

Monthly Thematic Series

The Mobility Industry



JOBY AVIATION (JOBY) AND ARCHER AVIATION (ACHR) BEST PLACED AS REGULATORY AND CASH BURN CHALLENGES LIKELY TO RESULT IN CONSOLIDATION IN THE eVTOL SECTOR.

Key takeaway: *electric Vertical Takeoff and Landing (eVTOL) is a revolutionary solution that can disrupt the mobility sector by addressing major conventional problems such as urban congestion, environmental footprint of mobility, and boosting efficiency and connectivity. The industry is emerging from a challenging couple of years, caused by extended development and certification cycles, regulatory concerns, and capital crunch faced by players, especially smaller companies. We believe that market leaders that have navigated this down cycle better and have the balance sheet strength to complete late-stage development cycles, will consolidate market share and should be on investors' radar. Joby Aviation (JOBY) and Archer Aviation (ACHR), who have made decent progress in the development cycle and have also maintained a healthy capital position, meet this criterion and are our leading picks in this disruptive sector.*

Advanced Air Mobility (AAM) is emerging as an innovative transportation alternative as well as a crucial paradigm shift poised to redefine the future of human and cargo mobility. In an era marked by rapid urbanization, escalating environmental concerns, and the relentless pursuit of efficiency, the transportation sector stands at the cusp of a revolutionary transformation. As cities continue to grow and environmental pressure mounts, the limitations of conventional mobility solutions have become increasingly apparent. We believe AAM offers a solution to these limitations, promising a future where mobility is not only more efficient and sustainable but also more equitable and accessible. Embracing AAM is not merely adopting a new mode of transport; it is taking a bold step towards reimagining the very fabric of urban and regional mobility. **AAM solutions can address the three conventional problems faced by the mobility industry:**

- **Urban congestion and infrastructure limitations:** Modern urban centers are grappling with severe congestion, a consequence of decades of urban sprawl and the limitations of ground-based infrastructure. Traditional transportation systems, confined by terrestrial constraints, are increasingly facing challenges to cope with the rising demand for mobility. AAM offers a three-dimensional solution to this two-dimensional dilemma, proposing a leap into the airspace above to alleviate the pressure on crowded city streets and highways.
- **Environmental imperatives:** The global transportation sector is a significant contributor to greenhouse gas emissions, with road vehicles accounting for a considerable share. The transition to electric mobility is underway, yet the pace is hampered by various factors, including infrastructure readiness and vehicle range. AAM, leveraging electric or hybrid propulsion technologies, presents an immediate opportunity to leapfrog towards a cleaner, more sustainable mode of transport, reducing the carbon footprint of urban transportation.
- **Enhanced efficiency and connectivity:** AAM solutions promise to drastically reduce travel times for intra-city and inter-city commutes. By flying over natural and man-made obstacles, AAM can offer direct routes between destinations, significantly cutting down on travel time compared to conventional road travel. This efficiency not only enhances productivity but also improves the quality of life by freeing up time currently lost to commuting.

electric Vertical Takeoff and Landing (eVTOL) is the AAM solution that has taken huge strides in the last couple of years and appears closest to commercial viability. While there are several types of AAM solutions under development, eVTOLs are at the forefront of AAM solutions approaching commercial viability. Their alignment with current technological capabilities, regulatory momentum, market needs, and investment trends positions them as the leading edge of the emerging advanced air mobility landscape. Here are some of the factors that make eVTOL a better, and a more versatile AAM solution.

- **Regulatory momentum:** Regulatory bodies such as the Federal Aviation Administration (FAA) in the U.S. and the European Union Aviation Safety Agency (EASA) have shown a proactive stance towards integrating eVTOLs into

national airspaces. These organizations are actively working on frameworks to certify eVTOL aircraft and outline operational standards. This regulatory groundwork is essential for the commercial launch of eVTOL services, and the progress made so far suggests that eVTOLs are ahead in the regulatory approval process compared to other AAM solutions.

