local jurisdictions will also be responsible for setting any conditions and enforcement with respect to environmental impacts - limitations on the number of operations for noise reasons, limitations on the times of day that vehicles can be flying, and any local restrictions on routes that aircraft can follow (for instance, to avoid a nature preserve). For private infrastructure, local jurisdictions may also want to place emergency access requirements.

It is also worth noting that while federal and local requirements will make up the bulk of the requirements landscape for eVTOL operations, insurance companies may impose their own conditions and restrictions.

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