Chapter 2. AAM Industry Forecast Analysis

2.1. Introduction

Assessing the future demand and growth projections of Advanced Air Mobility (AAM) aviation initiatives, and how it relates to the State of Illinois, involves a comprehensive analysis of current forecasts that are based on the most reliable existing data available. Forecasts and data examined within this analysis predominantly serve as a benchmark for the industry's key focus area of crewed and uncrewed electric vertical takeoff and landing (eVTOL) aircraft and operations within the AAM industry. The evolution and progress of AAM technology in recent years, marked by successful test flights and preparations for Federal Aviation Administration (FAA) approvals, underscore its potential to revolutionize the aviation sector. Industry progress and the increasing number of participants in this emerging market offer valuable insights into its potential trajectory and prospects of this emerging technology. This forecast analysis utilized the latest original equipment manufacturer (OEM) and industry projections for AAM, focusing on forecasts established in 2023 and the first quarter of 2024, supplemented by relevant data from 2022. Given the rapidly evolving landscape of AAM regulatory approvals, this analysis prioritized the utilization of the most recent data for accurate and timely forecasting purposes. By evaluating the nature and scale of potential future AAM activity, this analysis aims to inform strategic planning efforts. Subsequent sections of specific use cases delve into existing relevant industry forecasts of AAM. The analysis acknowledges the inherent limitations and constraints associated with forecasting for the AAM industry given its developmental stage and the consequent scarcity of reliable data. Understanding these limitations allows for a more realistic approach to examining AAM activity and operational forecasting trends. Additionally, the timing for certification of AAM aircraft will be crucial to 2025 forecasted numbers researched in this analysis. At the time of this forecast analysis, September 2024, it is anticipated that certification and operations could begin as early as 2025.

2.2. Use Cases

Traditional transportation is currently serviced by cars, busses, trains, boats, and planes, where each mode of transportation serves its own clientele based on cost, travel distance, travel time, and items being transported. This system of travel typically requires transfers between modes to go from actual origin to destination, slowing the total point-to-point travel process. It seems that consumer preferences have shifted away from segregated travel modes as users look for a more streamlined and simple travel/transport experience using integrated bookings (multiple modes sold under one ticket) or single-mode transit options (e.g., taking a ride share to the airport rather than parking offsite and taking a shuttle). AAM is one of the emerging technologies that could potentially simplify the point-to-point travel process by supplanting use of one or more travel modes. Replacement of a traditional transport mode with AAM may increase the speed of the overall transport process, expediting the journey of people, goods, or services. Several early use cases have emerged for AAM that illustrate the potential replacement of one or more traditional

transport nodes. The use cases below could be instrumental to the introduction and acceptance of the industry. These are not the only use cases that AAM may fulfill but are the ones with the greatest opportunity or interest from potential users in the state.

- **Cargo Use Cases** – Metropolitan Chicago region is recognized as one of the most significant freight hubs in the US. Approximately 25 percent of all freight trains in the country pass through this area. Trucks make up roughly one in seven vehicles on Illinois' urban interstate highways, with some facilities in metropolitan Chicago handling over 30,000 trucks daily.[1] Given the extensive freight network and the high demand for cargo delivery, the state can position itself as a testbed for the viability of cargo delivery using AAM while also addressing the growing demand for sustainable cargo transportation. Short-distance, mid-mile cargo transport will be a primary use case for early AAM operations, as eVTOL aircraft could be used to transport cargo from large processing facilities (such as international airports or shipping ports) to smaller distribution centers, where uncrewed aerial systems (UAS) would perform first- and last-mile cargo delivery. Initial AAM cargo use can include drone package delivery from e-commerce websites such as Amazon as shown in **Figure 2.1.** AAM cargo missions may expand to a regional level as technology advances, particularly as longer-range aircraft are introduced and Beyond Visual Line of Sight (BVLOS) operations are approved.[2] Once BVLOS operations are approved, autonomous operations may expand, paving the way for an integrated network of uncrewed AAM and UAS vehicles providing mid- and last-mile cargo deliveries.

Figure 2.1: Amazon Drone Delivery

Source: Amazon

- **Passenger Use Cases** – Passenger travel has emerged as another desired use case for early AAM operations. The initial intent is for AAM to provide transportation for people that currently use cars, taxis, rideshares, subways, trains, or short charter flights on intra-city trips in urban or suburban areas. These types of missions are collectively coined as "Urban Air Mobility" (UAM). One example of a UAM mission is the Archer Aviation and

[1] "Maintain the Regions Status as North America's Freight Hub." CMAP, Chicago Metropolitan Agency for Planning, www.cmap.illinois.gov/2050/mobility/freight. Accessed May 28, 2024.
[2] Walsh, Amelia. "FAA Greenlights Amazon Drone Delivery Beyond Visual Line Of Sight". May 31, 2024. https://www.avweb.com/aviation-news/faa-greenlights-amazon-drone-delivery-beyond-visual-line-of-sight/

Figure 2.2: AAM Passenger Aircraft

Source: Kimley-Horn, BETA Technologies (Left), Joby Aviation (Right)

United Airlines eVTOL planned "taxi service" from Chicago O'Hare International Airport (ORD) to the Medical District of Downtown Chicago, set to launch in 2025. Archer and United believe the cost of the eVTOL service will be comparable to premium ground-based rideshare service, such as Uber Black. Initial AAM aircraft will be best suited to support these missions, as aircraft such as the Beta ALIA and Joby Aviation S4, shown in **Figure 2.2**, are planned to have maximum ranges of 100-250 miles and payloads of 1,000-1,500 lbs.[3] However, the trip is anticipated to take 10 minutes, roughly a quarter of the travel time of ground-based services.[4] Eventual use cases for passengers include suburban and city-to-city super commuters who may be able to use AAM at a regional level (referred to as Regional Air Mobility [RAM]). RAM passenger use cases could be specifically useful to communities separated by bodies of water, such as Lake Erie, where current modes of transportation across, such as ferries or boats, lack convenience and efficiency. However, these long-distance RAM operations may not be feasible until new aircraft and infrastructure are introduced. Similar to cargo uses, passenger AAM uses are expected to begin as crewed operations until appropriate technologies and regulations can safely facilitate autonomous operations.

- **Emergency Response Use Cases** – AAM aircraft blend the attributes of fixed-wing aircraft and helicopters, offering additional flexibility that is critical in emergency response situations, particularly medical evacuations and firefighting. Emergency medical evacuations are a common activity at many airports in Illinois, as helicopters are used to quickly transport patients from accident sites or rural medical centers to larger hospitals. However, helicopters are limited in their speed and ability to operate in inclement (low

[3] *Archer Aviation, "Aircraft", Archer Aviation, https://www.archer.com/aircraft, Accessed August 14, 2024; Electric VTOL News, "Beta Technologies ALIA-250", the Vertical Flight Society,* https://evtol.news/beta-technologies-alia/*, Accessed August 14, 2024.*

[4] Vallamizar, Helwig. "Archer, United Airlines to Launch First EVTOL Air Shuttle." RSS, https://www.airwaysmag.com/legacy-posts/archer-united-first-evtol-air-shuttle#. Accessed May 27, 2024.

visibility) weather. Use of AAM aircraft would enable faster transport to hospitals, and autonomous technologies could help aircraft land in zero- and low-visibility conditions using similar procedures as BVLOS systems as shown in **Figure 2.3**. In firefighting and natural disaster response operations, meanwhile, use of AAM aircraft for rapid personnel deployment and incident management/control could help make operations safer and more efficient, reducing impact to the public, emergency responders, the natural environment and manmade facilities.

Figure 2.3: JOUAV CW-15

Source: JOUAV Unmanned Aircraft Systems

- **Medical Use Cases** – Beyond emergency medical evacuation, AAM could support the healthcare system by supporting the rapid transport of equipment, personnel, and organs between facilities or communities. Historically, medical professionals have relied on a mix of helicopters, fixed-wing aircraft, and ground vehicles to transport organs and equipment between hospitals in distant communities. In these instances, fixed-wing aircraft are used to travel between communities while ground vehicles travel between the hospital and airport at both the origin and destination. AAM offers greater speed and flexibility as it provides a more streamlined connection between the field and hospital, saving time and increasing the likelihood of successful medical needs outcomes. For example, Valqari has partnered with Northwestern Medicine to create a drone transport system for patient labs. I depiction of this system is shown in **Figure 2.4**. AAM could also be used to transport doctors directly between hospitals in the same community or in outlying areas, offering a more integrated and efficient healthcare system across the state.

Figure 2.4: Valqari and Northwestern Medicine's Lab Trasport

Source: Valqari

- **Military Use Cases** – With three military bases, including Scott Air Force Base, Illinois has the potential to be one of the most practical test users of military AAM. In October 2023, the U.S. Air Force (USAF) took delivery of a Beta ALIA eCTOL aircraft, which is being evaluated through the AFWERX program to test the capabilities of the aircraft and its support infrastructure for military uses. The USAF intends to demonstrate the ALIA's use to transport passengers and support agile combat logistics (cargo) with a 1,000-pound payload capacity.[5] Other potential military use cases for AAM aircraft include unmanned air refueling efforts (example aircraft shown in **Figure 2.5**) surveillance, search and rescue, personnel training, and troop transport. The military installations in Illinois may ultimately play a pivotal role in the industry.

Figure 2.5 Boeing's MQ-25

Source: Boeing

- **Agricultural Use Cases** – Agricultural missions including aerial product application and crop inspection are mostly performed using traditional fixed-wing aircraft and helicopters today. While these aircraft are often the most cost efficient and practical method for fulfilling their missions, they can represent a substantial portion of agricultural producers' total costs and carbon emissions. AAM provides the opportunity to make aerial agriculture missions more efficient by using autonomous aircraft that can evenly apply products and treatments to crops. This action is depicted in **Figure 2.6**.

Figure 2.6: TALOS Drones DJI Agras T50

Source: TALOS Drones

The use of electric aircraft would help reduce GHG emissions, helping the state to achieve sustainability goals. UAS are already replacing crewed aircraft and ground vehicles for crop

[5] Clouse, Matthew. "BETA's ALIA electric aircraft arrives at Eglin AFB". Air Force Research Laboratory Public Affairs. October 30, 2023. https://www.af.mil/News/Article-Display/Article/3571824/betas-alia-electric-aircraft-arrives-at-eglin-afb/.

spraying in limited quantities around Illinois. With 75 percent of Illinois' land designated as farmland, there is high demand for more efficient and sustainable agricultural practices that may use UAS or AAM.[6]

2.3. Limitations in Forecasting AAM

Forecasting in general involves analysis of numerous variables over a specified duration to predict the potential outcomes or trends for certain activities at a future point in time. The complexity amplifies in emerging markets due to the scarcity of data, especially in the absence of fully approved AAM commercial service activities nationwide as the industry navigates through developmental and approval processes.

AAM OEMs have been swiftly advancing their development processes, consistently achieving milestone markers year after year. Concurrently, the FAA has been diligently working to establish the AAM aircraft approval process and ensure the seamless integration of AAM into the National Airspace System (NAS). Despite the FAA's efforts, delays have ensued in the approval process nationwide, resulting in developmental setbacks and an uncertain timeline for overall AAM implementation.

