THE EVTOL MARKET: BRIDGING THE GAP BETWEEN HYPE AND REALITY

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The vision of air taxis flying above city streets has captured global attention, with sleek prototypes and bold promises suggesting that commercial eVTOL operations are imminent.

However, a clear gap remains between this optimism and the actual readiness of the industry to deploy real-world services, and this gap is perceived and addressed differently across regions. In the United States, momentum is growing rapidly following recent federal directives that have accelerated regulatory alignment.

Manufacturers are consolidating their positions in the market, and for the first time, piloted flight tests under active type certification processes are underway.

In Asia, China has already granted full type and air operator certificates, enabling limited autonomous commercial operations. Yet these achievements have received little international recognition, despite their operational significance.

Europe, meanwhile, continues to navigate complex regulatory pathways while several of its key manufacturers face financial difficulties, delaying market entry and raising questions about long-term competitiveness.

The eVTOL sector now stands at a critical inflection point, where public enthusiasm and industrial advances must converge with robust regulatory approvals and viable business models to truly take off.

HYPE VS. READINESS: THE CURRENT STATE OF EVTOL INDUSTRY

Over the past few years, eVTOL developers and public officials have often promoted optimistic timelines for flying taxis.

In the late 2010s, companies predicted that commercial urban air mobility services would be a reality by the mid-2020s, and cities like Paris, Dubai, and Los Angeles were presented as early launch sites. This narrative was amplified by media coverage and investor enthusiasm.

Volocopter, for example, committed to launching air taxi services during the 2024 Paris Olympics, backed by local authorities and showcased as a flagship use case for Europe. However, as the Games approach, those operations have not materialized, and the company has since filed for insolvency and been acquired by new investors.

In the United States, Archer Aviation has also played a visible role in shaping public perception, announcing partnerships and plans to operate during major events such as the 2028 Los Angeles Olympics.

While Archer remains active and is progressing through the certification process, these high-profile announcements reflect a broader pattern in the eVTOL sector, where public-facing promises continue to outpace the complex and lengthy work still required for real-world commercial deployment.

In reality, regulators and engineering milestones have not moved as quickly as marketing departments. As of early 2025, not a single eVTOL aircraft has been fully certified by the U.S. Federal Aviation Administration (FAA) for commercial passenger service.

The FAA's approach has been cautious and methodical, emphasizing safety over speed. Years of work have gone into crafting a new certification basis for eVTOLs as "powered-lift" aircraft, essentially creating a special category outside traditional airplane or helicopter rules.

Only in late 2024 did the FAA issue some of its first permanent rules to enable eVTOL operations – for example, new pilot licensing standards specific to powered-lift aircraft were finalized in October 2024.

Additional operating rules and airworthiness criteria are still being ironed out, reflecting the careful step-by-step progress required before air taxis can take off in the U.S.

Technical hurdles have also curbed early enthusiasm. Airbus, for example, paused its CityAirbus NextGen program in early 2025, citing limitations in current battery technology.

CEO Bruno Even explained that today's batteries still lack the energy density and power delivery required to support key mission profiles such as carrying four passengers over 80 to 100 km routes.

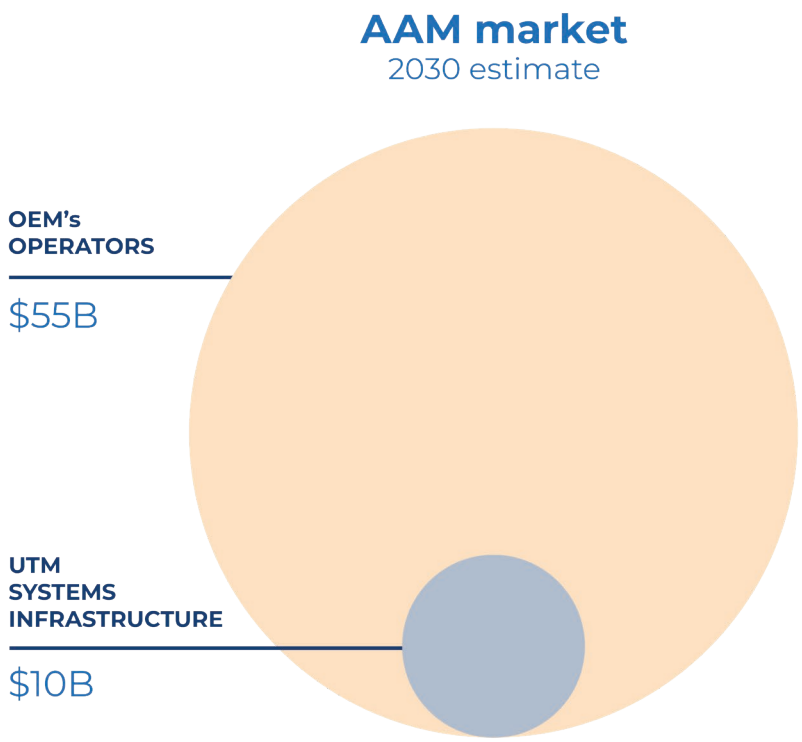


Figure 1. AAM market estimation until 2030

As illustrated in Figure 1, OEMs and operators are projected to capture the bulk of the Advanced Air Mobility market by 2030, with a combined value of approximately $55 billion. In contrast, infrastructure, UTM systems, and ground support services are expected to receive just $10 billion.

This imbalance suggests a potential bottleneck in the broader ecosystem: while significant resources have flowed into aircraft development and manufacturing, the enabling infrastructure required to scale operations may be underfunded and underdeveloped.

Without proportional investment in U-space systems, charging networks, and vertiports, the industry's growth could face logistical and regulatory constraints.

The energy density of current lithium-ion batteries (around 250 Wh/kg) pales in comparison to the much higher specific energy of aviation fuels (typically several thousand Wh/kg).

Moreover, eVTOLs demand high peak power and rapid discharge capabilities to enable vertical takeoffs and landings, which places immense strain on battery performance.

In essence, the physics of flight and energy storage impose constraints that cannot be resolved through optimistic timelines alone.

