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# The Future of Vertical Mobility

Formula E – May, 27<sup>th</sup>  
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**Porsche Consulting**



**PORSCHE**

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## Focus of presentation

- 01 **Why** is it relevant?
- 02 **What** is Vertical Mobility?
- 03 **How big** will be the market?
- 04 **How fast** will it evolve?



**1994**

Founding date



**60% | 40%**

Extern | VW-group

# Porsche Consulting

Strategic Vision. Smart Implementation



**9**

Offices worldwide

Atlanta | Berlin | Hamburg | Munich | Milan | São Paulo | Shanghai | Silicon Valley | Stuttgart



**600**

Professionals

Ø 8 Years of Professional Experience

**We love**  
**CHALLENGES**  
**& MOBILITY**

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# Mobility is more than just moving from A to B



**Rational**

Most efficient

Fastest mode

Logic



**Emotional**

Dream

Experience

Fun



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Today's reality

**But** this may not be your  
daily mobility experience!

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# Today's reality?



» If your dreams  
don't scare you  
they are too  
small.”  
Richard Branson

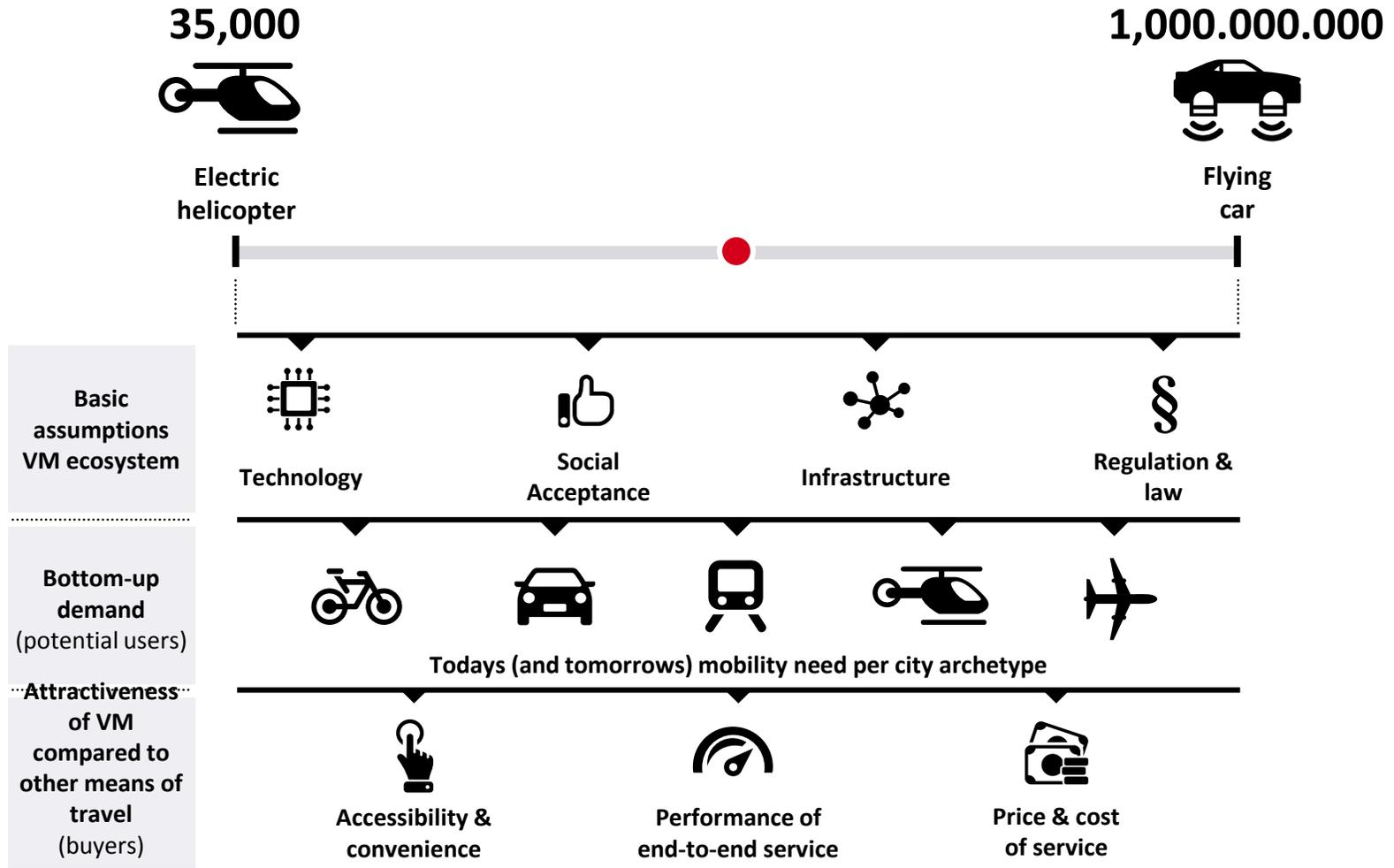
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# Italdesign Pop.Up Next – Flying Autonomous Car concept of Audi & Airbus