It is worth noting that despite these setbacks, AAM aircraft are progressing through the phases of the approval process with the FAA, and manufacturers anticipate beginning operations by 2026.[7]

2.4. AAM Forecast Summary

Advancements within AAM are rapidly occurring year over year; however, delays in FAA certification and approvals continue to push out the overall implementation schedule. Safety is of the highest priority for certification, and the groundwork must be first set for the aircraft to operate within the existing NAS. OEMs have prepared forecasts for AAM activity based on their desires for implementation. Companies within the industry, investment firms, and government regulators have also developed forecasts as to when AAM will achieve successful commercial operation certification and implementation. As documented in this section, OEMs have released several AAM demand projections, some bold in their predictions with others being more conservative. This Forecast Analysis chapter provides an examination of 2022, 2023, and early 2024 forecasts that are currently available to understand the projections anticipated based on the most recent data.

2.4.1. Existing National AAM Industry Forecasts

Current AAM industry forecasts, at the time of this writing, are represented below in **Sections 2.4.1.1 to 2.4.2.3**. Forecasts from previous years (2022 and 2023) and the first quarter of 2024 are summarized below, providing the most current data, market expectations, certification

[6] Illinois Department of Agriculture. "Facts about Illinois Agriculture."

[7] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

timeline, and implementation expectations. The near-term projections produced to date range from two to five years, while the mid-term presents anticipated demand over a decade. Long-term forecasting includes ranges beyond 10 years with 20-to-30-year horizons.

2.4.1.1. OEM Forecasts

OEM forecasts are typically characterized by their assertiveness, as these companies are at the forefront of development, working diligently to obtain certification for their aircraft to begin operation. Their forecasts serve as a means to reassure investors of their progress and the realization of their ambitions. Forecasts such as these are typically more optimistic and align with ambitious targets for their desired progress. As such, OEM forecasts can vary significantly and are often tailored to their intended audience. Additionally, the AAM industry is a fast-paced and evolving market, resulting in information quickly becoming out of date as regulatory, development, and other changes affect the forecasts.

Particularly in the emerging stages of production for many of these aircraft, the operational forecasts tend to rely on OEM production capability numbers associated with plans for production facilities. At the time of this Forecast Analysis, no OEM has commenced full-scale production, meaning that the numbers presented often represent best-case scenarios with contingencies in place to accommodate additional facility construction if necessary.

Individual manufacturers have articulated company-specific objectives while engaging in fundraising efforts for facilities and capital. As of December 2023, over 400 companies were identified as existing or potential AAM OEMs, all in various stages of development. Several of these are further along in development and have available forecast rates of their anticipated production capabilities.[8] For instance, Lilium has expressed aspirations to establish production facilities capable of manufacturing 400 aircraft annually, with the potential to scale up production to 800 aircraft per year if market demand warrants.[9] Such ambitious goals underscore the confidence and vision of manufacturers like Lilium in their ability to meet their anticipated future demand and position themselves as key players in the AAM sector. BETA forecasts that it will begin full-scale production in 2025 with 300 aircraft per year, and also can double production with an expansion of its facility.[10] Archer Aviation estimates that it will start production with 250 aircraft by 2025, double the capacity to 500 aircraft per year through 2027, and ultimately produce 2,000

[8] Berckman, L., Chavali, A., Hardin, K., Dronamraju, T., & Sloane, M. (2023). Advanced air mobility: Achieving scale for value realization. Deloitte Research Center for Energy & Industries. https://www2.deloitte.com/us/en/insights/industry/aerospace-defense/advanced-air-mobility-evtol-aircraft.html

[9] Crumley, B., & Crumley, B. (2022, September 29). *Lilium's annual 400 eVTOL air taxi production goal seeks new funding*. DroneDJ. https://dronedj.com/2022/09/29/lilium-evtol-air-taxi/

[10] Warwick, G. (2023, October 02). *Beta Opens Electric Aircraft Manufacturing Plant, Launches Production.* Aviation Week Network. https://aviationweek.com/aerospace/advanced-air-mobility/beta-opens-electric-aircraft-manufacturing-plant-launches

aircraft per year beginning in 2028.[11] Joby Aviation stated it estimates 350 aircraft in 2025 with a jump to 500 aircraft per year being produced from 2026 onward.[12] More conservatively, Volocopter announced that its new production facility will produce 50 aircraft per year.[13] Each of these future estimates of production are viewed as the maximum output that could be anticipated. None of these forecasts are tied to identified demand for the aircraft or consider that there may be multiple aircraft in the market from which buyers can acquire to meet their anticipated demand rates.

Figure 2.7 provides a sample projection of OEM aircraft delivery forecasts for each respective company by 2040. As shown, when combined, the five OEMs alone are projecting over 45,000 aircraft to be produced annually in 2040.

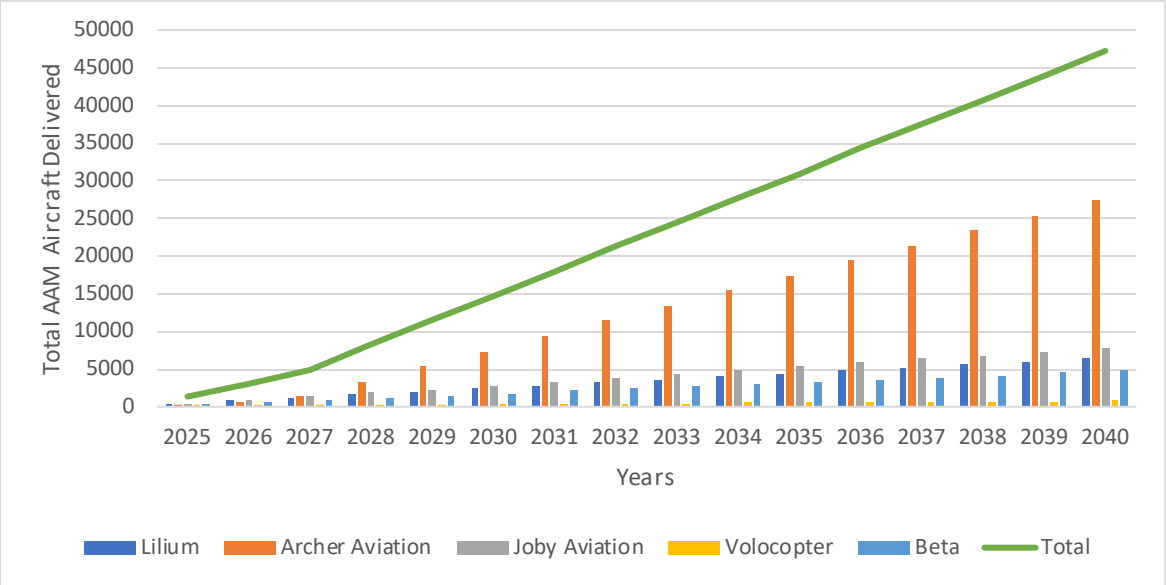
It is evident that a consistent trajectory in production numbers is expected, with a notable increase projected after the industry attains the anticipated widespread certification and demand is realized. These projections do not consider actual market demand by the consumer and the life cycle of each aircraft and additional entrants into the market over time. With the below sample, it is not unreasonable to expect large numbers of aircraft and operations in the future, especially with additional companies not as outspoken about their forecasted production estimates.

[11] Nair, A. (2022, October 25). *Archer Aviation plans to build 250 air taxis in 2025.* Reuters. https://www.reuters.com/business/autos-transportation/archer-aviation-plans-build-250-air-taxis-2025-2022-10-24/

[12] Joby. (2023, September 18). *Joby Selects Dayton, Ohio, Birthplace of Aviation, for First Scaled Manufacturing Facility* [Press release]. https://www.jobyaviation.com/news/joby-selects-dayton-ohio-first-scaled-manufacturing-facility/

[13] Volocopter. (2023, April 5). *Volocopter Completes Production Setup for Electric Air Taxis* [Press release]. https://www.volocopter.com/en/newsroom/volocopter-completes-production-setup

Figure 2.7: Sample OEM Cumulative Production Forecasts (2025-2040)



Sources: Lilium (DroneDJ article) [14], Archer Aviation (Reuters article) [15], Joby Aviation [16], Volocopter [17], Beta (Aviation Week Network Article) [18] ,Analysis by The Aviation Planning Group (2024)

Certification and approval for commercial AAM aircraft and operations are being undertaken with safety as the key focus. This is an emerging market, and all facets of integration must be considered.

Certification will not occur quickly, and this consideration alone makes the forecasting process across the industry somewhat challenging.[19] OEMs are expending significant amounts of capital while navigating the certification process. Any company that ceases operations due to the inability to continue through the process will affect the market as it reduces production capacity and further dampens the commercial growth timeline.

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[14] Crumley, B., & Crumley, B. (2022, September 29). *Lilium's annual 400 eVTOL air taxi production goal seeks new funding*. DroneDJ. https://dronedj.com/2022/09/29/lilium-evtol-air-taxi/

[15] Nair, A. (2022, October 25). *Archer Aviation plans to build 250 air taxis in 2025*. Reuters. https://www.reuters.com/business/autos-transportation/archer-aviation-plans-build-250-air-taxis-2025-2022-10-24/

[16] Joby. (2023, September 18). *Joby Selects Dayton, Ohio, Birthplace of Aviation, for First Scaled Manufacturing Facility* [Press release]. https://www.jobyaviation.com/news/joby-selects-dayton-ohio-first-scaled-manufacturing-facility/

[17] Volocopter. (2023, April 5). *Volocopter Completes Production Setup for Electric Air Taxis* [Press release]. https://www.volocopter.com/en/newsroom/volocopter-completes-production-setup

[18] Warwick, G. (2023, October 02). *Beta Opens Electric Aircraft Manufacturing Plant, Launches Production.* Aviation Week Network. https://aviationweek.com/aerospace/advanced-air-mobility/beta-opens-electric-aircraft-manufacturing-plant-launches

[19] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

2.4.1.2. Aviation Week Forecasts

The Aviation Week Network (or Aviation Week), an industry provider of data analytics and current information, forecasts 1,000 eVTOL aircraft will be operating around the globe by 2030, increasing to more than 10,000 eVTOL aircraft in operation by 2040, and continuing the rapid climb to almost 30,000 by 2050. These numbers are substantial, but consideration should be given to the lifecycle of aircraft. With technology advancing rapidly, expected high utilization rates, and rapid operations, the lifecycles will require higher fleet turnover and replacement than traditional aircraft operating today. The Aviation Week Fleet Data Team predicts that eVTOL aircraft will begin operating under a five-year replacement lifecycle and eventually settle into a 10-year lifecycle by 2050. This assumption would result in approximately 19,000 eVTOL aircraft in actual operation out of the total 30,000 eVTOL aircraft forecasted to be produced by 2050.[20]

As part of the Aviation Week forecast, the Fleet Data Team researched other forecasts and found the following:

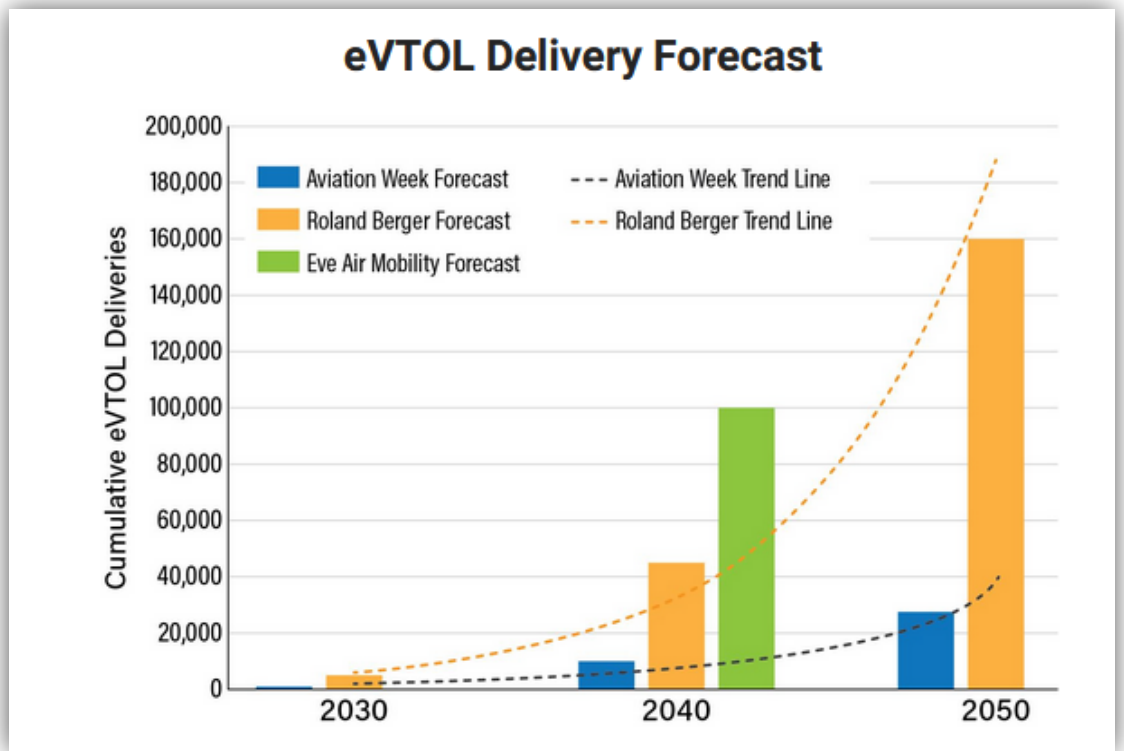
- Roland Berger, an international management consultant firm based in Germany, predicts nearly 5,000 eVTOL aircraft will be produced by 2030, 50,000 by 2040, and nearly 160,000 by 2050.
- Eve Air Mobility, an AAM manufacturer that has yet to conduct its first test flight, forecasts a total industry-wide production of 100,000 eVTOL aircraft by 2040.[21]

Figure 2.8, prepared by the Aviation Week Fleet Data Team, provides a cumulative eVTOL delivery forecast by each independent firm previously discussed in this section. The results indicate significant variation between each forecast projection.

[20] Moore, D. W., Moore, D. W., & Moore, D. W. (2023, June 16). *Aviation Week Forecasts 1,000 eVTOL Deliveries By 2030. Aviation Week Network*. Retrieved February 1, 2024, from https://aviationweek.com/shownews/paris-air-show/aviation-week-forecasts-1000-evtol-deliveries-2030

[21] Moore, D. W., Moore, D. W., & Moore, D. W. (2023, June 16). *Aviation Week Forecasts 1,000 eVTOL Deliveries By 2030. Aviation Week Network*. Retrieved February 1, 2024, from https://aviationweek.com/shownews/paris-air-show/aviation-week-forecasts-1000-evtol-deliveries-2030

Figure 2.8: eVTOL Delivery Forecast



Source: Aviation Week Network (2023) [22]

With so many entrants into the AAM development race, it is understandable that some OEMs will not achieve full-scale operations. Though manufacturer forecasts tend to be very optimistic, industry observers are more inclined to present a more conservative estimate when it comes to total future production.

2.4.1.3. FAA Aerospace Forecast - Fiscal Years 2023-2043

The FAA's annual Aerospace Forecasts offer insights into their expectations for the industry in the upcoming years. These forecasts provide statistical analyses of present and future trends, projecting anticipated demand across various facets such as operations, enplanements, and economic aspects. With over 6,000 hours of test flights conducted in recent years, the FAA acknowledges the AAM industry's rapid growth trajectory and goals for full operational and certified status.

The FAA's comprehensive examination of available industry studies aids in predicting the potential growth of AAM over their planning period (2023-2043) and establishing corresponding

[22] Moore, D. W., Moore, D. W., & Moore, D. W. (2023, June 16). *Aviation Week Forecasts 1,000 eVTOL Deliveries By 2030. Aviation Week Network*. Retrieved February 1, 2024, from https://aviationweek.com/shownews/paris-air-show/aviation-week-forecasts-1000-evtol-deliveries-2030

demand levels. This information serves as a foundation for setting timelines necessary for certification and regulatory processes within this emerging segment of the aviation industry.

However, challenges arise when considering the currency of the data represented in the FAA Aerospace Forecast. Discrepancies between the publication date of referenced data and the FAA Aerospace Forecast's publication date highlight instances where the information may fall outside the realm of current relevance. Thus, there is a need to prioritize recent forecasts and trends to ensure the most pertinent and up-to-date information is utilized in strategic decision-making processes.

For example, quotes from the FAA Aerospace Forecast compared to the publication date of the referenced data shows how some of the information is outside of the range of what would be considered "current data" and may not be as relevant as recent forecasts and trends that are more recently published:

- "Optimistic reports project the AAM passenger industry to have 23,000 aircraft with 740 million enplanements per year at a price of around $30 per trip by 2030."
    - FAA Source: Urban Air Mobility (UAM) Market Study, Nov. 2018, NASA.
- "KPMG predicts 60.4 million enplanements by 2030 and a much smaller industry size."
    - FAA Source: Getting Mobility Off the Ground, 2019, KPMG.
- "AAM passenger services could have a daily demand of 82,000 passengers served by approximately 4,000 four to five-seater aircraft in the US."
    - FAA Source: Goyal, Rohit et. al. (2021): Sustainability: AAM Demand Analysis. Advanced Air Mobility: Demand Analysis and Market Potential of the Airport Shuttle and Air Taxi Markets.
- "The AAM market in the US is to reach approximately US $115 billion by 2035, equivalent to 30% of the present US commercial air transportation market."
    - FAA Source: Deloitte and the Aerospace Industries Association (AIA). (2021)[23]

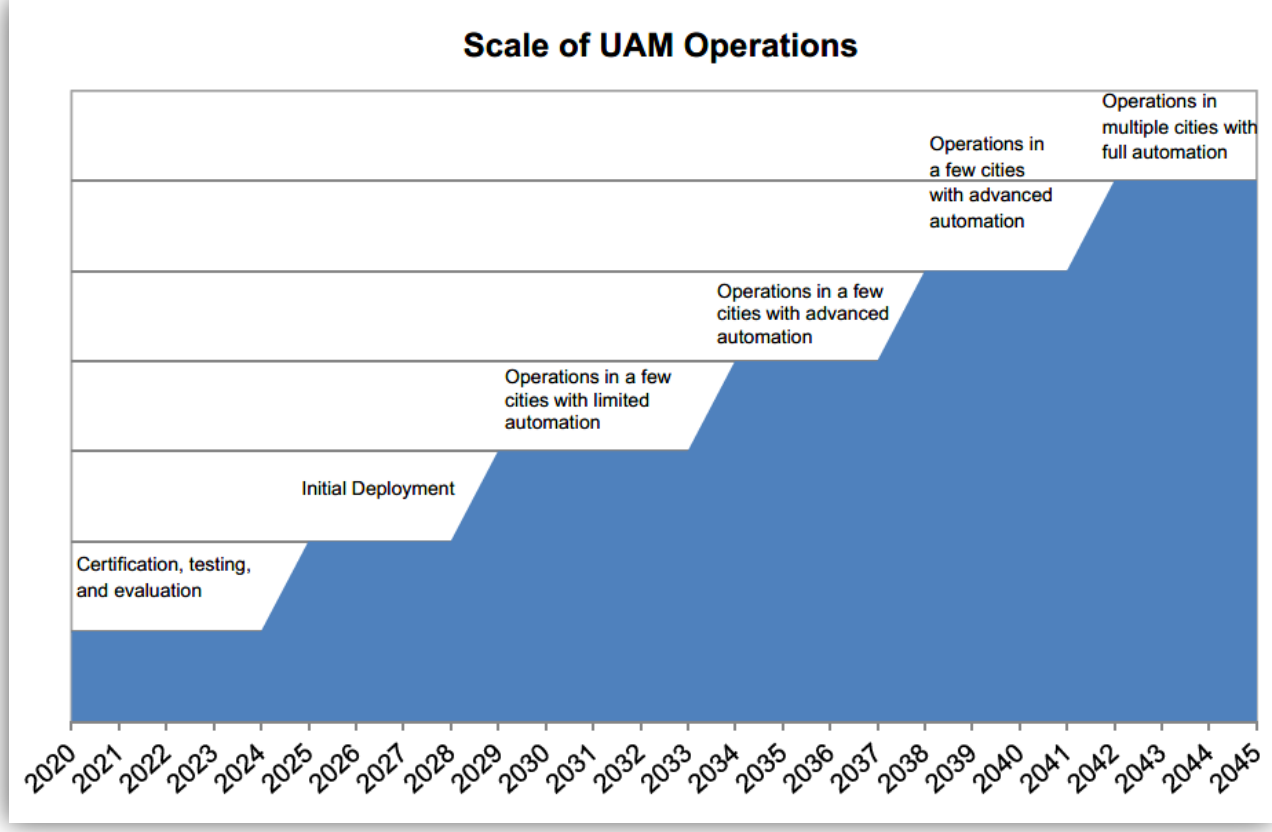
As mentioned throughout this analysis, AAM aircraft certification and initiation of commercial operations are dependent upon the FAA.

In addition to aircraft certification, the FAA has to certify the pilots, certify the vertiports and operating areas, and ensure the safety of operations within NAS. Assure, the FAA's Center of Excellence for UAS, also referenced as FAA Assure, anticipates that between 2,500 and 3,500 vertiports will need to be constructed in order for there to be a complete passenger network across

[23] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

the nation.[24] As shown in **Figure 2.9**, there are multiple steps anticipated over the coming years for operational integration and utilization of AAM and Urban Air Mobility (UAM).

Figure 2.9: FAA Forecast for UAM Operational Use



Source: FAA Aerospace Forecast Fiscal Years 2023-2043 (2023)

The FAA references a few key forecasts for market valuation of the AAM industry within the U.S.; these forecasts include:

- FAA Assure: A near-term market valuation for AAM within the U.S. is anticipated to be in the vicinity of $150 million in the initial deployment phase and grow to achieve $2.7 billion by 2030 as operations begin in a few cities.
- NASA - Booz Allen: The airport shuttle/air taxi market in the U.S. has a capacity of around $500 billion in market valuation and there are estimates that the AAM market will achieve $2.5 billion in the near term due to constraints of the emerging market.

[24] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

- Deloitte and the Aerospace Industries Association: This forecast shows a passenger AAM U.S. Market valuation of $57 billion by 2035. 25

The market valuation forecast potential is reliant on assumptions and predictions in a market that is full of uncertainties as the industry works through certifications, initial deployment, and establishing operations.

2.4.1.4. ACRP Synthesis 130: Airport-Centric Advanced Air Mobility Market Study

The Airport Cooperative Research Program (ACRP) is a research program led by industry representatives. The program is sponsored by the FAA and managed by the Transportation Research Board (TRB). A recent synthesis (Synthesis 130: Airport-Centric Advanced Air Mobility Market Study) presented a key finding that manufacturers anticipate starting commercial operations with AAM aircraft in the U.S. sometime between 2024 and 2026. This research anticipates that airports will be the first focal point of operations, resulting in an airport-to-airport type of flight operation, similar to conventional aircraft today. Eventually, it is expected that AAM aircraft operations will expand beyond airports, justifying the development of certified vertiports that are located on rooftops, mobility hubs, and other accessible areas.