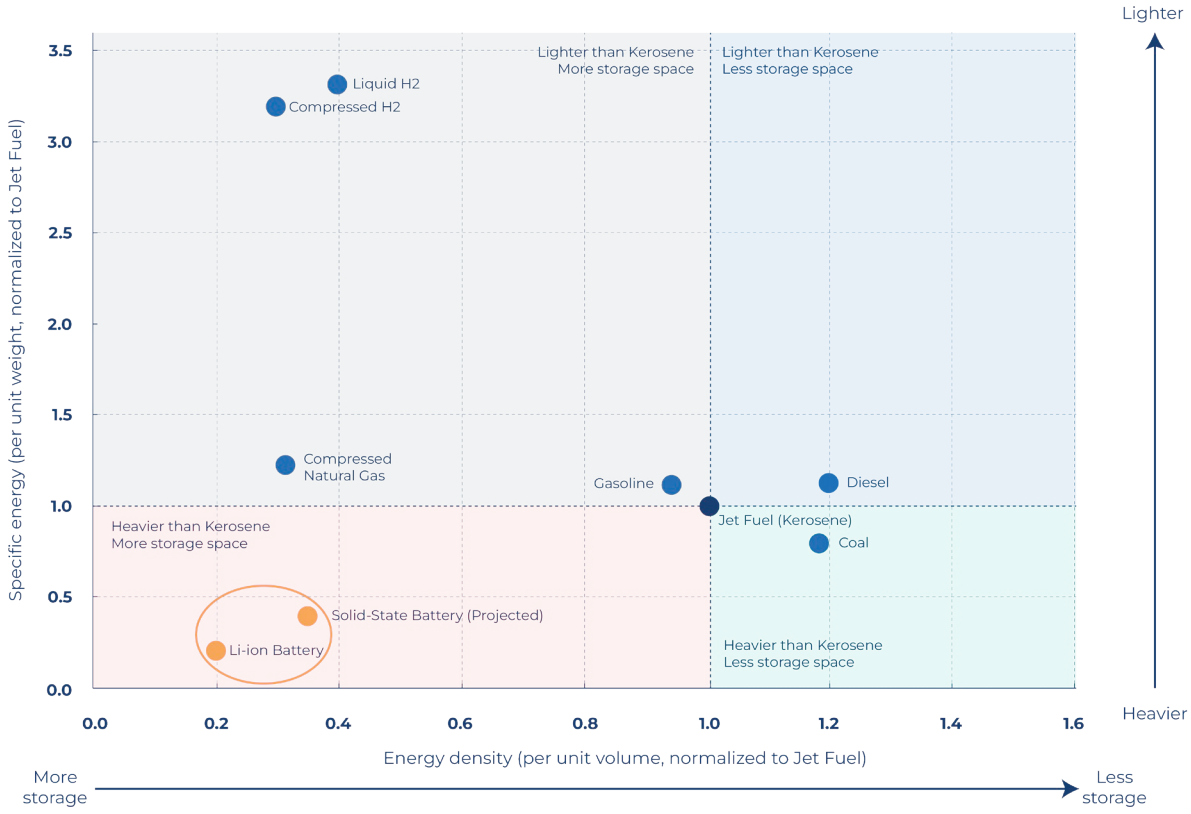


Figure 2. Comparison of energy density and specific energy transportation energy sources

The chart above illustrates the core dilemma facing eVTOL development. While modern lithium-ion batteries offer moderate energy densities suitable for electric vehicles, they fall short on both energy and power requirements needed for vertical flight.

These limitations constrain flight range, payload, and operational flexibility. Although next-generation solutions like solid-state batteries are expected to reach up to 500 Wh/kg, and hybrid or hydrogen-based architectures are being explored, none are yet mature or scalable enough for widespread aviation use.

Jet fuel remains far superior in both energy per weight and volume, while hydrogen introduces significant storage and integration challenges.

As a result, many early forecasts predicting eVTOL services between 2023 and 2025 were based on overly optimistic assumptions about energy storage advancements. Airbus's recent decision to pause its eVTOL program due to battery limitations is a clear signal that the industry is now recalibrating its narrative to match the actual pace of technological and regulatory readiness.

This mismatch between promise and reality is increasingly drawing attention from analysts and investors. In May 2025, Culper Research, a well-known short-seller firm, published a report accusing Archer Aviation of overstating its readiness for near-term commercialization.

The report alleged that Archer had misled investors by announcing key milestones such as a "full transition flight" without releasing any publicly verifiable data to support the claim.

Although Archer strongly denied the accusations, the incident highlights the growing scrutiny and demand for transparency facing the eVTOL sector.

Stakeholders are no longer satisfied with bold narratives alone they are now expecting evidence of technical maturity, clear certification progress, and real operational planning.

The industry stands at a critical turning point, where it must transform prototypes and promises into certified aircraft, licensed pilots, approved frameworks, and scalable services.

The following sections examine how close leading eVTOL OEMs are to meeting those expectations, and what key roadblocks remain.

CERTIFICATION PROGRESS OF LEADING EVTOL DEVELOPERS

Although the timeline for commercial eVTOL operations has proven more ambitious than realistic, several leading manufacturers have made tangible progress toward type certification. These companies are advancing through complex testing programs and evolving regulatory frameworks, each progressing at a different pace depending on their technical maturity and regional context.

Figure 3 provides a comparative view of the certification trajectory of major OEMs including Joby, Archer, Volocopter, EHang, and others, illustrating when they entered key phase s such as design, prototype testing, and regulatory engagement, and where progress has slowed or stalled.

Figure 3. Diverging certification paths among leading eVTOL manufacturers

Joby Aviation (USA)

Joby is among the most advanced eVTOL developers in the U.S., having completed three of five FAA type certification stages and entering the final phase of FAA flight testing by late 2024.

With over 1.4 billion dollars in funding, including 894 million from Toyota, and five conforming prototypes, Joby is targeting certification and limited commercial launch in 2025.

The company also holds a Part 135 Air Carrier Certificate, enabling it to simulate operations with conventional aircraft ahead of eVTOL deployment. Partnerships with Delta for airport transfers in New York and infrastructure planning in Dubai signal global ambitions.

If timelines hold, Joby could be the first eVTOL operator to launch in the U.S.

Archer Aviation (USA)

Archer is targeting a 2025 launch with its five-seat eVTOL, Midnight, currently undergoing FAA testing. The company opened a production facility in Georgia in 2023 and plans to scale output from two aircraft per month in 2025 to 650 annually by 2030.

Backed by over $2 billion in funding including $400 million from Stellantis and a $6 billion order book, Archer is working closely with the FAA toward type certification. It has partnered with United Airlines for routes like O'Hare to downtown Chicago and is also developing a military variant.

Like Joby, Archer plans to begin with piloted flights and aims to secure certification by late 2025 or early 2026.

Volocopter (Germany)

Volocopter, founded in 2011, was considered a European eVTOL pioneer and a leading candidate for first certification under EASA. Its two-seat VoloCity vehicle underwent numerous public test flights, including in Paris, and was originally slated for debut during the 2024 Olympics.

However, by late 2024, Volocopter faced severe financial difficulties and filed for insolvency in Germany after failing to secure additional funding.

Certification and production efforts were paused, and its nearly 450 employees were placed on standby. In mid-2025, Diamond Aircraft Industries acquired Volocopter's assets, aiming to resume the certification program and stabilize operations.

Before its financial setback, the company had received Design Organization Approval and was progressing toward full type certification. The delay means Europe's first eVTOL service, once anticipated for 2024, is now postponed.

The Volocopter case underscores that sustained funding is as critical as regulatory progress in the race to launch commercial eVTOL services.

Lilium (Germany)

Lilium, a German startup known for its vectored-thrust eVTOL jet, attracted global attention with its ambitious design and listing on NASDAQ via a SPAC.

Despite this early momentum, the company faced persistent challenges related to technical complexity, development delays, and financial strain.

By late 2024, Lilium was in a severe cash crunch after the German government declined to provide a €100 million loan guarantee that could have unlocked further private investment.

In early 2025, after a critical funding deal collapsed, Lilium filed for insolvency for the second time in four months. The company ceased operations, laid off most of its staff, and paused all development activities.

Although Lilium had targeted manned flight tests in 2025 and certification by 2026, it never reached the stage of full prototype testing. Its remaining assets and intellectual property are now being liquidated.

Lilium's story underscores the significant financial and engineering hurdles in the eVTOL sector, where even the most high-profile ventures can falter without sustained investment and sufficient development runway.

EHang (China)

EHang became the world's first eVTOL manufacturer to secure a full Type Certificate for a passenger-carrying aircraft on October 13, 2023, when China's Civil Aviation Administration (CAAC) approved the EH216-S.

This two-seat, fully autonomous electric aircraft, with a range of around 30 km and a maximum takeoff weight of approximately 650–670 kg, flies pre-programmed routes under remote supervision, without a pilot onboard.

The certification process lasted more than 1,000 days and involved over 40,000 test flights across 500 test conditions.

Following certification, EHang quickly moved to commercialize the aircraft. Passenger demo flights began in Guangzhou and Hefei by late 2023, and by early 2025, two operator partners received the first-ever eVTOL Air Operator Certificates (AOCs), allowing ticketed tourism and sightseeing services within designated airspace.