- **Market demand and use cases:** There is a clear market demand for urban air mobility solutions that can offer an alternative to congested ground transportation, especially in densely populated cities. eVTOLs are uniquely positioned to meet this demand due to their vertical takeoff and landing capabilities, allowing them to operate in urban environments with limited space. Their potential use cases range from air taxi services, commuting solutions, to emergency medical services, which have garnered significant interest from both the public and private sectors.
- **Investment and partnership trends:** eVTOL companies have attracted substantial investment from venture capital, strategic partners, and even traditional aerospace firms. This influx of capital has enabled them to advance research and development, conduct testing, and plan for scalable manufacturing. Additionally, partnerships with cities, airports, and infrastructure developers are laying the groundwork for the ecosystem that eVTOL operations will require, such as vertiports and air traffic management systems.
- **Early adopters and pilot programs:** Several eVTOL companies have entered into agreements with airlines, ride-sharing services, and governments to launch pilot programs and pre-order fleets. These early adopter programs are critical for demonstrating operational viability, refining business models, and building public trust in eVTOL technology.

The eVTOL landscape is highly competitive and there are several players from global markets that are trying to develop eVTOL solutions. However, the multi-step development and certification process is long and difficult and also varies depending upon the regulatory framework in the country of development. In December 2023, Aviation Week presented the developmental status of various eVTOL players from across the world. As the graphic below indicates, China seems to have created an accelerated certification process, as two of its players EHang and Autoflight seem to be distinctly ahead than most of their peers.

Chart 1: eVTOL Development Progress

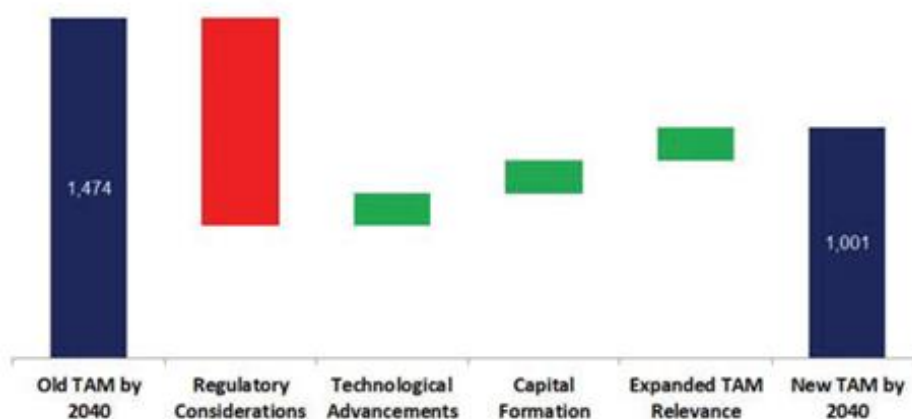


Source: Intro-act, Aviation Week, SMG Consulting

The slower than desired pace of regulatory progress may have moderated the growth of eVTOL total addressable market (TAM); however, the TAM remains very large at \$1 trillion, per Morgan Stanley. The eVTOL sector has lost some of its sheen in the last few years as many promising startups that were expected to come out with

disruptive products and had made ambitious commercialization targets have hit a multi-layered speed breaker of sorts, especially in Europe and North America. At the same time, companies are having to undergo a “slow” process of regulatory conformations, primarily because this is a new dimension for regulators as well, which crosses between traditional passenger and cargo aircraft and urban ground travel. The regulatory challenges are multi-dimensional and include issues related to air space management, safety issues, public acceptance, battery development, among others. This is reflected in Morgan Stanley having to revise its total addressable market projections for eVTOL market for 2040, from ~\$1.5 trillion to \$1 trillion. In 2018, Morgan Stanley had put out estimates of TAM reaching \$1.5 trillion by 2040, which it later revised downward in 2021 to \$1 trillion, but added that by 2050 the TAM could reach \$9 trillion.

