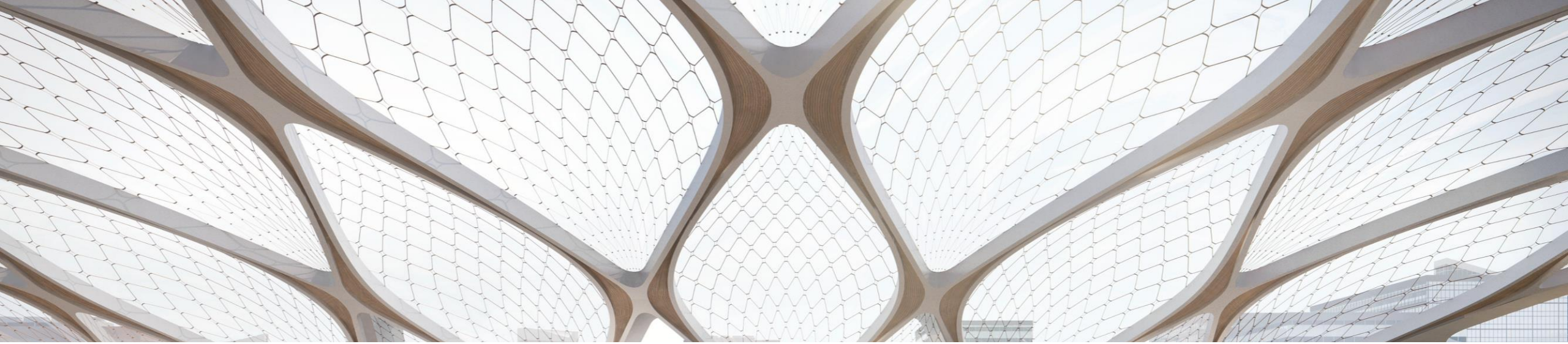


Hyperconnected Europe

Introductory webinar

Welcome to the Hyperconnected Europe INTRO webinar

Introduction to hyperloop

Mars Geuze – Co-founder and CCO, Hardt Hyperloop

