

# Model-based Forecasting Approach to Estimate Global Demand and Fleet Size of Urban Air Mobility

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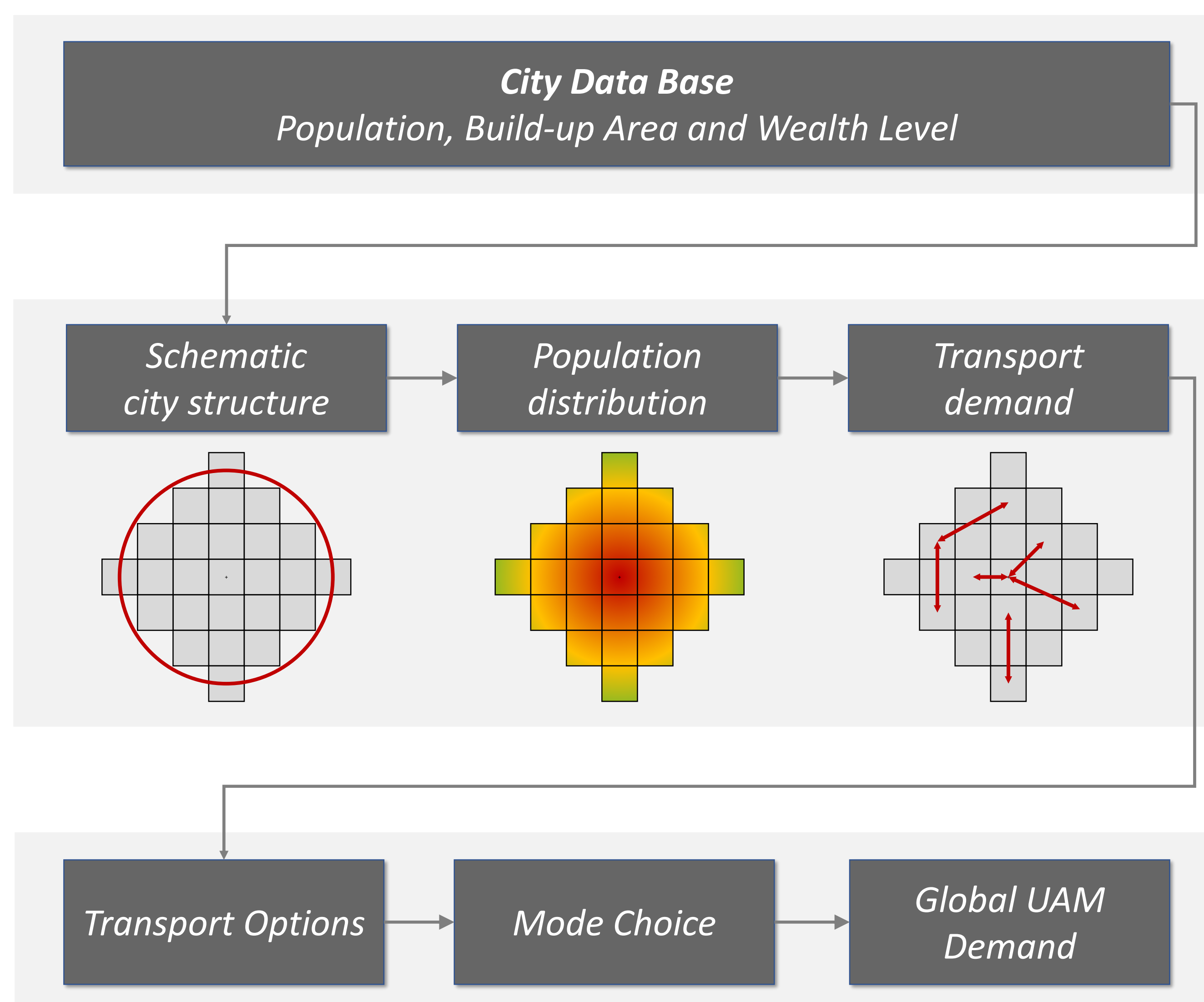
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## Motivation and Challenges