The ACRP synthesis's forecasts revealed that OEMs had a very near-term target of aircraft entry into service. As certification has not occurred for any AAM aircraft to date and full-scale production for aircraft has not started, it is unlikely that the forecasted timelines will be met for the targeted entry into service by the respective OEMs listed in **Table 2.1**.

[25] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

Table 2.1: OEM AAM Aircraft Target Entry into Service Reported by ACRP Synthesis 130

Company	Aircraft	Type	Target Range (mi)	Target Entry into Service	Passenger Seats	Initial Operations
Archer	Midnight	Vectored thrust	100	Late 2024	4+1	Piloted
BETA	A250	Lift and cruise	250	Late 2024	5+1	Piloted
Joby	S4	Vectored thrust	150	2024	4+1	Piloted
Wisk	Generation 6	Vectored thrust	90	Date not set	4	Autonomous

Note: As of August 2024, the BETA ALIA VTOL's entry into service was changed to 2026. Additionally, BETA's ALIA CTOL also changed its entry into service to 2025.

Source: ACRP Synthesis 130: Airport-Centric Advanced Air Mobility Market Study (2023)

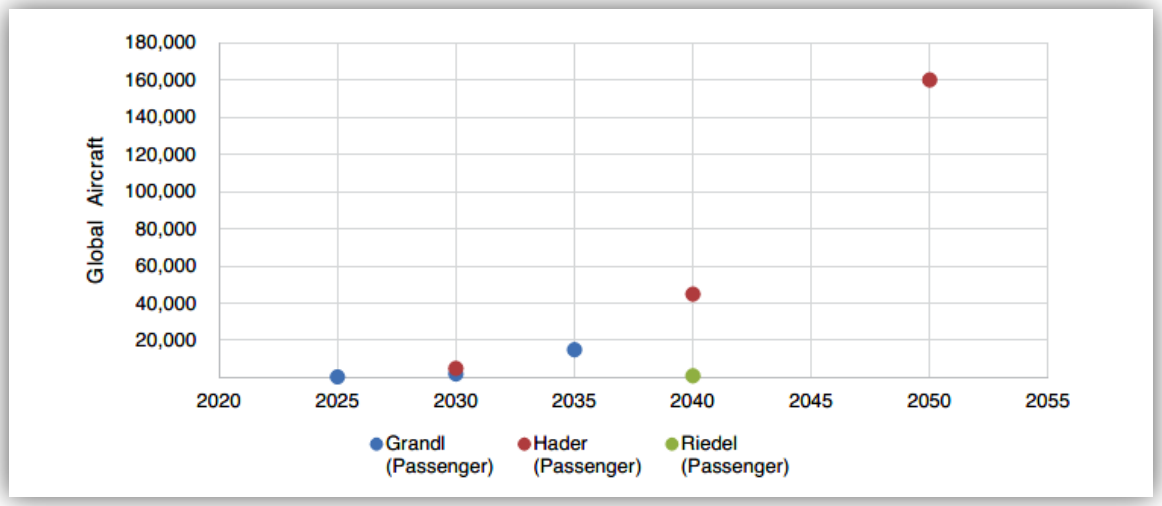
The ACRP Synthesis 130 examined available existing data to formulate the market study. The findings show that the forecasts within the industry varied significantly yet had similarities in many cases. An excerpt from the Synthesis highlights the forecasting ranges:

> "To highlight some of the forecast differences, a report by Porsche Consulting in 2018 estimates a global passenger market in 2025 of $1 billion with 500 aircraft, growing to $21 billion with 15,000 aircraft by 2035 (Grandl, et al. 2018). A report by McKinsey in 2022 estimates a global passenger market of $1.5 billion with 1,000 aircraft in 2040, substantially lower than the Porsche estimates for the period 5 years earlier (Riedel and Rozenkopf 2022). On the other hand, a report by Roland Berger estimates a global passenger market of $16 billion with 45,000 aircraft by 2040 (Hader, et al. 2020). In the United States market, two studies sponsored by NASA estimate between 30 million and 740 million trips per year by 2030, served by between 4,000 and 23,000 aircraft." - *(ACRP Synthesis 130)*[26]

Figure 2.10 illustrates projected global AAM aircraft production from the synthesis regarding passenger aircraft.

[26] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1[27] Brown, Henig, Anderson, Wilkowski, Taylor, Labib, Taspinar, Reut-Gelbart, Dowgala, & Duncan. (2022). *Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution*. KPMG International Entities.

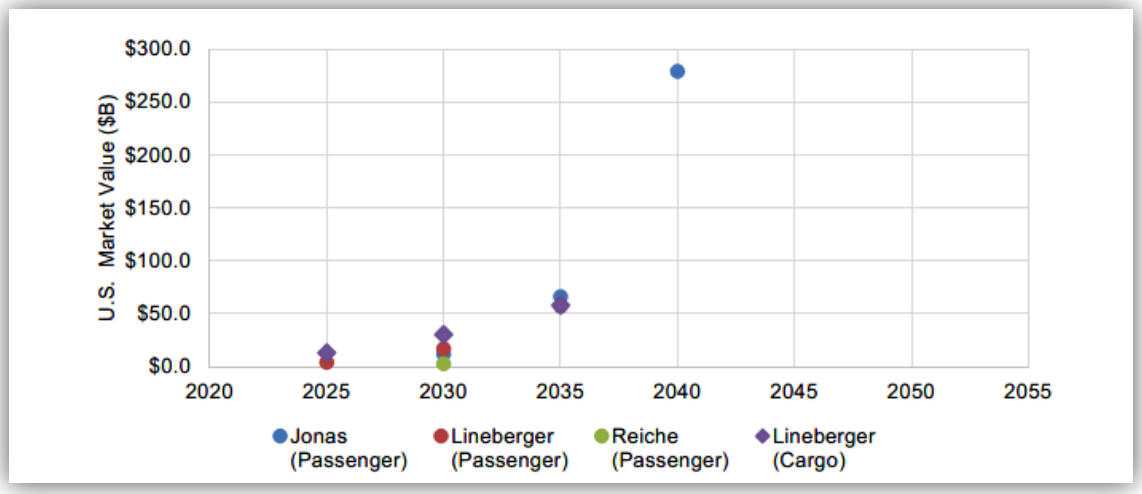
Figure 2.10: ACRP Summary of Global AAM Aircraft Estimates



Source: ACRP Synthesis 130: Airport-Centric Advanced Air Mobility Market Study (2023)

In addition to service entry forecasts, the ACRP Synthesis researched market value estimations for the U.S. It was found that the projections, listed by the author of their respective publications that were researched, are relatively similar throughout the planning period. **Figure 2.11** shows the estimated market valuation over time as observed in the forecast research of the study.

Figure 2.11: ACRP Summary of U.S. AAM Market Value Estimates



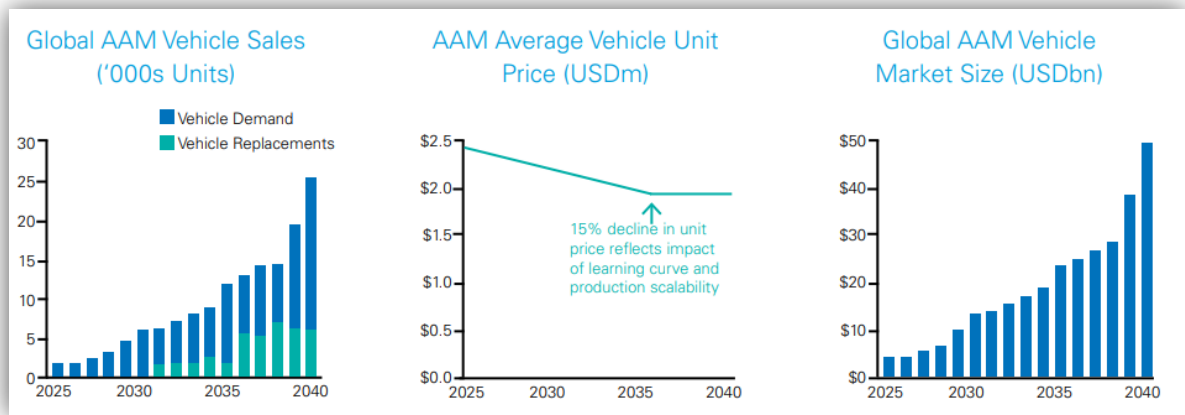
Note: Lineberger (Cargo) is for cargo-only compared to others that are passenger AAM

Source: ACRP Synthesis 130: *Airport-Centric Advanced Air Mobility Market Study (2023)*

2.4.1.5. Aviation 2030 (KPMG)

Aviation 2030 was written by KPMG International Entities and provides a synopsis of passenger use cases within AAM worldwide. KPMG predicts that by 2040 the AAM global market valuation will reach $120 billion. With such a large market sector, they believe that aircraft production will reach 25,000 AAM aircraft worldwide by 2040, growing at a compound annual growth rate of 18 percent between 2025 and 2040.[27] **Figure 2.12** provides the monetary metrics behind the forecasted growth in production.

Figure 2.12: AAM Aircraft Sales and Market Projections

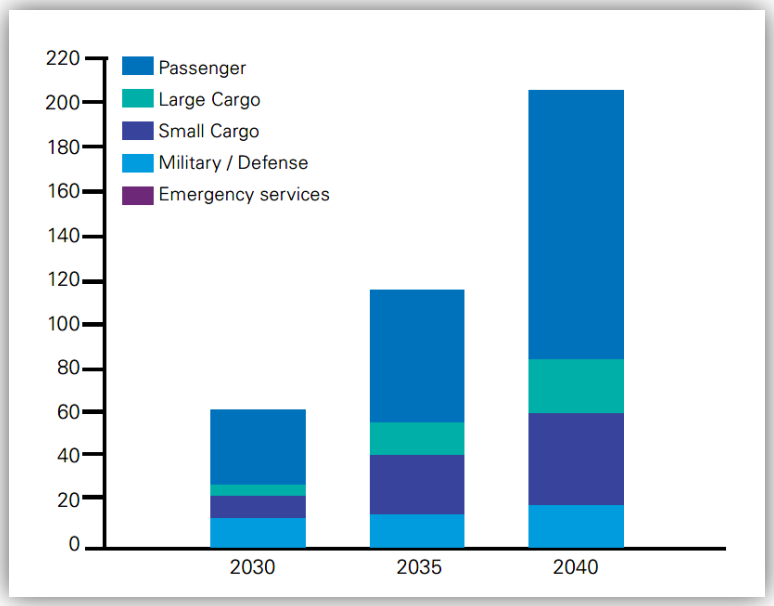


Source: Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution, KPMG (2022)

KPMG's Aviation 2030 report focused on projected AAM market sector growth related to key use case areas such as passenger operations, cargo operations, military operations, and emergency services. **Figure 2.13** provides the growth forecasts for each market area or use case. Passenger activity is anticipated to lead the valuation projections year over year.

[27] Brown, Henig, Anderson, Wilkowski, Taylor, Labib, Taspinar, Reut-Gelbart, Dowgala, & Duncan. (2022). *Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution*. KPMG International Entities.

