

The Launch of Urban Air Mobility in Singapore – **A ROADMAP**

Pioneering Entry into
the Asia-Pacific Region



We bring urban air mobility to life.



VoloPort demonstration including Volocopter 2X model in 2019, Marina Bay

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FOREWORD

BUILDING ON COLLABORATIVE PARTNERSHIPS IN SINGAPORE

Urban air mobility (UAM) is a new form of transportation that uses electric vertical take-off and landing (eVTOL) aircraft to transport people and goods in urban and suburban areas. This safe and efficient aviation transportation system has garnered increasing interest due to ever more congested roads and the air pollution brought on by urbanization. Cities from Paris, Los Angeles, and Tokyo are actively developing strategies to integrate UAM into their transportation systems. Singapore is an early adopter of this exciting technology. After conducting multiple successful meetings with Singaporean authorities since 2017, Volocopter, the pioneer of UAM, highlighted the positive working relationships and progress in Singapore with a historic first Asia flight in October 2019. In the run-up to this milestone, Volocopter conducted extensive tests at Seletar Airport and worked closely with several key stakeholders, such as the Ministry of Transport (MOT), the Civil Aviation Authority of Singapore (CAAS), and the Economic Development Board (EDB). On 22 October 2019, Volocopter successfully completed its first crewed eVTOL flight in Asia over Singapore’s iconic Marina Bay. This offered a unique opportunity to experience what UAM will look and sound like. The test flight validated and showcased Volocopter’s progress in bringing commercial air taxi services to Singapore. It also signaled the Lion City’s intention to be a leader in UAM integration, revolutionizing the way we live, work, and play.

VOLOCOPTER AND SINGAPORE

Volocopter plans to launch commercial passenger air taxi services with its VoloCity aircraft in Singapore within the next two years. This will revolutionize urban transportation and mobility, enabling spectacular touristic routes within the Marina Bay area or to nearby regional economic centers from Singapore in just 30 minutes. Our customers can forget about traffic jams and detours as they sit back, relax, and enjoy the breathtaking views over Singapore. The VoloCity air taxis will be quiet and emission-free in flight, and take off and land vertically at strategically located VoloPorts, the gateway infrastructure to this new world of mobility. Volocopter aims to make its services safe, sustainable, and comfortable.

So, why is Volocopter starting its Asian launch with Singapore? With a sterling track record of achieving the Certificate of Entitlement (COE)¹ and the Electronic Road Pricing (ERP)² schemes for ground transportation, Singapore has written the innovation playbook to design and implement mobility solutions for metropolitan areas. The government is developing regulations that encourage innovation while integrating various modes of transportation. Home to the world’s best airport and the aviation hub in the Asia-Pacific region (APAC), the Lion City is paving the way for the next dimension of transport – UAM. Partnering with Volocopter will accelerate Singapore’s journey to launching UAM services. Our family of electrically powered aircraft includes air taxis for short and long urban routes (the VoloCity and VoloRegion*) and heavy-lift drones for goods (the VoloDrone). Together with the physical and digital infrastructure (the VoloPort and VoloIQ, respectively), Volocopter provides the comprehensive UAM ecosystem to make this happen.

¹ A Certificate of Entitlement (COE) represents a right to vehicle ownership and use of the limited Singaporean road space for ten years

² On high traffic roads, there are Electronic Road Pricing (ERP) gantries; drivers pay a fee when using these during operating hours

*The aircraft was renamed the VoloRegion in October 2022 (formerly the VoloConnect)



Figure 1 Crewed Flight Demonstration at Marina Bay, Singapore, 2019

VOLOCOPTER IN THE APAC REGION

With Singapore as its APAC headquarters, Volocopter has made significant progress in paving the way for UAM in various countries across the region.

In July 2021, Volocopter signed a Memorandum of Understanding (MOU) with Malaysia Airports and Skyports to conduct a feasibility study for vertiport deployment in Malaysia. In China, Volocopter has formed a joint venture with Aerofugia, a subsidiary of China's innovation-driven Geely Technology Group to bring UAM to China, the most significant single market opportunity for the UAM industry. Volocopter also joined the Osaka Roundtable in Japan and committed to flying during the Expo 2025 Osaka Kansai.

In November 2021, Volocopter made history in South Korea, conducting the nation's first crewed public air taxi test flights at Gimpo and Incheon airports. We also partnered with South Korea's largest mobility platform company, Kakao Mobility, to conduct a feasibility study introducing UAM in the country.

We will continue to reach out and work with other governments and partners in the region to raise awareness and establish a UAM ecosystem.

OBJECTIVE OF THIS ROADMAP

This roadmap highlights the benefits of UAM for Singapore and provides a roadmap to launch urban air taxis in the city-state. Thanks to our close collaboration with the Singaporean government, we are confident that UAM will serve as an engine for economic growth in the near future. Offering an efficient and sustainable mobility experience will facilitate movement and attract more people into the city-state. This service will enhance both quality of life and regional connectivity in the urban environment of Singapore. We look forward to embarking on a journey that will transform how we move about our cities over the coming decades.

Welcome on board!



Florian Reuter

Volocopter Chief
Executive Officer



Hon Lung Chu

Head of Volocopter Singapore and
Business Development Southeast Asia



UAM BENEFITS for Singapore

The launch of UAM in Singapore will generate many benefits for the city-state. Besides offering a reliable mode of transportation that reduces travel time for a fast-paced **society**, it will also serve as an enabler to achieve the city-state's **environmental** targets. Furthermore, UAM will act as an engine for **economic** growth in a post-pandemic world and **politically** sustain the island's image as an innovative powerhouse on the global stage.