With both type and operator certification in hand, EHang became the first company globally to achieve full regulatory approval for passenger eVTOL operations.

This milestone was enabled by strong government support and a flexible certification regime, allowing faster progress than seen in the U.S. or Europe.

EHang has signed partnerships with local players like China Southern Airlines to expand into tourism zones, and it is now seeking international validation of its Chinese certificate, though global acceptance may be hindered by differing autonomy and safety standards.

Others

Several other eVTOL developers continue advancing despite industry setbacks. In the UK, Vertical Aerospace is pushing ahead with its four-seat VX4, having completed hover tests and secured $50 million in early 2025 to support development through the year. It targets certification by 2026.

In the U.S., Beta Technologies focuses on cargo and defense applications with its Alia aircraft, which is in active flight testing and has orders from logistics firms and the U.S. Air Force. Wisk Aero, backed by Boeing, is developing a fully autonomous four-seat eVTOL, now in FAA-approved test flights, though certification is expected later in the decade.

In Japan, SkyDrive is developing the compact SD-05 and received initial certification approval in 2023. It plans to showcase the aircraft at the Osaka World Expo in 2025.

COMPARING GLOBAL APPROACHES TO EVTOL CERTIFICATION: EASA, FAA, AND CAAC

A critical factor shaping the timeline and scope of eVTOL deployment is the regulatory environment each region has adopted. While Europe's EASA, the United States' FAA, and China's CAAC all aim to certify aircraft that meet high safety standards, their regulatory philosophies and pathways differ significantly.

These differences reflect distinct priorities such as safety rigor, speed to market, and flexibility for innovation. As a result, they directly influence how soon and under what conditions commercial eVTOL services can be launched.

Table 1 provides a comparative summary of the key characteristics of each regulatory approach, highlighting how variations in certification standards, pilot requirements, and operational rules shape the readiness of each region to support eVTOL commercialization.

Criteria	EASA (Europe)	FAA (USA)	CAAC (China)
Initial eVTOL regulation year	2019 (SC-VTOL)	~2022 (Part 21.17 (b))	2022 (Special conditions)
Certification category	New dedicated (SC-VTOL)	Special class (powered-lift)	Tailored for each vehicle
Safety target (fatal/hr)	10^{-9}	10^{-8} (2-6 pax)	Not publicly disclosed
Autonomy allowed (Passenger)	Not before 2030	Not yet	Allowed (EH216-S certified)
First type certificate issued	Pending	Pending	Issued Oct 2023 (EH216-S)
Public flight trials allowed	Yes (Paris, Rome)	Yes (Joby surrogate flights)	Yes (Guangzhou, Hefei)

Table 1. Comparative overview of eVTOL certification approaches by EASA, FAA, and CAAC

Europe (EASA)

The European Union Aviation Safety Agency (EASA) was the first aviation regulator to issue a comprehensive certification framework for eVTOL aircraft.

In 2019, it introduced the Special Condition VTOL (SC-VTOL), establishing dedicated airworthiness requirements for small-category vertical takeoff and landing aircraft carrying up to nine passengers.

Crucially, EASA set a stringent safety threshold, requiring a catastrophic failure probability no greater than 1×10^{-9} per flight hour for passenger-carrying eVTOLs—equivalent to commercial airliner standards. This high bar reflects EASA's philosophy of pairing helicopter-level operational flexibility with airline-level reliability.

Over the following years, EASA continued to refine its framework. In mid-2024, it published SC-VTOL Issue 2, including updated Means of Compliance (MoC) and an "Easy Access Rules" package.

A key revision was the increase in the allowable maximum takeoff weight from 3,175 kg to 5,700 kg, offering developers more room to accommodate heavier battery systems and larger cabin configurations.

These rules are being harmonized with FAA standards to support potential dual certification pathways for OEMs seeking transatlantic market access.

Although several European eVTOL projects are actively progressing through certification testing, no Type Certificate has been granted yet as of 2025. EASA and national authorities are moving cautiously, emphasizing public safety and acceptance.

Officials have openly stated that autonomous operations are unlikely in Europe before 2030, with initial deployments expected to involve piloted aircraft only.

Operational planning has run in parallel: for example, Paris laid the groundwork for urban shuttle services linked to the 2024 Olympics, including approved vertiports and flight corridors, though launch timelines were pushed back due to Volocopter's delays.

United States (FAA)

United States (FAA): The Federal Aviation Administration took a distinct approach from its European counterpart by integrating eVTOL certification into existing frameworks rather than issuing a dedicated regulation early on.

It is using 14 CFR Part 21.17(b) – the “special class” category – to certify eVTOLs on a case-by-case basis as powered-lift aircraft. This strategy allows flexibility by borrowing elements from small airplane (Part 23) and rotorcraft regulations, tailored to each vehicle’s design.

Progress has been incremental. In mid-2023, the FAA published proposed airworthiness criteria for specific eVTOL models and followed up with powered-lift pilot certification standards in 2024.

Operational rules for eVTOL services, including training and flight requirements, are also in development. Compared to EASA, the FAA’s safety threshold for small passenger eVTOLs is slightly less stringent, targeting a 10^{-8} fatal failure probability per flight hour versus EASA’s 10^{-9}.

This reflects a “right-sized” risk model: smaller air taxis may not need to match commercial airliner reliability, especially if doing so would hinder innovation. For context, traditional light helicopters operate at levels around 10^{-7} to 10^{-8}.

Alongside certification, the FAA is collaborating with NASA, local governments, and industry partners to build the broader AAM ecosystem working on vertiport design, low-altitude airspace integration, and community-based test routes.

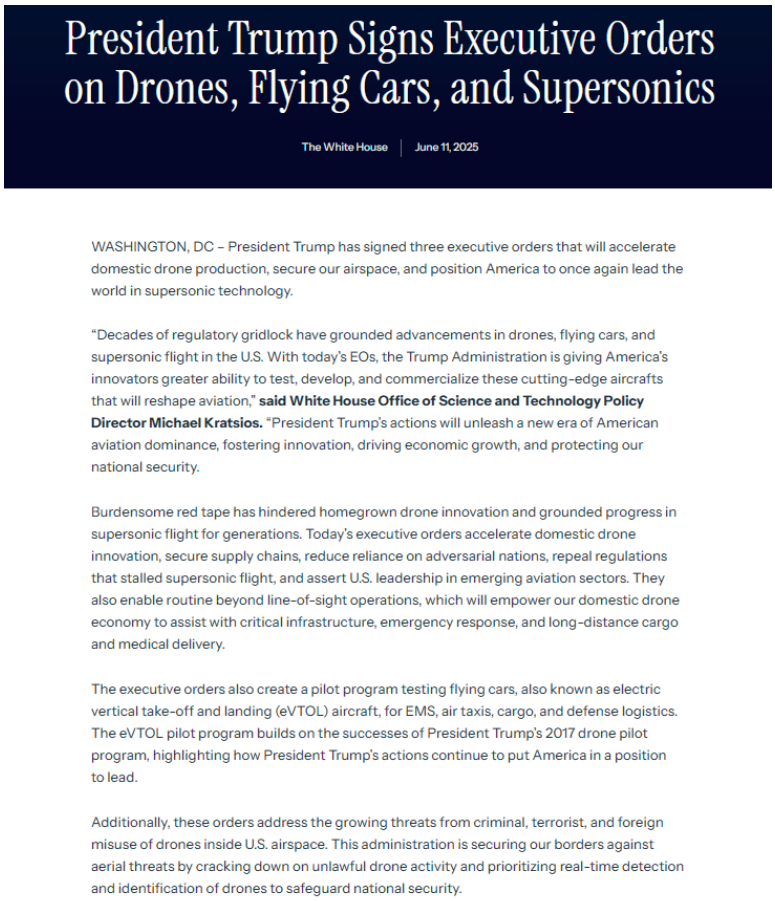
Cities like Los Angeles, Miami, and Orlando have expressed interest in hosting pilot services. However, no eVTOL services had launched commercially in the U.S. as of 2025. The prevailing regulatory philosophy has been to "crawl before you fly," with a focus on foundational safety before scaling operations.

