PLAYING TO

VERTICAL AEROSPACE

> LEADERS MOVE INTO CERTIFICATION PHASE

> NEXT WAVE STEPS UP FUNDING EFFORTS

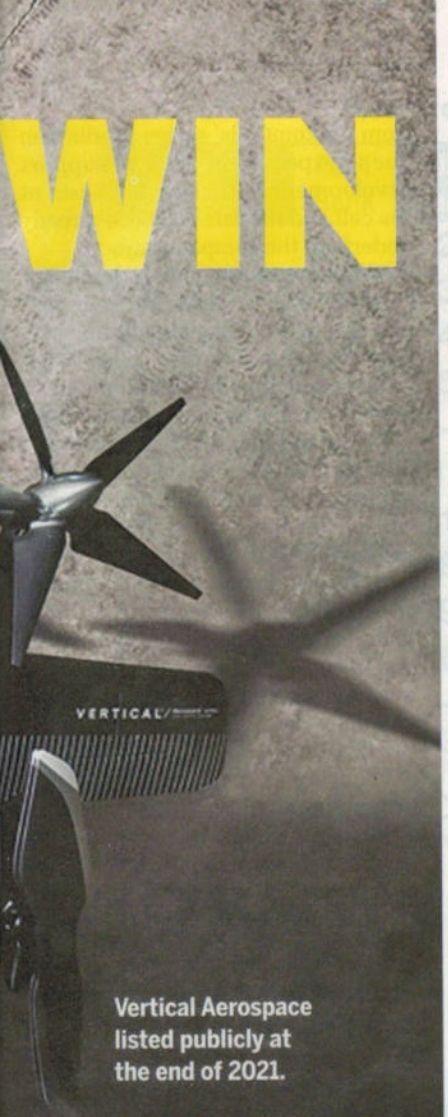
Graham Warwick Washington

While headlines about the advanced air mobility industry in 2021 were largely financial, the focus for 2022 returns to the technical as the market leaders get to grips with certifying their vehicles. And it may prove a tougher task than some anticipated.

As the slick presentations on mergers with special-purpose acquisition companies (SPAC) are filed away, and the newly public startups come to terms with financial reporting, notes of caution are replacing the bold projections. This is because 2022 must be a year of solid progress if they are to meet their targets.

Four of the leaders have agreed certification bases for their electric vertical-takeoff-and-landing (eVTOL) air taxis. But the latest performance-based regulations set high-level requirements, and the devil is in the details of agreeing on the means of compliance—the testing required to validate an aircraft conforms with its certification basis. For all of them, that is the task in 2022.

WIN



Vertical Aerospace listed publicly at the end of 2021.

"I believe that to certify and enter service in 2024, an eVTOL OEM needs to have started certification flights with their conforming certification vehicle by the end of 2022," says Sergio Cecutta, founder of SMG Consulting.

Despite the billions of dollars that flowed into the nascent advanced air mobility (AAM) market in 2021, few industry observers would be surprised if schedules started to slip in 2022 under the pressures of finalizing certification plans and continued pandemic-related disruptions. But after the first one or two certifications, once the special conditions and means of compliance are published, it will be easier for those that follow.

JOBY AVIATION
Continuing To Execute

From securing funding and building the team to making progress with testing and certification, Joby Aviation has done everything needed to keep its lead in the AAM market. Joby was the first to agree on its Part 23 certification basis with the FAA, in late 2020. Now it is working to agree on the means of compliance, an effort it expects to wrap up in the second half of 2022. But the sign-off will be progressive, and the company plans to begin verification testing on components ahead of that date.

"I am curious to see when their conforming certification vehicles will roll out, as it usually takes around 18 months to complete a trouble-free flight test program," says Cecutta, whose AAM Reality Index also ranks Joby first among the sector's leaders.