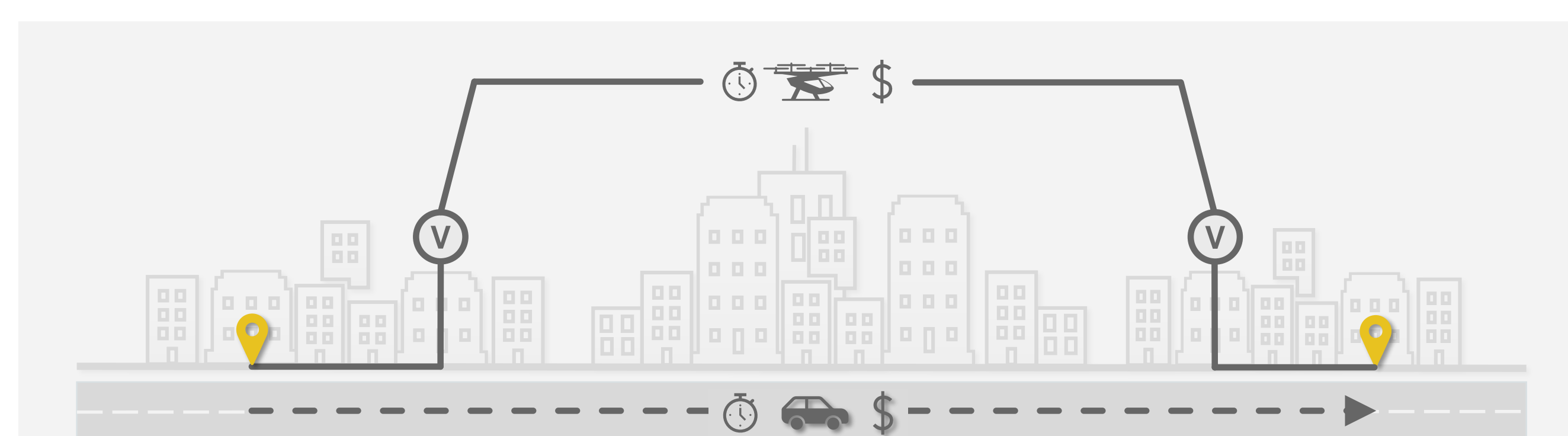
- A preliminary estimate of the potential need for UAM, the associated number of aircraft movements, and the required number of vehicles is needed by manufacturers and operators for strategic planning at an early stage.
- Due to the diversity of cities, there is a need for a method that is as easy and applicable to all cities as possible without having to create individual transport models for each city.

## Concept of a Model-based Forecasting Approach

- Approach uses a limited number of input parameters.
- 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.



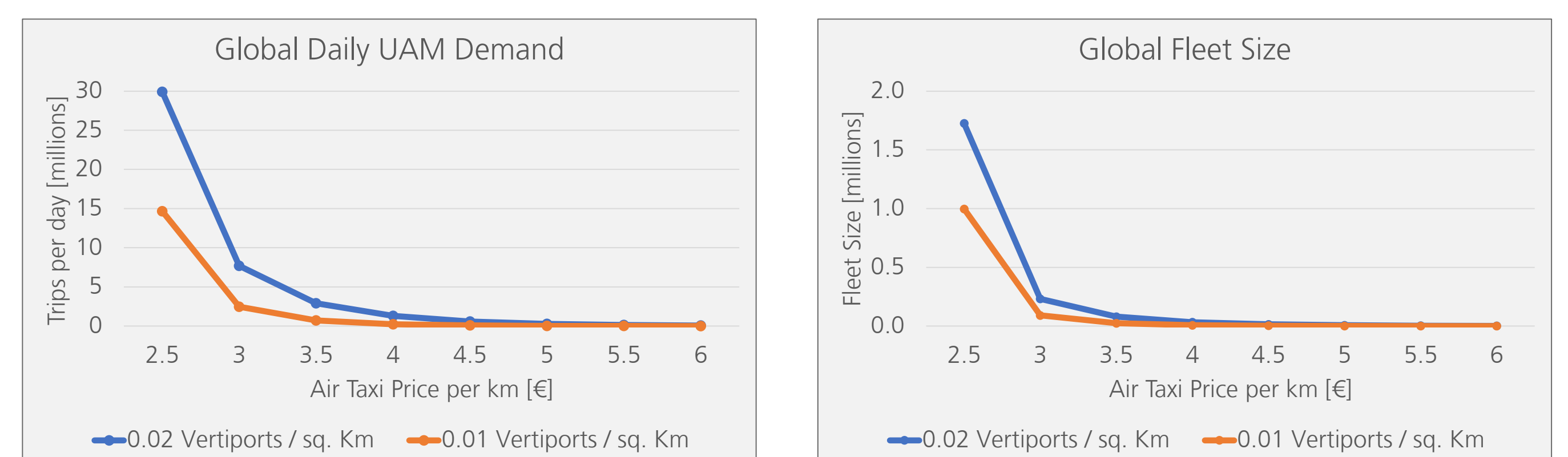
- For each OD-pair, travel time and cost by air taxi and by alternative transport modes are calculated.
- A multinomial logit model is used to determine probabilities that travelers will choose the air taxi and provides the air taxi share.