1

Crewed flight demonstration of 2X model in 2019, across Marina Bay

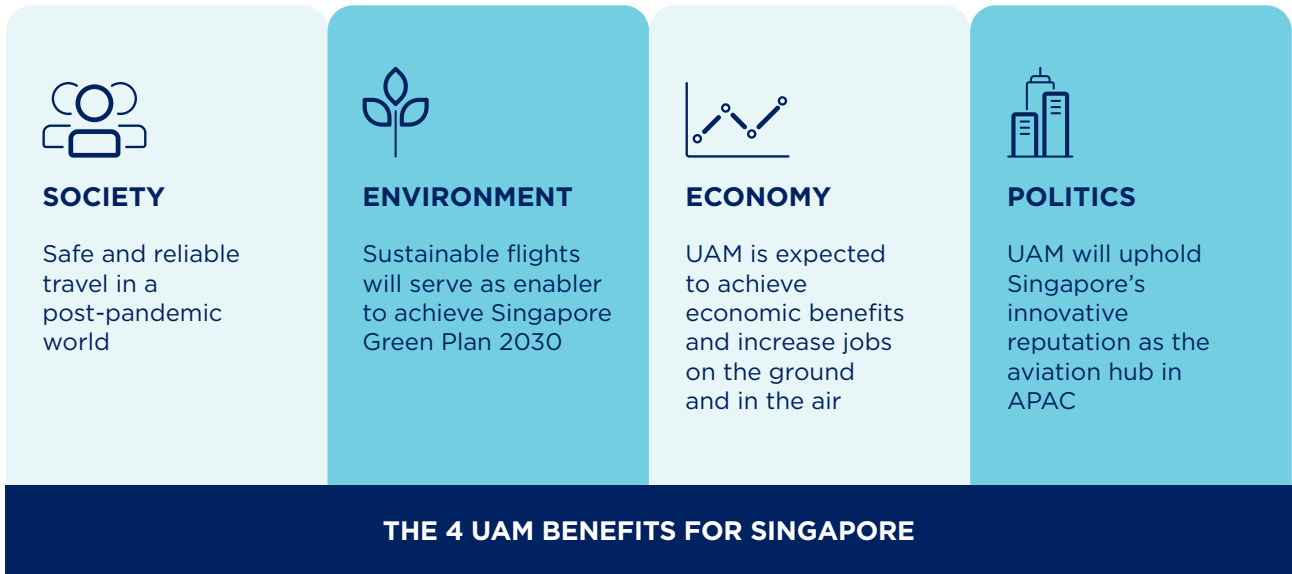


Figure 2 Overview of UAM Benefits for Singapore



“ We are proud of Volocopter as one of the pioneers in eVTOL venturing out of Germany, and stepping onto the world stage, building the world’s first sustainable and scalable UAM business to bring affordable air taxi services to megacities like Singapore. I am delighted to see companies like Volocopter leading the cooperation with local partners in infrastructure, operations, and air traffic management to build the ecosystem necessary to ‘Bring Urban Air Mobility to Life’.

Dr Norbert Riedel, German Ambassador to Singapore, 2021

1.1 SOCIETAL BENEFITS

1.1.1 Safe and Reliable Travel in a Post-Pandemic World

With numerous limitations on international travel in place, the biggest trend for 2021 was unsurprisingly a surge in domestic travel.³ This trend, paired with the fast-moving globalized economy, will heighten demand for faster mobility services that facilitate travel between business centers. Air taxis that are well integrated into existing transportation modes can help alleviate some of these pressures and promote a seamless mobility experience.

³ Travelers Ignite Their Passion for Rediscovering Closer-To-Home Destinations, FTN News, October 13, 2021. ftnnews.com/tours/42646-travelers-ignite-their-passion-for-rediscovering-closer-to-home-destinations

The ever-changing rules and restrictions during the pandemic have crippled air travel around the world. As an international long-haul hub connecting the East and West, Singapore has introduced measures such as the Vaccinated Travel Lane (VTL) to facilitate traveler movement.

However, traveling from countries that are not part of the VTL arrangement is still challenging. This is especially true for travelers coming from non-VTL countries and crossing the border into Malaysia or Indonesia via ground transportation or ferries. Volocopter believes UAM can provide an easier option to counteract this. If Volocopter can be used as a layover option between Singapore Changi Airport and neighboring economic centers (e.g. Johor Bahru, Riau Islands), passengers will remain in international airspace. They will only need to clear inbound immigration at their final destination, without stepping foot in Singapore. An example of how this could work under the prevailing regulations is shown in Figure 3 below.

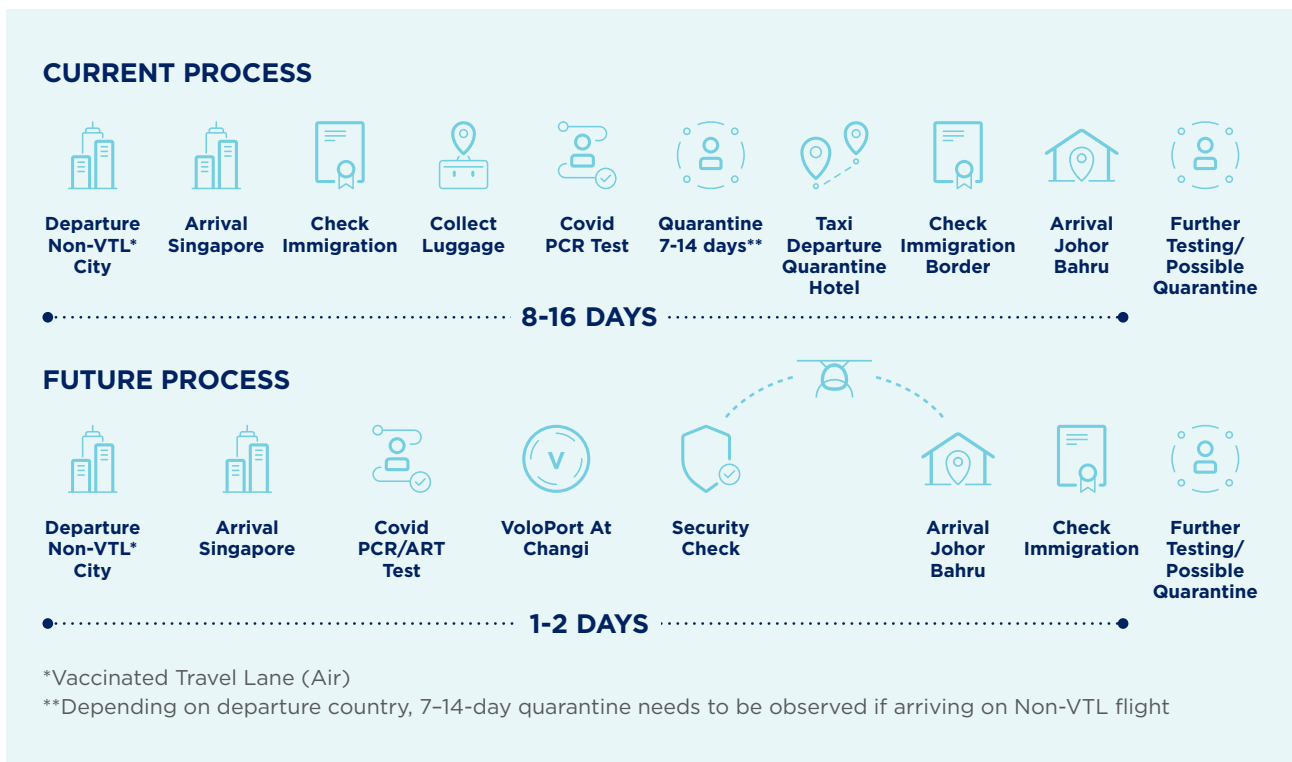


Figure 3 Passenger Journey for Cross-Border Flights

1.1.2 Enhanced Regional Connectivity

Volocopter’s services also stand to improve Singapore’s island-to-island connectivity. The VoloCity services will unlock new transportation routes to help alleviate time-consuming traffic bottlenecks at border points like the Johor Bahru Causeway. The VoloRegion*, the latest development within the Volocopter family of aircraft, will allow seating for up to four passengers on routes of 100 km at a speed of 180 km/h, using a hybrid lift and push design. This increase in flight range will significantly enhance regional connectivity for Singapore and open up new travel destinations within the hundreds of islands in Indonesia and Malaysia. To sum up, besides the initial inner-city touristic flights, Volocopter will provide a new vertical dimension of cross-border transportation to connect the islands, reduce travel time, promote growth in regional economies, and strengthen social cohesion.

