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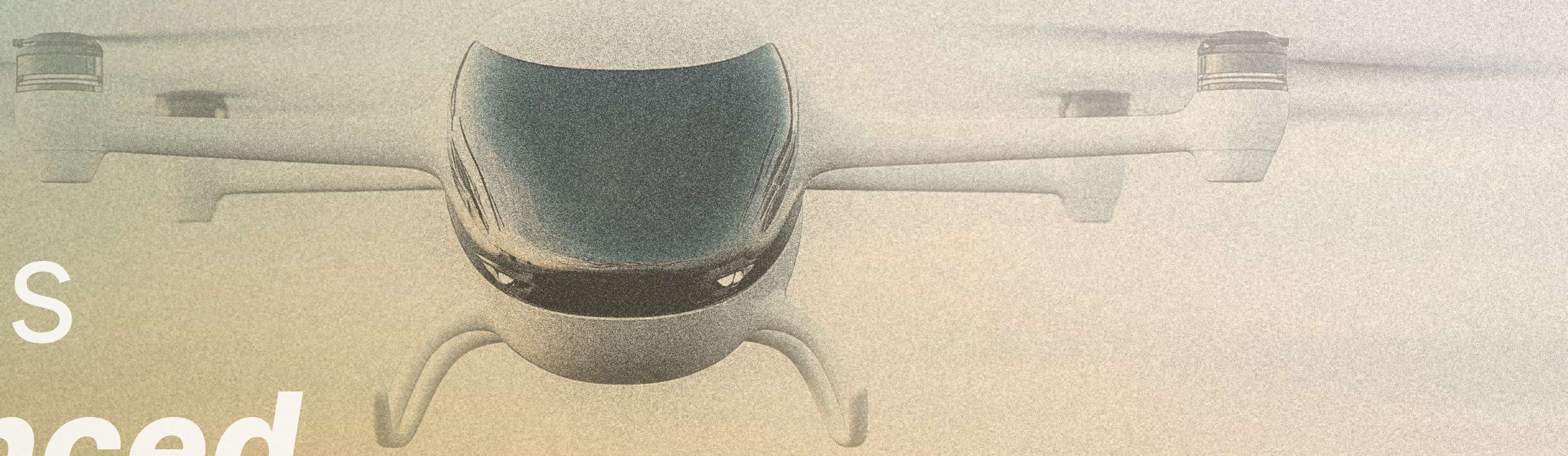

# What is *Advanced Air Mobility?*

A case for advanced automated electric aircraft in Denmark

Christina Okai Mejborn, Claus Lassen, Lars Illum Jørgensen, Martin Winther Andersen, Kelly Andrew Nelson

# Welcome to the white paper series ***Luftforbindelser***

This is the first in a series of white papers that examine the potential of introducing advanced automated electric aircraft as a sustainable mode of transport to the Danish market. The infrastructure surrounding electric aircraft is often referred to as "advanced air mobility" (AAM), and includes small manned or unmanned aircraft for the transport of passengers or cargo.

ZESO Architects see great potential in using AAM to create greater cohesion in Denmark, especially in regional areas with limited access to public transport. By integrating new sustainable mobility technologies into our infrastructure planning, we can help build bridges and create connections where it makes a difference.

We have joined forces with Aalborg University, UAS Denmark Test Center and Grøn Luftfart in a consortium to uncover what AAM means in a Danish context and who will benefit from it.

Together we will create and visualize a feasible concept for AAM in Denmark with concrete examples of how it could become an integrated part of public transport.

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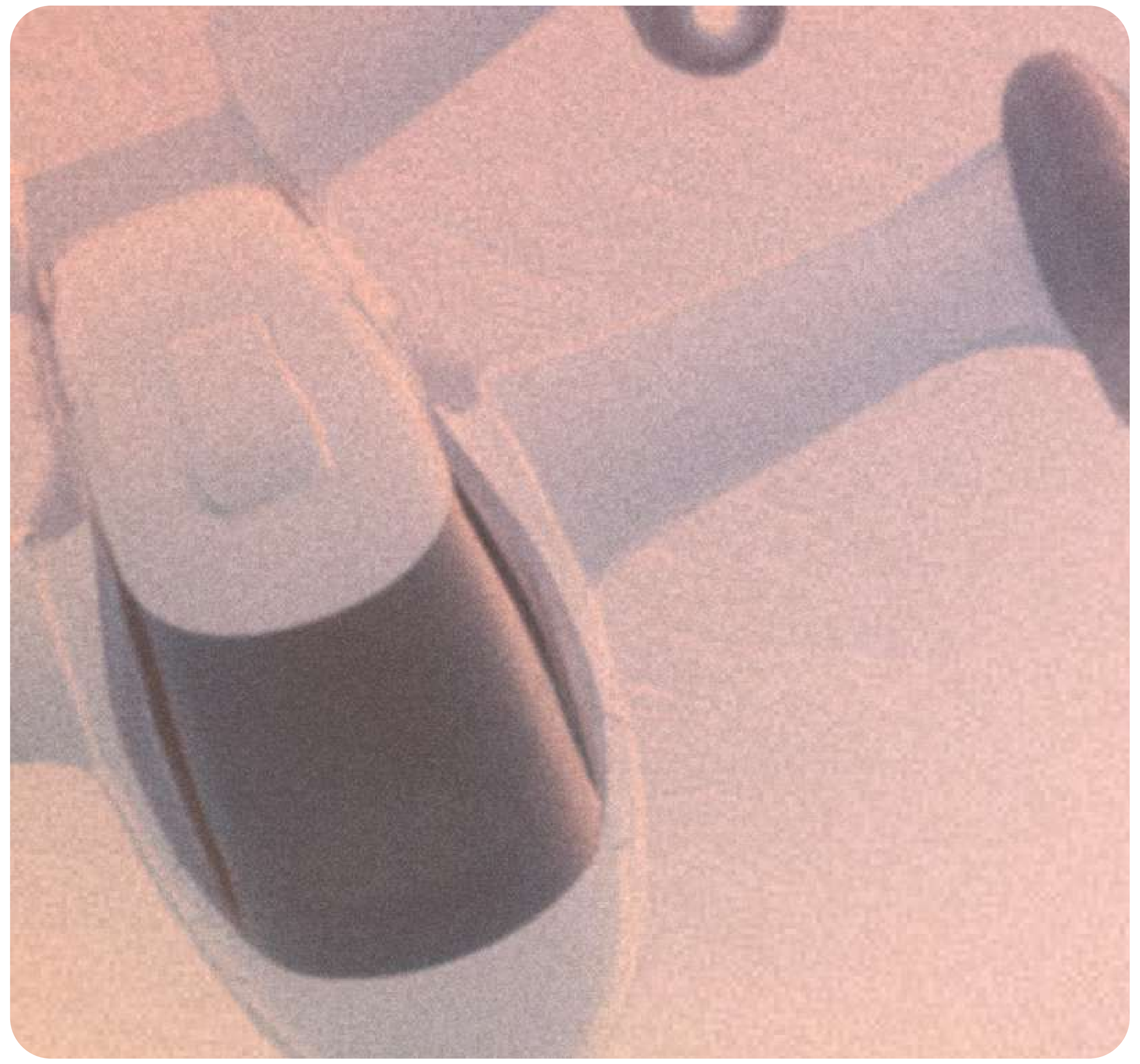
# Content

The subject of this white paper is to understand the motivations behind travel and to explore what Advanced Air Mobility (AAM) consists of.