The logo for the Pop.Up Next concept is centered on a black background. It features the text "POP.UP" in a large, bold, sans-serif font. A small, glowing blue dot is positioned between the "P" and "U" of "UP". Below "POP.UP", the word "NEXT" is written in a smaller, italicized, sans-serif font.

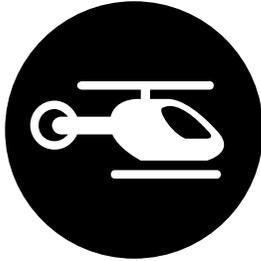
How **big**  
will be the market?

# Sizing the global market



# The vertical mobility ecosystem & barriers

01



## Technology

Electric battery

VTOL concept

Cost

02



## Acceptance

Noise emission

Privacy

Price & personal benefit

03



## Infrastructure

Vertiports: number/location

“Air & ground” integration

Charging infrastructure

04



Regulation and Law

# Sizing the global market for passenger drones

## Passenger drones – Total addressable market (TAM)

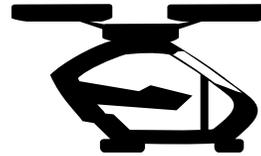
Theoretically achievable global market with fully established infrastructure

Starting in 2025



Air taxis

Electric VTOL TAM\*



200,000 units

Passenger market TAM\*



230 billion

\* Intracity plus 150,000 units city-to-city

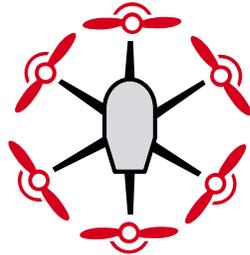
Source: Porsche Consulting

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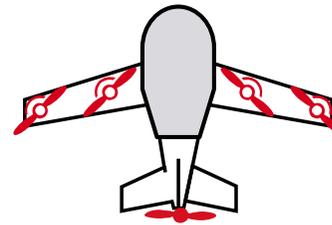
# VTOL concept: What are the technological concepts for Vertical Mobility?