By mid-2025, the FAA joined aviation regulators from Canada, the UK, Australia, and New Zealand to form the National Aviation Authorities Network, publishing a roadmap to harmonize eVTOL type certification standards globally by 2027.

This initiative, with indirect participation from EASA via the UK, is aimed at enabling mutual recognition of certifications across jurisdictions and smoothing global rollout.

Momentum increased in June 2025, when President Trump signed a series of executive orders to accelerate domestic production of drones and eVTOLs, streamline operational approvals, and reinforce U.S. leadership in advanced aviation technologies.

This high-level political support underscores the country's intent to move beyond the regulatory build-up phase and into actual implementation of advanced air mobility.



President Trump Signs Executive Orders on Drones, Flying Cars, and Supersonics

The White House | June 11, 2025

WASHINGTON, DC – President Trump has signed three executive orders that will accelerate domestic drone production, secure our airspace, and position America to once again lead the world in supersonic technology.

"Decades of regulatory gridlock have grounded advancements in drones, flying cars, and supersonic flight in the U.S. With today's EOs, the Trump Administration is giving America's innovators greater ability to test, develop, and commercialize these cutting-edge aircrafts that will reshape aviation," **said White House Office of Science and Technology Policy Director Michael Kratsios.** "President Trump's actions will unleash a new era of American aviation dominance, fostering innovation, driving economic growth, and protecting our national security.

Burdensome red tape has hindered homegrown drone innovation and grounded progress in supersonic flight for generations. Today's executive orders accelerate domestic drone innovation, secure supply chains, reduce reliance on adversarial nations, repeal regulations that stalled supersonic flight, and assert U.S. leadership in emerging aviation sectors. They also enable routine beyond line-of-sight operations, which will empower our domestic drone economy to assist with critical infrastructure, emergency response, and long-distance cargo and medical delivery.

The executive orders also create a pilot program testing flying cars, also known as electric vertical take-off and landing (eVTOL) aircraft, for EMS, air taxis, cargo, and defense logistics. The eVTOL pilot program builds on the successes of President Trump's 2017 drone pilot program, highlighting how President Trump's actions continue to put America in a position to lead.

Additionally, these orders address the growing threats from criminal, terrorist, and foreign misuse of drones inside U.S. airspace. This administration is securing our borders against aerial threats by cracking down on unlawful drone activity and prioritizing real-time detection and identification of drones to safeguard national security.

Figure 4. Executive push to accelerate eVTOL and drone integration in the U.S.

China (CAAC)

China's Civil Aviation Administration (CAAC) has taken a notably flexible and pragmatic approach to eVTOL certification, which helped EHang become the world's first company to obtain full type certification for a passenger eVTOL aircraft.

In the absence of a pre-established regulatory framework, CAAC issued tailored special conditions for EHang's EH216-S in February 2022.

These conditions outlined specific safety and performance objectives adapted to the aircraft's unique design as a fully autonomous, two-seat aerial vehicle.

Over the following 18 months, CAAC worked closely with EHang as it conducted tens of thousands of test flights under varied conditions.

While CAAC did not publicly release detailed certification criteria or compliance methods—making the process less transparent than those of EASA or the FAA—the agency emphasized real-world validation of key systems such as battery integrity, structural resilience, and data link reliability.

The certification process culminated in October 2023 with the issuance of the first-ever eVTOL type certificate for a passenger aircraft after more than 1,000 days of review and testing.

China's centralized governance enabled a streamlined path not only for certification but also for deployment. Authorities quickly approved early passenger demonstration flights in cities like Guangzhou and Hefei, followed by the issuance of Air Operator Certificates to commercialize the service.

CAAC's model embraces autonomous flight from the outset, bypassing the Western requirement for onboard pilots during early operations.

This regulatory latitude, combined with strong government backing, has positioned China ahead of the United States and Europe in operational readiness.

The trade-off for this speed is the challenge of international acceptance. Western regulators may not recognize CAAC-certified aircraft without additional validation, especially for pilotless systems. Nonetheless, China's early start provides its manufacturers with valuable experience, positioning them competitively as global eVTOL markets mature.

DIVERGING REGULATORY APPROACHES AND FIRST STEPS TOWARD OPERATIONS

As regulatory frameworks solidify, leading eVTOL developers are shifting focus from prototype testing to preparing for actual service deployment. This includes obtaining operator certifications, training personnel, and building out necessary ground infrastructure such as vertiports.

In China, EHang has pioneered operational deployment. Its local affiliate, Guangdong EHang General Aviation, became the first entity globally to receive a commercial AOC for eVTOL flights. The initial use cases are short, scenic rides for tourists, lasting 5–10 minutes, over parks and riverside areas.

While basic, these operations are revenue-generating and represent a historic shift from demos to scheduled services. Local governments are actively involved Guangzhou, for instance, has established a dedicated UAM zone, with designated landing sites and mobile ticketing via app.

Japan is also on track for a major public demonstration during Expo 2025 Osaka. National startup SkyDrive has received a certification basis from the Japan Civil Aviation Bureau for its SD-05 aircraft, with public flights planned at the Expo.

The government, alongside Osaka Prefecture, is developing vertiport infrastructure and flight corridors around the exhibition site.

Japan's strategy emphasizes high-profile demonstrations followed by gradual commercial rollout, supported by strategic alliances such as ANA partnering with Joby Aviation and JAL partnering with Volocopter.

In the United States, operational readiness is centered around securing Part 135 air carrier certificates.

Joby Aviation, for example, already holds such a certificate and is conducting flights with conventional aircraft (Cirrus SR22, Robinson R44) under its own callsign to simulate future operations, test logistics, and collect customer feedback.

Archer Aviation, in partnership with United Airlines, is preparing for initial services in Chicago and Los Angeles, with plans to connect downtown areas to major airports. Vertiport development is underway, often in collaboration with real estate partners and municipal agencies.

Europe has made similar preparations. Paris, in anticipation of a Volocopter showcase during the Olympics, built a demonstration vertiport at Pontoise complete with ground handling and charging infrastructure, and designated urban corridors for test flights along the Seine.

Although Volocopter's certification delays postponed the event, the infrastructure remains available for future demonstrations. Rome is also preparing to launch a shuttle service from Fiumicino Airport in 2025–2026, pending aircraft readiness.

Operators across all regions are actively forming partnerships to secure the resources, certifications, and operational know-how required.

In Europe, companies like Bristow Group are teaming up with eVTOL manufacturers such as Vertical Aerospace and Eve Air Mobility, leveraging their existing AOCs and helicopter experience.

In the U.S., major airlines are directly investing in eVTOL firms United with Archer, American Airlines with Vertical Aerospace suggesting eVTOL flights may eventually be integrated into their premium customer services.

Figure 5. Pioneering vertiport initiatives across key global airports

STRATEGIC UNDERPINNINGS OF AAM DEPLOYMENT IN THE MIDDLE EAST

While the Middle East has featured prominently in global discussions on advanced air mobility (AAM), the drivers behind this interest extend beyond technology hype.

In countries like the United Arab Emirates and Saudi Arabia, AAM is emerging as a strategic tool to support long-term visions for economic diversification, mobility innovation, and global competitiveness.

However, this transformation remains in early stages and is still shaped by market uncertainty, unproven business models, and regulatory complexity.