Joby is aiming for certification by the end of 2023, allowing it to launch air taxi services in the U.S. in 2024. Founded in 2009 and with a workforce approaching 1,000 people, the startup went public in August through a merger with SPAC Reinvent Technology Partners that grossed $1.2 billion—less than hoped for but sufficient, the company says, to fund it through certification and commercial launch.

Tail spar, battery drop, lightning strike and cabin bird-strike tests have begun, and initial pilot evaluation of the cockpit design and high-risk environmental testing of the flight control computer has been completed. The systems integration lab is being built, and the first representative airframe structure, a composite panel, has undergone FAA conformity testing.

The startup is working with investor Toyota to establish manufacturing operations in California. The powertrain line in San Carlos has begun delivering electric propulsion units. And with installation of a second automated fiber placement machine, the Marina plant has sufficient capacity to support pilot production volumes, Joby says.

On Joby's first quarterly call in November, analysts questioned the wisdom of its highly vertically integrated approach. But the result, the company says, is a more optimized and higher-performance aircraft with better operating economics. Now flying two engineering prototypes, Joby says it has exceeded a 150-mi. range and a 10,000 flight-cycle battery life on automotive-grade cells.

Continuing the vertical integration theme, the startup's business plan is to operate and not just manufacture its eVTOLs, to retain control of the safety, passenger experience and revenue potential of a growing fleet and not just aircraft deliveries. The five-stage process to gain Part 135 air carrier certification began in July and is expected to be completed by the end of 2022, Joby says.

BETA TECHNOLOGIES
Keeping It Simple

Beta Technologies is almost the exact opposite of Joby. Both companies are led by visionaries who believe electric propulsion can revolutionize aviation. But Beta has eschewed going public and continues to raise funding privately. The company's singular focus is on simplicity, Beta describing its Alia eVTOL as a fixed-wing aircraft with VTOL capability and focusing its innovation on the electric propulsion system.

Founded in 2017, the Burlington, Vermont-based startup plans to manufacture and sell its aircraft, not operate them like Joby. The second pillar of its business model is not a branded air-taxi service, but a Tesla Supercharger-style nationwide network of charging stations for electric aircraft that will provide a second life for aircraft batteries.

And Beta believes that cargo, and not passengers, will be the first AAM market to scale. The company's investors include Amazon's Climate Pledge; UPS, which has placed orders and options for up to 160 aircraft; and early backer United Therapeutics, which has ordered 60 Alias for organ transport. Another customer, helicopter ride-share provider Blade Air Mobility, expects organ transport to be its first commercial use for eVTOLs.

"Cargo will be half of the AAM market by value in 2030, so I see more OEMs working on cargo versions of their eVTOL as insurance against a slow UAM market start," says Cecutta, who ranks Beta second.

Beta has raised $511 million to date and employs about 350 people. The company began manned conventional takeoff-and-landing flight tests of a full-scale engineering prototype in June 2020. A second Alia engineering prototype is now being used for VTOL

testing. Beta does not detail its certification plans but says it is pleased by progress with the FAA toward Part 23 type certification, planned for 2024.

Beta has funding in place, a direct path to certification, orders in hand and the potential for its aircraft to demonstrate its economics, safety and reliability by accumulating flight hours in cargo operations should the air taxi market prove slow to take off.

VOLOCOPTER
Building the Ecosystem

An eVTOL pioneer, Germany's Volocopter has been building out an ecosystem for urban air mobility from vehicles to vertiports, but its lead is being challenged by other well-funded startups. Expected to fly in 2021, the first prototype of the company's two-seat VoloCity is still in ground testing, and certification has slipped to 2023. German media reported that Volocopter canceled plans to go public through a SPAC merger. Having raised $377 million privately, the company says it is "open to considering all forms of financing."

Despite the challenges, Volocopter in 2021 launched a longer-range eVTOL, the VoloConnect winged two-seater, aiming for certification by 2026. The company signed agreements that could see it launch air taxi services in China, France, Italy, Japan, Saudi Arabia and South Korea by the mid-2020s. These include forming a joint venture in China with automaker Geely, backed by an order for 150 aircraft, while Japan Airlines reserved 100 aircraft, with plans to launch service at the Osaka World Expo in 2025.