Single phase\*



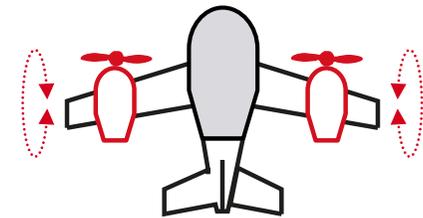
**MULTIROTOR**  
lift

Dual phase\*



**LIFT AND CRUISE**  
combination

Transition phase\*



**TILT-X**  
tilt-wing, tilt-rotor, tilt-duct

- ▶ Time to market
- ▶ Travel speed (indicative)
- ▶ Routes
- ▶ Potential

**Fastest certification**

~70 - 120 km/h

**Selected**

~70% of intracity  
0% of city-to-city

**Slower certification**

~150 - 200 km/h

**All**

100% of intracity  
100% of city-to-city

**Slowest certification**

~150 - 300 km/h

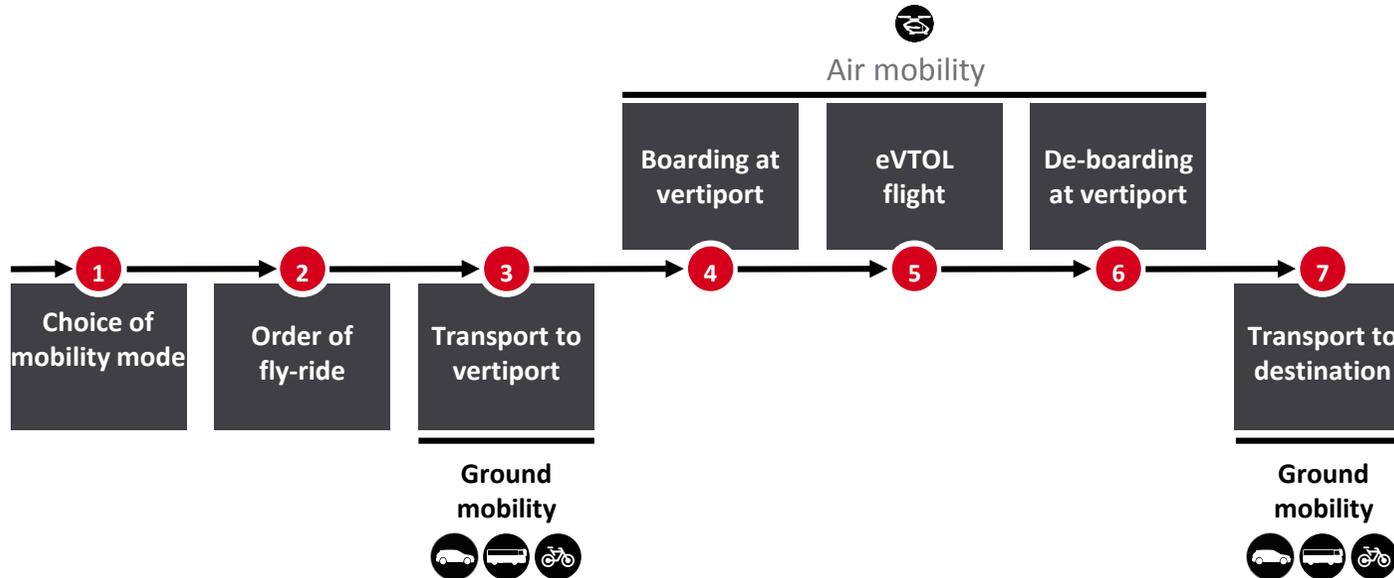
**All**

100% of intracity  
100% of city-to-city



# Personal benefit: Seamless and on-demand Vertical Mobility

## Customer journey on-demand eVTOL air taxi



### Constraints

- No end-to-end mobility – transfer between other mobility modes necessary
- Infrastructure limitations (starting and landing)
- Complementary mobility service only