1. AVIATION AS A STRATEGIC LEVER

Saudi Arabia: A pivotal reassessment underway

In Saudi Arabia, aviation plays a central role in the Vision 2030 agenda, which aims to grow annual air passenger volumes from 110 million in 2019 to over 330 million by the end of the decade.

The Kingdom has committed more than $100 billion to the sector, encompassing new airport developments such as King Salman International Airport in Riyadh, the expansion of national carriers, and the creation of a highly connected domestic aviation network.

Within this context, AAM is positioned as a complementary layer to connect secondary and remote destinations like AlUla, NEOM, and Abha, where conventional aviation infrastructure is either limited or not feasible.

AAM is also aligned with Saudi Arabia's ambition to become a global destination for events such as the 2034 FIFA World Cup and the Asian Winter Games in NEOM, alongside continued growth in religious tourism in Mecca and Medina. In these scenarios, eVTOLs and hybrid-electric aircraft could support premium services such as VIP transfers, frequent shuttles, or medical response.

However, early initiatives have encountered significant setbacks. The country's initial strategy centered on two high-profile agreements: a joint venture between NEOM and Volocopter, and a 100-aircraft deal between Saudia Group and Lilium.

Volocopter filed for insolvency in late 2024, and although a recapitalization plan was secured in 2025, delays in certification have raised concerns. NEOM is now actively seeking alternative OEM partners with aircraft better suited for regional missions across vast distances.

Meanwhile, Lilium's financial collapse in early 2025 disrupted Saudia's plans to deploy electric jets for high-value pilgrimage and tourism routes such as Jeddah–Mecca and KAEC–Madinah.

These disruptions have prompted a strategic reassessment. The Kingdom is now prioritizing more resilient OEMs and longer-range aircraft platforms, possibly including fixed-wing eSTOL and hybrid VTOL configurations that are better suited to Saudi Arabia's geographic scale and decentralized urban layout.

This turning point highlights the need for solutions beyond short urban hops, pushing for regulatory and commercial strategies that can support scalable intercity and regional AAM use cases.

UAE: Dubai and Abu Dhabi takes the lead

In the United Arab Emirates, and particularly in Dubai, AAM is being developed with a more urban and multimodal focus.

The Roads and Transport Authority (RTA) is leading efforts to integrate eVTOL services into the city's wider mobility system, aiming to connect metro lines, business districts, airports, and tourist hubs.

Dubai's position as a global logistics and tourism hub, combined with growing congestion and high-value passenger demand, creates a favorable environment for the deployment of air taxi services as a premium offering.

In February 2024, the RTA signed a six-year exclusive concession agreement with Joby Aviation and Skyports to launch the city's first commercial AAM network.

The agreement includes the development and operation of four vertiports at strategic locations including Dubai International Airport (DXB), Palm Jumeirah, Dubai Marina, and Downtown Dubai.

Construction of the DXB vertiport, known as DXV, began in mid-2024 and has already reached advanced stages, with commercial operations targeted for 2026.

In parallel, regulatory and certification progress has accelerated. In June 2025, Joby successfully conducted single-pilot demonstration flights in Dubai airspace, supervised by the UAE's General Civil Aviation Authority.

That same month, Archer completed its first demonstration of the Midnight aircraft in Abu Dhabi. These are the first U.S.-manufactured eVTOLs to perform piloted test flights in the region, signaling growing regulatory alignment and operational readiness.

The GCAA is actively developing a regulatory framework that builds on FAA standards for powered-lift aircraft, while also moving toward local air operator certification for eVTOL services.

Abu Dhabi, while slightly behind Dubai in terms of public commitments, is quietly laying the foundation for its own AAM deployment strategy.

With strong institutional players such as the Abu Dhabi Investment Office (ADIO) and Mubadala involved in advanced mobility initiatives, and a clear interest in aerospace and smart city development, Abu Dhabi is poised to leverage AAM as part of its broader innovation ecosystem.

The emirate's involvement in regional demonstration programs and its role as a logistics and freight hub further position it as a complementary partner in the UAE's nationwide air mobility vision.

Together, Dubai and Abu Dhabi present a dual-core model for AAM development: one driven by urban integration and public transport interoperability, the other by innovation funding, demonstration hosting, and long-term industrial policy.

If the UAE succeeds in rolling out commercial eVTOL operations on schedule, it will become the first country in the world to offer regulated, integrated air taxi services at scale—reinforcing its brand as a global pioneer in next-generation mobility.

DIMENSION	United Arab Emirates (UAE)	Saudi Arabia (KSA)
Strategic focus	Urban mobility and smart city integration (Dubai, Abu Dhabi)	Regional connectivity, event logistics, VIP and religious tourism
Government leadership	RTA (Dubai) and GCAA (national)	GACA and giga-project teams (NEOM, Matarat)
Deployment model	Multimodal integration with metro, airport, and road systems	Point-to-point services connecting remote hubs and pilgrimage sites
Infrastructure readiness	DXV vertiport under construction; 3 others planned	Initial vertiports planned in NEOM and Jeddah; progress slowed
Key OEM partnerships	Joby Aviation and Skyports (active); Archer (testing)	Former: Volocopter (NEOM) and Lilium (Saudia) – now defunct
Flight demonstrations	Joby (Dubai, June 2025); Archer (Abu Dhabi, June 2025)	Volocopter (NEOM, 2023); no recent certified demonstrations
Certification path	GCAA aligning with FAA Part 135 and powered-lift framework	GACA expected to create hybrid between EASA and local standards
Concession/ Business model	Exclusive 6-year concession for Joby/Skyports	TBD – under review after OEM withdrawals
Use case priorities	Premium urban transport for residents, tourists, and business travel	Intercity VIP travel, mega-event support, Hajj/Umrah mobility
Challenges	Airspace coordination near DXB; building public trust	Lack of OEM continuity; long-range platform requirement
Overall readiness level	Advanced and coordinated	Recalibrating after early setbacks

Table 2. Comparative landscape of advanced air mobility deployment in the Middle East

2. SYSTEMIC INTEGRATION: EMBEDDING AAM INTO THE NATIONAL MOBILITY FABRIC

While both Saudi Arabia and the UAE are aggressively pursuing AAM as part of broader national transformation agendas, the true impact of these efforts will depend on how well AAM is integrated into the legacy aviation and transport systems. Unlike isolated trials seen in other parts of the world, the Middle East is uniquely positioned to implement AAM as a coordinated layer within national mobility ecosystems.

This ambition, however, raises a set of complex and still-unanswered questions that will shape the operational and regulatory trajectory of AAM in the region.

Airspace management: How will low-altitude corridors for eVTOLs coexist with existing commercial flight paths, especially in dense traffic environments like Dubai (DXB) or Riyadh (RUH)?

Certification and regulatory pathways: Will GCAA and GACA adopt harmonized standards based on FAA or EASA models, or develop bespoke frameworks tailored to regional needs?

Infrastructure ownership and operations: Who will finance and operate vertiports? Can existing airport infrastructure be adapted for eVTOL operations, or will new facilities be required?

Multimodal integration: How will AAM routes connect with metro networks, ground taxis, and intercity rail to enable seamless end-to-end journeys?

These strategic considerations go far beyond the aircraft themselves. They point to institutional readiness, governance structures, and urban planning capacity required to scale AAM from pilot programs to sustainable transport solutions.

For stakeholders shaping these ecosystems, answering these questions will be crucial. It also underscores the growing need for specialized advisory services in regulatory design, airspace management, infrastructure planning, and integrated mobility strategy—areas where firms like ALG can bring critical value.