Hyperloop Development Program and recent results

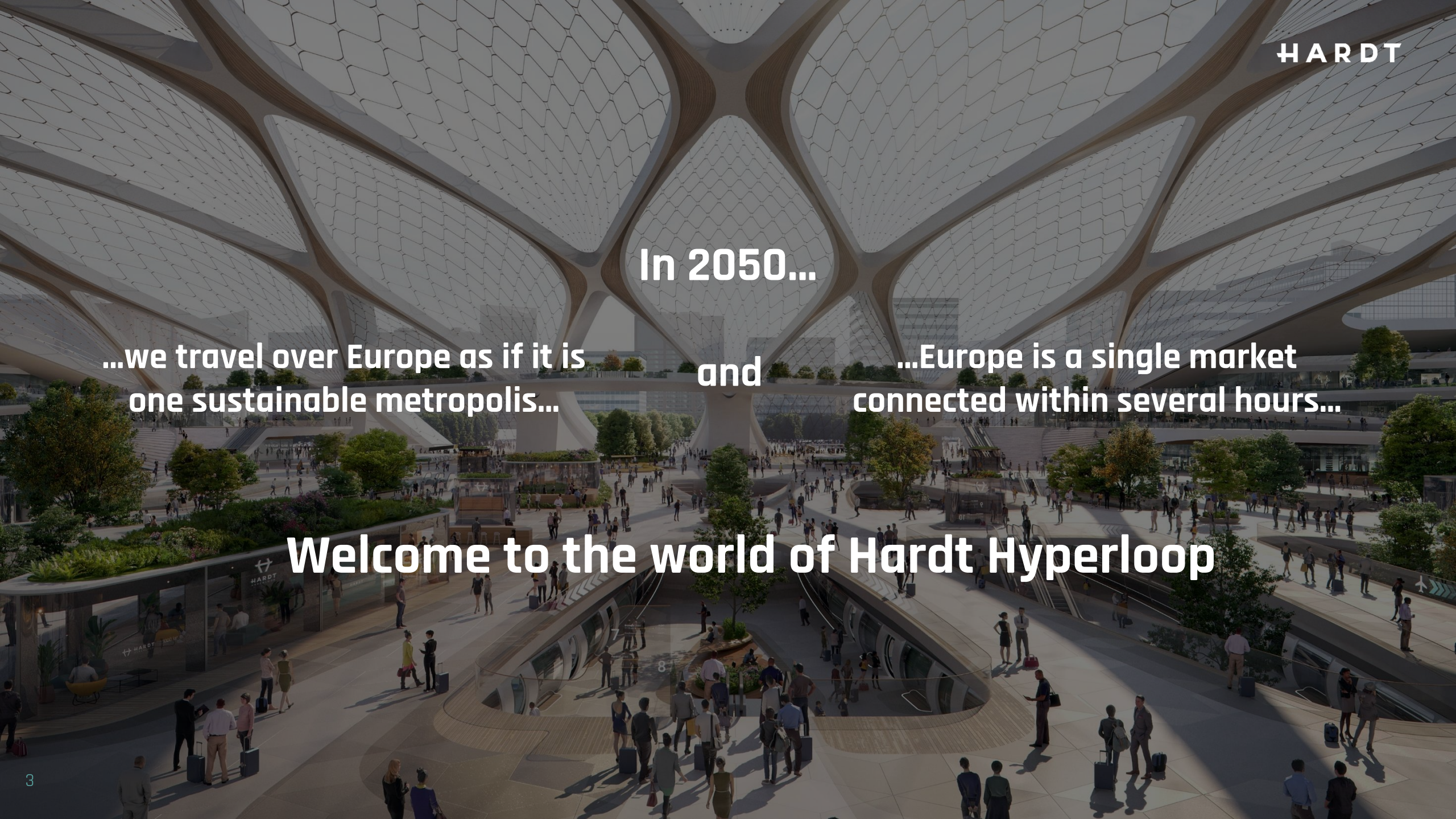
Anna Dabrowska – WG Passengers

Dominik Härtl – WG Future Prospects

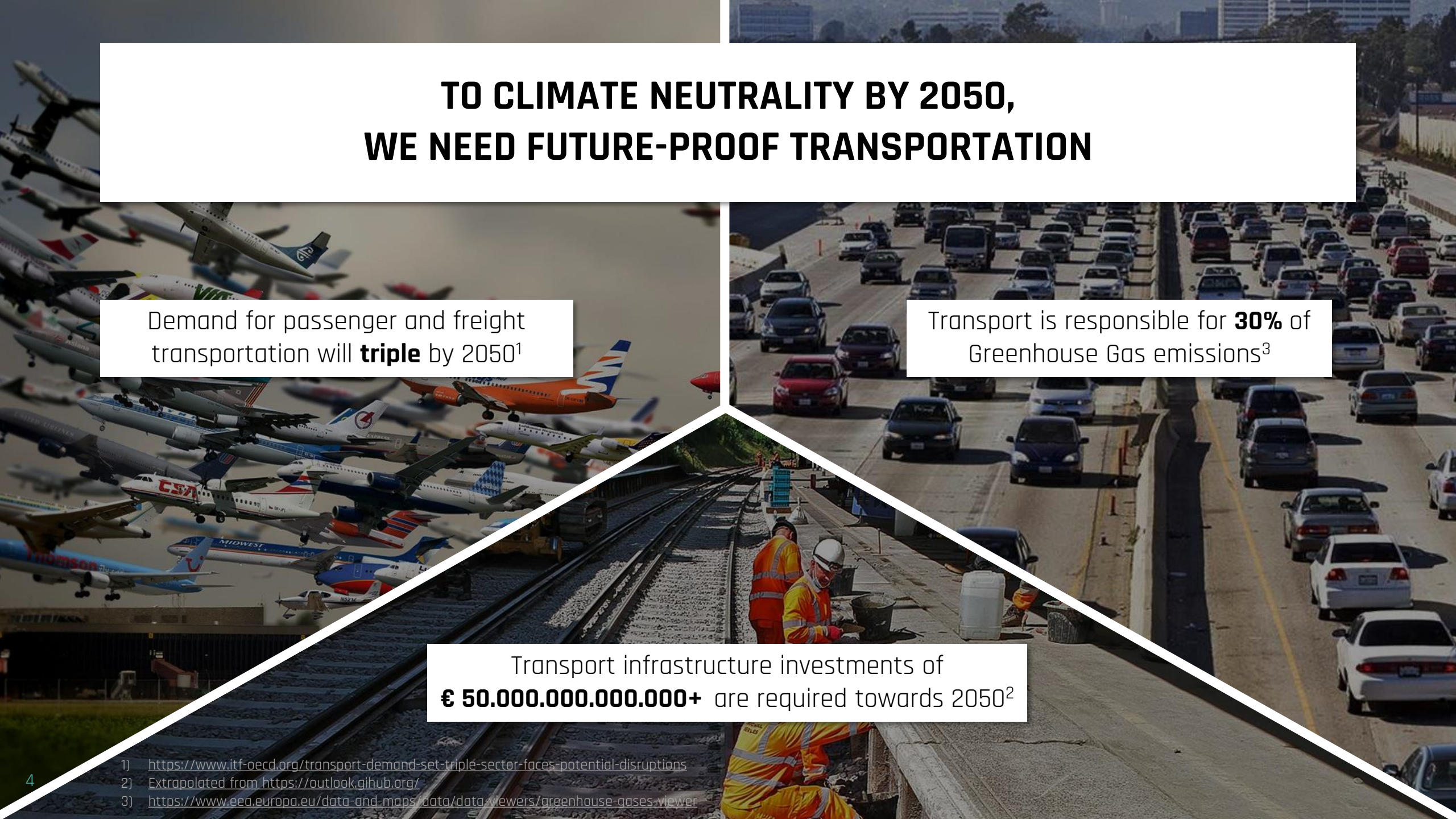
About Hyperconnected Europe, support and planning