# Social Acceptance:

## What are the key issues for acceptance of Vertical Mobility?



### Noise emission

Aircraft noise & sound profile

Vertiport locations

City noise levels



### Privacy

Privacy and security

Airspace structure & vertiport locations

System reliability & emergency procedures



### Price & personal benefit

Price/affordability

Accessibility, convenience & comfort

Soft factors & end-to-end (intermodal) service



# Vertiports:

## How will a ramp-up look like in reality?

### Vertiport infrastructure build-up in example city São Paulo

01

#### Initialization

Connection of hubs with existing helipads



02

#### Expansion

Increase of fixed routes for commuters and city visitors



03

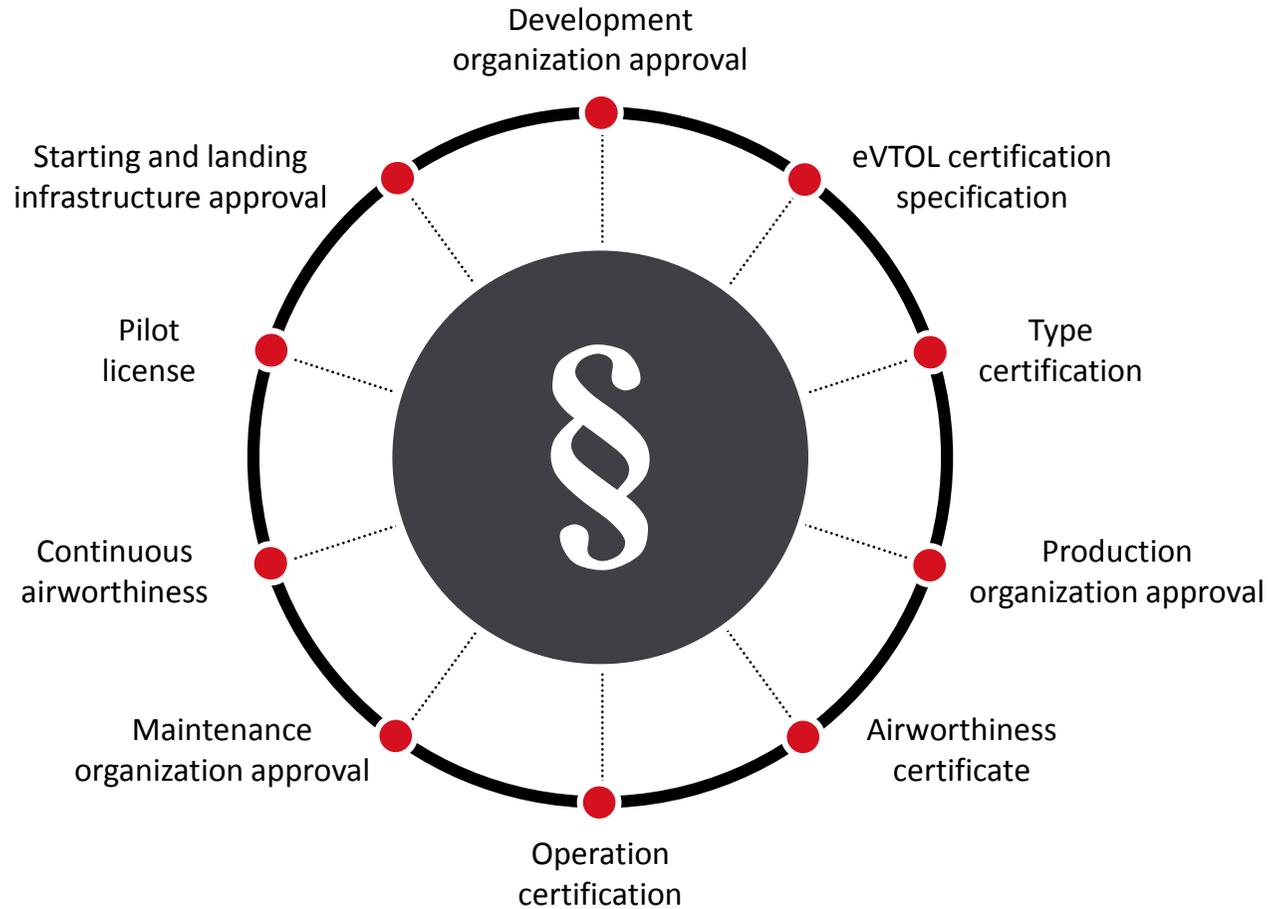
#### Elaboration

On-demand services and reduction of first and last mile

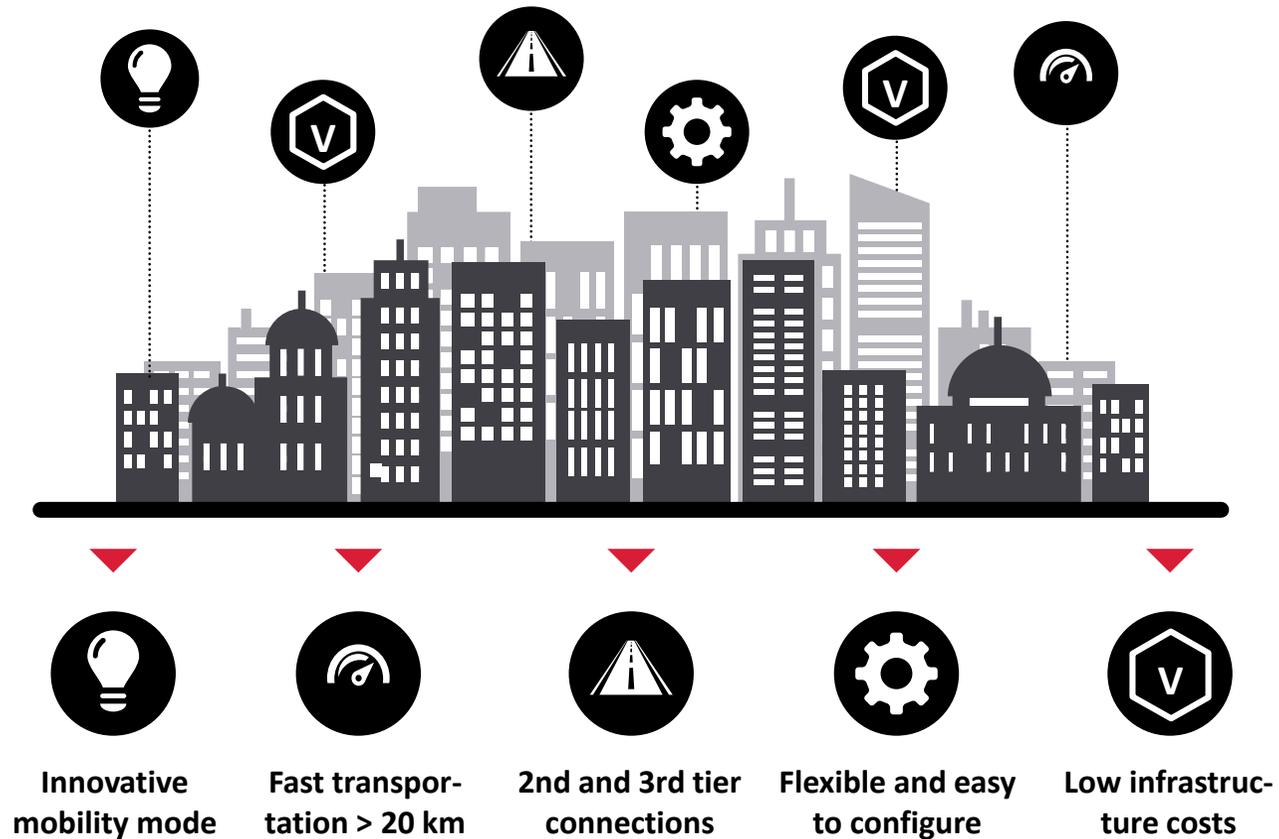




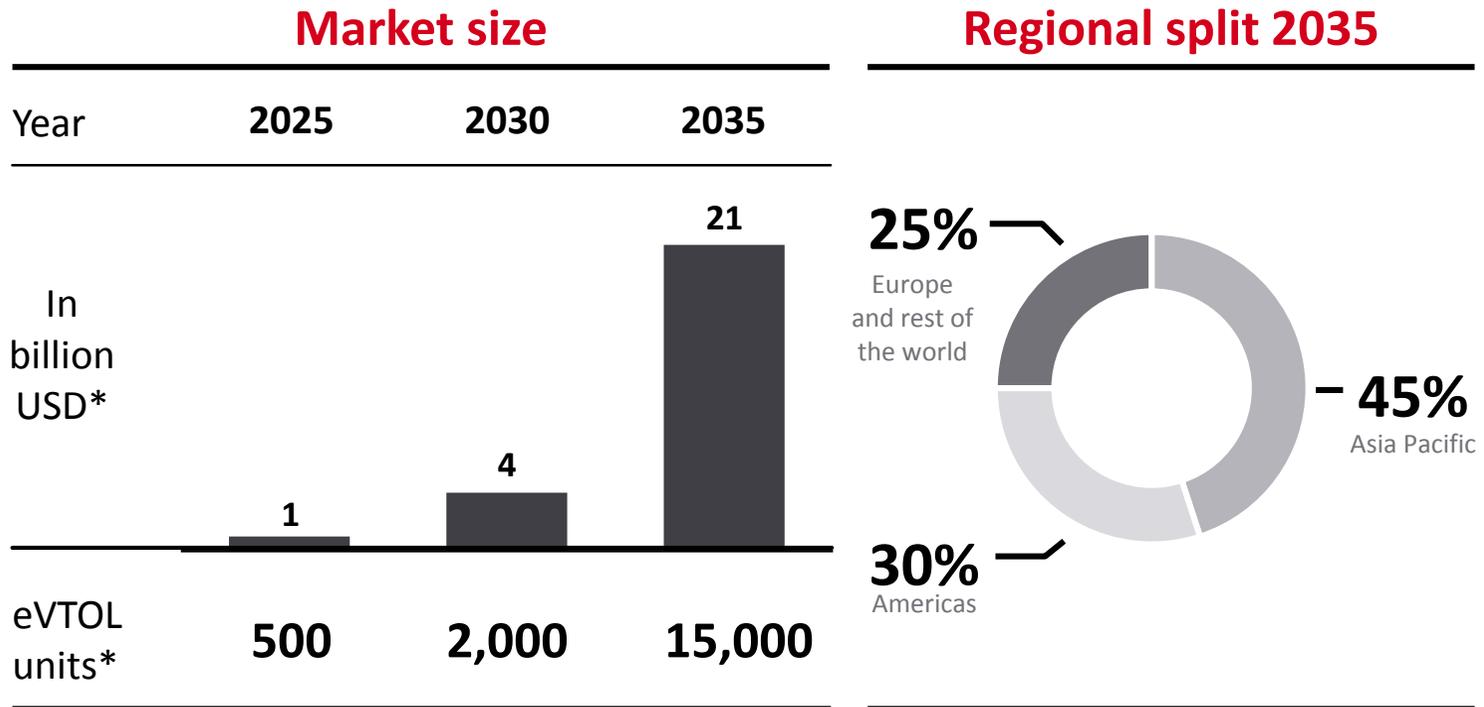
# Certification and law: Approval of flight system, operations, organizational aspects