Each of the chapters is dedicated to one of four contributors from the consortium, who examines their particular field of expertise.









# 01 The Travel Needs

What potential impact could AAM have on proximity needs in regions outside the big cities?

“

Reference can be made to the English sociologist John Urry, who is concerned with the underlying reasons for human mobility. He examines what social motives or rationales lie behind the need to move from point A to point B.

**Claus Lassen**
Ass. Professor of Mobilities and Urban Planning
Director Danish Aeromobilities Academy
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**Bio**

Claus is an associate professor and research leader at Aalborg University, specializing in the societal impact of aviation, including on business travel, decision-making processes, airport planning and the historical development of aviation. He is a leading researcher in the field of aeromobility with a focus on the role of aviation in society. He led the Grand Solution project, Airport City Future, and supervised five business PhDs in the project. Claus has published several internationally recognized books and articles and completed executive programs at Harvard Business School.

Fundamentally, the public transport system in Denmark operates at a financial deficit.
This reflects a deliberate societal and political prioritization, aimed at reducing individual car dependency. The broader socio-economic benefits to society outweigh the financial investment.

We must acknowledge that AAM, whether implemented as a pilot scheme or as a permanent system, will entail public financing, and it is necessary to determine the scale of these costs. How much flying would be possible if the same level of subsidy were applied as it is for public buses, and how would this align with social needs? Would it make a difference?

From a regulatory perspective, it makes sense to initiate AAM facilities at existing airfields where landing permissions are already in place. Shuttle buses could then be connected to provide onward transport into the city.

Alternatively, AAM landing sites should be located in areas with already high levels of mobility - for example, at a Park & Ride facility with access to a car sharing scheme.

It is important that the AAM system provides predictability, with clearly defined service frequencies and departures. A certain number of fixed departures could be scheduled, supplemented by 'on-demand' services that are included in the timetable but only operate if bookings have been made.

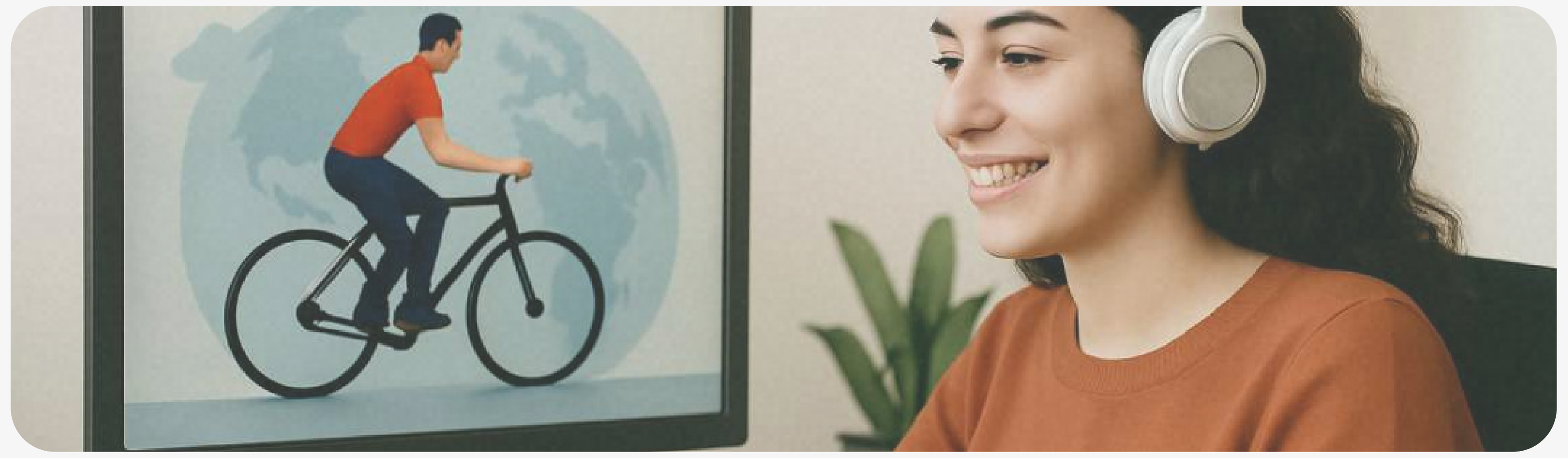
### The Tourist

Seeks the different and extraordinary to break away from everyday life

### Mobility as a Necessity

Social and economic obligations force people to move physically (work, education, health, relationships, etc.)

### Systemic Mobility



Physical, virtual and imaginary mobility affects how and why we move

### Mobility Paradigm

Focus on flow, networking and participation in social movements

Examples of motives for people to move from one place to the other

***Insights from Claus Lassen, Aalborg University***

*Lassen's insights underscore the importance of strategic planning and public investment in shaping the future of mobility in Denmark and of aligning AAM infrastructure development with societal needs.*

## Mobility cannot be conceived solely in the singular. It must be understood in the plural if we are to grasp the underlying reasons for people's movements.

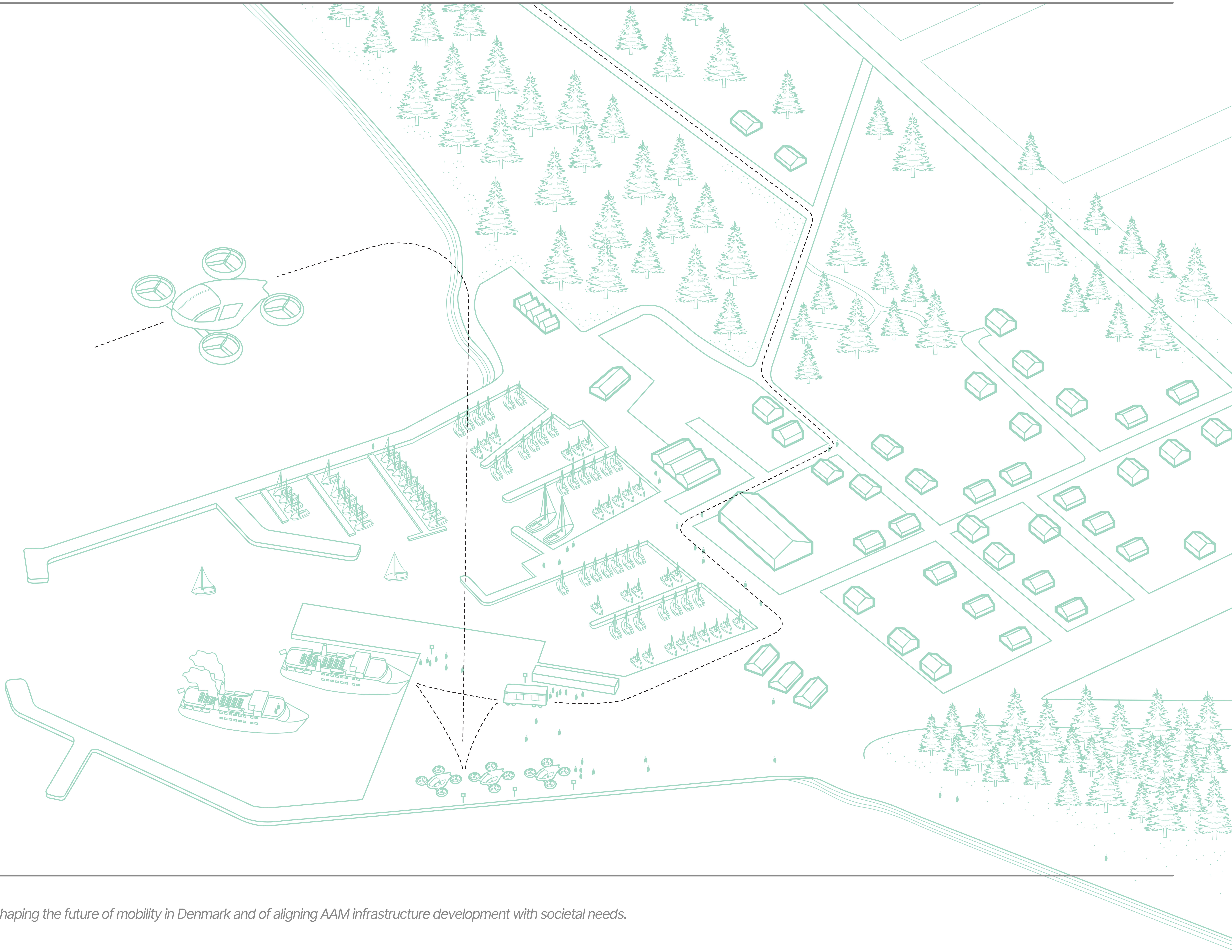
As an example of a remote area outside the major cities, one might consider an island without a bridge connection. More generally, one may ask what constitutes the positive discourse around living on an island. An island may foster a sense of closeness, community, and strengthened local identity, while also offering proximity to nature and embodying a 'slow living' concept.