*The aircraft was renamed the VoloRegion in October 2022 (formerly the VoloConnect)



1.2 ENVIRONMENTAL BENEFITS

1.2.1 Sustainable and Quiet Flights

As outlined in the Singapore Green Plan 2030, the city aims to strengthen its commitments under the UN's 2030 Sustainable Development Agenda and the Paris Agreement to achieve its long-term net-zero emissions aspiration as soon as viable.⁴ Besides promoting electric cars and the use of public transportation, UAM can become an additional enabler to achieve the respective sustainability targets. For example, studies have shown that traveling 100 km (point-to-point) with one pilot in an eVTOL aircraft produces greenhouse gas emissions that are 35% lower than a one-occupant internal combustion engine vehicle (ICEV).⁵

Specifically, the VoloCity air taxi is a technologically advanced electric aircraft with the ability to vertically take off and land. The VoloCity's 18 motors are powered by nine rechargeable batteries, which can be swapped in between flights with minimum time on the ground. The battery swap design allows Volocopter to charge batteries under ideal conditions, which is an investment in operational efficiency and sustainability as it significantly increases the battery packs' lifespan.

Besides zero carbon emissions in flight, the low noise level of eVTOL aircraft is another crucial advantage for operating in the city. When passengers experience a VoloCity flight for the first time, they will be pleasantly surprised by how quiet it is in full flight. All 18 rotors acoustically operate within a narrow frequency range, thus canceling each other out to a high degree. In fact, VoloCity air taxis are four to five times quieter than a small helicopter, which will certainly be music to Singaporeans' ears.

1.2.2 Reduced Land Usage

UAM provides an additional mode of transportation that is more sustainable and efficient when it is well-integrated into the existing mobility network. It will offer Singapore a three-dimensional transportation grid, which will increase convenience, reduce travel time, and provide an escape from the highly used infrastructure on and below the surface. Given the island state's constraints like land scarcity and a growing population, eVTOL aircraft will alleviate land-use pressures by tapping into underutilized air space above existing roads. By doing this, Singapore can reduce the need for new roads or road expansions and lower the cost of road maintenance. This is a remarkable opportunity for all cities, but especially land-scarce ones like Singapore.

⁴ Singapore Green Plan 2030, [greenplan.gov.sg](https://www.greenplan.gov.sg)

⁵ Study "Role of flying cars in sustainable mobility", 2019, [nature.com/articles/s41467-019-09426-0](https://www.nature.com/articles/s41467-019-09426-0)

1.3 ECONOMIC BENEFITS

1.3.1 A S\$4.18 Billion Business Case for Singapore

We envision the VoloCity to generate unprecedented opportunities and growth in Singapore’s tourism and aviation industry.

Based on the latest estimates from Volocopter internal studies, **S\$4.18 billion of cumulative economic benefits and the creation of up to 1,300 local jobs can be achieved in Singapore by 2030.**⁶ These benefits include revenues from sales of air taxi tickets, contributions to suppliers and government bodies, R&D investments, jobs created to support the air taxi service, and more. The economic gain results from the combination of direct, indirect, and induced benefits that UAM implementation can offer by 2030. Direct benefits include air taxi ticket sales and employee remunerations. Indirect and induced benefits consist of UAM supply chain revenue flowing through Singapore that is generated by the growth of air taxi markets in APAC, and the knock-on touristic expenditures and government taxes. We also considered MRO activities, R&D investments, and staff training activities as we envision Singapore to become the training hub for UAM in the region.

Volocopter estimates that by operating both domestic and cross-border flights, Singapore can generate total economic benefits to the tune of S\$4.18 billion. The direct, indirect, and induced economic outputs based on tourism and cross-border routes, and the local and regional contributions are presented in Figure 4 below.

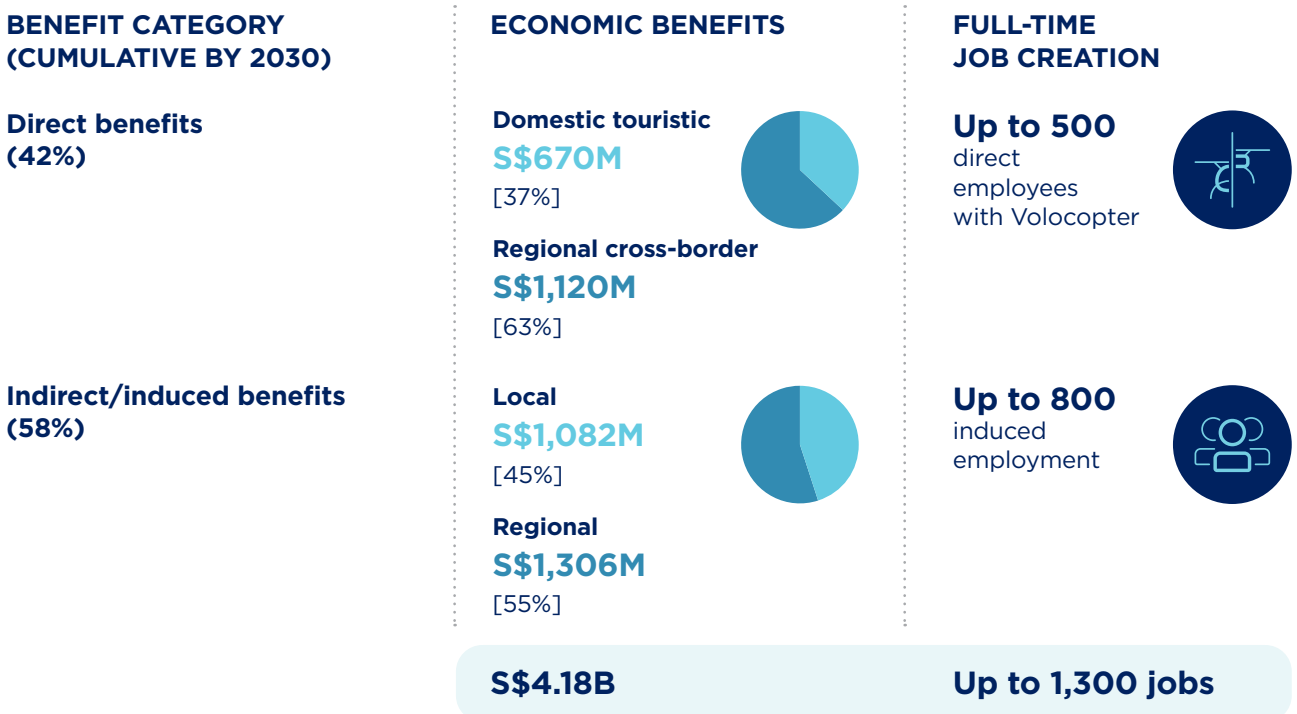


Figure 4 Summary of Economic Benefits from Volocopter Internal Study

⁶ Estimate based on internal studies



“ **Urban Air Mobility is an emerging area within the broader mobility sector, which we have identified as a growth industry for Singapore. Singapore is an important regional testbed for autonomous cars, electric vehicles, and Urban Air Mobility, including the successful test flight by Volocopter in 2019. We are glad that Volocopter has chosen Singapore to anchor its commercial and R&D activities. This will help build new capabilities for our mobility ecosystem and create many exciting opportunities for Singapore.**

Mr. Tan Kong Hwee, Executive Vice President, EDB, 9 December 2020⁷

1.3.2 Building UAM Operational Testbed and R&D Opportunities

Volocopter can support the creation of an operational testbed for UAM led by the Singaporean government as one of the first cities in the world to launch electric air taxis. This collaboration can chart the R&D direction of the city-state as it leads the world in operating air taxis, focusing on local needs for high-quality connectivity, Unmanned Traffic Management, and unique infrastructure developments. Volocopter works closely with local institutes and universities to establish potential case studies and test the evolving eVTOL technology.