# Overview integrated mobility – Role of Vertical Mobility in future city mobility



# What does that mean for the market in 2035?

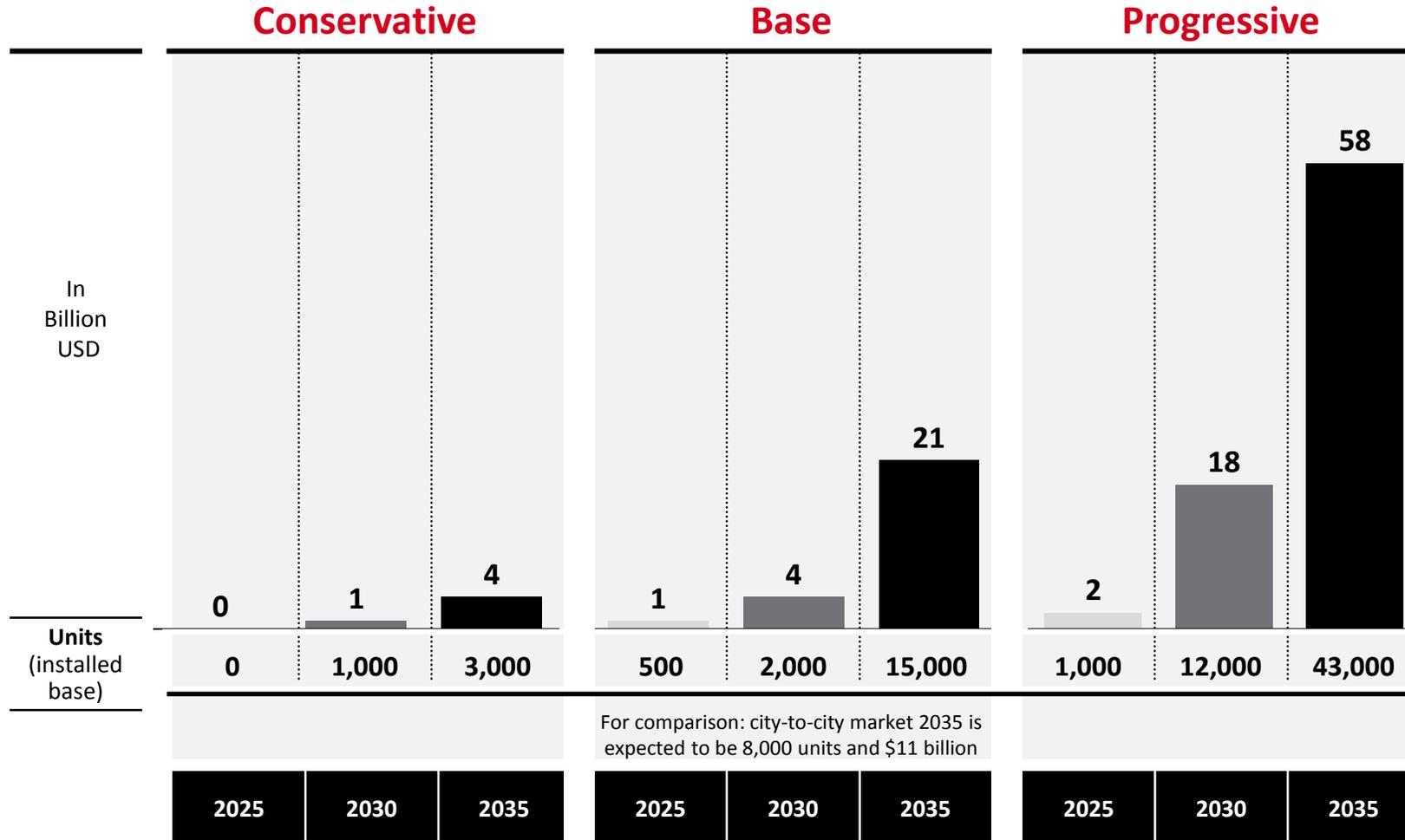


\* plus 8,000 units and \$ 11 billion for the city-to-city

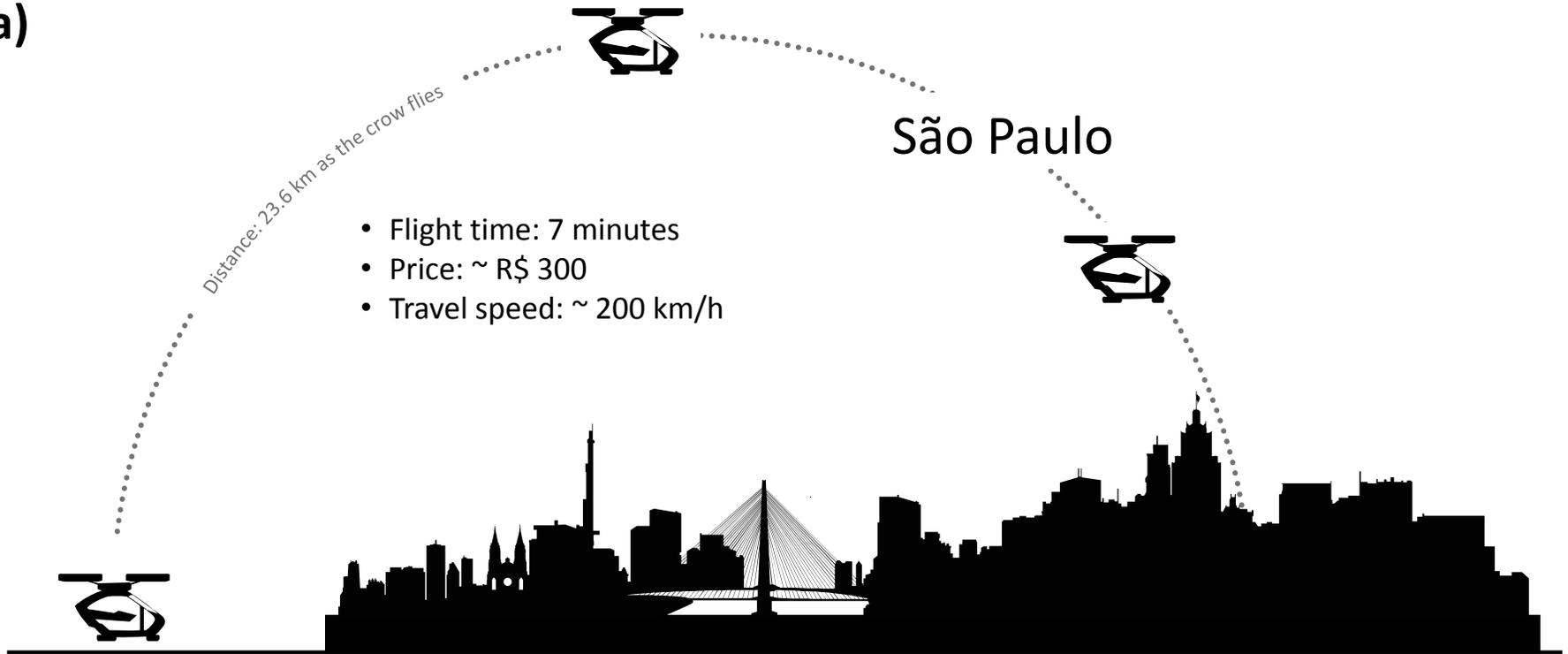
Source: Porsche Consulting

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# Which other scenarios are feasible?

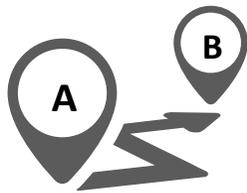


# São Paulo - Guarulhos International Airport (GRU) to Paulista Avenue (central area)



São Paulo – Guarulhos International Airport (GRU)

São Paulo – Paulista Avenue (central area)



27.2  
km



35 - 60 min



~ R\$ 130  
Price

—  
For further interest on Vertical Mobility

## Porsche Consulting Study – „The Future of Vertical Mobility“



[www.porsche-consulting.com/de/medien/  
studien/the-future-of-vertical-mobility/](http://www.porsche-consulting.com/de/medien/studien/the-future-of-vertical-mobility/)





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