At the same time, there are certain challenges associated with everyday life, as living on an island may entail reduced opportunities for employment. The labor market is more limited, and part of one's work may have to take place online. There are greater constraints and more obstacles to accessing education, which may in turn diminish one's economic mobility. Especially among young people in geographically challenged areas, where access to education is not a given, there is a need for a broader and more diverse range of educational opportunities that reflect societal development and young people's individual ambitions.

There may also be limitations in terms of access to cultural and leisure activities, as well as a lack of doctors, hospitals, educational institutions, and even basic goods.

Consequently, island life is highly dependent on access to infrastructure. Until now, this has largely been one-dimensional, relying on walking, cycling, or driving onto a ferry.

Increased mobility would profoundly affect the ways in which island residents live. Mobility is an integral part of daily life. It does not exist outside of it.



***Insights from Claus Lassen, Aalborg University***

*Lassen's insights underscore the importance of strategic planning and public investment in shaping the future of mobility in Denmark and of aligning AAM infrastructure development with societal needs.*

# 02 The Airspace

Which layers of the airspace does AAM occupy and how does it relate to other forms of air transport?

“

When discussing AAM, three fully holistically integrated elements must be considered:
**zero-emission aircraft, automated airspace and multiports**

**Lars Illum Jørgensen**
Business Developer, UAS Denmark

**Bio**

Lars heads the activities within advanced air mobility at UAS Denmark International Test Center, including the development of airport infrastructure and testing of airspace for autonomous vehicles. He previously worked for 20 years at Fairchild Dornier and Airbus as a systems engineer, flight tester, business developer, technical manager and chief engineer.

Three holistically integrated elements (aircraft, airspace and multiport) and the current expectations for a future AAM route network.

Illustration: Væridion


## Aircraft - Emission-free & automated

AAM aircraft are emission-free and will feature a high degree of automation - blending autonomous and automatic functions.
It is expected that the volume of air traffic generated by AAM aircraft will significantly increase overall air traffic levels.
Thus, several AAM aircraft will be visible simultaneously, and in urban areas, there will at any given moment be between five and ten of them in the air.

## Airspace - Aircraft network in the air

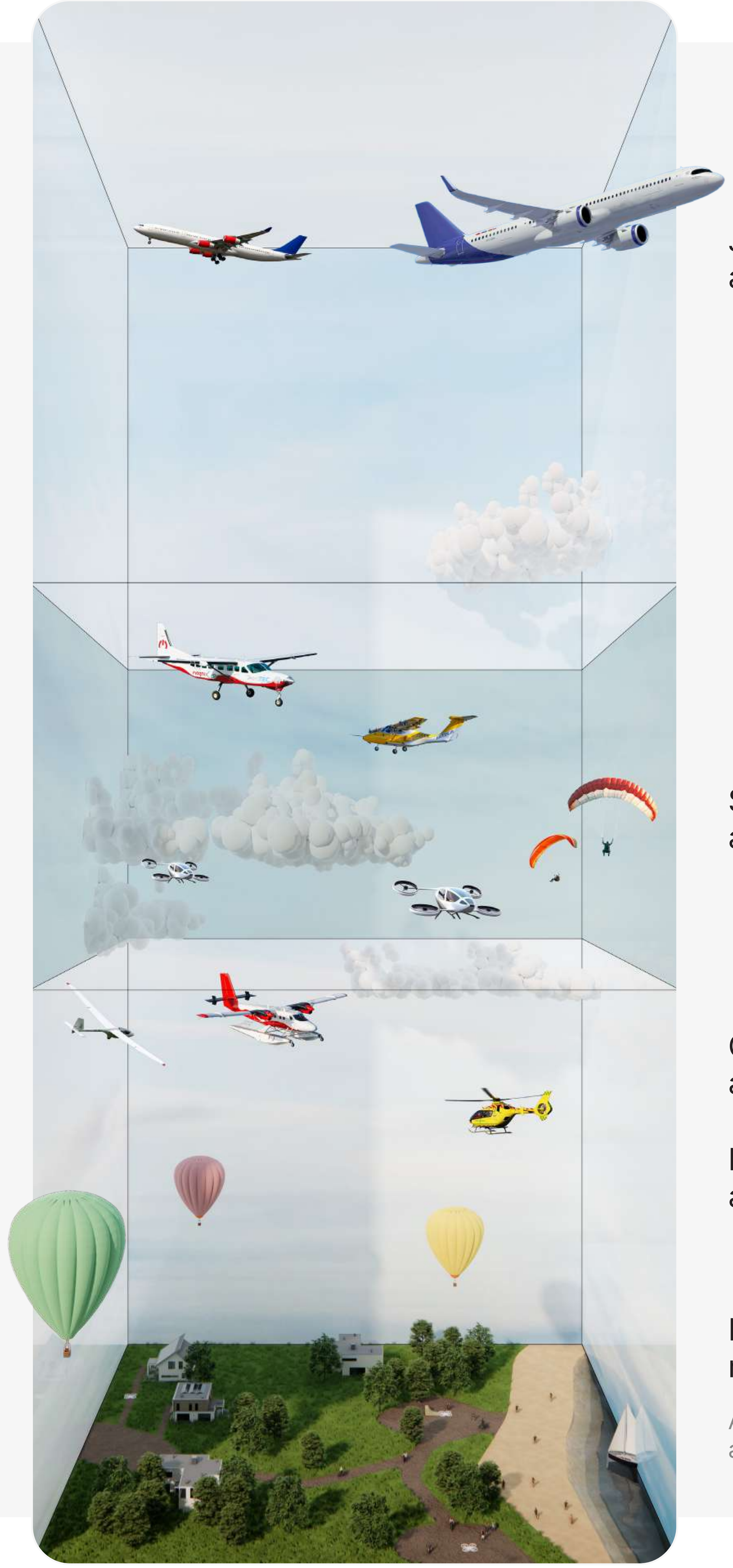
Aircraft must be capable of mutual detection, a function managed under UTM (Unmanned Traffic Management).
At a higher level, this framework is encompassed by the concept of U-space, in which automated systems ensure safe and efficient route planning. Detection can be achieved either through onboard technologies that allow drones to sense other aircraft directly, or via signaling systems that transmit their positional data to surrounding traffic.