“ **We believe that working with an eVTOL pioneer and leader in UAM like Volocopter has tremendous value in developing and harnessing local R&D to enable a UAM future. We are excited to collaborate with Volocopter in the areas of customization of eVTOL deployment in urban city, routes planning, integration with ATMs, and environmental studies among other interesting topics.**

Professor Low Kin Huat, Air Traffic Management Research Institute, Nanyang Technological University, 2021

⁷ EDB, Press Release, 2020, Volocopter Commits to Launch Air Taxi Services in Singapore, edb.gov.sg/en/about-edb/media-releases-publications/volocopter-commits-to-launch-air-taxi-services-in-singapore.html

1.4 POLITICAL BENEFITS

1.4.1 Upholding's Singapore's Innovative Reputation

Shaping the growth of the UAM ecosystem will help Singapore maintain its position as one of the world's most innovative cities. While the city is already supporting autonomous and shared mobility solutions on roads, the introduction of UAM solutions could be the next step to enhance its reputation. Driverless and on-demand mobility services, including air taxis, are predicted to reduce car ownership and promote more sustainable and safer journeys.⁸ Tapping into existing information and communication technologies, Singapore will have the chance to transform as it implements the future of urban mobility. This will further improve the brand image of the city-state as an innovation hub and continue to attract new technology leaders and key businesses to Singapore.

1.4.2 Lighthouse for the Development of UAM in Metropolitan Areas

With the launch of UAM in Singapore, the island city would become the torchbearer for the rest of Asia as it adopts this new form of mobility. As the Singapore government aims to welcome innovative technologies with efficient regulations, the Civil Aviation Authority of Singapore (CAAS) could seize this opportunity to define UAM standards. This strategy could shape international standards and regulations in the long term and provide opportunities for academia and industry worldwide to work closely with CAAS.



In this new area of Urban Air Mobility, we look forward to continue working with Volocopter. This gives us the opportunity to co-create regulations and technologies with the industry, facilitating innovation to enable a future mode of transportation for Singapore.

Mr. Tan Kah Han, Senior Director (Unmanned Systems Group) of CAAS, 9 December 2020⁹

⁸ Lee Kuan Yew School of Public Policy research paper, Singapore - Challenges and Improvements in Urban Mobility, lkyssp.nus.edu.sg/docs/default-source/research-centres-document/devansh-jain.pdf?sfvrsn=3d0d960b_2

⁹ EDB, Press Release, 2020, edb.gov.sg/en/about-edb/media-releases-publications/volocopter-commits-to-launch-air-taxi-services-in-singapore.html



A ROADMAP TO LAUNCH UAM in Singapore

UAM is a new market with little operational precedence, especially in a densely populated environment. This section details key considerations to develop a roadmap for launching UAM in Singapore. We first identify the initial target customer and market segment, emphasizing the four key service enablers that differentiate Volocopter's product and service offerings. Afterwards, we discuss the air taxi routes using sample user journeys. Finally, in this section we present high-level considerations for local operations, followed by an outlook on the next steps.

2

Crewed flight demonstration of
2X model in 2019, across Marina Bay

2.1 CONSUMER BEHAVIOR AND TARGET MARKET

A recent international study¹⁰ on how consumers view UAM has shown that the main reason for using urban air taxis is to reduce travel time — especially for highly congested urban areas. The survey also shows that the number of people willing to commute in a UAM vehicle decreases with age and increases with household size. The study concludes that an early UAM adopter is between the ages of 18 and 29 and lives in a large household; gender does not seem to have a significant impact on consumer preferences. Additionally, the survey reveals that 35% of today's ride-hailing users and 32% of limousine users are willing to switch to an air taxi to get to the airport. Those consumers using public transportation or private cars are the least willing to switch, possibly due to their higher price sensitivity.

Individual feedback from Volocopter's 2019 Singapore flight trial and a subsequent consumer study conducted in Singapore in 2020 show that there is market potential for local private Volocopter aerial tours, especially crewed flights. In the survey, **72% of those surveyed expressed high interest in flying in a VoloCity**. Those keen on aerial tours tend to be younger and have higher personal incomes. In keeping with other studies worldwide, safety was the main barrier expressed among those apprehensive about UAM services. Notably, **piloted flights are preferred over autonomous flights by a significant margin**.¹¹ Beyond aerial tours, Volocopter will be able to add a new dimension of mobility to the urban environment of Singapore. Using direct aerial paths to bring customers to their destinations, Volocopter will increase convenience, reduce travel time, and offer an escape from conventional roads/traffic. Furthermore, Volocopter services support the Singapore government's roadmap to reduce car ownership.¹²

How big is the potential segment size for urban air taxis in Singapore? A feasibility study performed by Grab and Volocopter has yielded an auspicious outlook. Based on a share of 0.5% of 200 million rides per year (a combination of privately hired cars, buses, rails, and taxis), the study reveals a segment size of S\$250 million as of the launch date.



“ As a superapp, Grab has gathered traffic patterns and user insights in the region to help our teams come up with innovative mobility solutions. This partnership will enable Volocopter to further develop urban air mobility solutions that are relevant for Southeast Asian commuters so they can decide on their preferred journey option based on their budgets, time constraints and other needs, in a seamless way.

Chris Yeo, Head of Grab Ventures, 18 February 2020¹³

¹⁰ McKinsey Study “Up in the air: How do consumers view advanced air mobility”, 2021, [mckinsey.com/industries/aerospace-and-defense/our-insights/up-in-the-air-how-do-consumers-view-advanced-air-mobility](https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/up-in-the-air-how-do-consumers-view-advanced-air-mobility)

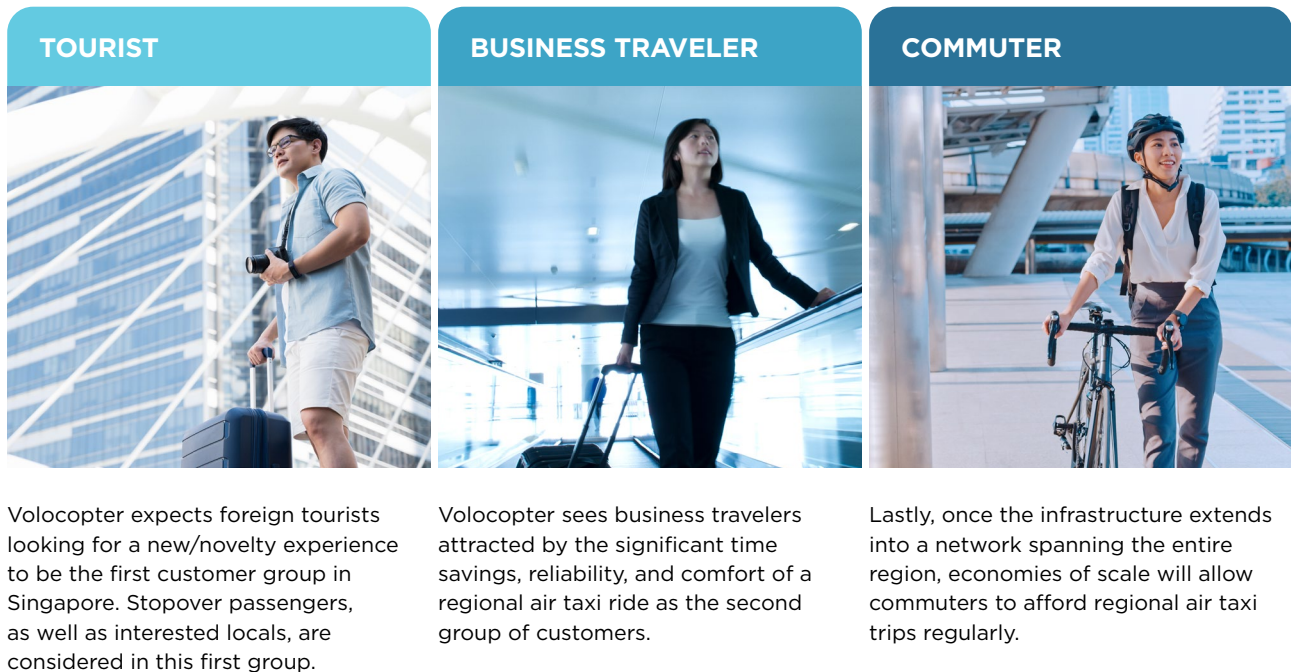
¹¹ Air Taxi Services Consumer Interest Study conducted by an external agency for Volocopter, 2020