Figure 2.13: AAM Global Market Projections in ($ Billion)

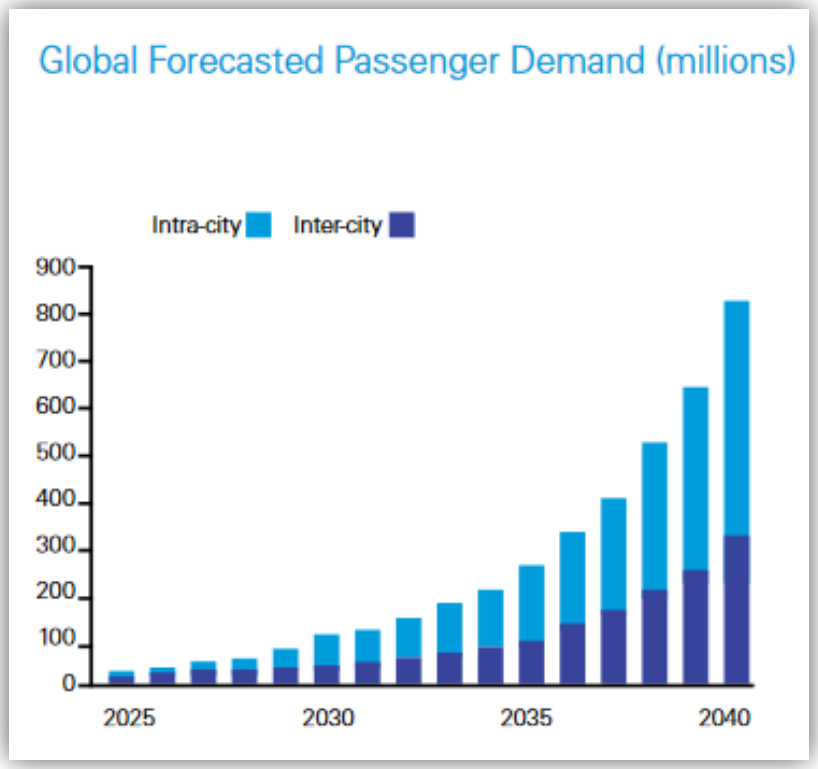


Source: Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution, KPMG (2022)

The growth projections established in this forecast also examine the utilization trends that will be used by passengers worldwide. The projections continue to establish that the global AAM market is forecasted to exceed 100 million passengers annually by 2030. The total combined usage is categorized into: intra-city, also known as UAM, and inter-city commonly referenced as RAM. Once commercial operations commence globally in the projected year 2025, AAM aircraft passengers are anticipated to primarily use the services for city-to-city flights as a regional connector. Within the initial five years of commercial operations, it is estimated that global intra-city operations will begin to grow as a common mode of transportation within each city, similar to how one would use Uber or Lyft or other providers in major cities around the world. The direct point-to-point connectivity with the ability for quick operations and smaller passenger loads are expected to be contributors to the acceptance of inter-city connectivity which will grow this area of the market well beyond that of the intra-city passenger operations estimations as seen in **Figure 2.14**.[28]

[28] Brown, Henig, Anderson, Wilkowski, Taylor, Labib, Taspinar, Reut-Gelbart, Dowgala, & Duncan. (2022). *Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution*. KPMG International Entities.

Figure 2.14: AAM Global Forecasted Passenger Demand in Millions



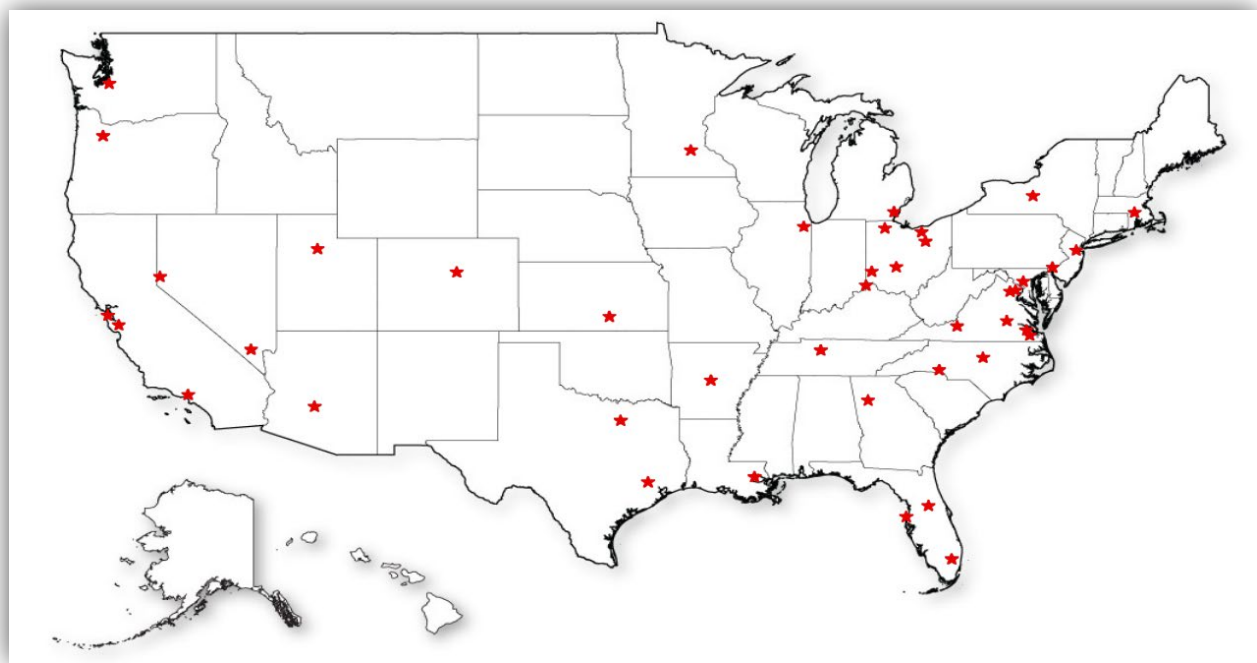
Source: Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution, KPMG (2022)

2.4.1.6. Passenger Demand and Economic Impact: A Business Case for AAM Investment (UAM Geomatics, Inc)

UAM Geomatics presented a forecast of AAM passenger numbers based on projected demand across the U.S., providing a comprehensive national snapshot of potential utilization. Though limited in detail, the forecast information indicates that there are 42 primary metropolitan statistical area (MSA) target markets for AAM to begin operations with a focus on UAM, or intra-city operations. Larger metropolitan areas within proximity to one another are expected to see shared operations, but the primary analysis indicates that urban transportation is a key market area within this specific forecast.[29] The 42 MSAs that UAM Geomatics prepared forecasts for are shown in **Figure 2.15**.

[29] Dyment, P. (2023, January). *Passenger Demand and Economic Impact – A Business Case for AAM Investment* [Presentation]. UAM Geomatics, Inc.

Figure 2.15: 42 Metropolitan Statistical Areas



Source: Passenger Demand and Economic Impact, UAM Geomatics (2023)

Additionally, projected daily passenger loads across the 42 metropolitan areas were forecasted and are presented in **Table 2.2.**

Table 2.2: Forecasted AAM Daily Passenger Utilization in the 42 MSAs

	2026-2030	2031-2035	2036-2040	2041-2045
Forecast Average AAM Passengers per Day	25,543	64,441	135,963	282,101
Forecast Percent of AAM to Airline Passengers for 42 MSAs	0.90%	2.30%	4.50%	8.70%

Source: Passenger Demand and Economic Impact, UAM Geomatics (2023)

Growth in each MSA, and especially in the Chicago MSA for Illinois, is projected to grow year over year. The percentage of daily AAM passengers compared to daily airline passengers' ratio indicates that the growth will be substantial, eventually becoming a major mode of transportation. This study primarily focuses on UAM within each MSA, though certain metropolitan areas in proximity to one another will be able to venture into RAM.

2.4.1.7. Forecast Market Opportunities and Regional Air Mobility (NDSU)

A forecast published in the journal *Technology Forecast & Social Change* by Raj Bridgelall at North Dakota State University (NDSU) focused on market opportunities involving UAM and RAM.

Based on the study's forecasted data, over 3,000 AAM aircraft are predicated to conduct over 7,000,000 annual trips, equating to approximately 19,000 daily trips across the nation beginning in 2030. These operational activity levels enable 28,470,000 annual enplanements, representing 78,000 daily enplanements in 2030. The study focused on the routes and infrastructure needs across the nation and determined that 4,214 vertiports must be in place to meet activity demands.[30]

2.4.2. Existing Industry Forecast Analysis

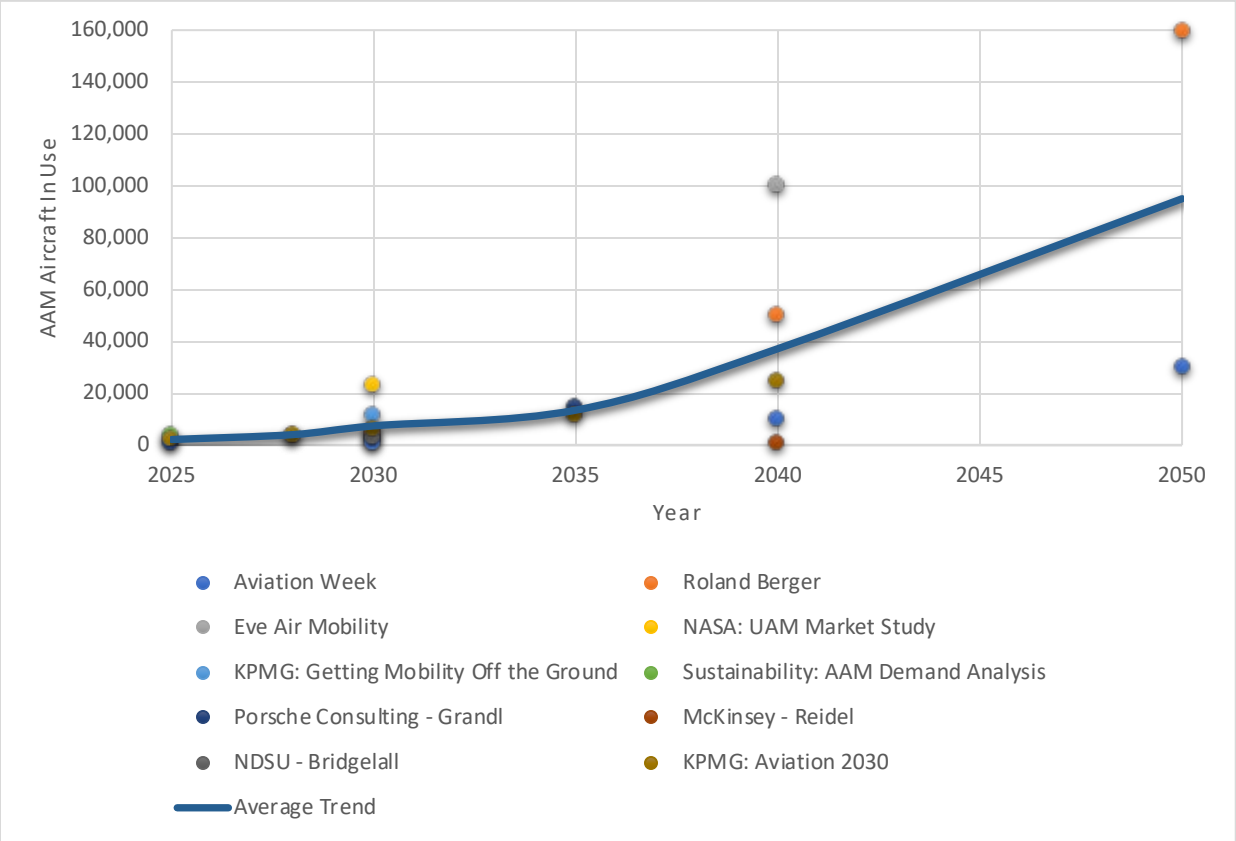
This section compares the above forecasts and identifies what is believed to represent the most realistic national outlook for the industry going forward. It should be noted that the existing industry forecast analysis is reporting the existing OEM and industry forecasts at the time of the research. Certification of AAM aircraft is needed prior to full production, which may affect forecast years, especially 2025.