KEY TECHNICAL AND OPERATIONAL BARRIERS AHEAD

While progress is undeniable, several critical barriers remain before eVTOLs can realize widespread commercial deployment. The Spanish research article emphasized that bridging the gap from prototype to a scalable air mobility service will require overcoming challenges in technology, infrastructure, societal acceptance, and economics.

Below, we outline the key hurdles:

Figure 6. Key barriers to eVTOL commercial deployment

BATTERY TECHNOLOGY AND RANGE

Virtually all eVTOLs rely on lithium-based batteries for propulsion. Current battery energy densities limit flight endurance to around 15–30 minutes for most designs – sufficient for short urban hops, but far from the 200+ km range that many developers target for future models.

The weight of batteries is a double penalty: more weight requires more lift (hence more power), which requires even more batteries – a difficult cycle. Airbus's decision to halt the CityAirbus NextGen program in 2023 was a stark reminder that today's batteries don't yet offer the needed combination of light weight, high capacity, and fast charging.

Until a new generation of batteries or alternative energy sources (like hydrogen fuel cells) are available, eVTOLs will have range and payload limitations.

This impacts route planning (routes must be short, with reserves for diversions) and vehicle design (manufacturers are exploring energy-saving features like improved aerodynamics or hybrid-electric systems to stretch range).

Battery limitations also affect operating costs – batteries may need frequent replacement (every few hundred cycles) and are expensive, impacting the economic equation for eVTOL fleets.

CHARGING INFRASTRUCTURE AND VERTIPORTS

The deployment of eVTOL networks depends heavily on new ground infrastructure. Vertiports – dedicated hubs with landing pads, passenger facilities, and high-power charging – are essential but still in early development.

As of 2025, only a few prototypes exist (e.g., Paris, Singapore, Los Angeles), while design standards are still being finalized by regulators like EASA and the FAA. Fast-charging requirements are demanding, with each eVTOL potentially needing hundreds of kilowatts, requiring strong grid connections and possibly on-site energy storage.

In parallel, urban airspace must be adapted, with new low-altitude routes and automated UAM Traffic Management (UTM) systems under development to safely coordinate high volumes of flights.

Without robust infrastructure and airspace integration, eVTOL services will remain limited. To overcome the chicken-and-egg dilemma of demand vs. infrastructure, coordinated public-private pilot projects will be critical.

REGULATORY AND PILOT TRAINING HURDLES

In addition to certifying aircraft, regulators must also certify pilots, maintenance personnel, and operational procedures.

Most early eVTOLs will be piloted, requiring new training programs under the powered-lift category. The FAA finalized pilot certification rules in late 2024, mandating training similar to helicopter or airplane pilots, with added instruction for vertical flight.

Companies like Joby and Archer are developing training and simulators in collaboration with flight schools. Long-term autonomy will require separate certification for automated systems and remote operators, likely not before the 2030s.

Maintenance standards are still evolving, as eVTOLs combine airplane, rotorcraft, and electric components, demanding specialized technician training. Operational rules covering aspects like weather minima and noise abatement are also under development.

Until a mature framework exists, many operators will rely on exemptions or limited approvals.

PUBLIC ACCEPTANCE (NOISE, SAFETY, PRIVACY)

Public acceptance is vital for eVTOL deployment in cities. Noise remains a top concern—while eVTOLs are quieter than helicopters due to electric propulsion, they still produce noticeable sound, especially during takeoff and landing.

Perception of noise increases when aircraft are visible, making route planning crucial (e.g., flying over rivers or highways).

Safety is another key factor; although systems are designed to airline-level standards, public trust will depend on proven track records and incident-free operations.

Privacy concerns may also arise, especially regarding flights over residential areas. Western countries are particularly sensitive to these issues, prompting a cautious, piloted approach.

In contrast, China has moved ahead with autonomous flights under strong government backing and less public scrutiny.

Community engagement, transparent communication, and gradual demonstrations will be essential to build trust and gain social license to operate.

ECONOMIC VIABILITY AND COST

Development costs are extraordinarily high: leading OEMs have each invested between $1–2 billion just to reach near-certification readiness, with continued expenditure required for testing, manufacturing, and scaling operations.

In 2025 alone, the sector attracted over $25 billion in global investment including funding for aircraft development, vertiport infrastructure, and regulatory compliance (sources: Leeham News & Analysis, MDPI, Carbon Credits).

Unit prices remain steep. Archer's Midnight, for example, is priced at approximately $5 million per aircraft on par with a light commercial helicopter.

While electric propulsion offers lower operating costs over time due to fewer mechanical components and no fuel consumption, the initial capital outlay is significant, and battery replacement represents an ongoing cost.

As illustrated in Figure 7, current estimates place the cost of a typical 10 km eVTOL trip between $40 and $100 per passenger, or roughly $4–$11 per passenger-mile substantially higher than conventional urban transportation options:

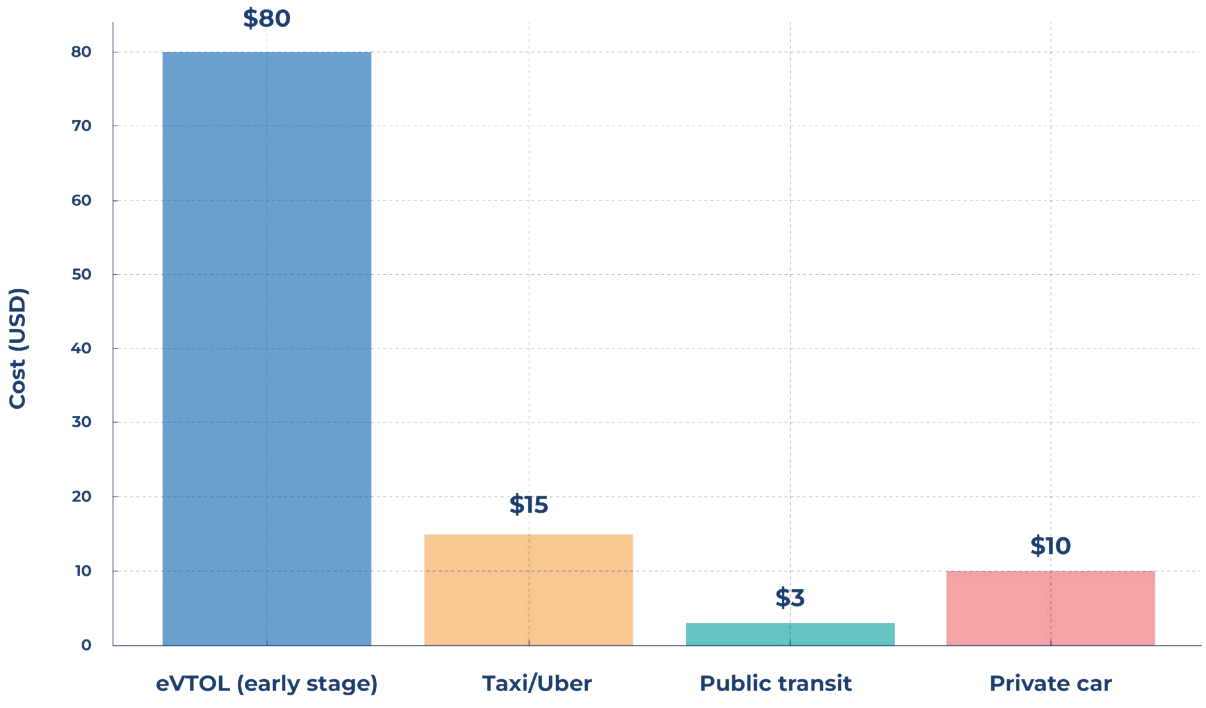


Figure 7. Estimated cost of a 10 km urban trip by transport mode

Sources: NASA, Carbon Credits, FLYING Magazine, eVTOL Insights, Africanews, The Verge, ScienceDirect

Even when accounting for time savings such as bypassing traffic or reducing airport transfer times the premium remains substantial. Until costs can be reduced through economies of scale, higher fleet utilization, and eventually autonomous operations, eVTOL services are likely to remain a niche or premium offering.