## Results

### Sensitivity Analysis

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



### Scenarios of Market Development

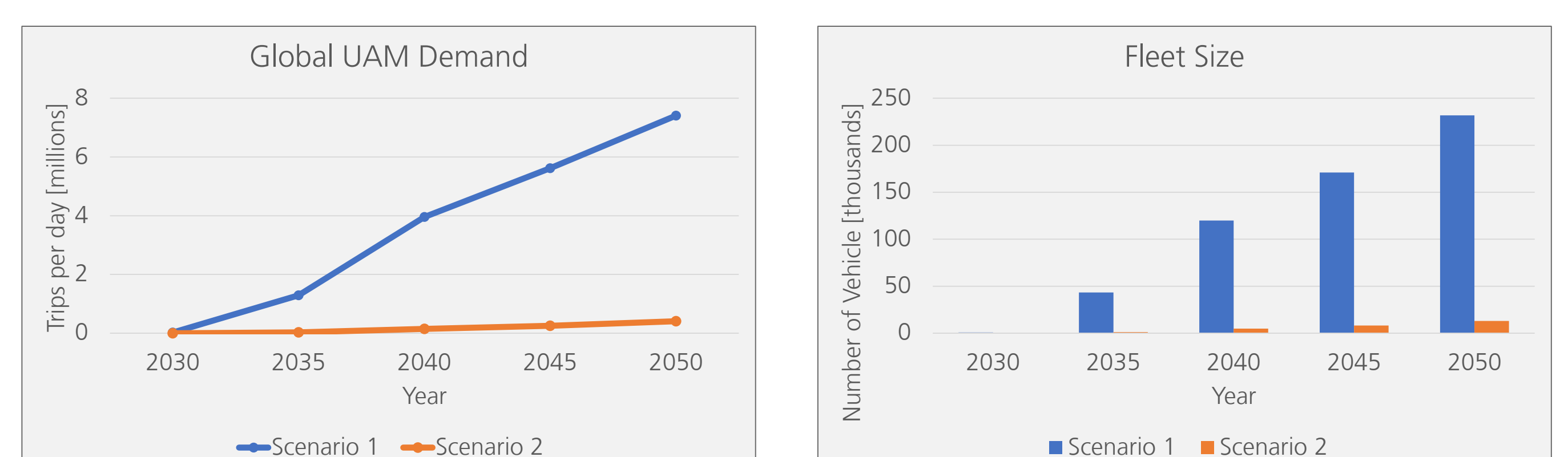
Two scenarios for market development until 2050 are considered:

#### Scenario 1

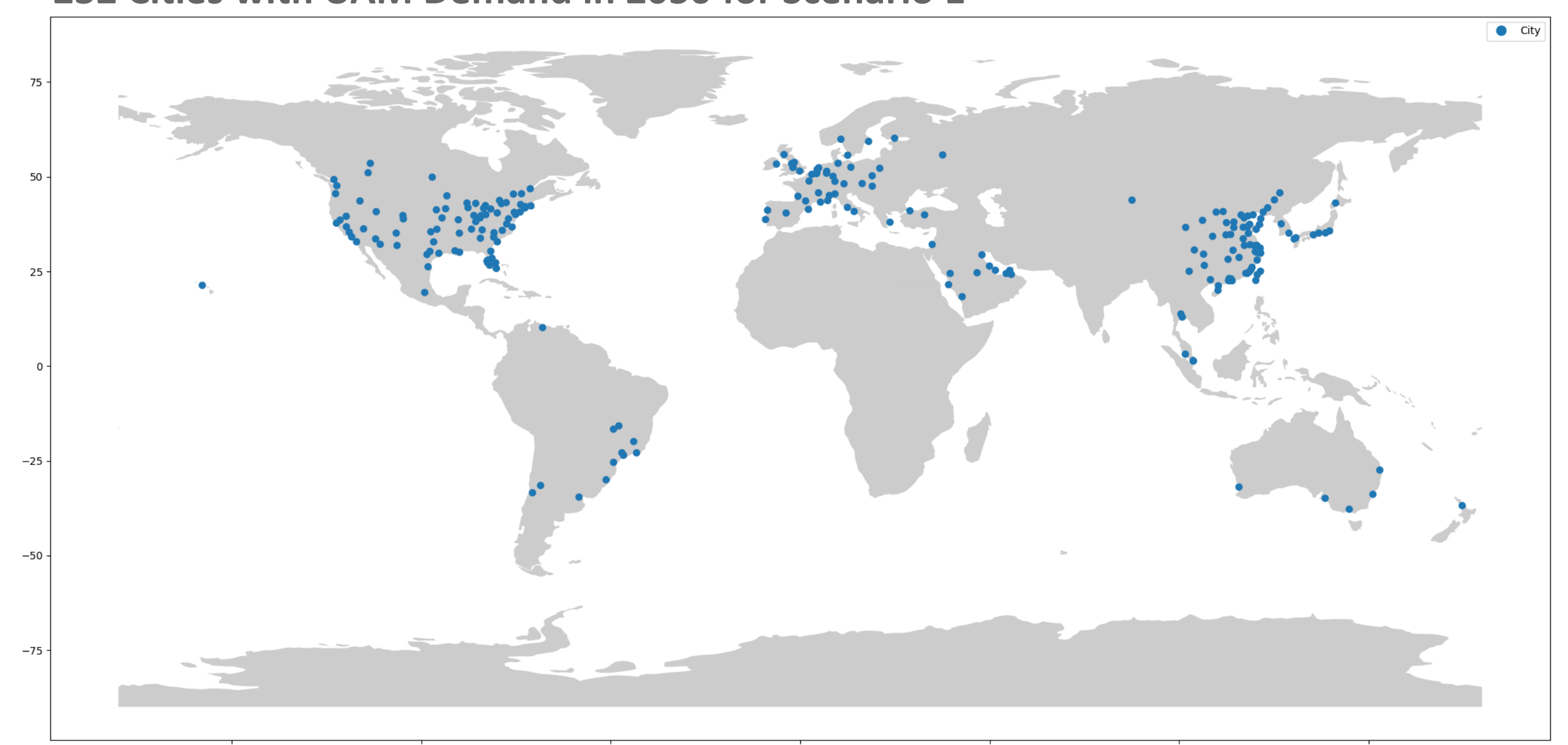
- Vertiport density growing up to 0.02 vertiports per sq. km
- Ticket price: 3.00 € per km

#### Scenario 2

- Vertiport density growing up to 0.01 vertiports per sq. km
- Ticket price: 3.75 € per km



### 232 Cities with UAM Demand in 2050 for Scenario 1



## Conclusion

- A scenario suitable approach to estimate global UAM demand and fleet size was developed.
- Sensitivity analyses show that both, low ticket prices and high vertiport densities are crucial for high UAM demand.
- According to our scenario analysis, there could be market potential for UAM in more than 200 cities by 2050, mainly in Europe, North America and Eastern Asia.