¹² Vehicle Ownership Controls, Ministry of Transport Singapore, mot.gov.sg/About-MOT/Land-Transport/Motoring/Vehicle-Ownership

¹³ Volocopter, Press Release, 2020, [volocopter.com/newsroom/volocopter-and-grab-conduct-air-taxi-feasibility-study-in-southeast-asia](https://www.volocopter.com/newsroom/volocopter-and-grab-conduct-air-taxi-feasibility-study-in-southeast-asia)

2.2 TARGET CUSTOMERS

Based on the target market and routes of the VoloCity, there are three different customer types for the urban air taxi service in Singapore as shown in Figure 5 below.



Volocopter expects foreign tourists looking for a new/novelty experience to be the first customer group in Singapore. Stopover passengers, as well as interested locals, are considered in this first group.

Volocopter sees business travelers attracted by the significant time savings, reliability, and comfort of a regional air taxi ride as the second group of customers.

Lastly, once the infrastructure extends into a network spanning the entire region, economies of scale will allow commuters to afford regional air taxi trips regularly.

Figure 5 VoloCity Target Customers

2.3 FOUR KEY SERVICE ENABLERS

The VoloCity combines **four characteristics** that make it the perfect transportation mode in urban environments. First, the aircraft are very sustainable by offering electrically powered flights and **not adding to the pollution** in megacities. Second, they are **very quiet** compared to conventional aerial transportation modes like helicopters or airplanes. In fact, they are so subtle that they cannot be heard flying over the backdrop of regular city noise. The VoloCity will blend into the background noise of an average city, illustrated in Figure 6.¹⁴ Third, urban air taxis will provide **extremely high safety standards**, equivalent to conventional jetliners. Fourth, the landing infrastructures, i.e. VoloPorts, will serve as **iconic landmark attractions**, especially in the early years of the service. Their unique design and appearance will attract customers and tourists from countries worldwide and serve as a brand experience center for Volocopter.

To sum up, Volocopter will create the mobility solution in Singapore to fit the interests and needs of the customers, the Singaporean public, and the urban environment.

¹⁴ At 65 dB, a Volocopter is 4-5 times quieter than a standard helicopter at a 120 m distance

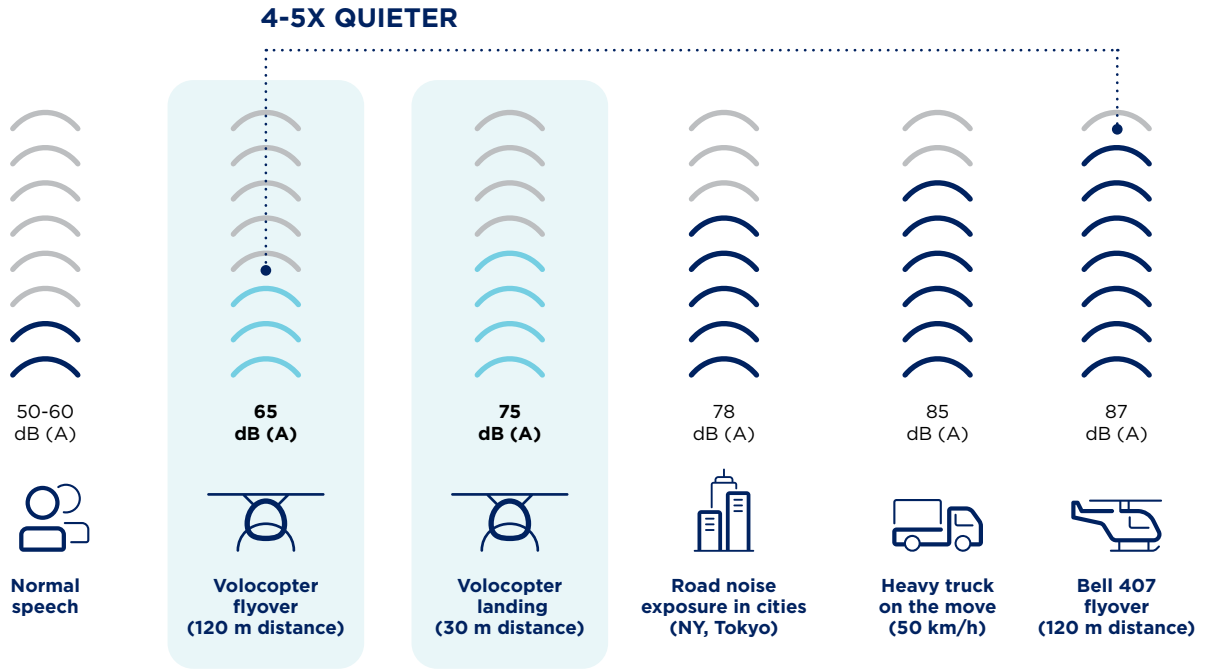


Figure 6 Volocopter Noise Level

2.4 THE CONCEPT

Volocopter is preparing for the commercial launch of UAM services in Singapore to connect urban areas with sustainable, aerial solutions. Volocopter’s ecosystem will comprise electric air taxis (the VoloCity and VoloRegion*), electric heavy-lift drones (the VoloDrone), ground infrastructures essential for the UAM ecosystem (the VoloPort), and a digital connective platform for UAM (the VoloIQ).

VOLODRONE

Heavy-lift cargo drone



VOLOCITY

Urban air taxi



VOLOREGION*

Air taxi for long distances



RANGE	40 km	RANGE	35 km	RANGE	~100 km
CRUISE SPEED	80 km/h	CRUISE SPEED	90 km/h	CRUISE SPEED	~180 km/h
PAYLOAD	200 kg	PAYLOAD	200 kg	PAYLOAD	300 - 400 kg
SAFETY	10 ⁻⁹	SAFETY	10 ⁻⁹	SAFETY	10 ⁻⁹

Figure 7 Volocopter Product Portfolio and Specifications

*The aircraft was renamed the VoloRegion in October 2022 (formerly the VoloConnect)

Volocopter aims to build a strong, strategic partnership network in Singapore. The company is proactively engaging with city decision-makers and forging alliances with a coalition of industry, academia, think tanks, and NGOs to fully develop a multi-layered ecosystem of partners and stakeholders. A holistic approach is essential to make the UAM launch in Singapore successful. With this ecosystem, the launch of Volocopter services in Singapore will change the future of urban air mobility globally, and especially in APAC.