Vertiport infrastructure adds further pressure to the business case. Constructing a rooftop vertiport equipped with passenger facilities, charging stations, and fire safety systems can cost tens of millions of dollars.

The return on such investments remains uncertain, especially in the early stages of deployment with limited flight frequency. Initial operations will likely rely on public subsidies, partnerships with airlines or real estate developers, and strong government backing.

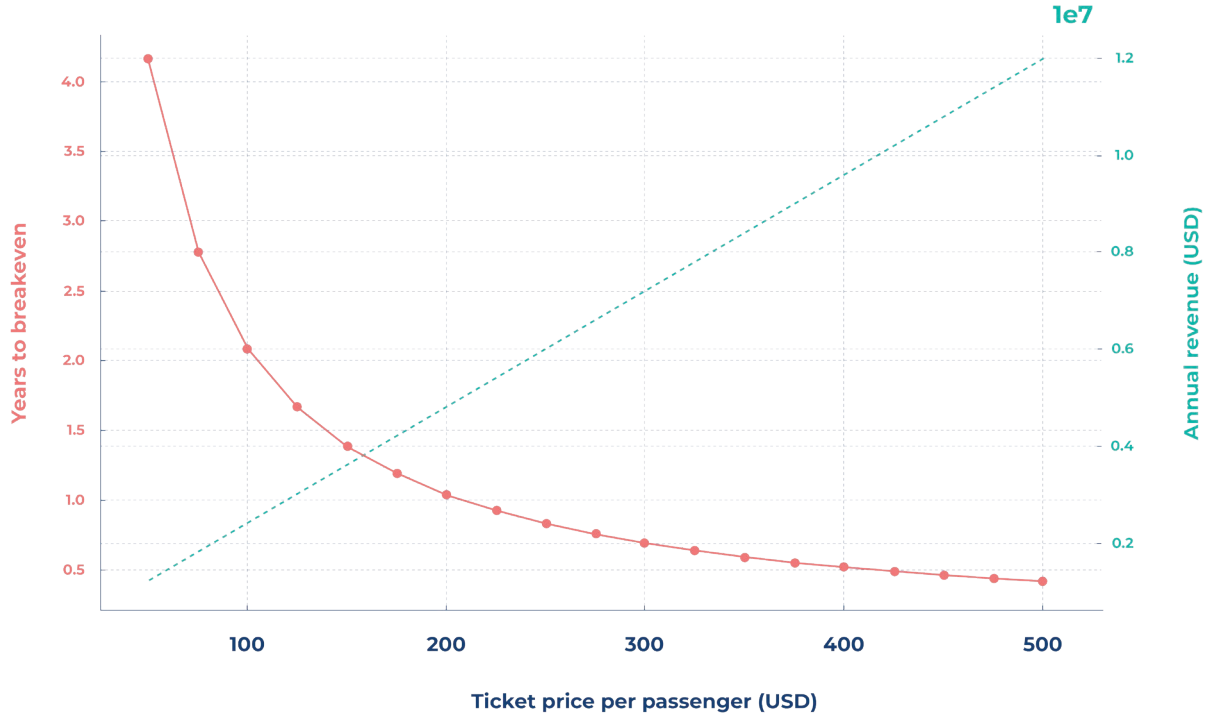


Figure 8. Projected break-even and revenue ramp for eVTOL operators

The following chart illustrates the anticipated path to profitability for a typical eVTOL operator, highlighting the cumulative revenue and cost trajectory over time.

Based on current assumptions, which include high upfront capital expenditure, moderate passenger load factors, and significant infrastructure investment, break-even is generally projected to occur between years seven and ten of sustained operations.

The initial years are characterized by negative margins, with financial viability heavily dependent on continued access to venture capital and strategic investment.

GLOBAL OUTLOOK: EAST LEADS EARLY, WEST PRIORITIZES "GETTING IT RIGHT"

The global evolution of the eVTOL market reveals two contrasting approaches: Asia is prioritizing rapid deployment, while Europe and North America focus on safety and regulatory rigor.

This divergence is shaping the competitive dynamics and maturity of the advanced air mobility (AAM) sector.

China, in particular, has taken the lead with strong government backing and a flexible regulatory model. It was the first country to authorize autonomous eVTOL passenger flights, albeit for tourism purposes.

With urban air mobility pilot zones in cities like Guangzhou and Shenzhen, China is actively exploring broader use cases such as logistics and emergency response.

Property developers are even integrating vertiports into new urban projects, aligning with smart city initiatives.

This top-down approach has allowed China to bypass certain steps, such as requiring pilots onboard, accelerating time-to-market and operational learning.

Other Asian countries like Japan, South Korea, and Singapore are moving forward with more measured but government-backed initiatives.

Japan's plans for Expo 2025, South Korea's K-UAM roadmap, and Singapore's collaboration with Skyports on cross-border eVTOL routes show regional momentum backed by international partnerships.

In contrast, the U.S. and Europe emphasize regulatory maturity and public trust.

Certification processes are thorough, with high safety standards and community engagement central to deployment strategies.

Services in cities like Paris, London, and New York will likely start conservatively, with piloted aircraft and premium use cases.

Western regulators are also focused on harmonizing global standards through efforts like the NAA Network's certification roadmap and ICAO's vertiport design work.

While Asia gains a head start in operations, Western firms are watching closely.

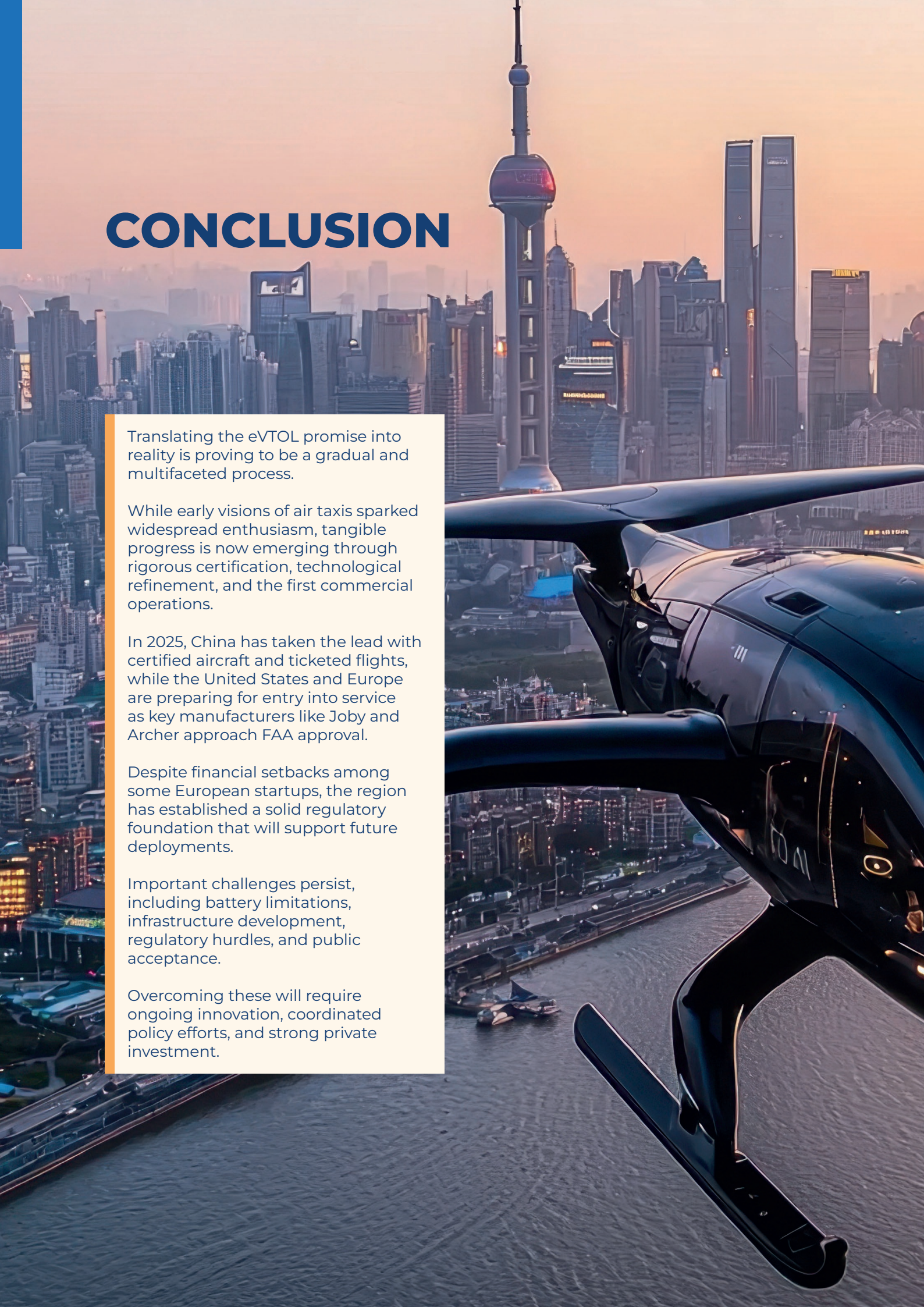
Companies like Joby, Volocopter, and Airbus are actively pursuing Asian partnerships, while Chinese OEMs like EHang expand internationally.