Chart 2: Regulatory Overhang on eVTOL TAM



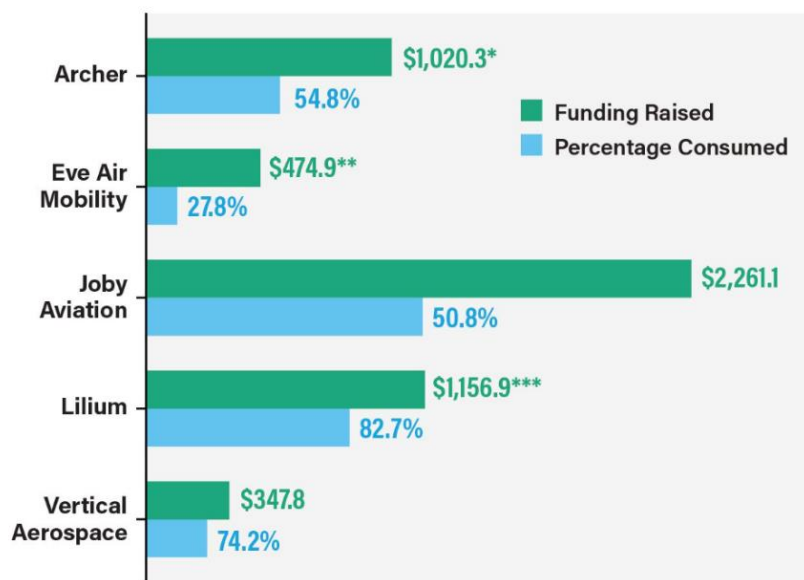
Source: Intro-act, Morgan Stanley Research

Further, a combination of SPAC meltdown, high interest rates, and a funding winter has meant that the eVTOL industry is likely to experience consolidation and investors should prefer companies that have the balance sheet strength to grow and consolidate market share in this disruptive sector – Archer Aviation (ACHR) and Joby Aviation (JOBY) are the best bets. The eVTOL industry has had a tough couple of years after the SPAC Boom ended. As investors questioned ambitious claims that some eVTOL startups made, the sector faced an erosion in market capitalization. The situation further worsened as this period coincided with a sharp interest rate increase cycle undertaken by the Fed, and the funding winter experienced by the private market. All these hurt the innovation ecosystem in this nascent industry and are likely to result in consolidation in our view. Given this context, cash burn becomes an important factor to assess eVTOL players, as judicious use of cash and appropriate cash buffer will help the leading players ensure sustenance through extended development and certification cycles – ACHR and JOBY emerge as safer bets on this parameter (see Chart 3 below.)

Investors are coming back to the sector as is evident from the strong performance of sector leaders like ACHR and JOBY. ACHR is up 96% y/y, as of 2/16, whereas JOBY is up 46% in the same time frame. At the same time, small players who are relatively cash crunched such as Vertical Aerospace (EVTL) are down 87% y/y. The changing investor sentiment is also evident in recent research published by New Horizon Aircraft, which indicates that 73% of the investors believe that public support for eVTOLs will improve over the next three years. These investors also highlighted the top-5 initiatives that can drive public support higher in the coming years (see Chart 4 below).

Overall, we believe that investors should follow the regulatory developments in the eVTOL space closely, as well as track the strategic partnerships that leading players are making to build out an ecosystem that will allow them to rapidly scale their commercial operations once they have the regulatory go ahead. JOBY and ACHR are our leading picks from this disruptive sector. We spotlight these players in the following pages.