2.4.1 Air Taxi Routes: An Overview

To deliver the benefits outlined above, Volocopter envisions four to six VoloPorts in Singapore by 2030. The areas currently in consideration for the VoloPort construction are Marina South, Sentosa, and the Changi area. The feasibility of air taxi routes as outlined in the roadmap below are based on these locations.

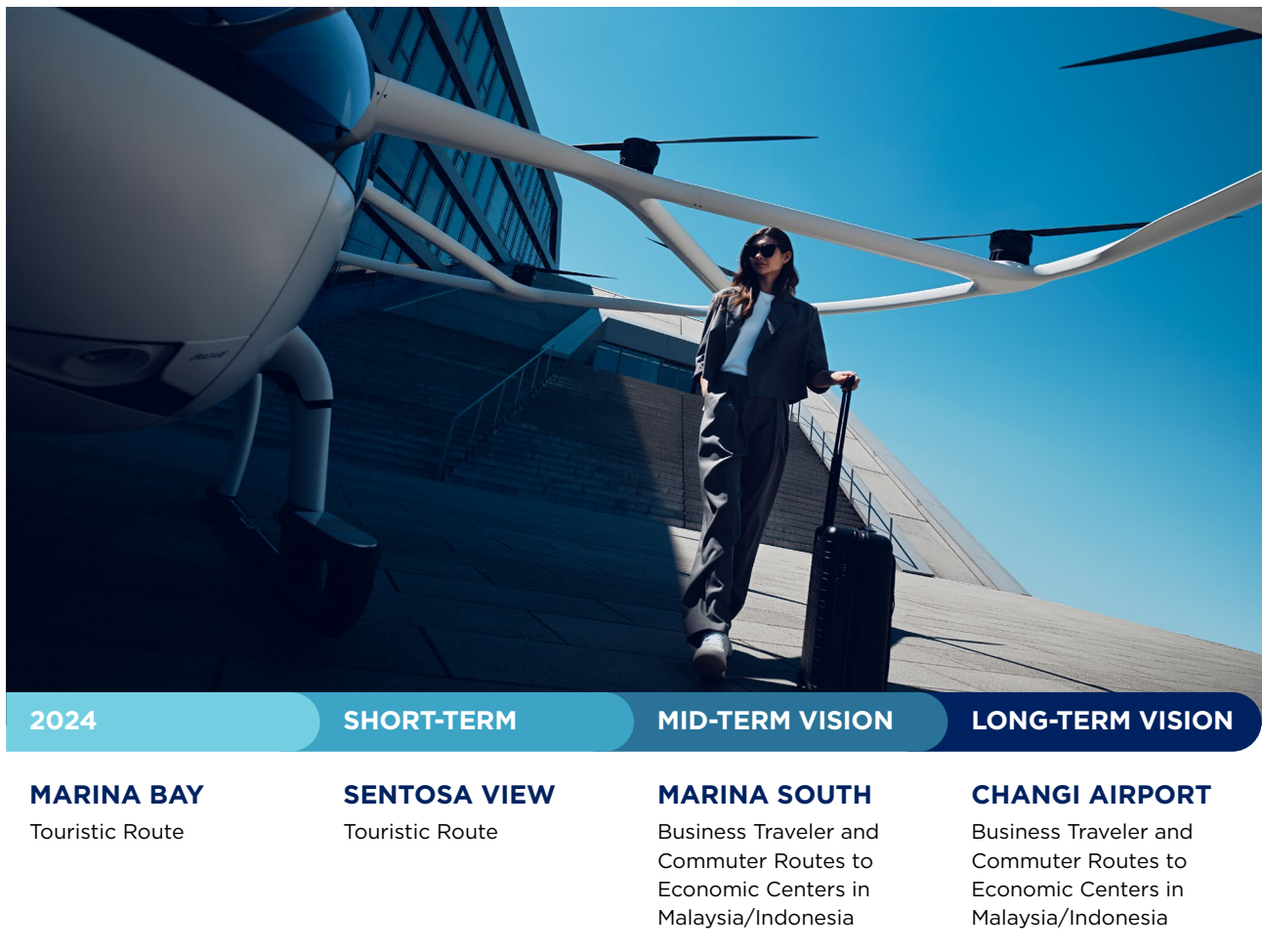


Figure 8 Roadmap for Potential Air Taxi Routes

2.4.2 Touristic Routes

For the initial VoloCity launch, Volocopter will focus on touristic routes within the heart of Singapore. These include a scenic circular path within the Marina Bay area offering incredible views of Marina Bay Sands, the Central Business District, the Formula One racetrack, and the Singapore Flyer. A second potential route would offer unique views over Sentosa Island and the Singapore skyline. Volocopter seeks to work closely with the Singaporean Tourism Board to create unforgettable experiences for locals and international tourists. The potential areas for the touristic routes are illustrated in Figure 9 below.



Figure 9 Marina and Sentosa View as Two Examples of an A-A Touristic Route

2.4.3 Regional Cross-Border Routes

After launching these two touristic routes, Volocopter could then expand its VoloCity network to cross-border flights by utilizing Singapore’s unique city island landscape and its proximity to Indonesia and Malaysia. These short, cross-border flights offer unique, time-saving opportunities to travelers and complement the country’s excellent domestic ground transportation network.

A business traveler landing at Changi Airport and traveling to the Ibrahim International Business District of Johor Bahru, Malaysia, could arrive at their destination in 30 minutes, compared to 3 hours* by car.

Volocopter also envisions integrating Changi Airport into the VoloPort network for efficient and convenient transfers from Changi to central business districts in the neighboring countries.

While a typical journey by car between Changi Airport and Ibrahim International Business District (IIBD) of Johor Bahru, Malaysia can take more than three hours*, a VoloCity flight along this route would take 30 minutes. By choosing a VoloCity flight, a business traveler transiting from Changi Airport to IIBD could save up to 150 minutes on their journey.



Figure 10 Ibrahim International Business District and Tanjung Puteri are in the Central Business District, Johor Bahru and are examples of popular destinations served by an A-B cross-border route

*Dependent on the traffic conditions at Johor Causeway



An air taxi flight from Changi Airport (to Batam, Indonesia) would take less than 20 minutes, saving them up to 160 minutes on their journey.

Similarly, regional connectivity could be improved by offering air taxi services for journeys between Singapore and Indonesia. With the opening of Nongsa Digital Park, a technology talent magnet at the Indonesia-Singapore border, air taxi services could provide significant time savings and greater connectivity. The VoloCity will serve as a bridge between Singapore and Indonesia and attract digital entrepreneurs from the region.

Connecting journeys via Singapore to Indonesia can become more time-efficient with a VoloPort at Changi Airport. Today, business travelers have to go from the airport to Harbourfront Ferry Terminal. Including waiting times for the ferry, it can take up to three hours to travel to Nongsapura Ferry Terminal in Batam, Indonesia. Comparatively, the duration of the VoloCity flight from Changi Airport will take less than 20 minutes, reducing current travel times by around 160 minutes.