Having grown to more than 400 employees, Volocopter in July acquired German glider manufacturer DG Flugzeugbau to secure European Union Aviation Safety Agency (EASA) production organization approval in preparation for eVTOL manufacturing. The startup is working with German logistics company DB Schenker, an investor, to develop a blueprint for operation of its VoloDrone unmanned cargo eVTOL, with certification to follow that of the VoloCity.

"The VoloCity is their conforming certification vehicle, so they are the first OEM in the industry to get to that milestone," says Cecutta, whose AAM Reality Index ranks Volocopter fifth.

Volocopter is working with Lufthansa to develop its VoloIQ booking app and digital backbone, with CAE to develop an eVTOL-pilot training program and with Skyports and other partners to develop the VoloPort landing infrastructure. The company is aiming for trial air taxi services in Paris for the 2024 Olympics. Other announced markets are Singapore, Rome and the Neom smart city in Saudi Arabia.

Funding remains a concern, but while others snap at its heels, Volocopter continues to make progress across the UAM ecosystem and internationally. A start to VoloCity flight testing would bolster confidence that the company can still launch air taxi service ahead of its rivals.

LILIUM
Pushing the Envelope

Lilium entered 2022 conducting the preliminary design review (PDR) for its piloted seven-seat Lilium Jet while continuing flight tests of its unmanned five-seat technology demonstrator. The Munich-based startup grew rapidly through 2021, to 750 people, with a target of 950 in 2022. Cash burn also increased, but after going public in September through a merger with SPAC Qell Acquisition that grossed $584 million, the company says it has the funds needed to launch service by the end of 2024.

The startup agreed on the certification basis for its eVTOL with EASA in 2020 under the Special Condition for VTOL. The demonstrator flew in July 2021 and will relocate to Spain in mid-2022 to expand the flight envelope and complete full transition testing. Detail design of the Lilium Jet will begin in 2022, aiming for first flight in 2023.

Lilium is developing the ducted-fan vectored-thrust propulsion system but has selected Honeywell to supply the cockpit avionics and flight control system. Spain's Aciturri will build the fuselage and wings using composites supplied by Toray. After PDR, Lilium plans to partner with Tier 1 aerospace suppliers for other subsystems but cautions it is working to mitigate post-pandemic disruption and inflation in the supply chain that is putting pressure on prices and lead times.

Where Joby is using automotive-grade batteries, Lilium has selected high-energy-density silicon-anode cells from Germany's CustomCells to achieve the Jet's aggressive performance goals. Delivery of the first cells from CustomCells' series-production line is expected in 2022 to support development of the Jet, but tests at the cell and module level are already underway, the company says.

"The use of advanced-chemistry cells raises two questions: their cost and the manufacturing volumes, as they are not automotive cells proven to be producible in high quantities," says Cecutta, who ranks Lilium third.

Lilium has identified two routes to market. Plans to launch regional air mobility networks in 2025 are underway in Germany with support from airports and in Florida with infrastructure company Ferrovial. Lilium also intends to use vertiport networks that Ferrovial plans to build in Spain and the U.S. The second route is sales to passenger and cargo operators, beginning with a 220-aircraft deal with Brazil's Azul.

Focusing on regional rather than urban air mobility, Lilium is taking a different route. Much depends on progress with the Lilium Jet over the next year, as a competitive high-speed transportation service will require a high-performing vehicle.

ARCHER AVIATION
Racing To Be a Leader

The first hover flight of Archer's Maker technology demonstrator on Dec. 16 added needed credibility to the company's fast-paced plan to catch up with the AAM leaders. Founded in 2018, the California-based startup's goal is to certify its eVTOL air taxi in late 2024, just a year after Joby despite being four years behind in flying a full-scale aircraft.