## Multiport - Landing area

The multiport is the location where the aircraft takes off and lands. Potential landing areas include existing airfields, the outskirts of industrial zones, or the peripheries of residential neighborhoods.

***Insights from Lars Illum Jørgensen, UAS Denmark***

*Jørgensen emphasizes the importance of regulation, technology and strategic planning in shaping a safe and efficient future for air mobility.*



Jet
approx. 10 - 12,000 m

AAM & GA
approx. 1,000 - 2,300 m

General AAM and drone flights in UAS' airspace are typically at an altitude of approximately 1 - 2 kilometers above the ground.

Skydiving
approx. 1,000 – 4,000 m

Glider & Seaplane
approx. 500 - 2,000 m

Helicopter
approx. 400 - 600 m

Remote controlled drone
max. 120 m

Activities in the air above 120 meters in altitude are called BVLOS - Beyond Visual Line of Sight

## To prevent collisions, notions such as 'See & Avoid' (involving a human operator), 'Detect & Avoid,' and 'Sense & Avoid' are employed.

The figure provides a mapping of where AAM aircraft are positioned within the airspace in relation to other modes of aerial transport. Other users of the airspace include gliders, hang gliders, and parachutists.

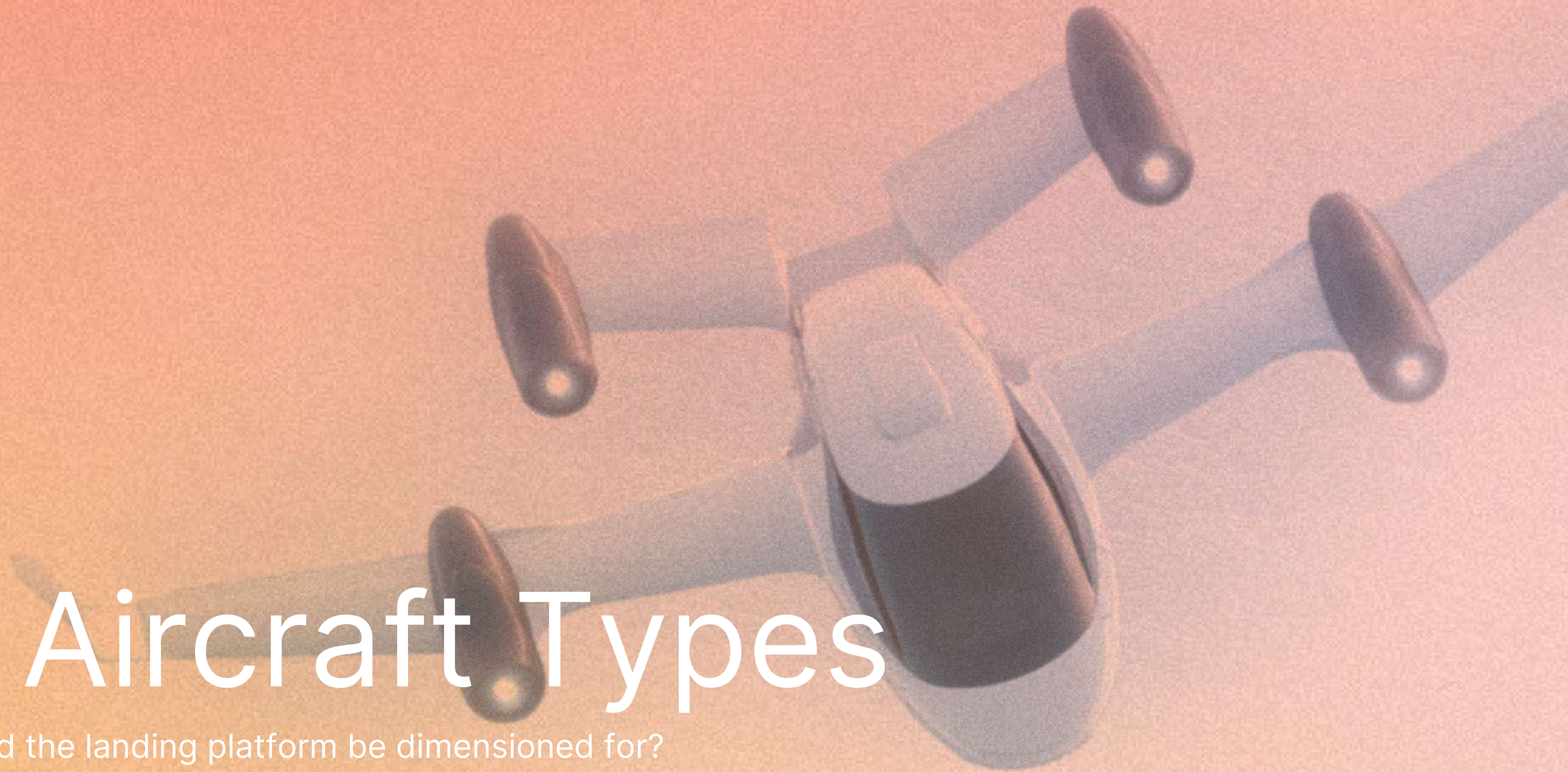
AAM operations are expected to take place primarily in mid-level airspace, which is also commonly occupied by general aviation (GA) and where weather conditions have a significant impact on flight operations.

Unlike AAM aircraft, which are required to detect one another and broadcast their positions through advanced technologies, GA aircraft are not currently subject to the same obligations. While all air traffic, including GA, must notify airports with controlled airspace when requesting to land, in the rest of the national airspace it remains best practice - though not mandatory - to contact the national flight information service.

Given current conditions, this regulatory gap creates safety implications when GA aircraft without the necessary onboard systems enter the more complex AAM environment, known as U-space. This challenge is amplified in scenarios where the level of automated activity in the airspace continues to grow.

***Insights from Lars Illum Jørgensen, UAS Denmark***

*Jørgensen emphasizes the importance of regulation, technology and strategic planning in shaping a safe and efficient future for air mobility.*



# 03 The Aircraft Types

Which types of aircraft should the landing platform be dimensioned for?

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**I expect eSTOL and eCTOL to be the first aircraft types to enter the Danish market.** Looking ahead, it will likely not be until after 2030 that we can determine whether eVTOL vehicles will truly become viable - that means by being fully certified and in serial production.