Chart 3: Cash Burn of Leading eVTOL Players as of 3Q23



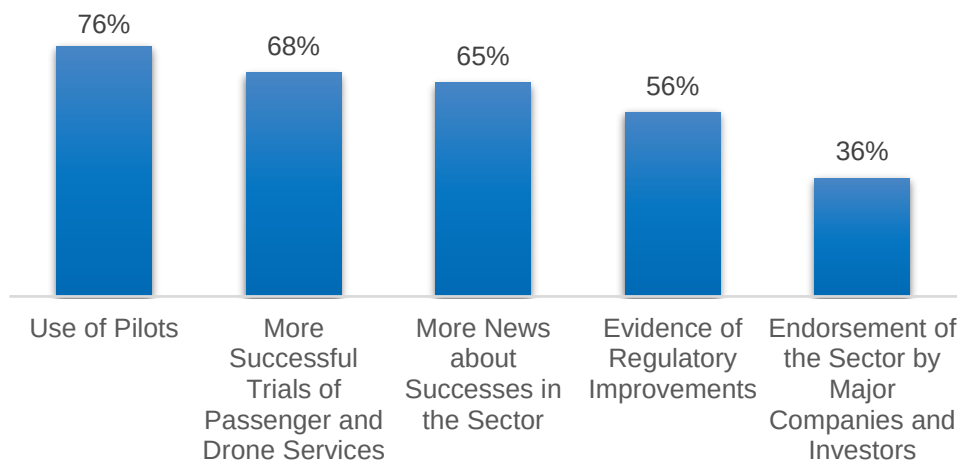
*Does not include \$70 million investment closed on Oct. 16, 2023.

**Includes \$97.5 million BNDES credit lines.

***Does not include \$185.4 million raised in July 2023.

Source: Intro-act, Aviation Week, SMG Consulting

Chart 4: Key Factors to Boost Public Support for eVTOLs



Source: Intro-act, New Horizon Aircraft, South Carolina Ports

Company Spotlight: Joby Aviation (JOBY)

Joby Aviation, Inc., headquartered in Santa Cruz, California, stands at the forefront of the Advanced Air Mobility (AAM) industry with its innovative approach to developing electric Vertical Takeoff and Landing (eVTOL) aircraft. Founded with a vision to revolutionize how people commute, Joby Aviation has emerged as a dominant player in the air mobility market, setting the pace for sustainable, efficient, and fast transportation solutions. Since its inception, Joby Aviation has strategically expanded its footprint across the globe, with a focus on establishing a strong presence in key markets anticipated to benefit significantly from AAM solutions. The company operates with a dual emphasis on technological innovation and market expansion, dedicating substantial resources to research and development, manufacturing, and regulatory certification processes. Joby's infrastructure includes state-of-the-art facilities for design, engineering, and production, along with partnerships aimed at building out the necessary ecosystem for eVTOL operations.

The cornerstone of Joby Aviation's product lineup is its proprietary eVTOL aircraft, designed to carry passengers over congested urban areas quickly and quietly, directly contributing to the alleviation of traffic congestion and reduction in carbon emissions. This aircraft is engineered to achieve a range of 150 miles on a single charge, with a maximum speed of 200 miles per hour, and the capability to transport four passengers plus a pilot. The design focuses on safety, noise reduction, and efficiency, featuring multiple rotors for vertical lift and a fixed wing for flight in forward motion.

