

Global UAM Market Development: Impact of ticket prices and vertiport density on global UAM demand

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Motivation and Challenges

- A preliminary estimate of the potential need for UAM, the associated number of aircraft movements, and the required number of vehicles is needed by manufacturers and operators for strategic planning at an early stage.
- In addition to population and wealth level, the ticket prices per km and the density of vertiports are significant factors influencing the demand for UAM. It is therefore essential to give these factors careful consideration.
- The impact of these factors varies considerably depending on the specific characteristics of the cities.

City-centric Forecasting Approach

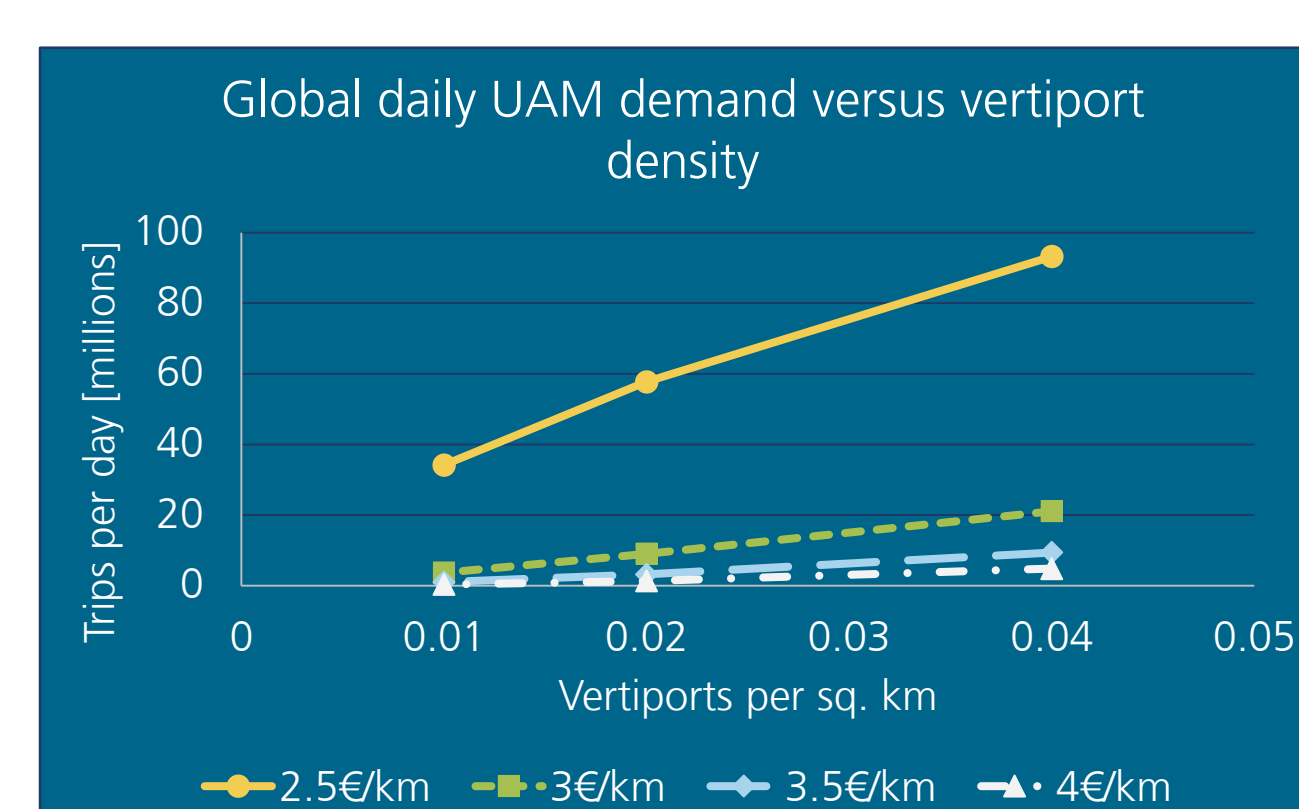
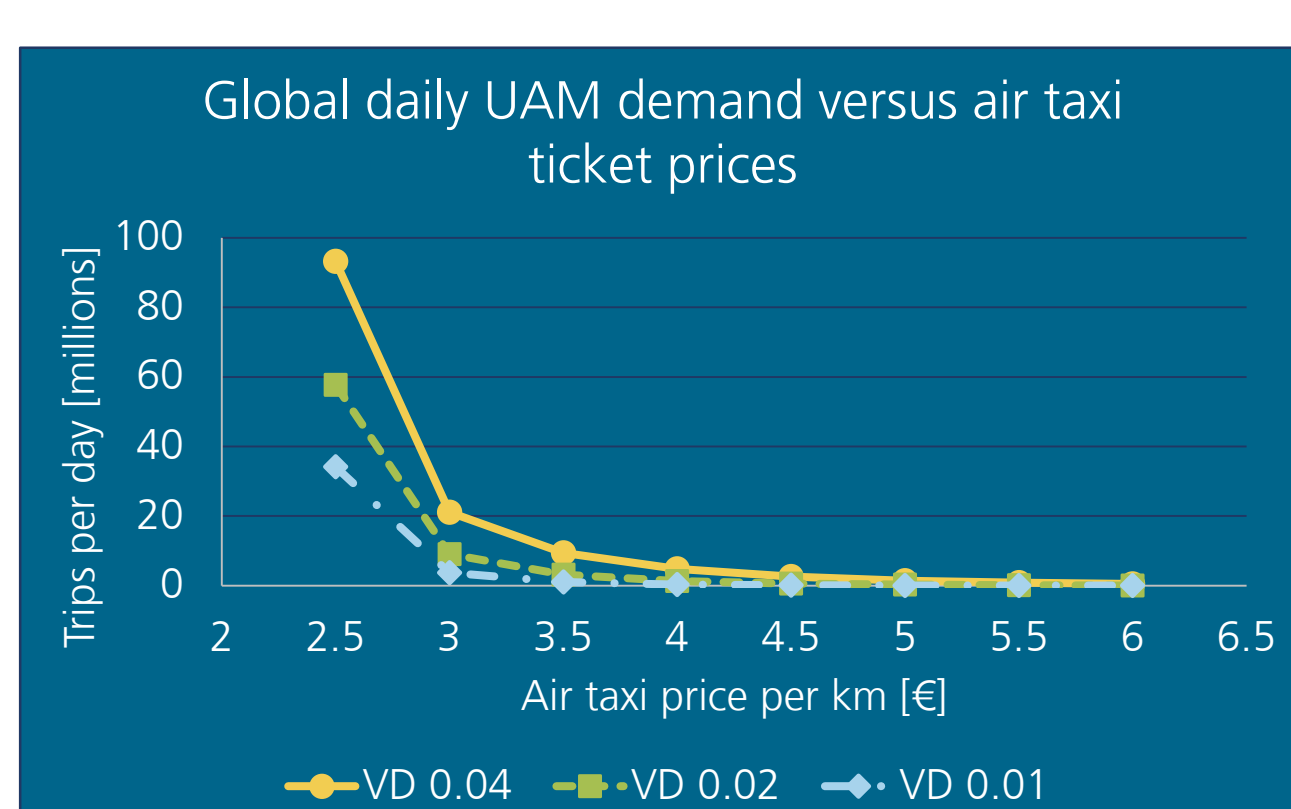
- 990 urban areas with more than 500,000 inhabitants were investigated.
- Each city is represented by a circle with area equal to the city area and evenly divided into traffic zones. Population of the city is distributed across the traffic zones with highest density in the city center.
- Total transport demand between traffic zones is specified by using a trip rate and a distribution of trips by distance, resulting in a trip table for each city.
- The number of vertiports is determined based on the city's size and wealth level. They are evenly distributed throughout the city.
- For each OD-pair, travel time and cost by air taxi and by alternative transport modes are calculated.
- A multinomial logit model is used to determine probabilities that travelers will choose the air taxi and provides the air taxi share, taking into account the city specific wealth level.