**Martin Winther Andersen**
Co-Founder & CEO Grøn Luftfart

**Bio**

Martin has been at the forefront of studying aviation electrification since 2015, and compiled a comprehensive directory of more than 1,000 AAM developers, which has positioned him as Denmark's leading expert in the field.
A helicopter pilot with deep expertise in aviation and aerodynamics, he has authored numerous articles on advanced air mobility.
Martin represents Denmark at the global AAM Institute and serves as CEO of Grøn Luftfart and Copenhagen Helicopter.

Three types of aircraft are currently central to AAM.


Photo: Volocopter.com

Photo: Electra.aero

Photo: Beta.team

## eVTOL
### Electric vertical take-off and landing

The defining feature of an eVTOL is its capacity for vertical take-off and landing. A wide range of design concepts exist, many drawing inspiration from military projects of the 1960s - 1980s. The rise of eVTOL technology is closely linked to the broader electrification of transport and reflects a vision of aircraft able to take off and land virtually anywhere - offering the versatility of helicopters, but in a form that is quieter, more sustainable and more cost-accessible for wider use.

## eSTOL
### Electric short take-off and landing

An eSTOL is a conventionally designed aircraft reimagined with a battery-electric or hybrid-electric powerplant and optimized wing profiles for short runways. eSTOLs can in many cases deliver a helicopter-like performance, yet at the lower cost of a fixed-wing aircraft.

## eCTOL
### Electric conventional take-off and landing

An eCTOL represents a conventional aircraft reimagined with a battery-electric or hybrid-electric powerplant. Several designs incorporate long, glider-like wings to maximize aerodynamic efficiency and minimize energy consumption. With runway requirements identical to conventional aircraft of similar size, eCTOL offers a sustainable evolution of traditional aviation without the need for entirely new infrastructure.

***Insights from Martin Winther Andersen, Grøn Luftfart***

*Andersen gives a clear picture of the technological dynamics shaping the future of air mobility, emphasizing the importance of international collaboration and the regulatory framework for AAM.*

## Auro Aero, Beta, Electra, and Væridion are currently the closest to market entry in Denmark.

The United States currently leads the global development of AAM technologies.

In Europe - including Denmark - the regulatory landscape is notably complex, shaped by a patchwork of small national and cross-border airspaces. Combined with denser urban environments and a higher number of noise-sensitive zones, these factors make implementation more challenging than in the U.S.

Within Europe, Germany and the United Kingdom stand out as key drivers of AAM progress.

Meanwhile, Ehang has become the first to be certified to operate commercially in China with pilotless passenger aircraft, marking a milestone in the global adoption of AAM.