Chart 5: Snapshot of Joby S4



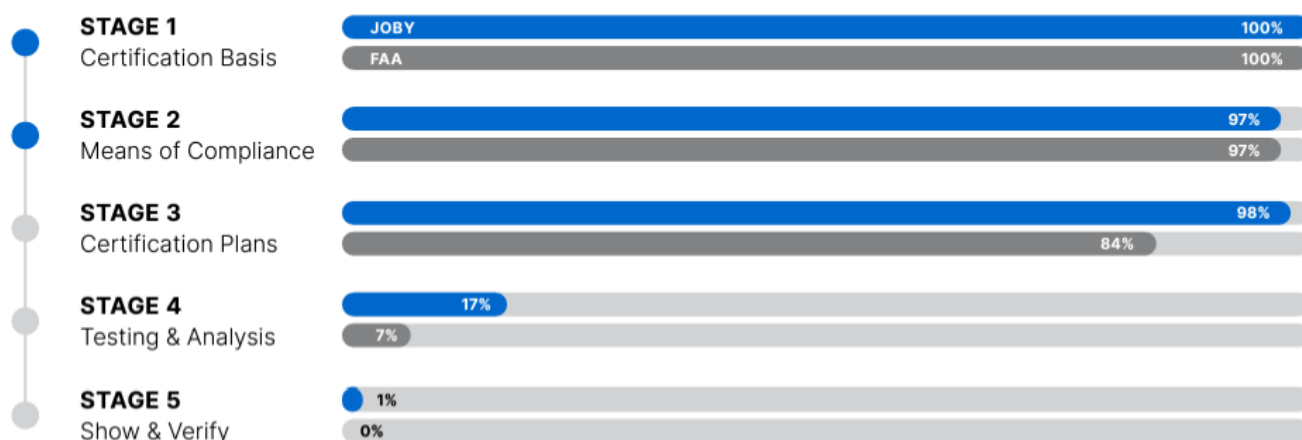
Source: Intro-act, Joby

Joby Aviation's dominance in the air mobility market is underpinned by its proactive initiatives, strategic partnerships, and other achievements. Joby Aviation's strategic initiatives over the past year, including significant partnerships, government contracts, and infrastructure development efforts, position the company as a leader in the rapidly evolving AAM sector. As it progresses towards FAA certification and commercial launch, Joby Aviation remains focused on its mission to deliver a fast, clean, and quiet urban air mobility solution. The company's leadership is evidenced by:

- In a major achievement, **the U.S. Federal Aviation Administration authorized Joby Aviation for flight testing of its electric air taxi in June 2023**, advancing the company towards commercial operation approvals.
- In December 2023, Joby Aviation, in **collaboration with NASA, successfully conducted tests to integrate air taxis into busy airports**. The partnership focused on operational and safety frameworks, demonstrating air taxis' potential to seamlessly operate alongside traditional aircraft. This achievement represents a critical step toward the commercial viability of air taxis, with Joby Aviation leading the charge in pioneering this new mode of transportation.
- **Strategic Partnership with Toyota:** In April 2023, Joby expanded its long-standing partnership with Toyota Motor Corporation. This collaboration involves Toyota supplying key powertrain and actuation components for Joby's aircraft, signifying a major step towards commercial production and operational readiness.

- **In September 2023, Joby delivered its first electric vertical take-off and landing (eVTOL) aircraft to Edwards Air Force Base as part of the company's \$131 million contract with the U.S. Air Force.** Joby's current and previously completed work with the Department of Defense represents a total potential contract value of \$163 million, the largest in the industry. The contract not only marks Joby's first revenue-generating operation but also underscores the U.S. government's confidence in Joby's technology and its potential applications for defense and government services.
- Joby announced that it will **invest \$500 million to build its first serial production facility** in Dayton Ohio at a 140-acre site at Dayton International Airport. The company will be able to deliver 500 aircraft per year from this facility.
- **Infrastructure Electrification with Atlantic Aviation:** In January 2024, Joby announced a collaboration with Atlantic Aviation aimed at electrifying aviation infrastructure in New York and Southern California. This initiative is critical for supporting the launch of Joby's air taxi service by ensuring the availability of charging infrastructure at key locations.
- **Joby Aviation has initiated manned flight tests of its S4 eVTOL air taxi**, marking a significant milestone for both the company and the eVTOL industry in October 2023. The company joined international competitors Volocopter, eHang and Beta Technologies, who are already working on manned vehicles.

Chart 6: Certification Progress of Joby



Source: Intro-act, Joby Shareholder Letter, 3Q23. Status as of October 2023.