The Maker is an unmanned two-seat demonstrator for Archer's piloted four-passenger eVTOL. Critical transition flight testing is scheduled for 2022, when a second Maker will join the test program. Now in preliminary design, the production eVTOL is to be unveiled in 2023. Archer agreed on its Part 23 certification basis with the FAA in 2021 and hopes to finalize the means of compliance in 2022.

"Can the learning [from] Joby's four-year flight tests be compressed into a little over one year, considering the test vehicle is not fully representative of the certified aircraft?" questions Cecutta, who ranks Archer ninth.

The company went public in September through a merger with SPAC Atlas Crest Investment that grossed

Aviation Week's AAM Baker's Dozen

	2021 Rank	2020 Rank	Change
Joby	1	2	$1.2 billion SPAC.* Certification progress.
Beta	2	3	$511 million raised. Testing progress.
Volocopter	3	4	Acquired POA.** China joint venture.
Lilium	4	5	$584 million SPAC. Flew technology demonstrator.
Archer	5	—	$858 million SPAC. Flew technology demonstrator.
Vertical	6	12	$300 million SPAC.
EHang	7	1	Change in business model to operator.
Eve	8	8	Announced $547 million SPAC for 2022.
Airbus	9	9	Unveiled CityAirbus NextGen.
Wisk	10	6	Boeing investment. No service-entry date yet.
Hyundai	11	—	Created UAM company Supernal.
Overair	12	—	Unveiled production aircraft and plans.
Honda	13	—	Launched eVTOL development program.

*Special-purpose acquisition company **Production organization approval

$858 million. Archer has been spending heavily building its team, which now exceeds 200 people. The company is developing the electric powertrain and flight-control software internally but working with automaker Stellantis on the supply chain and manufacturing plant, with site selection coming in 2022.

Archer's business plan has two legs. The company will operate the aircraft itself on the Archer Network. The mobile booking app is planned to be released in 2023, and Archer is aiming for Part 135 air carrier certification in 2024. Archer Direct involves sales of aircraft to large operators such as United Airlines, which has conditional orders and options for 300. Production is expected to be split 50:50 between the two lines of business.

Archer is designing a simplified vehicle capable of back-to-back 25-mi. trips with minimal charging time. The startup has an aggressive schedule but adequate resources and is confident its technology choices will ease the path to certification.

VERTICAL AEROSPACE
The System Integrator

UK eVTOL startup Vertical Aerospace was listed on the New York Stock Exchange on Dec. 16 after completing a merger with SPAC Broadstone Acquisition that grossed approximately $300 million, including $200 million in debt financing. Although significantly less than was raised by the year's other AAM SPAC deals, Vertical says the proceeds are sufficient to cover the estimated $250 million cost of certifying its VX4 air taxi and launching production by the end of 2024.

The SPAC deal included $94 million from investors including supplier partners Honeywell, Rolls-Royce and Microsoft and customers American Airlines and lessor Avolon. Vertical intends to be less vertically integrated than its eVTOL rivals and argues that its projected capital costs are substantially lower because it is leveraging investments in technology development by its supplier partners that exceed $500 million.

"Their legacy-aerospace certification strategy, with so much of the financial burden left with suppliers, raises the question whether the money raised is enough, especially if the schedule does not hold up," says Cecutta, who ranks Vertical eighth.

Founded in 2016 and with a workforce that now exceeds 260 people, Vertical is focused on developing the battery system and propellers. Rolls-Royce will supply the electric propulsion units and Honeywell the cockpit avionics and flight control system. GKN Aerospace is to supply the electrical wiring system and produce the wing using composites from Solvay. Other suppliers are still to be announced.

Vertical plans to fly a full-scale technology demonstrator for the piloted four-passenger VX4 early in 2022. This follows two previous large-scale demonstrators with different configurations, the single-seat ducted-fan VA-X1 in 2018 and two-seat multicopter VA-X2 in 2019. Flight testing of the VX4 will be unmanned, at least at first, the company says. The first certification prototype is planned to fly in 2023.