2.4.2.1. AAM Aircraft Forecast

The range of previously presented AAM aircraft production forecasts is represented in **Figure 2.16**. The data has both conservative and optimistic projected outcomes in terms of projected AAM aircraft that may be produced globally once certified. The trend line represents an average of the forecasts, beginning with an average of over 2,000 AAM aircraft produced in 2025 and growing to 95,000 AAM aircraft by 2050. The majority of the forecasts have 2050 as the furthest horizon year. Given that the industry is in it's early growth stages with limited information, the trend line appears to be more indicative of probable outcomes.

[30] Bridgelall, R., NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

Figure 2.16: AAM Aircraft Forecast – Total Aircraft Produced Over Time (2025-2050)



Sources: Aviation Week Network [31], FAA Aerospace Forecast (23-43) [32], ACRP Synthesis 130 [33], NDSU - Bridgelall [34], KPMG [35], Analysis by The Aviation Planning Group (2024)

Table 2.3 identifies the high, average, and low forecasts for AAM aircraft production identified in this analysis of forecasts. There is a wide range of forecast projections for each year, resulting in a non-linear forecast for the high and low results.

[31] Moore, D. W., Moore, D. W., & Moore, D. W. (2023, June 16). *Aviation Week Forecasts 1,000 eVTOL Deliveries By 2030*. Aviation Week Network. Retrieved February 1, 2024, from https://aviationweek.com/shownews/paris-air-show/aviation-week-forecasts-1000-evtol-deliveries-2030
[32] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf
[33] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport-Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1
[34] Bridgelall, R., NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835
[35] Brown, Henig, Anderson, Wilkowski, Taylor, Labib, Taspinar, Reut-Gelbart, Dowgala, & Duncan. (2022). *Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution*. KPMG International Entities.

These results were averaged over time to show a more linear forecast of AAM aircraft production rates. The average of the forecasts and a comparison to the average to the projected production numbers of five OEMs (Lilium, BETA, Archer, Joby, and Volocopter) is shown in **Figure 2.17**. The comparison provides an indication of the limited yet optimistic data available from OEMs compared to the average developed from reviewing the various production forecasts of others.

Table 2.3: AAM Aircraft Production Forecasts Analysis

	2025	2030	2035	2040	2050
Number of Forecasts	3	7	2	5	2
High	4,000	23,000	15,000*	100,000	160,000
Average	2,167	7,432	13,500	37,200	95,000
Low	500	1,000	12,000	1,000*	30,000

Note: Data points involve multiple forecasts that do not report every benchmark year. The out-of-trend line numbers are indicated by the (*). The 2040 Low is reporting the low numbers reported in the McKinsey-Reidel Forecast, which only provided a forecast for 2040. The 2035 High is reporting from two data sources, KPMG and also ACRP referencing Porsche Consulting.

Sources: Aviation Week Network [36], FAA Aerospace Forecast (23-43) [37], ACRP Synthesis 130 [38], NDSU - Bridgelall [39], KPMG [40], Analysis by The Aviation Planning Group (2024)

[36] Moore, D. W., Moore, D. W., & Moore, D. W. (2023, June 16). *Aviation Week Forecasts 1,000 eVTOL Deliveries By 2030*. Aviation Week Network. Retrieved February 1, 2024, from https://aviationweek.com/shownews/paris-air-show/aviation-week-forecasts-1000-evtol-deliveries-2030

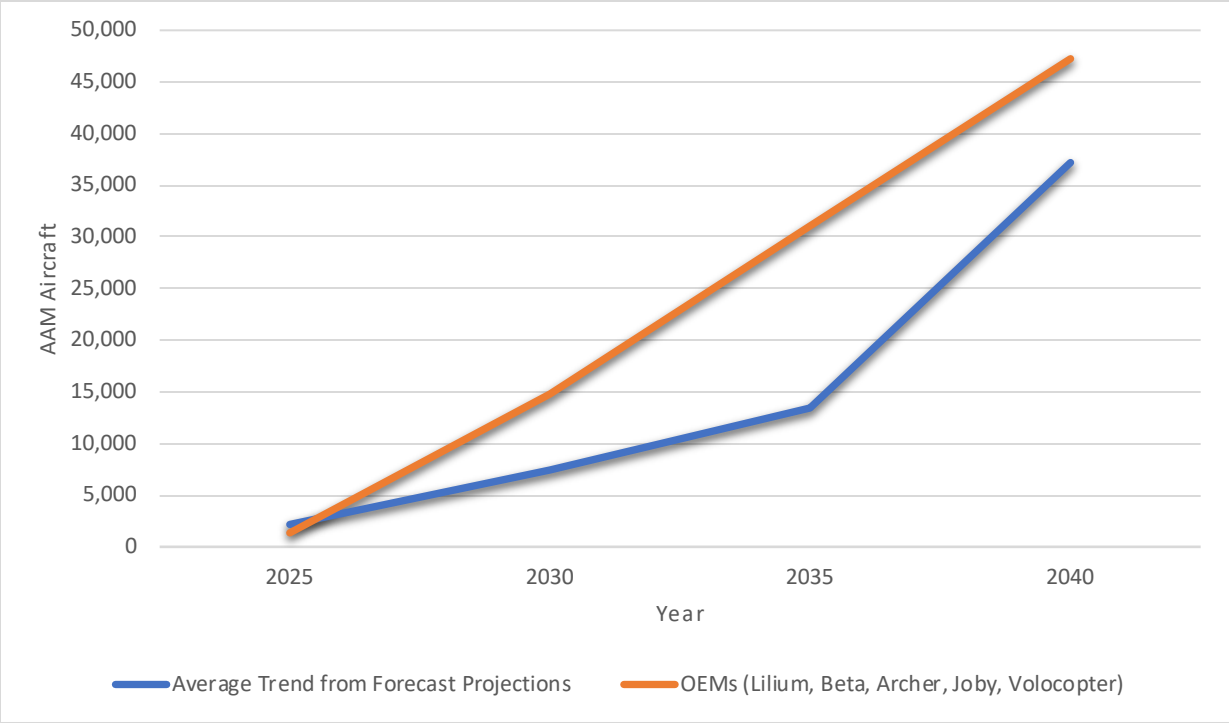
[37] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[38] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport-Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

[39] Bridgelall, R., NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

[40] Brown, Henig, Anderson, Wilkowski, Taylor, Labib, Taspinar, Reut-Gelbart, Dowgala, & Duncan. (2022). *Aviation 2030: Passenger Use Cases in the Advanced Air Mobility Revolution*. KPMG International Entities.

Figure 2.17: AAM Aircraft Forecast Analysis Compared to OEM Production Forecasts (2025-2040)



Sources: Lilium (DroneDJ article)[41], BETA (Aviation Week Network Article)[42], Archer Aviation (Reuters article)[43], Joby Aviation[44], Volocopter[45], Analysis by The Aviation Planning Group (2024)

Although the OEMs' forecasts are straight-lined, it is anticipated that a curved forecast is more likely. This average forecast assumes development, integration, and demand increase exponentially as more aircraft are certified by the FAA, a workforce is developed, and AAM becomes more widely used and accepted by the public.

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[41] Crumley, B., & Crumley, B. (2022, September 29). *Lilium's annual 400 eVTOL air taxi production goal seeks new funding*. DroneDJ. https://dronedj.com/2022/09/29/lilium-evtol-air-taxi/

[42] Warwick, G. (2023, October 02). *Beta Opens Electric Aircraft Manufacturing Plant, Launches Production.* Aviation Week Network. https://aviationweek.com/aerospace/advanced-air-mobility/beta-opens-electric-aircraft-manufacturing-plant-launches

[43] Nair, A. (2022, October 25). *Archer Aviation plans to build 250 air taxis in 2025*. Reuters. https://www.reuters.com/business/autos-transportation/archer-aviation-plans-build-250-air-taxis-2025-2022-10-24/

[44] Joby. (2023, September 18). *Joby Selects Dayton, Ohio, Birthplace of Aviation, for First Scaled Manufacturing Facility* [Press release]. https://www.jobyaviation.com/news/joby-selects-dayton-ohio-first-scaled-manufacturing-facility/

[45] Volocopter. (2023, April 5). *Volocopter Completes Production Setup for Electric Air Taxis* [Press release]. https://www.volocopter.com/en/newsroom/volocopter-completes-production-setup

2.4.2.2. AAM Enplanement Forecast

Four sources provided AAM enplanement forecasts. These four forecasts are presented in terms of the high and low forecasts, which were then used to develop an average for annual AAM enplanements (see **Table 2.4**). The average annual enplanement forecasts on AAM aircraft in the U.S. indicate almost 900,000 annual enplanements on AAM aircraft in 2025, growing to nearly 50 million enplanements by 2040 (see **Figure 2.18**). It is important to note that only one forecast datapoint for forecast years 2025, 2035, and 2040 which is assumed to be the average given the lack of other available data.

Table 2.4: AAM U.S. Enplanement Forecasts Analysis

Annual U.S. AAM Enplanements	2025	2030	2035	2040
Number of Forecasts	1	4	1	1
High	886,590	29,930,000	23,520,965	49,626,495
Average	886,590	19,842,096	23,520,965	49,626,495
Low	886,590	9,323,165	23,520,965	49,626,495

Note: 2025, 2035, and 2040 only had one forecast data point available from the sampling of forecasts

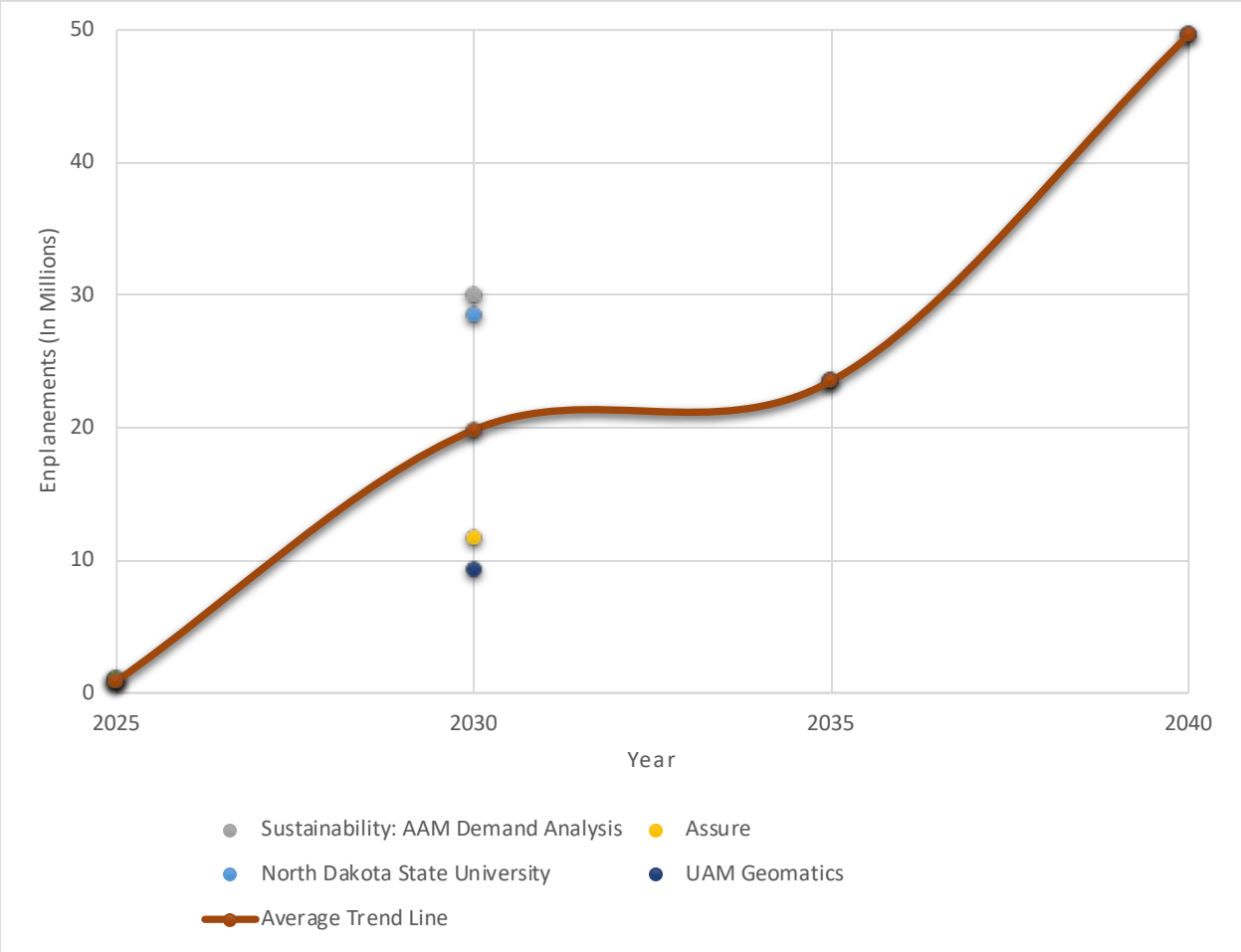
Sources: FAA Aerospace Forecast (23-43)[46], ACRP Synthesis 130[47], NDSU - Bridgelall[48], Analysis by the Aviation Planning Group (2024)