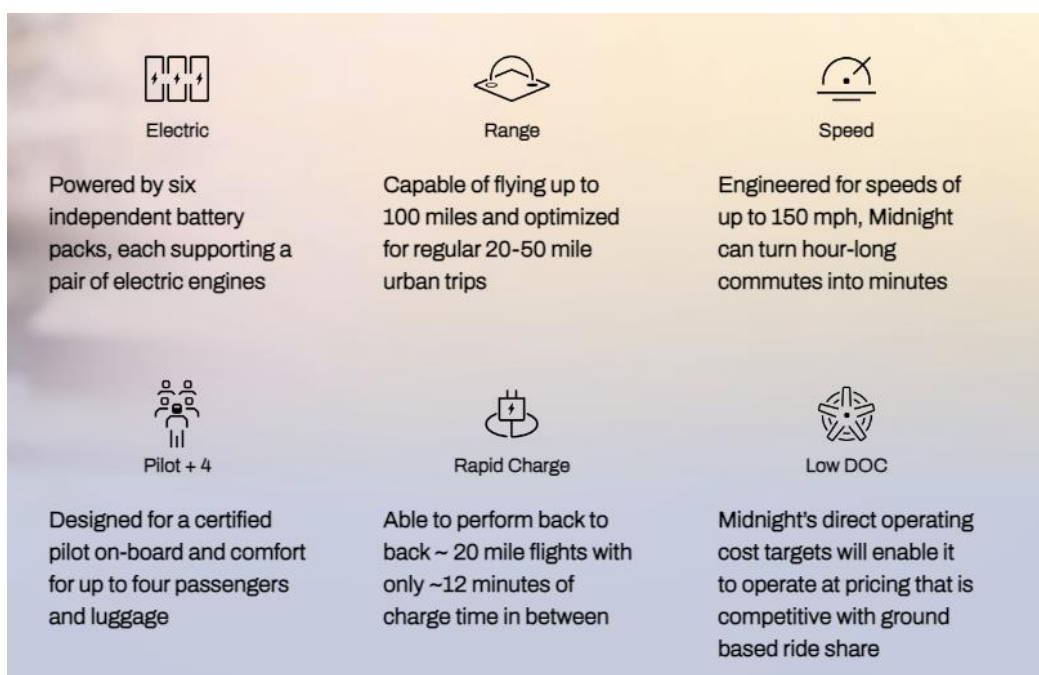
In 3Q23, Joby reported a net income of \$1.5 million, a notable improvement from the previous year, with an \$80.7 million increase compared to 3Q22. This positive shift was driven by other income totaling \$129.7 million, primarily from a revaluation gain on derivative liabilities of \$116.1 million and interest income of \$13.6 million. Operating expenses amounted to \$128.2 million, reflecting the company's investment in growth. The company ended 3Q23 with \$1.1 billion in cash and cash equivalents and investments in marketable securities.

Company Spotlight: Archer Aviation (ACHR)

Archer Aviation Inc., based in Santa Clara, California, has positioned itself as a leader in the emerging field of eVTOL aircraft. Founded with the ambitious goal of revolutionizing urban transportation, Archer's innovative approach combines advanced eVTOL technology with strategic partnerships, aligning itself as a dominant force in the air mobility market. Archer's operational footprint extends across the development, manufacturing, and testing of eVTOL aircraft, specifically designed for urban air mobility. The company's segments encompass research and development, aiming to address the critical challenges of safety, noise, and efficiency in urban air transport.

Archer's primary product, the "Midnight" eVTOL aircraft, encapsulates the company's vision: to offer a sustainable, efficient, and scalable air mobility solution. The "Midnight" eVTOL aircraft is designed to carry passengers over urban landscapes efficiently and quietly. Midnight showcases a blend of innovative design and cutting-edge technology. It represents Archer's focus on transforming urban air mobility by providing a cleaner, faster, and more enjoyable transportation alternative.