Both models offer distinct advantages: Asia's rapid deployment fosters early operational experience, while the West's methodical approach lays the groundwork for scalable, globally accepted systems.

Ultimately, global collaboration will be essential. Success in one region can boost public confidence worldwide, just as failures could set back the entire industry.

Ensuring that early services are safe, accepted, and technically robust is in the shared interest of all AAM stakeholders.

CONCLUSION



Translating the eVTOL promise into reality is proving to be a gradual and multifaceted process.

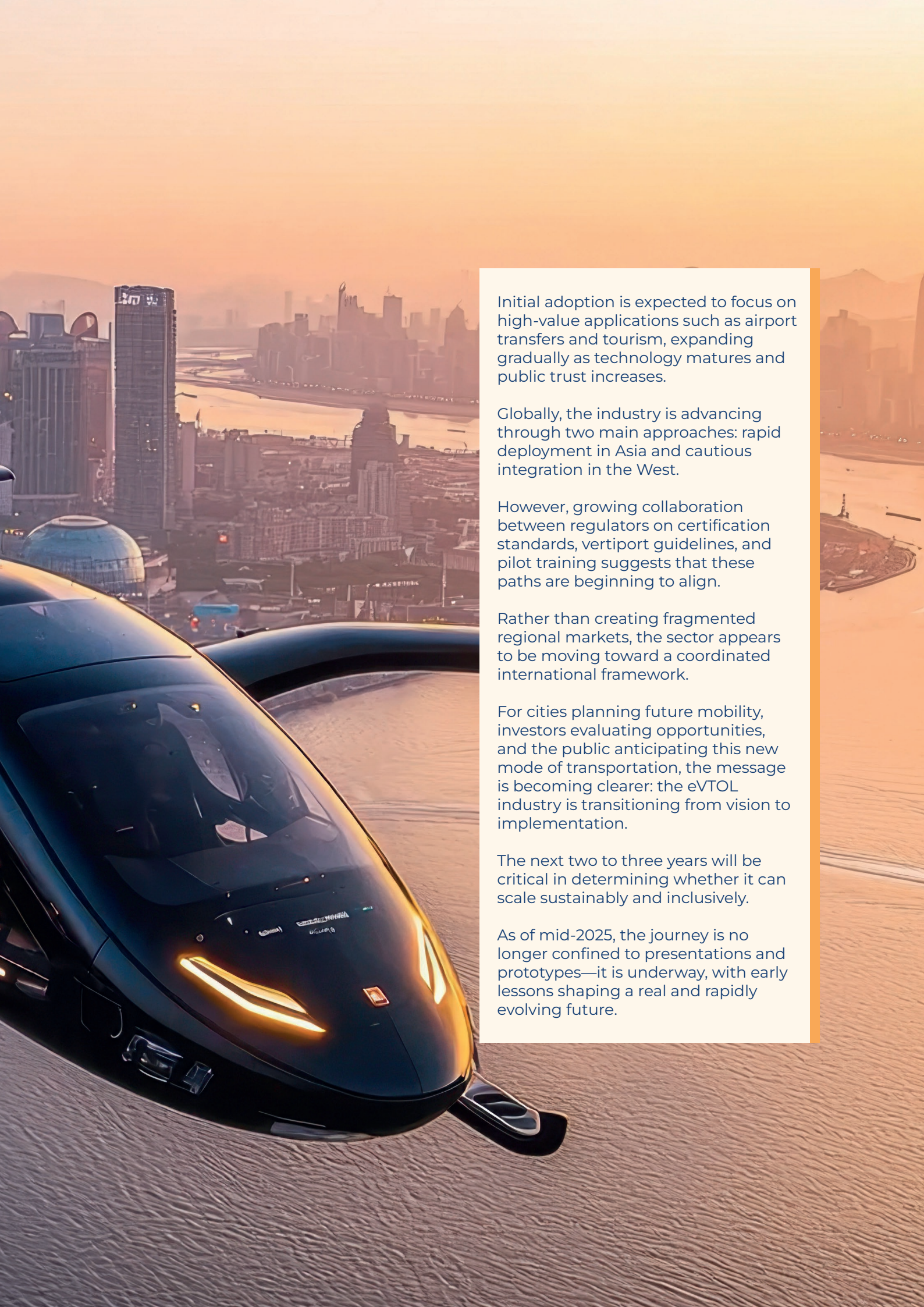
While early visions of air taxis sparked widespread enthusiasm, tangible progress is now emerging through rigorous certification, technological refinement, and the first commercial operations.

In 2025, China has taken the lead with certified aircraft and ticketed flights, while the United States and Europe are preparing for entry into service as key manufacturers like Joby and Archer approach FAA approval.

Despite financial setbacks among some European startups, the region has established a solid regulatory foundation that will support future deployments.

Important challenges persist, including battery limitations, infrastructure development, regulatory hurdles, and public acceptance.

Overcoming these will require ongoing innovation, coordinated policy efforts, and strong private investment.



Initial adoption is expected to focus on high-value applications such as airport transfers and tourism, expanding gradually as technology matures and public trust increases.

Globally, the industry is advancing through two main approaches: rapid deployment in Asia and cautious integration in the West.

However, growing collaboration between regulators on certification standards, vertiport guidelines, and pilot training suggests that these paths are beginning to align.

Rather than creating fragmented regional markets, the sector appears to be moving toward a coordinated international framework.

For cities planning future mobility, investors evaluating opportunities, and the public anticipating this new mode of transportation, the message is becoming clearer: the eVTOL industry is transitioning from vision to implementation.

The next two to three years will be critical in determining whether it can scale sustainably and inclusively.

As of mid-2025, the journey is no longer confined to presentations and prototypes—it is underway, with early lessons shaping a real and rapidly evolving future.

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