Impact of ticket prices and vertiport density

- The air taxi price per km is directly related to the customers' willingness to pay and, together with travel time, is a key factor influencing the choice of transportation mode.
- The density of vertiports affects the time needed for access and egress and therefore has a significant impact on the total travel time.

Parameter Study

- Global UAM demand and fleet size are nonlinearly related to air taxi price and vertiport density (VD).

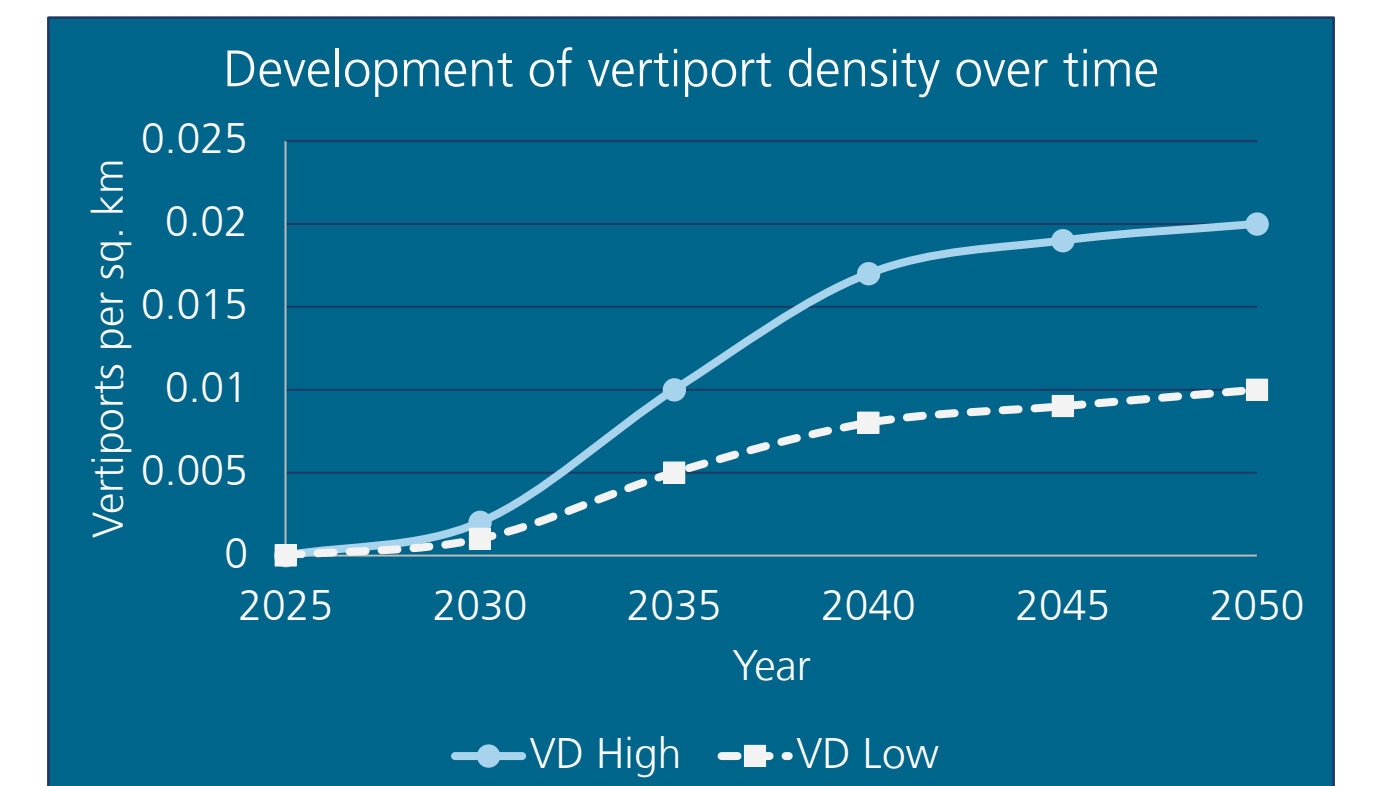
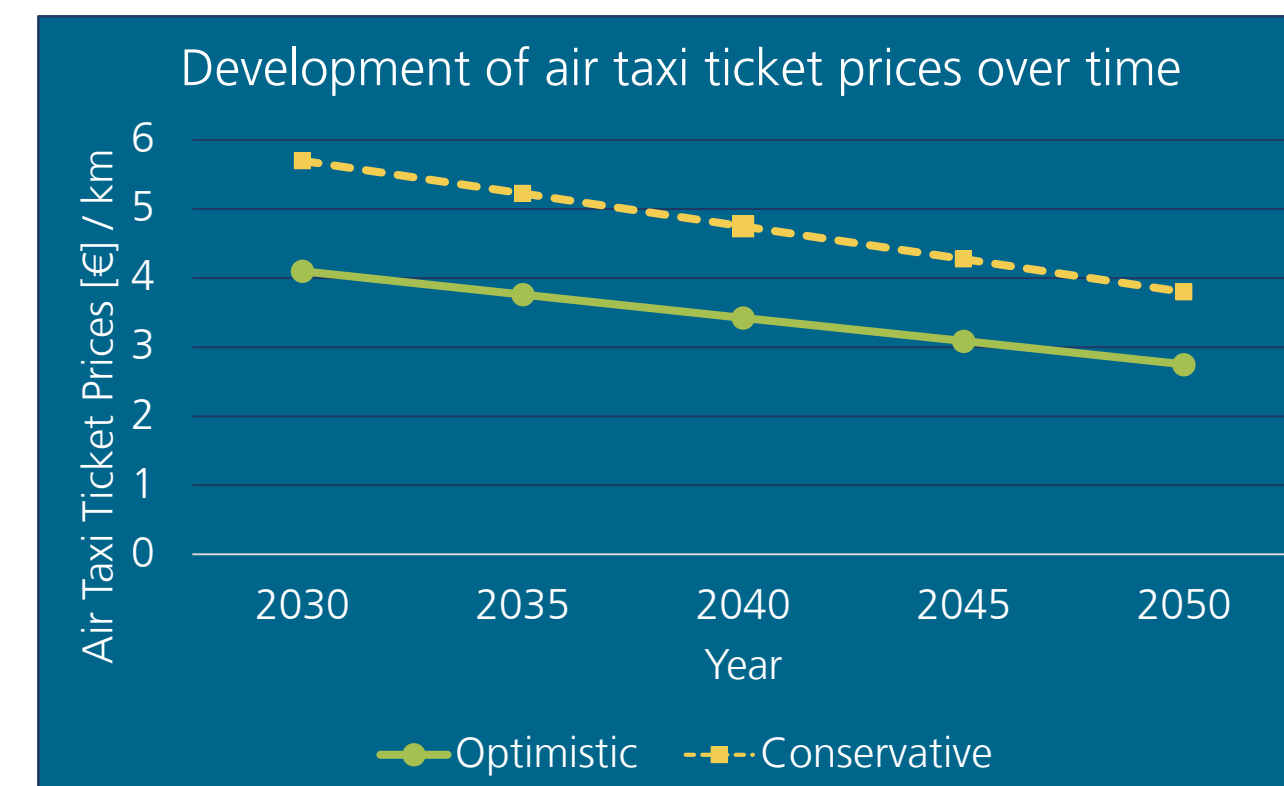


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Scenarios of Market Development