“ Indonesia has designated the Nongsa Digital Park as a Special Economic Zone for digital economy and tourism. Batam has the geostrategic advantage of being located close to Singapore and can serve as a digital bridge to connect Singapore to other growing cities in Indonesia. I am heartened to see companies like Volocopter taking the lead to launch urban air mobility to enhance regional connectivity, contributing to the outcome of bilateral discussions to develop Batam as a digital bridge between Singapore and Indonesia.

H.E. Suryo Pratomo, Ambassador, Embassy of the Republic of Indonesia, 2021



Figure 11 Nongsa Digital Park is in Batam, Indonesia and is an example of a popular destination served by an A-B cross-border route

In the long term, air taxi services could also entice tech talents to continue working in Singapore and Indonesia. Efficient and convenient cross-border travel will attract Singapore-based companies to leverage their proximity to Indonesia and strengthen both tech industries.

2.4.4 Sample User Journey

The customer is at the center of every VoloCity service in the world. Customer loyalty will grow if the user experience is intuitive, convenient, and reliable. To gain customer loyalty, the VoloCity customer journey must be perfectly integrated into other transportation methods to reduce waiting times and create seamless experiences. A sample user journey is illustrated below:

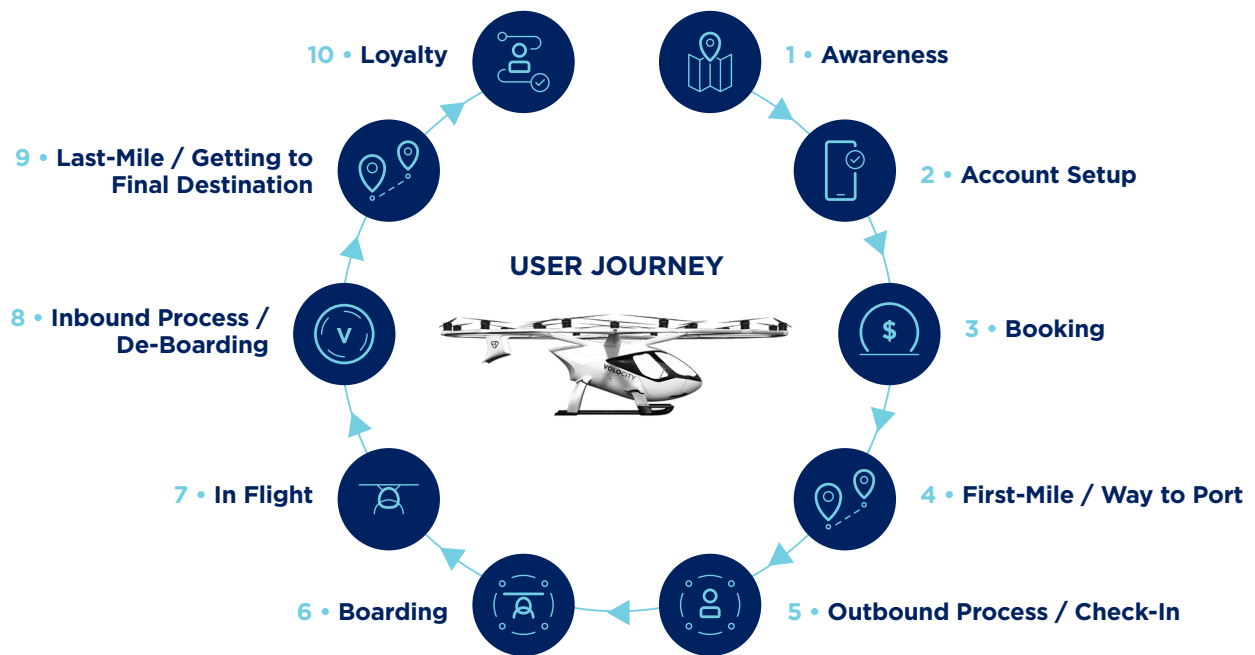


Figure 12 Overview of VoloCity User Journey

1. **Awareness:** Customers become aware of Volocopter’s services through direct channels such as the Volocopter website, app, and VoloPort kiosk, or indirect channels like social media, travel platforms, or tour agencies.
2. **Account Setup:** A customer decides to fly with Volocopter to save time on a business trip, choose a quick commute to work, or enjoy a unique view of Singapore. They can download the Volocopter app and create an account.
3. **Booking:** The customer enters the desired departure time, departure point, destination and then chooses a suitable flight. After settling the payment, they will input their weight data to confirm the booking and receive their virtual ticket.
4. **First-Mile / Way to Port:** The customer receives a reminder of the upcoming flight with the relevant information and security briefing on their digital devices ahead of the flight.
5. **Outbound Process / Check-In:** Upon arrival at a VoloPort, the staff will welcome the customer and verify their ID and ticket. They will then go through a weight and security check before entering the waiting area of the VoloPort.

6. **Boarding:** When the VoloCity is ready for departure, the customer enters the boarding area and scans their boarding pass. A VoloPort staff member will guide the customer to the aircraft and help them get settled in.
7. **In Flight:** After the necessary clearances, the VoloCity takes off and flies to the destination VoloPort. During the flight, the customer can enjoy the view from the VoloCity or prepare for their next meeting.
8. **Inbound Process / De-Boarding:** Upon arrival at the destination VoloPort, staff will guide the customer as they leave the VoloCity and enter the destination VoloPort, receiving their luggage. They are then free to leave the VoloPort.
9. **Last-Mile / Getting to Final Destination:** The customer can choose to walk or use a variety of other public transportation options to get to their destination.
10. **Loyalty:** After leaving the VoloPort, the customer can evaluate the customer experience and receive recommendations for future flights.

To offer this customer journey, dedicated VoloPorts for VoloCity operations are essential for the long-term success of urban air mobility in Singapore. To minimize customers' travel times, VoloPorts ought to be centrally located and strategically positioned. The second key success factor for Volocopter services is integrating with providers of other existing transportation modes, like ride-hailing, taxis, and public transportation networks. Volocopter aims to be a key part of the customers' multimodal journey, seamlessly complementing other modes of ground transportation.



Figure 13 Rendered image of VoloPort atop urban building with VoloCity and VoloRegion*

*The aircraft was renamed the VoloRegion in October 2022 (formerly the VoloConnect)

2.5 OPERATIONS

To commercially operate eVTOLs, it is crucial to have a clear roadmap for (1) staff training, (2) air taxi operations, (3) maintenance, repair, and overhaul (MRO), (4) infrastructure support, and (5) digitalization of UAM.

- 1. Staff Training:** Since eVTOL aircraft are a new type of aircraft with new conditions and procedures, operational staff need specific training. This is true for pilots, maintenance teams, and ground personnel. On 8 July 2021, Volocopter and CAE, a global leader in aviation training, announced a strategic partnership to develop, certify, and deploy an **innovative pilot training program** for eVTOL operations. All training programs offer a great learning and growth opportunity for both seasoned and novice staff in Singapore.



“ As a high-technology company and the industry leader in pilot training, we continuously look at providing solutions that make the world a safer place. We are committed to supporting Volocopter’s inspiring vision and we look forward to leading in the design of UAM pilot training that prioritizes safety of operations through our data-driven solutions, world-class pilot training experience, and longstanding relationships with civil aviation authorities across the globe.

