

Air Taxis: Onward and Upward

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24/03/2022 Start-ups seeking to launch aerial taxis have been attracting investors, and some are already on the stock market. Now the entire sector has to follow through—what is needed for these business models to fly?

Joby Aviation, Lilium, Volocopter, Archer, Vertical Aerospace, Electra.aero —the list of companies that have raised billions of dollars to make air taxis with electric drives widely available to the public as a means of transportation has lengthened continuously in 2021. Around 100 manufacturers worldwide have entered the race to present the first functioning business model. Common to all is the vision of relieving the pressure on traffic hubs. How? By making zero-emission air taxis as easy to book as regular taxis on the streets today.

The young companies have acquired the requisite seed capital from traditional investment rounds with venture capitalists, private equity firms, and strategic investors. Established partners like American Airlines and car makers like Toyota (Japan) und Geely (China) have joined in. Stock market launches

have led to the biggest headlines, with special purpose acquisition companies (SPACs) raising investment capital for the young enterprises. In the first three quarters of 2021 alone, around six billion US dollars have flowed into the accounts of air taxi manufacturers. Counting the investments since 2015, the sector has succeeded in raising nearly seven billion dollars.

Takeoff requires an ecosystem

"For vertical mobility to succeed, the buildup on financial markets will have to yield concrete steps by 2025," says Gregor Grandl, Senior Partner at Porsche Consulting. In a study entitled *The Economics of Vertical Mobility* , he analyzed the progression to profitability and sketched a step-by-step route to implementation. The trajectory begins with the first commercial flights expected in the mid-2020s. His conclusion: for short to medium distances of 20 or more kilometers, electric passenger drones could definitely be a relevant player. For that to happen, the entire ecosystem of hardware, infrastructure, and services needs to move swiftly from proof of concept to actual operations.

"Congratulations to all who have come this far and completed their financing rounds," says Grandl. "Now they need to follow through and make it past a certain vale of tears. Only then can vertical mobility make good on its high-altitude promises and become an integral part of future transportation networks."

The potential to establish a new and sustainable means of transportation over the next 15 years is certainly present. According to the above study by Porsche Consulting, the market for vertical mobility will be worth around 32 billion dollars by the year 2035. But this will require investing at least 20 billion dollars. In order for the first routes to be flown by the middle of this decade, the eVTOL (electric vertical takeoff and landing) aircraft makers will have to invest five to ten billion dollars in development. Further sums will need to be invested by infrastructure and service providers. Moreover, as the study notes, it is unclear whether the requisite regulatory frameworks and infrastructure will be in place by then.

Three challenges

The first pressing task consists of developing reliable hardware and obtaining authorization for use. "We're currently seeing a race for both strategies and authorizations, where only five or ten of the more than 100 contestants will arrive at the finish line," observes Grandl. "Several strategies are already out ahead. Manufacturers now have to show they're technologically feasible. They also and especially have to convincingly demonstrate that this new means of transportation can make money."

Further development of air-taxi technology is closely linked to acceptance on the part of the public. The sector can only be successful if it can present sound arguments to allay concerns. This applies especially to operational safety, air-taxi use—and the environmental impact of factors like noise emissions from rotors.

The second immediate challenge lies in turning the start-ups into professional companies, or "high-performance organizations," as Grandl calls them. Key considerations here include controlling costs while also keeping hardware costs down, working rapidly and efficiently, building company-specific production networks, and laying the groundwork for services such as repairing and rehauling the aerial taxi fleets.

Based on the study's extensive calculations, which evaluate three different scenarios in detail, an estimated 15,000 air taxis will be operating worldwide by 2035, although individual makers will not be producing more than 1,000 of these small aircraft a year. "Because of the low volumes, each manufacturer will only be able to operate profitably at a single location worldwide," explains Grandl. "The sites will have to serve suppliers and buyers, which will pose unusually high challenges for supply chains." In contrast to commercial jets, which are flown to central locations for large-scale repairs and rehauls, eVTOL maintenance will have to be done regionally. This means providers will need to establish their own workshops in every region where they are active.

The third challenge extends beyond the realm of hardware manufacturers. It consists of enhancing the appeal of vertical mobility by rapidly setting up complete ecosystems in collaboration with transport and other service providers. For the sector to assume a relevant share of the market by 2035, the study expects it to need at least half a million passengers a day and 1,000 to 2,500 takeoff and landing sites in up to 60 suitable cities worldwide.

Finally, for the new aircraft to get off the ground and generate sales, two general conditions need to be fulfilled. For one thing, charging stations and other infrastructure for the takeoff and landing sites—known as vertiports—have to be built. And not least of all, the initial routes need to be authorized. If these conditions are not met quickly enough, manufacturers will require more capital and thereby risk taxing their investors' patience. The more concrete the plans become, the more transparency is needed. As Grandl notes, "Companies that have made their initial public offerings are subject to greater disclosure obligations than other start-ups."

Clearance for takeoff in sight

Relevant players in the hardware, infrastructure, and service sectors have to develop strong strategies for when they enter which markets. In other words, they need to balance regional presence with internationalization. Locations like Hong Kong and Los Angeles have already joined with commercial partners like Volocopter to explore how air taxis can be integrated into existing transportation systems. For this to succeed, operational expertise and powerful customer experiences are crucial—from streamlined booking and dispatching processes to prompt maintenance. On a parallel track, the charging infrastructure needs to be quickly expanded and vertiport construction accelerated by, e.g., modular processes. Future vertiport operators will also have to develop innovative business models for incorporating retail and food businesses and for integrating aerial taxis with other means of transportation.

A large amount and wide range of work remains to be done. However, Porsche Consulting's study concludes that electric air taxis can become a worthwhile and future-oriented addition to existing transportation systems, an option that is both enticing and affordable to large segments of the population. “Vertical mobility will develop stepwise instead of exponentially,” predicts Grandl. The expert is convinced that “air taxis will be cleared to fly.”

Expert advice for a successful takeoff

Porsche Consulting commands the expertise and networks to provide comprehensive consulting on vertical mobility to companies and investors. The management consultancy supports the process from developing strategies to putting business models into practice. Aerial taxi makers can use this expertise to make the transition from business case to operations. Investors and vertiport operators can receive answers to questions about selecting the right sites, expanding the charging infrastructure, and connecting with existing transport networks. They also gain insights into urban transportation and operational excellence. In addition, Porsche Consulting can advise travel service providers on exemplary operations and compelling customer experiences, and support them in integrating and networking all modes of transportation.

Companiescan explore ways to become high-performance organizations and learn about efficiency programs.

For **hardware**, it pays to consult studies on modularizing industrial goods and optimizing product costs, as well as on the successful formula behind the 911 and on intelligent supplier management.

Also recommended are papers on lean production at Airbus and Porsche. Additional studies focus on smart factories, networked supply chains, logistics costs, and purchasing.

Also relevant are white papers on predictive asset management and on sizing the aerial taxi market.

Insights into **service** are found in studies on strategy work, new urban mobility, micromobility, and servitization.

Further information is also available on service and operational excellence from a customer perspective and the components of a successful service platform. Key topics such as brand acceptance should not be neglected.

Questions about **infrastructure** for vertical mobility are addressed in studies from the automotive industry and the construction industry and in reports on innovative business models following the Covid-19 pandemic.

Two more major factors for vertical mobility include airport appeal and stakeholder management in an era of sustainability.

Info

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