The Bristol, England-based startup plans to select a manufacturing site in 2022—expected to be in Britain, Northern Ireland or Ireland—and has an aggressive target to ramp up production to 1,000 aircraft a year in 2026. This is based on a total of 1,350 preorders and options secured from American Airlines, Avolon, Iberojet, Japan Airlines and Virgin Atlantic as well as Bristow Group and Japan's Marubeni.

With its SPAC merger completed, the task for Vertical is to prove to investors and the industry that its aggressive projections for development cost, certification timescale and production ramp-up are realistic and it can develop a Joby-class vehicle on a Volocopter-scale budget.

EHang is conducting trial operations under its 100 Air Mobility Routes initiative.

EHANG

Where Is EHang?

EHang is a clear leader in urban air mobility, with one caveat—most of its progress is in its home nation of China, where eventual regulations are expected to be different than those in Europe and the U.S. The startup anticipates certification of its autonomous two-seat EH216 by the Civil Aviation Administration of China (CAAC) in 2022. But while it has conducted unmanned demonstrations in several countries, approval for commercial passenger operations outside China could still take years.

"The CAAC has published the regulations for what it calls 'passenger drones' that leads me to believe that the 2022 date for certification is feasible. Certification by the FAA or EASA will be a different story, possibly by the first half of the 2030s," says Cecutta, whose AAM Reality Index ranks EHang 10th.

The Guangzhou-based startup traded some of its production lead over other eVTOL developers in 2021 for a change in business plan, from manufacturing and selling its aircraft to operating them—a model adopted by many of the AAM leaders. EHang is publicly traded, and this shift will decrease revenues and increase capital costs in the near term as it builds up a fleet and route network.

With approval from the CAAC to conduct trials while it works to certify the EH216, EHang has launched the 100 Air Mobility Routes Initiative to develop initial commercial services. The company says it had conducted some 2,800 operational trial flights at seven locations in China by December, mainly focused on the Guangdong-Hong Kong-Macau Greater Bay Area. Trials are underway in Guangzhou and Shenzhen and are to begin across the Pearl River Delta in Zhuhai. The flights are mainly for air tours.

With the shift in business strategy, direct aircraft sales are now focused on the EH216F unmanned firefighting version, and the customers are government agencies with longer procurement cycles, the company says. EHang began flight-testing the longer-range VT-30 winged eVTOL in 2021. The company plans to launch a longer-distance air taxi service in the Greater Bay Area using the VT-30, which has an intercity range of up to 300 km (185 mi.) compared with 35 km for the multicopter EH216.

Domestic competition for EHang stepped up in 2021, with rival Chinese startup Autoflight securing $100 million in funding to launch development of its V1500M four-seat eVTOL. The Shanghai-based company flew a prototype in October and is aiming for certification in 2024. HT Aero, a startup owned by Chinese electric vehicle-maker XPeng, raised $500 million and announced plans to field an eVTOL in 2024. But the twin-rotor vehicle is a fly-drive "supercar" for the consumer market and not a commercial air taxi.

Even if it succeeds in securing CAAC certification for domestic passenger operations, EHang can expect to face competition in its home market from Western manufacturers. Volocopter has established a Chinese UAM joint venture in Chengdu with automaker and investor Geely, and Lilium plans to expand into China with the assistance of its investor Tencent.

Who Is the Second Wave?

Eve Urban Air Mobility's announcement on Dec. 21 that it planned to go public in 2022 through a merger with blank-check company Zanite Acquisition sets the stage for the Embraer spinoff to be one of the leaders of the next tranche of advanced air mobility companies entering the market after 2025.

That second wave will include companies such as Airbus, Hyundai company Supernal, Overair and potentially Honda. It also will likely include those companies seeking to go directly to autonomous air taxis such as Wisk and Kitty Hawk. Whether it includes helicopter-maker Bell remains to be seen.