Nick Leontidis, CAE’s Group President, Civil Aviation Training Solutions, 8 July 2021¹⁵

- 2. Air Taxi Operations:** We plan to offer air taxi transport services for passengers in urban environments. Volocopter differs from traditional airline services by flying electric with fewer seats, shorter ranges, and lower altitudes. Volocopter aims to show travelers at all stages of the customer journey how fast and convenient air taxi travel is compared to ground transportation. This experience will require seamless boarding procedures and best-in-class reliability, while unwaveringly ensuring the highest safety standards.
- 3. Maintenance, Repair, and Overhaul (MRO):** To ensure that Volocopter services operate at the highest levels of reliability and safety, the company promises to uphold robust maintenance processes. These processes will use modified frameworks from conventional aircraft or helicopters to match the idiosyncracies of the eVTOL aircraft. In Singapore, Volocopter will establish a strategic MRO concept to serve as a basis for future expansion into APAC. The appropriate setup of maintenance hangars and training processes for MRO technicians will be coordinated in Singapore.

¹⁵ CAE, Press Release, 2021, [cae.com/news-events/press-releases/cae-and-volocopter-to-partner-and-create-the-global-air-taxi-pilot-workforce-of-tomorrow](https://www.cae.com/news-events/press-releases/cae-and-volocopter-to-partner-and-create-the-global-air-taxi-pilot-workforce-of-tomorrow)

- 4. Infrastructure support:** Together with its partner Skyparts, Volocopter is developing VoloPort infrastructure in Singapore to serve all aspects of vertiport operations, including aircraft ground services and passenger handling. In close consultation and collaboration with local authorities, we plan to establish a platform that paves the way toward safe, efficient, and viable vertiport infrastructure for Singapore and the APAC region.



“ Our VoloPort will be a crucial component in the development of an electric passenger air taxi service in Singapore – the first permanent, commercial service in the Asia-Pacific region. Skyparts is working to create a network of vertiports across the city-state to enable our partner Volocopter to maximise its sustainable urban air transport solution for the people of Singapore.

Duncan Walker, Managing Director of Skyparts, 17 January 2022

- 5. Digitalization of UAM:** Legacy tools and solutions for data management, such as MRO systems, flight planning, and monitoring tools that are commonplace in aviation, were not built to cope with the challenges of the emerging UAM industry. Instead, UAM requires a solid, holistic, more comprehensive, accessible, and digital foundation. This is where the Volocopter in-house digital software platform, the VoloIQ, comes into play. More information on Volocopter’s digital business model and VoloIQ is available in Whitepaper 2.0: The Roadmap to Scalable Urban Air Mobility.



“ Digital platforms and integrated solutions are the key to scale operations globally. They allow a seamless connection between existing ecosystems and new services. We look forward to being part of this newest sector of aviation. With our vast knowledge and experience, we will build a unique solution for Volocopter, bringing to life the VoloIQ.

Bernd Appel, Managing Director of Lufthansa Industry Solutions, 28 October 2020¹⁶

¹⁶ Volocopter, Press Release, 2020, volocopter.com/newsroom/volocopter-and-lufthansa-industry-solutions-cooperate-to-build-voloiq-on-microsoft-azure

Through existing agreements and partnerships with global leaders, such as Daimler, Aéroports de Paris, Microsoft Azure, and now CAE, Volocopter plans to launch its commercial services in cities around the world in the next few years. To achieve this, Volocopter is committed to developing Singapore into an MRO, R&D, and pilot training hub for UAM, alongside existing and new partners in APAC. This clear ambition, evident in the **projected indirect and induced benefits by 2030**, would advance Singapore's position as the aviation hub for the region.

2.6 OUTLOOK AND NEXT STEPS

On July 6, 2021, Volocopter secured Production Organisation Approval (POA) in compliance with the European Union Aviation Safety Agency (EASA Part 21G). Volocopter has now acquired its long-standing, trusted partner in innovation and production, DG Flugzeugbau, a global leader in composite aircraft production. Through this acquisition, **Volocopter is now the first and only eVTOL company holding both the required design and production organization approvals (DOA and POA) to advance its aircraft toward commercial launch.** This gives the company a competitive edge in the race to bring UAM to life. With the POA comes the ability to manufacture aircraft and ramp up productions, successfully pivoting Volocopter to deliver air taxi services at scale.¹⁷ Volocopter is currently working to expand the scope of POA to cover eVTOL aircraft production.

Simultaneously, Volocopter will continue to contribute and closely align with the EASA and CAAS to co-create UAM regulations. Volocopter will further explore R&D projects with local academic institutions and deepen ongoing conversations with local industries. Closer to the launch, Volocopter plans to create a public exhibit to increase public awareness and acceptance of this innovative service.

Besides preparing for the commercial launch of air taxis, Volocopter is also exploring possibilities to introduce the VoloDrone in Singapore. In this context, providing cargo services in and around Singapore would serve as a value-added element for the whole value chain, supplementing the existing transport logistics network.

¹⁷ Volocopter, Press Release, 2021, volocopter.com/newsroom/volocopter-secures-production-organisation-approval



Figure 14 VoloDrone prototype flying at ITS World Congress in Hamburg

SCHENKER

“ The VoloDrone unlocks new possibilities for the logistics industry, and it represents a key element for DB Schenker’s innovation and sustainability roadmap for logistics. Volocopter’s leadership in this emerging urban air mobility industry is most evident in their practical solutions, their customer-centric approach, and their commitment to bring UAM to life.

Erik Wirsing, Vice President Global Innovation at DB Schenker, 1 July 2021¹⁸

¹⁸ DB Schenker, Press Release, 2021, dbschenker.com/global/about/press/volocopter-and-db-schenker-announce-first-blueprint-for-volodrone-operations-708858



CONCLUSION

This document has demonstrated that UAM is tangible and stands to greatly benefit Singapore. Volocopter will continue to take all the necessary steps to prepare a safe, exciting, and memorable launch in the island city. We look forward to welcoming you on board soon.

3

Crewed flight demonstration of 2X model in 2019, across Marina Bay

3 CONCLUSION

UAM will trigger a profound transformation in how we move about our cities for decades to come. But who can really predict how exactly these technological breakthroughs and the emerging ecosystem will impact our lives 20 years from now? What we can say for sure is that Singapore is positioned squarely at the forefront of this exciting development.

Volocopter's aircraft portfolio provides tangible solutions with the potential to benefit Singapore economically, environmentally, socially, and politically. This requires a deep understanding of Singapore and demands close collaboration between Volocopter and the regional parties to shape the future of urban air mobility. Volocopter is focused on hiring local talent to build on employees' expertise, cultural knowledge, and highly developed skills in order to fully understand local conditions.

Furthermore, Volocopter will create an **entire ecosystem of solid partnerships** with industry-leading companies and institutions. For example, we have completed our initial feasibility study with ride-hailing provider Grab. There are several other ongoing projects with various Singaporean enterprises and institutions that aim to create new mobility solutions.

Lastly, Volocopter will continue its close alignment with the Singaporean government to achieve its long-term mutual vision: for Singapore to be the **torchbearer for the UAM industry and regulators**. Volocopter will continue to strengthen its working relationship with the forward-thinking people and government of Singapore, including MOT, CAAS, and EDB, to ensure a successful commercial launch of the Volocopter services in Singapore.

This success will inspire other markets and lead by example vis-à-vis other countries in APAC to launch UAM services.

Imprint

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We bring urban air mobility to life