[46] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[47] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

[48] Bridgelall, R.. NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

Figure 2.18: Annual AAM U.S. Forecast Passenger Enplanements (2025-2040)



Note: KPMG is not included in the summary chart illustration as it is a global study.

Sources: FAA Aerospace Forecast (23-43)[49], ACRP Synthesis 130[50], NDSU - Bridgelall[51], Analysis by the Aviation Planning Group (2024)

Annually the numbers look quite large, but when observed at a daily level, the projections become more palatable. The average daily enplanement forecasts for the U.S. indicate almost 2,500 daily enplanements in 2025 and growing to over 135,000 daily enplanements by 2040.

Table 2.5 identifies the high, average, and low forecasts for daily enplanements observed in this analysis of forecasts, while **Figure 2.19** shows the average daily U.S. enplanement forecasts on

[49] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf
[50] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1
[51] Bridgelall, R.. NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

AAM aircraft. Beginning modestly at nearly 2,500 daily enplanements in 2025, AAM forecasts expect an increase to over 135,000 daily enplanements by 2040.

Table 2.5: AAM Daily Enplanement Forecasts Analysis

Daily U.S. AAM Enplanements	2025	2030	2035	2040
Number of Forecasts	1	4	1	1
High	2,429	82,000	64,441	135,963
Average	2,429	54,362	64,441	135,963
Low	2,429	25,543	64,441	135,963

Note: 2025, 20355, and 2040 only had one forecast data point available from the sampling of forecasts

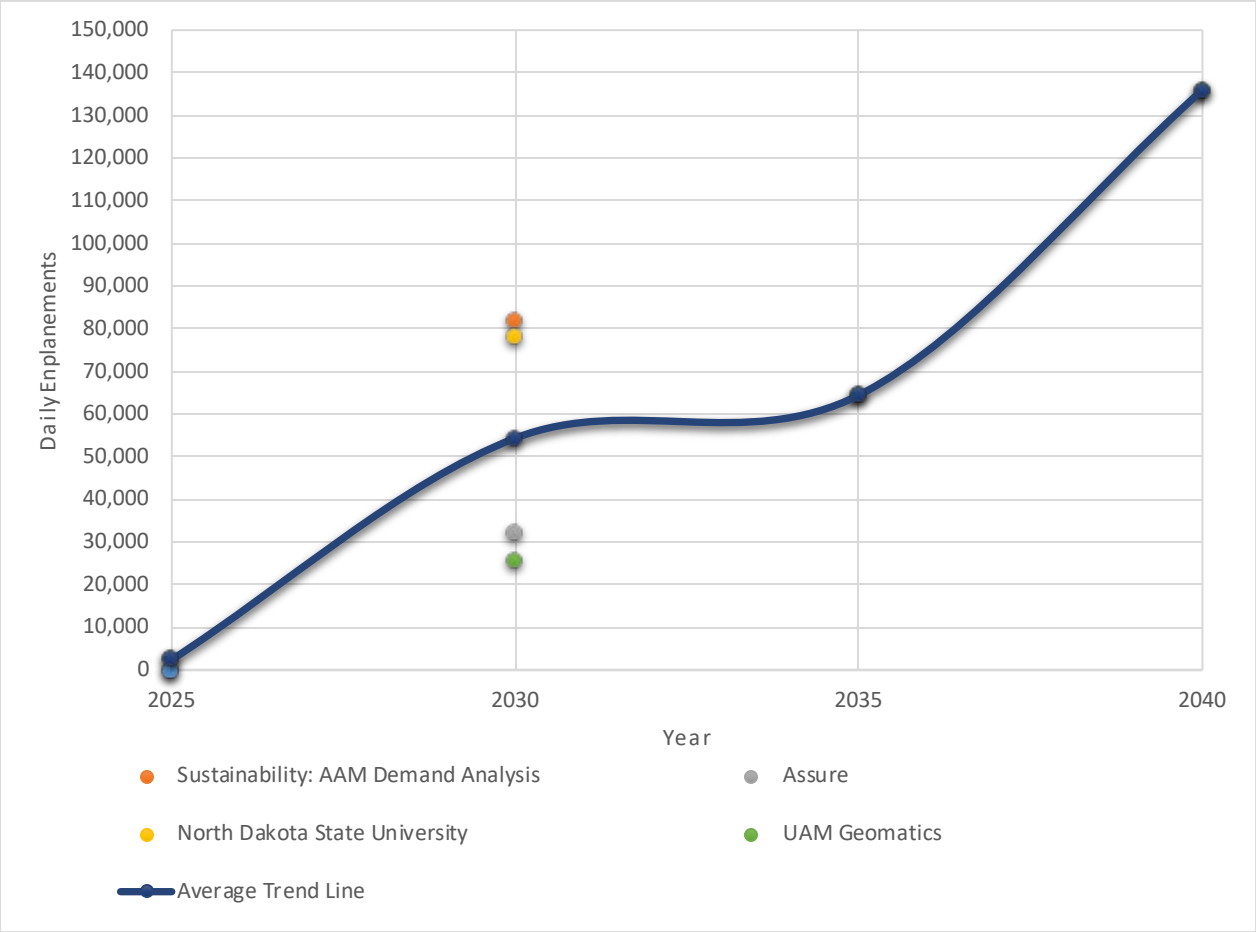
Sources: FAA Aerospace Forecast (23-43)[52], ACRP Synthesis 130[53], NDSU - Bridgelall[54], Analysis by the Aviation Planning Group (2024)

[52] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[53] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

[54] Bridgelall, R.. NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

Figure 2.19: Daily AAM U.S. Forecasted Passenger Enplanements (2025-2040)



Note: KPMG not included in the summary chart illustration as it is a global study.

Sources: FAA Aerospace Forecast (23-43)[55], ACRP Synthesis 130[56], NDSU - Bridgelall[57], Analysis by The Aviation Planning Group (2024)

[55] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[56] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

[57] Bridgelall, R., NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

Passenger demand will depend heavily on the availability of infrastructure forming the network to allow for growth and utilization among the general public. Assure, the FAA's Center of Excellence for UAS Research, expects a total of 2,500 - 3,500 vertiports[58] across the national market while the North Dakota State University research proposes a slightly higher number of 4,214 vertiports[59] based on route calculations and opportunities observed through the research. These numbers are similar enough to expect nearly 4,000 vertiports are needed in the future to accommodate the demand and network of vertiports required for full operations across the nation based on the forecasts of passenger demand utilizing AAM aircraft.

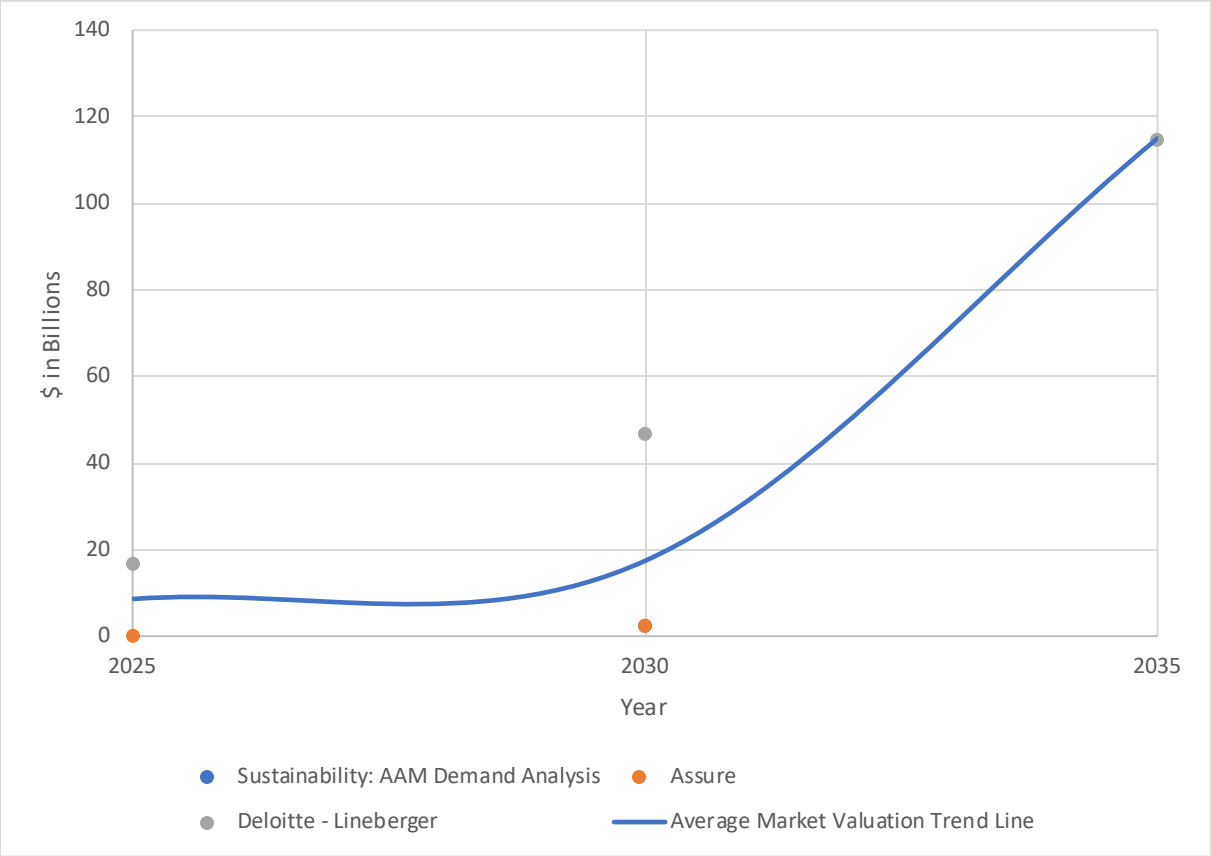
2.4.2.3. AAM Market Valuation Forecast

As the AAM market is an emerging industry, the valuation ranges vary significantly from forecast to forecast. **Figure 2.20** provides data on the three valuations observed in the analysis of the previously presented forecasts, as well as the average of these. It is important to note that only one forecast has data for 2035 which is assumed to be the average given the lack of other available data.