AURO AERO ERA eSTOL

ELECTRA ULTRA SHORT eSTOL

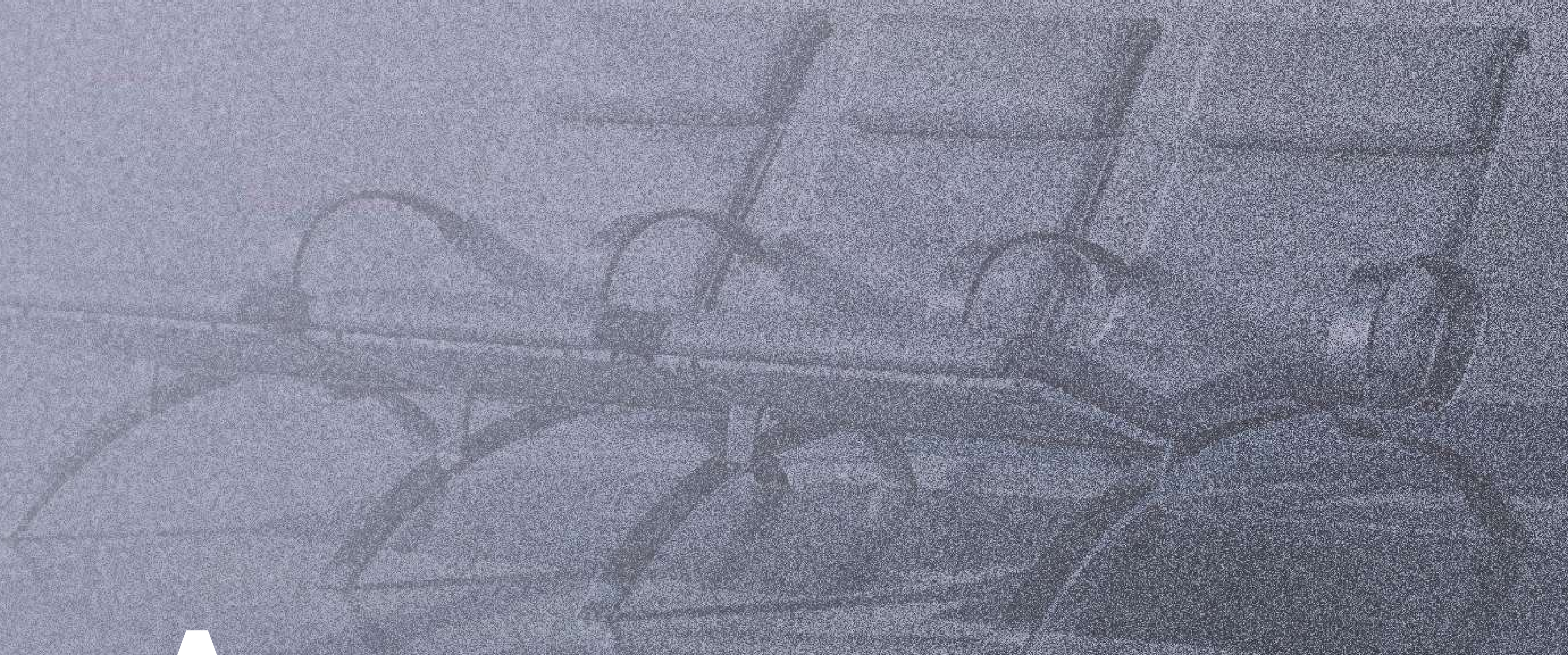
BETA ALIA eCTOL

VÆRIDION MICROLINER eSTOL

| Selected aircraft manufacturers | Country of origin | Aircraft type | Highlighted Partnerships | Announced Commercial Deployment | Range | Charging time (0 - 100 %) | Landing length | Number of passengers |
|---|---|---|---|---|---|---|---|---|
| Airbus | EU | eVTOL | Avincis + München Lufthavn | Not set (program on pause) | 80 km | 30 - 60 min | 0 m | 3 + 1 pilot |
| Archer | USA | eVTOL | United Airlines + Stellantis | 2026 - Abu Dhabi + 2028 - LA Olympiade | 80 km | < 15 min | 0 m | 4 + 1 pilot |
| **Auro Aero (Era)** | France | eSTOL | Occitanie Region + BPI + Innovacom | Before 2030 - France | 1,600 km | 30 min | 800 m | 19 + 2 piloter |
| **Beta (Alia)** | USA | eCTOL | UPS + Bristow | 2025 - Norway (test only - not in operation) | 600 km | 30 min | 670 m | 5 + 1 pilot |
| EHang | China | Pilotless eVTOL | Aena | 2025 - China (in operation to a limited extent) | 35 km | 2 timer | 0 m | 2 + 0 pilot |
| **Electra (Ultra Short)** | USA | Hybrid/eSTOL | Lockheed Martin + Honeywell + NASA | 2029 - Several countries incl. Denmark | 2,000 km | Opladning i flyet (Hybrid) | 46 m | 9 + 2 piloter |
| Eve | Brazil | eVTOL | Aero Solutions + Globalvia | 2026 - Brazil | 100 km | < 30 min | 0 m | 4 + 1 pilot |
| Hyundai / Supernal | South Korea / USA | eVTOL | Korean Air + Blade | Not set (program on pause) | 64 km | n/a | 0 m | 4 + 1 pilot |
| Joby | USA | eVTOL | Toyota + Uber + Delta | 2026 - Dubai | 160 km | < 15 min | 0 m | 4 + 1 pilot |
| Robinson (eR66) | USA | eHelicopter | magniX | 2029 - USA | 185 km | < 60 min | 0 m | 4 + 1 pilot |
| Vertical Aerospace | UK | eVTOL | Honeywell | 2028 - UK | 160 km | < 15 min | 0 m | 4 + 1 pilot |
| Volocopter | Germany | eVTOL | Jet Systems Hélicoptères | 2024 - OL France (test only - not in operation) | 65 km | 40 min | 0 m | 1 + 1 pilot |
| **Væridion (Microliner)** | Germany | eSTOL | Bosch + Copenhagen Helicopters | 2030 - Denmark | 400 km | 45 min | 8-1.000 m | 9 + 2 piloter |

***Insights from Martin Winther Andersen, Grøn Luftfart***

*Andersen gives a clear picture of the technological dynamics shaping the future of air mobility, emphasizing the importance of international collaboration and the regulatory framework for AAM.*



# 04 The Passenger Area

What foundational elements are necessary for establishing an AAM passenger area?

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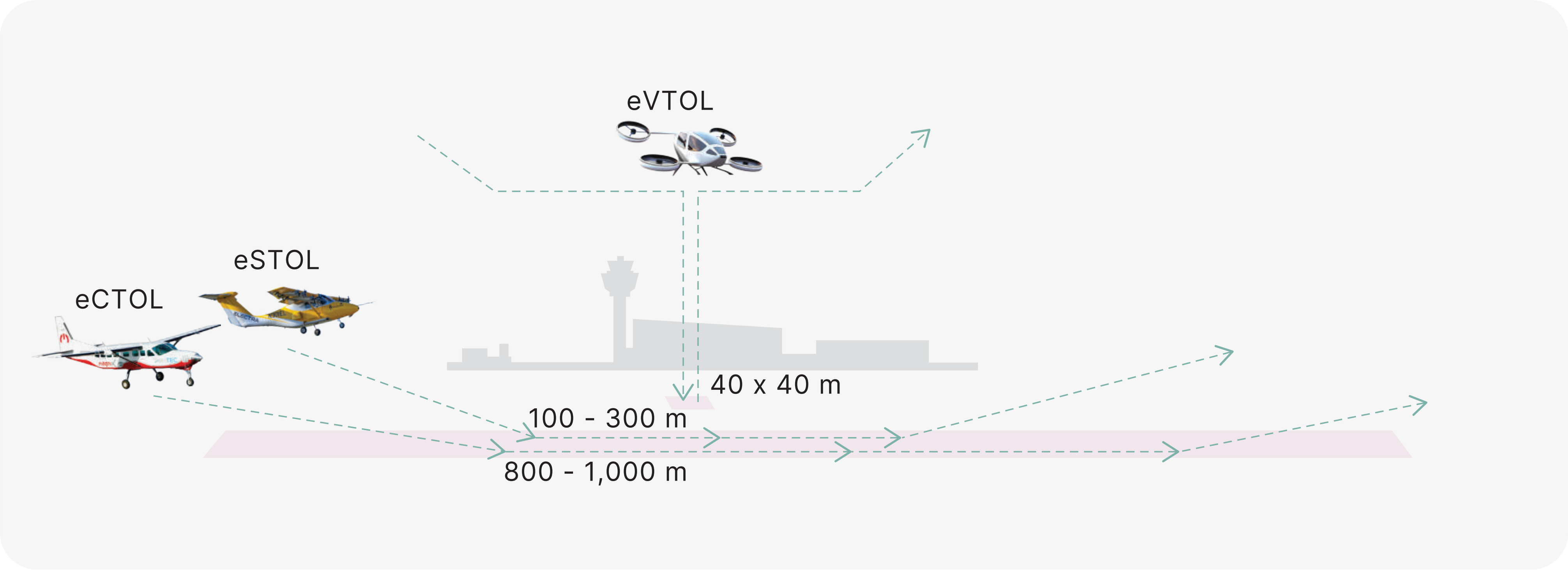
With their smaller spatial footprint and significantly lower noise levels compared to conventional aircraft, AAM vehicles create new opportunities for **placing terminals closer to where people naturally gather or in densely populated areas without the disturbances** that traditionally require heliports and similar facilities to be located at a distance.

**Kelly Andrew Nelson**
Architect MAA & Partner
ZESO Architects

**Bio**

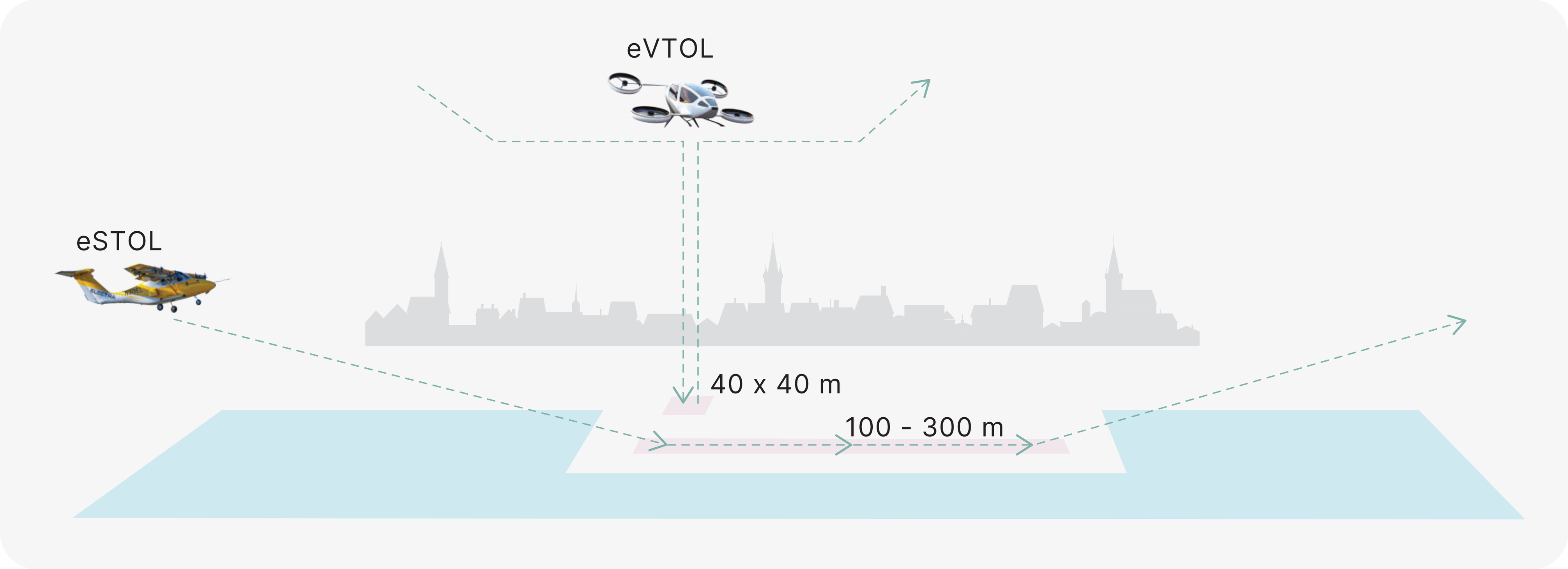
Kelly is a partner and architect at ZESO Architects, leading the firm's aviation architecture practice. He has extensive experience with large and complex projects and holds particular expertise in airport design. Kelly translates complex systems into meaningful environments for people and has substantial experience in facilitating communication among the many internal and external stakeholders that characterize airport projects. With an international background as an architect in North America, Asia, and Europe Kelly has lived in Copenhagen for many years, making him firmly rooted in Scandinavia.