Stan de Caluwe – Project Lead

Q&A after every block


HARDT
In 2050...
...we travel over Europe as if it is one sustainable metropolis...
and
...Europe is a single market connected within several hours...
Welcome to the world of Hardt Hyperloop

TO CLIMATE NEUTRALITY BY 2050,
WE NEED FUTURE-PROOF TRANSPORTATION



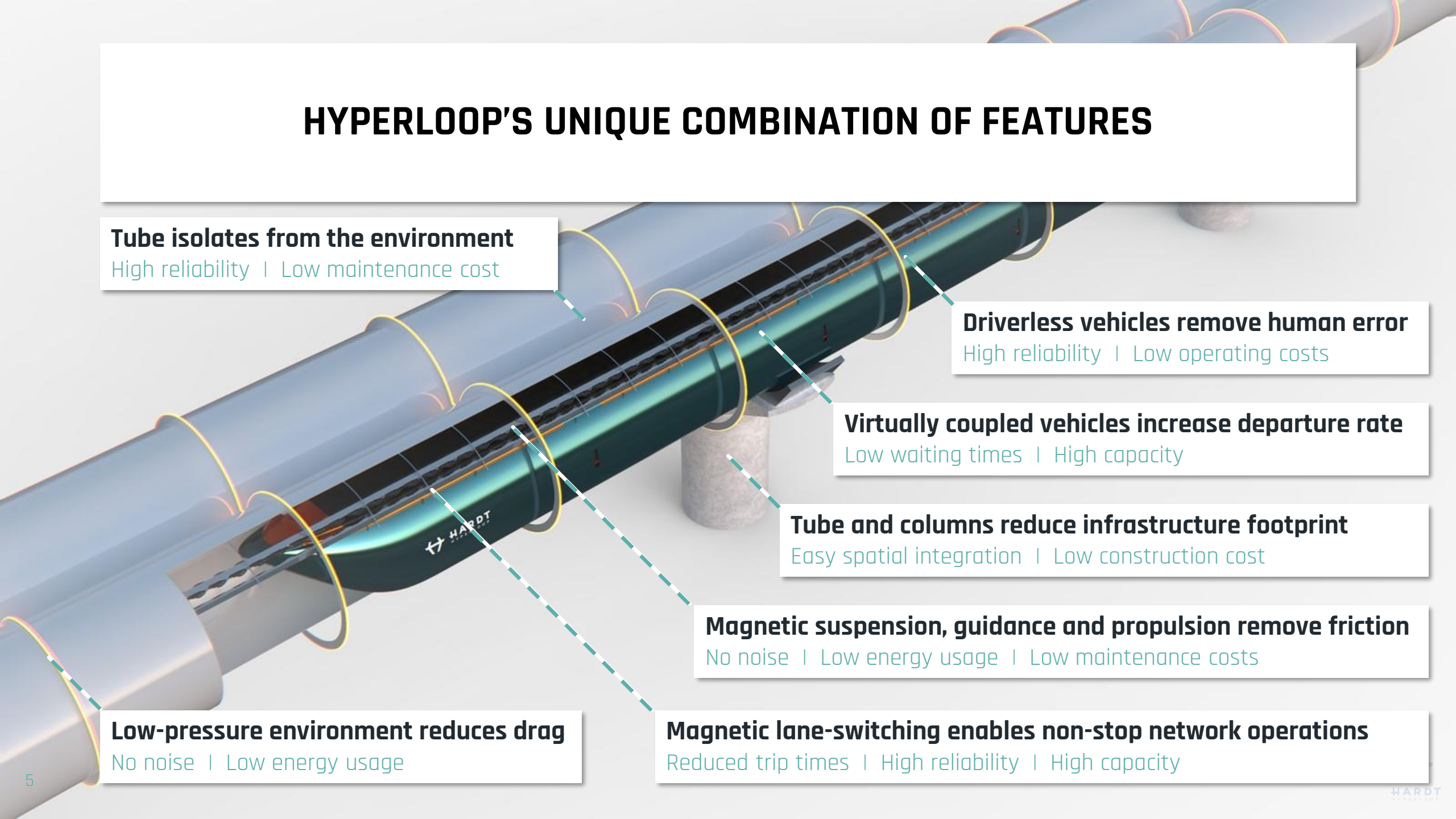
Demand for passenger and freight transportation will **triple** by 2050[1]