[58] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[59] Bridgelall, R., NDSU (2023). *Forecasting Market Opportunities for Urban and Regional Air Mobility*. Technological Forecasting & Social Change, 196. https://doi.org/122835

Figure 2.20: AAM U.S. Forecasted Market Valuation (2025-2035)



Sources: Analysis by The Aviation Planning Group, FAA Aerospace Forecast (23-43) [60], ACRP Synthesis 130 [61], (2024)

Table 2.6 identifies the high, average, and low forecasts of the AAM market valuations observed in this analysis of forecasts.

As depicted in the market valuation average projections there are conservative and optimistic results. This aspect is more pronounced with the limited data available for forecasting national projections by 2035 and beyond. As the industry develops and eventually establishes operations, data will become more certain, and forecasting will become more accurate.

[60] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[61] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

Table 2.6: AAM U.S. Market Valuation Forecasts Analysis ($ Billions)

AAM U.S. Market Valuation Forecasts	2025	2030	2035
Number of Forecasts	2	3	1
High	17	47	115
Average	8.58	17.40	115
Low	0.15	2.5	115

Note: Forecasts are respective of individual forecasts, with some only having individual year forecasts

Sources: Analysis by The Aviation Planning Group, FAA Aerospace Forecast (23-43) [62], ACRP Synthesis 130 [63], (2024)

2.4.3. Advanced Air Mobility in Illinois (Illinois Center for Transportation)

A study conducted by the McCormick School of Engineering at Northwestern University for the Illinois Center for Transportation (ICT) examined demand estimations for the State concerning passenger flights, emergency services, cargo, and agriculture use cases of AAM aircraft. Passenger uses within AAM are projected to be utilized for primary travel methods as an air taxi or incorporated into traditional travel sequences. AAM could offer a function of travel to the airport, where the passenger then boards a traditional aircraft for their primary journey. Similarly, when the passenger returns, they would board an AAM aircraft to travel back to their destination airport, rather than taking a vehicle or train. This utilization would expand current travel options to and from the existing airports for traditional flights. **Table 2.7** provides the study's estimations of the market share of passengers that would utilize AAM aircraft daily in the State of Illinois at the beginning and end of their trips commuting to and from the respective airports along with the correlation of how many daily trips that would represent.

Table 2.7: Illinois Forecasted Daily AAM Utilization

Scenario	Market Share of Commuters	Unconstrained Daily Trips Estimate
Worst-Case	1.11%	1,500
Middle-Case	3.06%	4,100
Best-Case	10.26%	13,600

Source: CT – Mahmassani et al. (2024)

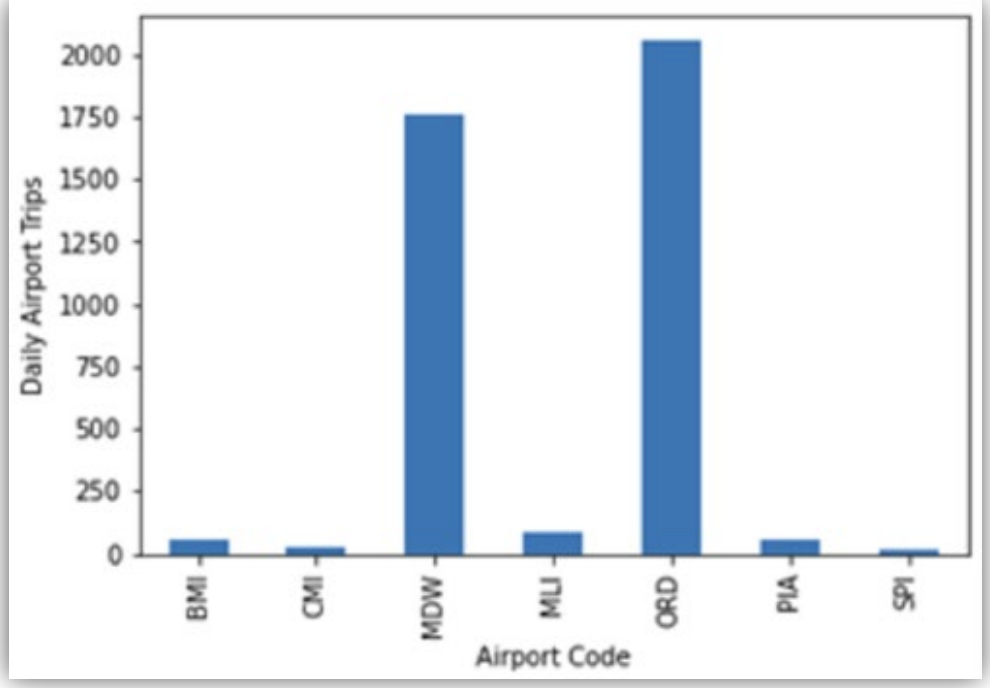
The ICT reports passenger utilization forecasts are unknown with a wide range of documented possibilities. This is due to consideration given to adoption rates of the new technology,

[62] Federal Aviation Administration. (2023). *FAA Aerospace Forecast Fiscal Years 2023-2043*. Federal Aviation Administration. https://www.faa.gov/sites/faa.gov/files/FY%202023-2043%20Full%20Forecast%20Document%20and%20Tables_0.pdf

[63] Fowler, Mark. (2023). *ACRP Synthesis 130: Airport -Centric Advanced Air Mobility Market Study* (2023). ACRP. https://nap.nationalacademies.org/read/27326/chapter/1

convenience, and the economics associated with the value of the AAM flight. The middle-case scenario, shown below in **Figure 2.21**, provides a utilization breakdown by Illinois airport for passengers commuting for a traditional flight.

Figure 2.21: Middle-Case Scenario of Passenger Utilization to Illinois Airports



Source: CT– Mahmassani et al. (2024)

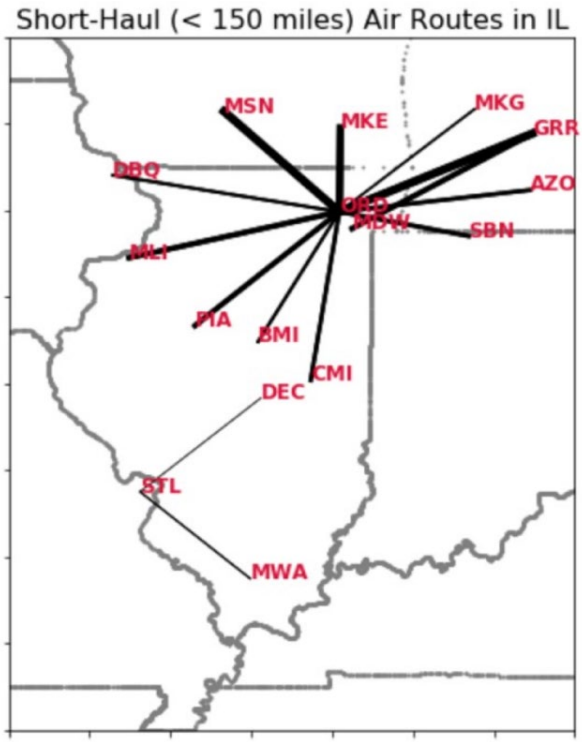
The largest airports in the state per daily trips, Chicago O'Hare International Airport (ORD) and Chicago Midway International Airport (MDW), are projected to realize the highest concentration of passenger use, while the smaller commercial service airports are expected to experience minimal utilization, although still providing a network for AAM opportunities.

As previously mentioned, AAM aircraft can be used as an air taxi service as a point-to-point mode of transportation, whether in UAM or RAM use cases. This ICT forecast studied the introduction of air taxi service to the State of Illinois and compared it to all current modes of travel. The ICT study estimated that 53 percent of all future AAM trips (i.e., UAM and RAM), will serve business travelers while the remaining 47 percent will serve non-work activities. Higher potential business utilization for AAM air taxi service is indicated, as currently only 24 percent of all travel is work-related.[64]

[64] Mahmassani, H., Cummings, C., Volakakis, V., Audenaerd, L., Del La Paz, J. (2024, February). *Advancing Air Mobility in Illinois*. Illinois Center for Transportation. https://rosap.ntl.bts.gov/view/dot/73552

The ICT study also evaluated regional demand and projects Chicago to have the highest uses for day-to-day air taxi services in Illinois. AAM services within the state are categorized into travel in three distinct areas (Chicago, St. Louis, and Central Illinois) where the first air taxi trips are expected to occur. The study's projections indicate that 87.6 percent of the trips would be around Chicago, while 2.4 percent would be trips around St. Louis, and 10 percent would occur in central Illinois. **Figure 2.22** demonstrates the forecasted utilization by route with thicker lines between each point for higher trip volume. Utilization within the Chicago area is expected to be higher than in the Illinois suburbs of St. Louis, MO, and around central Illinois as compared to the overall total trips and travel that occur in these areas through traditional road travel methods. (Total Trips: Chicago – 68.5 percent, St. Louis – 6.6 percent, Central IL – 24.9 percent). The current lack of short-haul air routes of less than 150 miles in Illinois provides an opportunity for an introduction of AAM aircraft to fill an important need through RAM.[65]

Figure 2.22: Potential AAM Air Routes in Illinois



Source: Illinois Center for Transportation – Mahmassani et al. (2024)

In addition to passenger utilization, cargo deliveries are also expected to hold a large share of operations within Illinois' AAM market. The ICT report indicates in 2022 over 43 million packages

[65] Mahmassani, H., Cummings, C., Volakakis, V., Audenaerd, L., Del La Paz, J. (2024, February). *Advancing Air Mobility in Illinois*. Illinois Center for Transportation. https://rosap.ntl.bts.gov/view/dot/73552

were shipped daily across the U.S., with FedEx being responsible for shipping six million daily packages nationwide (14.4 percent). The study showed that nearly half of the daily packages shipped would be of a weight capable of being delivered by Uncrewed Aerial Vehicles (UAVs). UAVs are a component of AAM, and this report focused on smaller UAVs for cargo and not for passenger travel. With weight being a significant limitation for UAV deliveries, consideration must also be given to distance, weather, and daylight, as UAVs must be operated with a clear line of sight.[66]

2.4.4. Summary of Forecasts Analysis

Illinois is very centrally located in the nation with a major metropolitan hub in the north. The state is expected to realize AAM operations in the near term. Key areas of success include the OEM's that have been working through their respective certifications, and legacy air carriers planning to incorporate AAM into their future business models. The State of Illinois is at the forefront of the AAM integration with partnerships between United Airlines and Archer for deployment in Chicago for AAM flights from downtown to Chicago O'Hare International Airport (ORD). As AAM deploys across the nation, it will be drawn to the major metropolitan areas, and Chicago will be the forecasted launching point for AAM when operations begin for the State of Illinois.

Progress at the dawn of an emerging industry does not come without its challenges. Constraints to the AAM market include regulatory hurdles, certification timelines, infrastructure development, public acceptance, and many more challenges to the industry prior to becoming fully operational and contending as a transportation option. Though expectations are high, the projected demand documented in the aforementioned studies throughout this Forecast Analysis may not be realized for many years.

[66] McCormick School of Engineering. (2023, October 25). *Advanced Air Mobility in Illinois: Project Summary, Key Findings, and Recommendations*. Northwestern University.