The placement of the airfield and aircraft types are determing factors for accessibility, functions and characteristics of the passenger area.



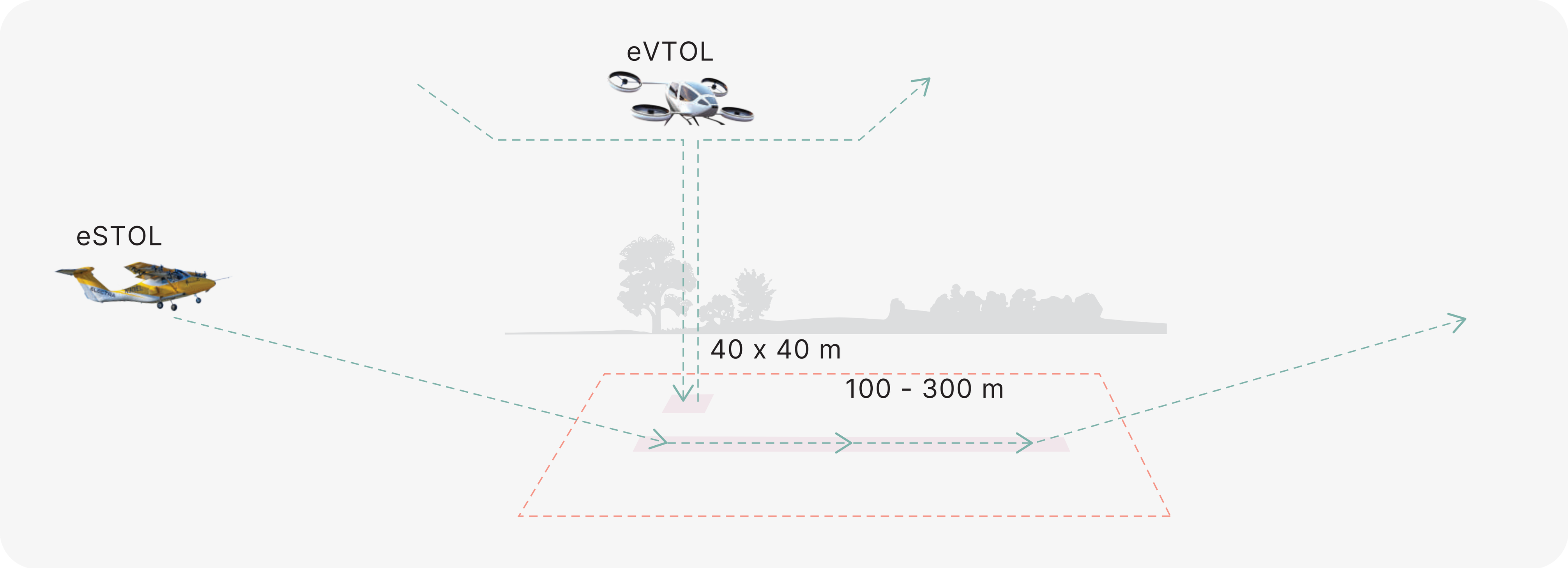

## Existing airfield

The advantage of existing airfields is that they allow the use of established infrastructure, while the disadvantage is that they are often located outside densely populated areas.




## Urban context or waterfront

The approach trajectories of eSTOLs, and especially eVTOLs, enable the integration of AAM landing sites within urban environments or their close peripheries.