"What is the advantage for these fast followers in the second wave? Probably an easier certification path, as the regulatory agencies will have worked the kinks out with the first wave," says Cecutta, whose AAM Reality Index ranks Eve 13th, after Airbus and Supernal.

Eve's merger with SPAC Zanite is planned to raise up to $512 million, including $305 million in investment from airline customers Republic Airways and SkyWest Airlines, lessors Azorra Aviation and Falko Regional Aircraft, as well as BAE Systems and Rolls-Royce.

After the merger, Embraer will still own 82% of Eve, which will have priority access to the Brazilian manufacturer's engineering, certification, production and support resources on a cost-transfer basis. U.S.-headquartered Eve plans to develop and certify its piloted four-passenger eVTOL in Brazil initially, to benefit from lower labor costs and unfettered access to Brazilian airworthiness authority ANAC.

Eve has assembled nonbinding letters of intent from 17 customers for a total of 1,735 aircraft, the largest conditional orderbook in the AAM market. Customers include airlines, helicopter operators, aircraft lessors and ride-share platforms in Asia, Brazil, France, the UK and U.S. The company plans to produce its aircraft as kits for local assembly in key markets to reduce the cost to operators.

Eve's business plan has several pillars. In addition to manufacturing and selling aircraft, with deliveries planned to begin in 2026, the company will offer service and support for its own and other eVTOLs and provide urban air traffic management systems. Eve will not operate its aircraft but plans to provide ongoing support for fleet operations on a risk- and revenue-sharing basis with operator partners.

Airbus committed to the AAM market in September with the unveiling of its CityAirbus NextGen four-seat eVTOL air taxi. Evolved from the shrouded-rotor CityAirbus demonstrator that has been flying since 2019, the NextGen is a winged multicopter focused on urban operations. First flight is planned for 2023, aiming for certification under Europe's Special Condition for VTOL regulations in 2025.

Bell, in contrast, has pulled back from the AAM market. Its ducted-rotor Nexus eVTOL is no longer an active program. Parent company Textron's eAviation team has taken the lead in evaluating potential electric aircraft and is still studying passenger-carrying eVTOLs but has yet to confirm a business case.

Reinforcing its commitment to the market, South Korean automaker Hyundai in November created a new company, Supernal, to develop a family of electric air vehicles and work with shareholders to integrate AAM into existing transit networks to provide intermodal mobility. U.S.-based Supernal plans to begin certification of its eVTOL air taxi in 2024 and launch commercial operations in 2028.

Embarked on a similar path to becoming a mobility service provider and not just an automaker, Japan's Honda has also entered the AAM race, announcing plans to fly an eVTOL technology demonstrator in 2023. The company intends to decide in 2025 whether to proceed with plans to certify a hybrid-electric intercity eVTOL air taxi and launch a Honda-branded commercial mobility service around 2030.

Other new entrants are stepping up fundraising in the hope of joining the next wave of AAM companies. These include Overair, established in 2019 by Karem Aircraft and backed by South Korean defense company Hanwha Systems. The startup plans to fly a demonstrator by early 2023 and is aiming for certification of its Butterfly quad-tiltrotor in 2026. Also targeting 2026, France's Ascendance Flight Technologies and Switzerland's Dufour Aerospace are still in the early stages of raising funds.

AUTOFLIGHT

Chinese startup AutoFlight flew its V1500M eVTOL air taxi prototype in 2021.

AAM Is Not All Vertical

After playing out through most of 2020 and 2021 for the electric vertical-takeoff-and-landing industry, the process of assembling memoranda of understanding, letters of intent and other expressions of interest to bolster fundraising drives is underway in other parts of the evolving advanced air mobility market.

That includes developers of electric short-takeoff-and-landing (eSTOL) aircraft that believe the limitations of battery technology are best overcome by using 300 ft. of runway rather than staying within the confines of a vertipad.