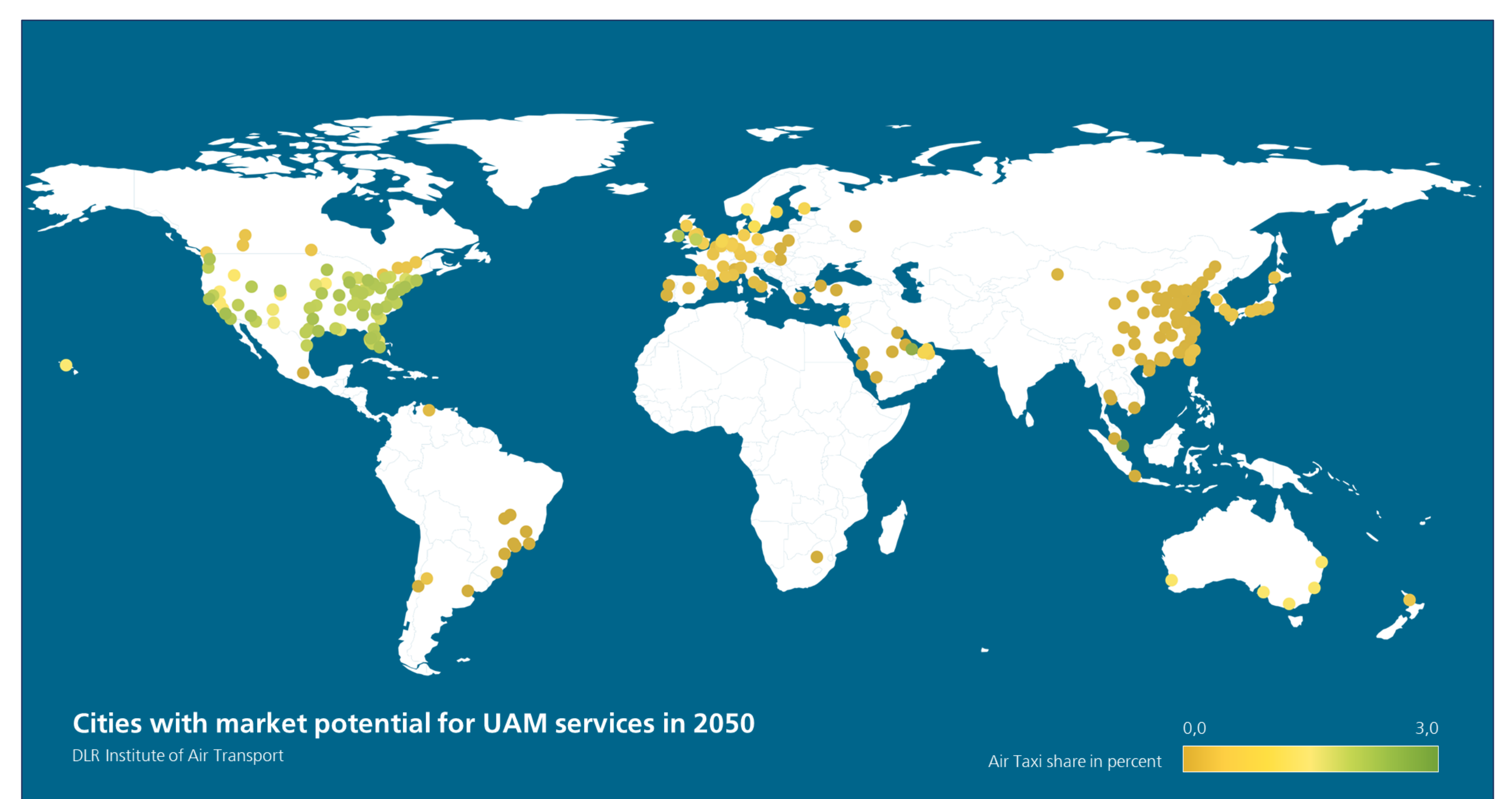
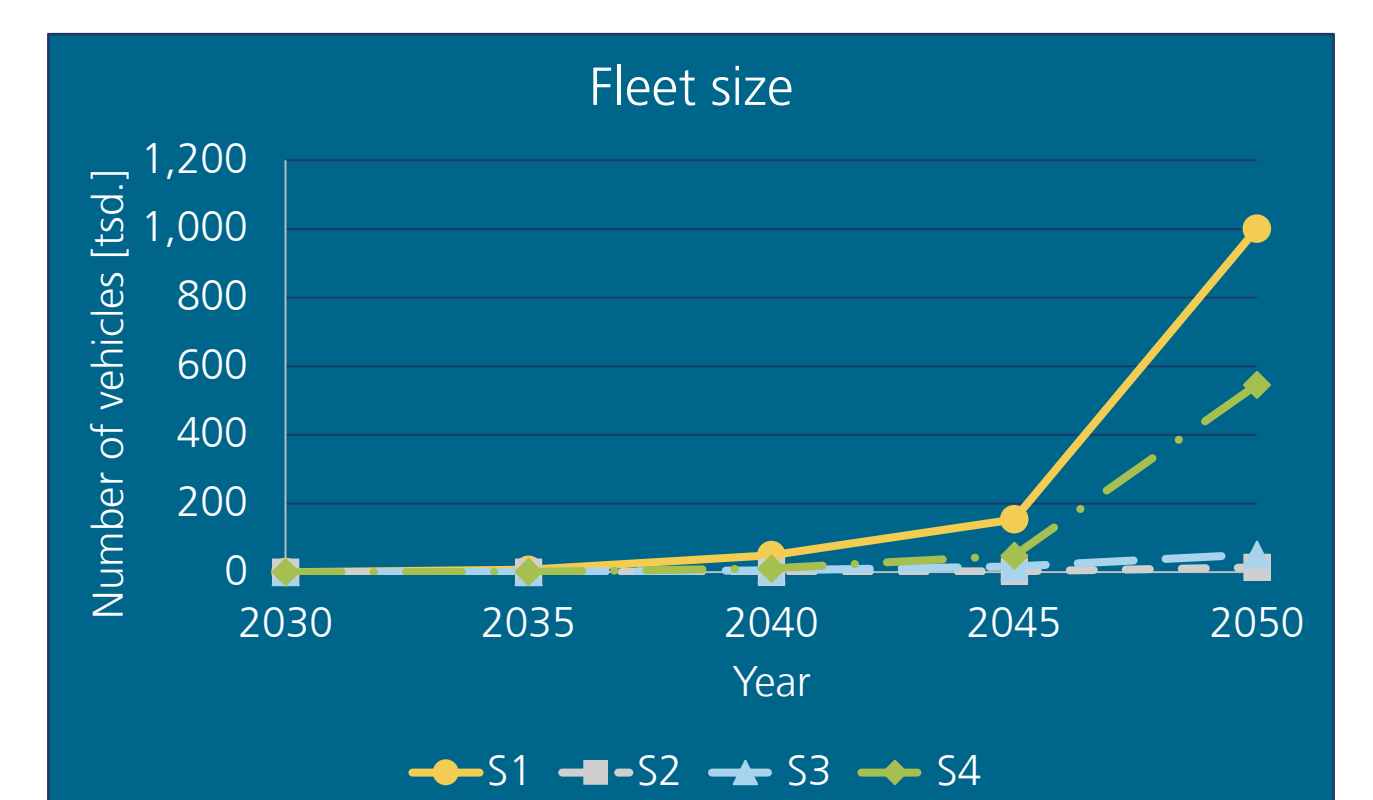
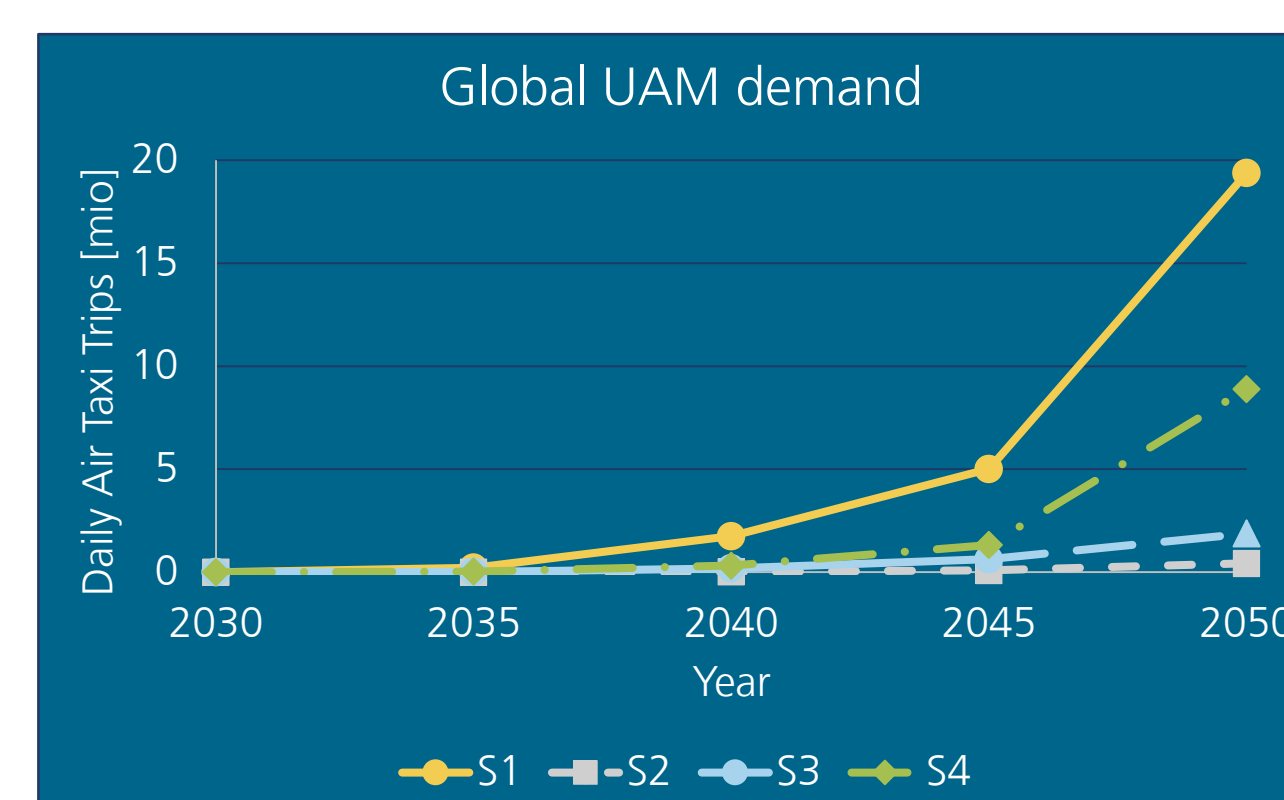
Four market development scenarios until 2050 are considered:

- Different assumptions regarding the development of vertiport density and air taxi ticket price per km over time.



	Vertiport Density	Air Taxi Prices
Scenario 1	High	Optimistic
Scenario 2	Low	Conservative
Scenario 3	High	Conservative
Scenario 4	Low	Optimistic

Results



Conclusion

- A parameter study shows that both, low ticket prices and high vertiport densities are crucial for high UAM demand.
- The market scenarios indicate that the market introduction could be problematic and require "staying power" on the part of manufacturers and operators, as the market development is characterized by low market growth in the initial phase and strong market growth thereafter.
- According to the scenario analysis, there could be market potential for UAM in more than 200 cities by 2050, mainly in Europe, North America and Eastern Asia.
- The findings highlight the need to carefully optimize system components and the entire system to minimize costs and maximize the quality of UAM services. Such an approach would contribute to the economic viability and successful deployment of UAM systems.