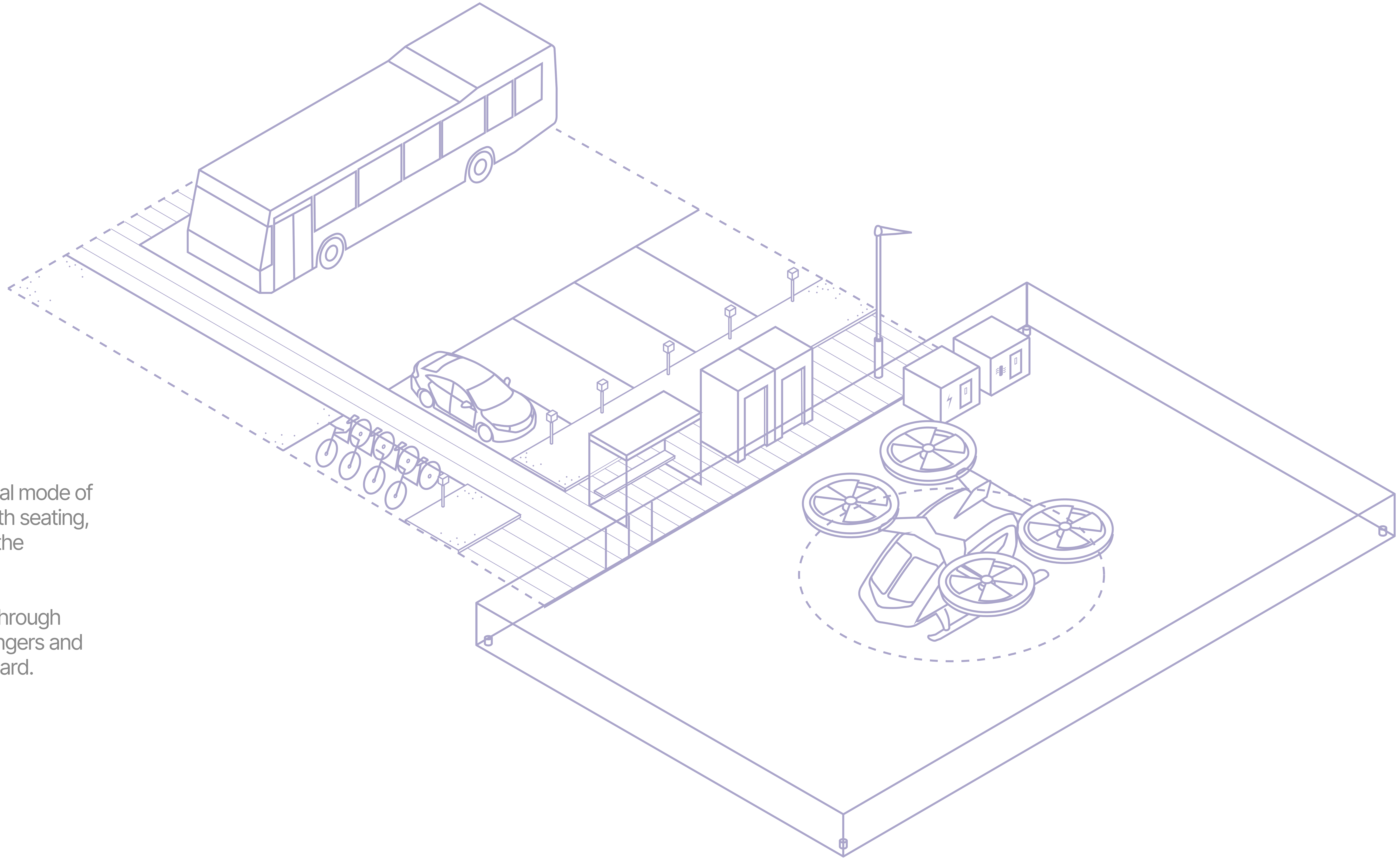

## Rural context

A final alternative is to locate the landing area in newly established rural sites dedicated specifically for this purpose.

***Insights from Kelly Andrew Nelson, ZESO Architects***

*Nelson highlights the importance of thoughtful design and alternative strategic placements of AAM to make this mode of transport accessible, safe and user-friendly for passengers.*

The optimal placement of a terminal and the configuration of a passenger area will vary according to the local context and available infrastructure. There is, therefore, no universal model or 'one size fits all' solution.



The minimum components of a passenger area are based on an unmanned, camera-monitored site, comparable to a large bus stop.

A seamless transition must be ensured between the passenger's arrival mode of transport and the aircraft itself. This could include a modest shelter with seating, a ticket kiosk and an information display guiding passengers through the procedure and offering support if needed.

Security is expected to be integrated into the process - for example, through QR code check-in systems that open access gates, safeguard passengers and guarantee that only verified, pre-booked travelers are permitted to board.

***Insights from Kelly Andrew Nelson, ZESO Architects***

*Nelson highlights the importance of thoughtful design and alternative strategic placements of AAM to make this mode of transport accessible, safe and user-friendly for passengers.*

# Next Edition

### Island Communities on the Move:
### Travel Patterns and the Potential of Air Mobility on Danish Islands.

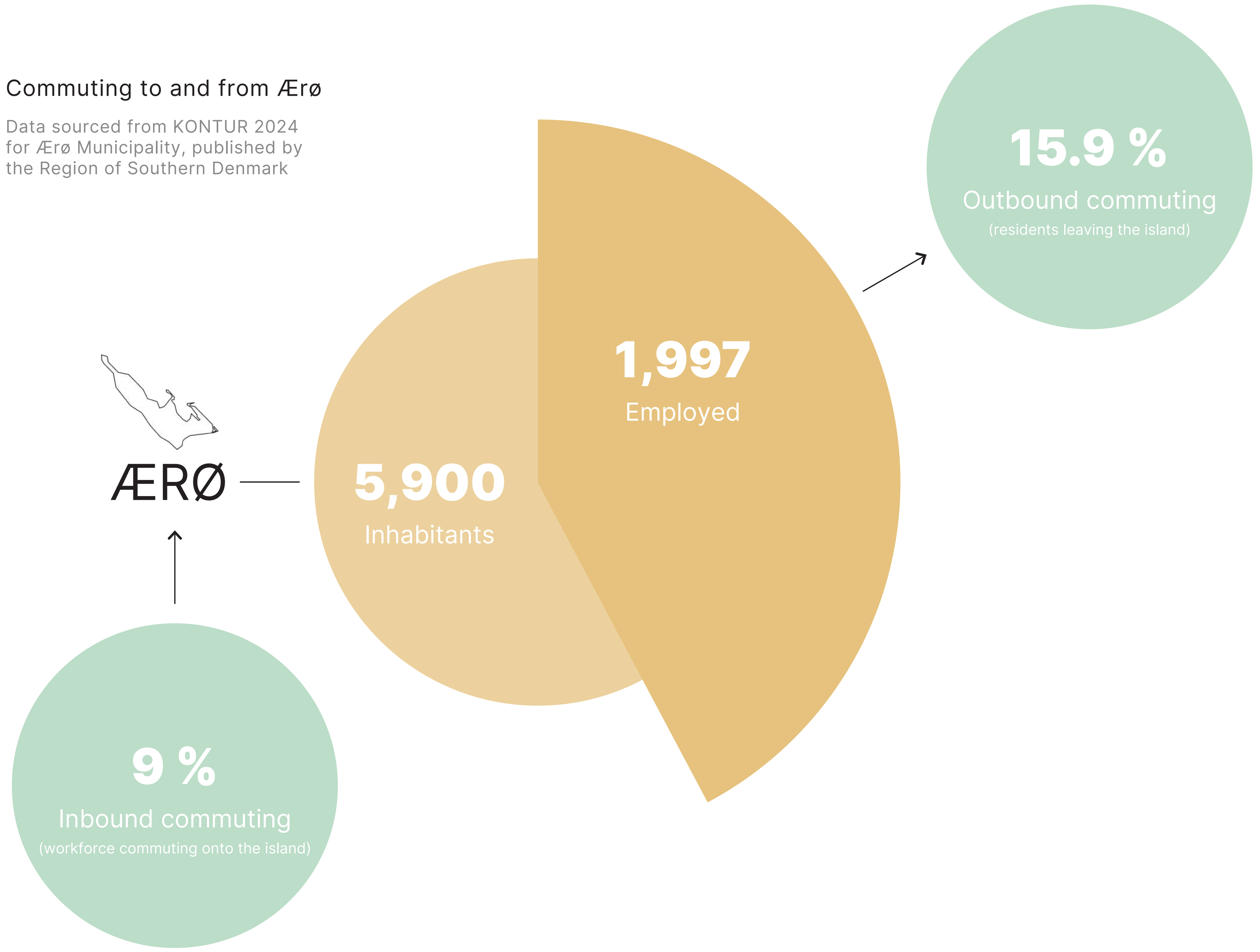
Denmark has approximately 30 inhabited islands without bridge connections. A shared challenge across these islands is their remoteness from the country's main transport corridors, with many relying on only a handful of daily ferry departures to maintain links with the mainland. This makes the islanders particularly vulnerable to high transport costs, measured both in time and money.

Where this edition of Luftforbindelser has focused on the building blocks of an AAM flight system, the next will explore the travel needs of island residents and sketch a conceptual vision of a future transport network, using Ærø as a case study. The purpose is to assess how AAM could transform mobility opportunities and enhance quality of life in local island communities.

The figure on the right illustrates commuting flows to and from Ærø. Commuting is only one of several categories of travel that will be examined in greater depth as part of this exploration.

Commuting to and from Ærø

Data sourced from KONTUR 2024 for Ærø Municipality, published by the Region of Southern Denmark



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The insights in this document mainly derive from continuous conversations in the Regional Air Mobility consortium spanning from August 2024 to November 2025.

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