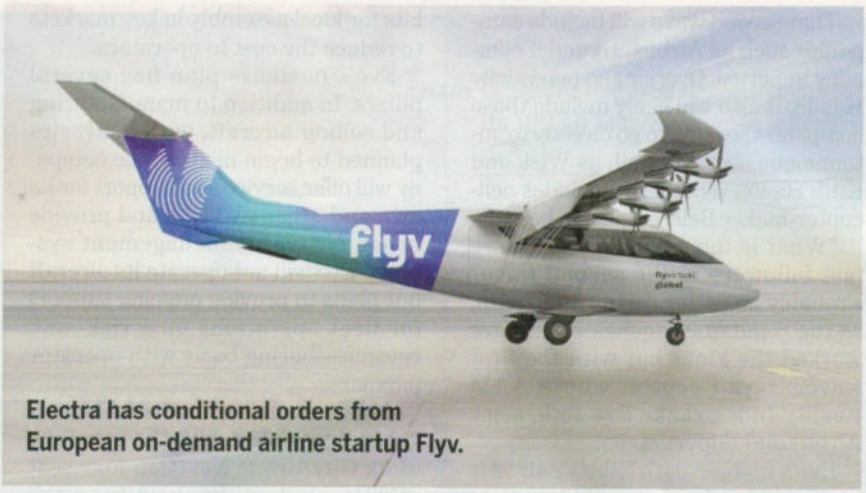
U.S. startup Electra has secured letters of intent for 280 of its seven-passenger, 500-mi.-range hybrid-electric eSTOL aircraft from commercial operators and ride-share platforms in Australia, Brazil and Europe. Rival startup Airflow has accumulated letters of intent for almost 300 aircraft from 13 customers for its nine-passenger, 500-mi.-range Model 200.

In addition to customer commitments, investors look for technical milestones, and both Airflow and Electra plan to fly piloted technology

demonstrators in 2022 to prove out their distributed-electric-propulsion blown-lift eSTOL configurations. Airflow plans to modify a Cessna 210, while Electra's demonstrator will be similar in scale. Airflow is aiming for certification in 2025, Electra in 2026.

At this early stage in development of the AAM market, several potential customers have hedged their bets and signed letters of intent for both eSTOL and eVTOL aircraft, reflecting operations and geographies that are not limited to dense urban areas. Global helicopter operator Bristow, for example, has signed with Electra as well as eVTOL developers Eve, Overair and Vertical Aerospace.

The AAM market has also expanded to encompass electric conventional-takeoff-and-landing (eCTOL) aircraft. The field of runners is limited but growing. Eviation Aircraft is preparing to fly its prototype nine-passenger, 440-nm-range Alice and has a firm 12-aircraft order from DHL for a cargo version. Swedish startup Heart Aerospace has letters of intent for almost 550 of its ES-19 19-seat electric regional airliners, including from United Airlines. Both companies are aiming to begin deliveries in 2026.



ELECTRA

Electra has conditional orders from European on-demand airline startup Flyv.

The electric aircraft market may have started out with its most challenging mission, urban air mobility, but the technology is rapidly expanding into other markets. Whether or not 2022 will see the levels of funding that flowed into eVTOL in 2021, the eCTOL and eSTOL aircraft developed will benefit from the certification ground being broken by the leaders in the AAM market.

"The eSTOL and eCTOL certification paths might be more straightforward than for eVTOL, leading to the need for less funds and time to arrive at certification," says Cecutta.

Embraer's Reputation Underpins eVTOL Spinoff Eve's Merger Plans

> ZANITE SPAC TO TAKE eVTOL DEVELOPER PUBLIC

> AIRLINES, LESSORS AND INDUSTRY TO INVEST IN THE DEAL

Graham Warwick Washington

When it comes to taking a start-up public through a merger with a blank-check company, the message to investors typically focuses on the vision of the founders and the strength of their team.