Chart 7: Archer Aviation's Midnight – Built to Perform



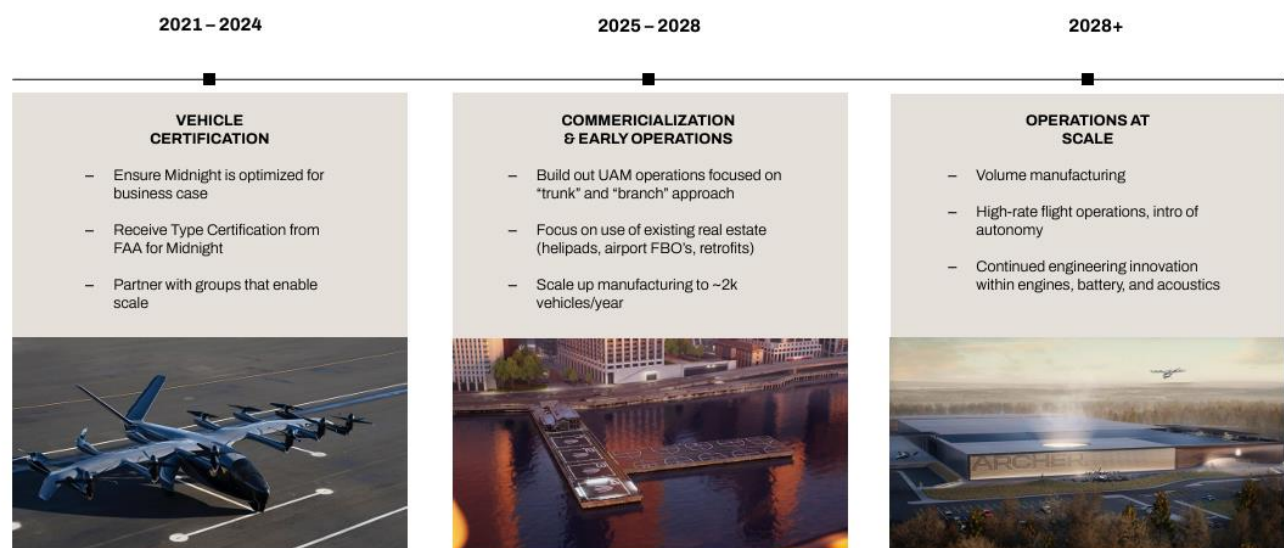
Source: Intro-act, ACHR Website

Archer Aviation's dominance in the air mobility market is underscored by its strategic initiatives, key partnerships, and significant achievements over the past year.

- **U.S. Air Force Contracts:** Archer expanded its partnership with the U.S. Department of Defense by signing new contracts valued at up to \$142 million with the U.S. Air Force. This collaboration not only validates the military's interest in eVTOL technology but also marks a pivotal recognition of Archer's role in advancing air mobility solutions.
- **Collaboration with BETA Technologies:** In an industry-first agreement, Archer and BETA Technologies have joined forces to accelerate the rollout of an interoperable fast-charging system for electric aircraft. This collaboration underscores Archer's commitment to infrastructure development and industry-wide standards.

- **Settlement and Collaboration with Boeing:** Archer reached a settlement with Boeing and its Wisk air taxi unit, agreeing to collaborate on autonomous technology. This settlement not only resolves previous litigation but also opens new avenues for technological cooperation, particularly in autonomy and safety systems.
- **Partnership with Stellantis and Safran:** Archer's strategic partnerships with automotive giant Stellantis and aerospace leader Safran Electronics & Defense are instrumental in advancing the manufacturing and avionics technology of the Midnight aircraft. These collaborations highlight Archer's approach to leveraging cross-industry expertise to refine its eVTOL solutions.

Chart 8: Archer Aviation – Timeline to Commercialization and Operations at Scale



Source: Intro-act, ACHR Investor Presentation

In its 3Q23 financial results, the company reported operating expenses of \$46.2 million, down from \$93.8 million that it reported a year ago. As a result, the net loss of the company declined from \$91.0 million to \$51.6 million in 3Q23. At the end of the quarter, the company had a strong financial position with nearly \$600 million of liquidity consisting of cash and cash equivalents of \$461 million as of September 30 (which includes \$145 million from the PIPE closed in August), coupled with the \$70 million it received from Stellantis' investment on October 16, and the remaining \$55 million under the forward equity purchase agreement with Stellantis. The company also finalized a debt facility of up to \$65 million that will cover substantial majority of cost to build its high-volume manufacturing facility in Georgia.

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