In the case of Embraer spinoff Eve's planned merger with special-purpose acquisition company (SPAC) Zanite Acquisition, announced Dec. 21, the message is all about the Brazilian manufacturer and its 50-plus years of experience designing, certifying, producing and supporting aircraft on a global scale.

U.S.-headquartered Eve was spun off from the EmbraerX market accelerator in October 2020 to enable it to be focused and agile yet still supported by the experience and resources of a major manufacturer. Eve has moved swiftly to establish the largest and broadest conditional order base in the advanced air mobility (AAM) industry, with nonbinding letters of intent for 1,735 aircraft from 17 customers.

The merger brings Embraer's industrial experience together with the market expertise of Zanite, led by Kenn Ricci, principal of Directional Aviation, a private-aviation company that owns fractional-ownership operators Flexjet and Flight Options, jet card provider Sentient Jet and aircraft remanufacturer Nextant Aerospace as well as helicopter operator Halo Aviation, an Eve customer.

"This is a combination of different strengths," says Francisco Gomes Neto, Embraer president and CEO.

The deal gives Eve an enterprise value of $2.4 billion and is intended to net $512 million in cash after transaction costs. This is sufficient to fund the company through to the planned 2026 entry into service of its electric vertical-takeoff-and-landing (eVTOL) air taxi, says Eve co-CEO Jerry DeMuro.

Of the total gross funding, $237 million will come from the SPAC, assuming there are no shareholder redemptions—which is unlikely, given previous AAM SPACs. Another $305 million is committed PIPE (private investment in public entity) funding from Embraer ($175 million), Zanite ($25 million) and other investors.

Eve's deal is the fifth AAM SPAC transaction announced in 2021: Mergers involving Joby Aviation, Archer Aviation, Lilium and Vertical Aerospace closed last year, grossing a total of more than $2.9 billion. Since its launch a year ago, Zanite has learned a lot about SPACs, Ricci says.

"A lot of the SPAC market has just been pure speculation," he says. "We've evolved. We now know about shareholder redemptions and how to make sure demand stays up." Zanite has limited the PIPE to strategic, long-term investors, and Embraer and Zanite have locked up their investments for three years.

"And there's not a better product out there," Ricci says. "A lot of the products, in our space particularly, are speculative. These are Silicon Valley startups that have an entrepreneurial vision, which is great for our industry, but no one has brought this depth of capability, this depth of production to the table."

"We are differentiated by Embraer's backing," DeMuro says, citing a master service agreement that gives Eve priority access to the Brazilian manufacturer's engineering, certification, production and support resources on a cost-transfer basis. "We will not have to go out and hunt for engineers," he notes.

Brazilian labor rates will lower costs, as will access to Embraer's testing infrastructure and worldwide support network. And while the FAA is certifying multiple U.S. eVTOLs, Eve has unfettered access to Brazilian regulator ANAC, which will lead certification with bilateral approval in the U.S. and Europe.

"We are not a startup," says Eve co-CEO Andre Stein. "We are not here for the show and fuss. We are here to deliver something, as we have done before." Embraer's backing provides access to infrastructure "that would take decades and hundreds of millions of dollars to build from scratch," he says.

EMBRAER

SkyWest, Republic Airways and lessor Azorra Aviation have signed letters of intent for 400 Eve eVTOL vehicles.

Adding to Embraer's capabilities in production, service and support, and urban air traffic management, Eve has assembled partners that address the complete AAM ecosystem, DeMuro says. These include helicopter operators, ride-share platforms, aircraft lessors, vertiport developers and power companies.

The PIPE funders include U.S. regional carriers Republic Airways and SkyWest Airlines, lessors Azorra Aviation and Falko Regional Aircraft as well as BAE Systems and Rolls-Royce. In addition to BAE and Rolls, Eve is collaborating with Austrian aerostructures company FACC, but it has yet to make supplier selections, Stein says.