Transport is responsible for **30%** of Greenhouse Gas emissions[3]

Transport infrastructure investments of **€ 50.000.000.000.000+** are required towards 2050[2]

1) https://www.itf-oecd.org/transport-demand-set-triple-sector-faces-potential-disruptions
2) Extrapolated from https://outlook.gihub.org/
3) https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

HYPERLOOP'S UNIQUE COMBINATION OF FEATURES



Tube isolates from the environment
High reliability | Low maintenance cost

Driverless vehicles remove human error
High reliability | Low operating costs

Virtually coupled vehicles increase departure rate
Low waiting times | High capacity

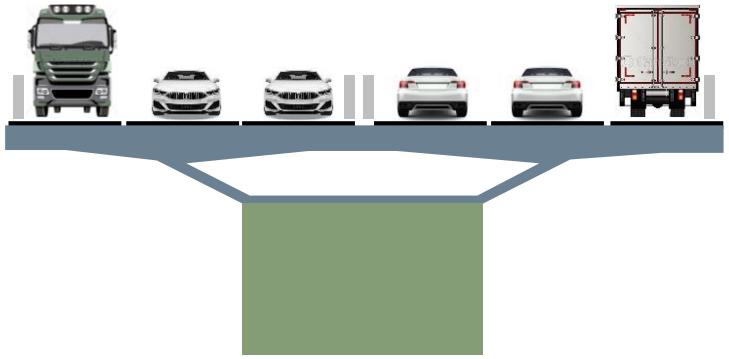
Tube and columns reduce infrastructure footprint
Easy spatial integration | Low construction cost

Magnetic suspension, guidance and propulsion remove friction
No noise | Low energy usage | Low maintenance costs

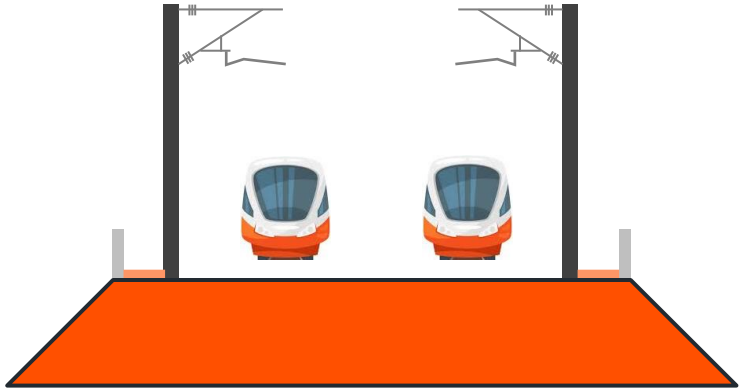
Low-pressure environment reduces drag
No noise | Low energy usage

Magnetic lane-switching enables non-stop network operations
Reduced trip times | High reliability | High capacity

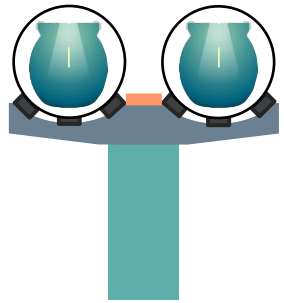
PASSENGERS AND CARGO



20 m



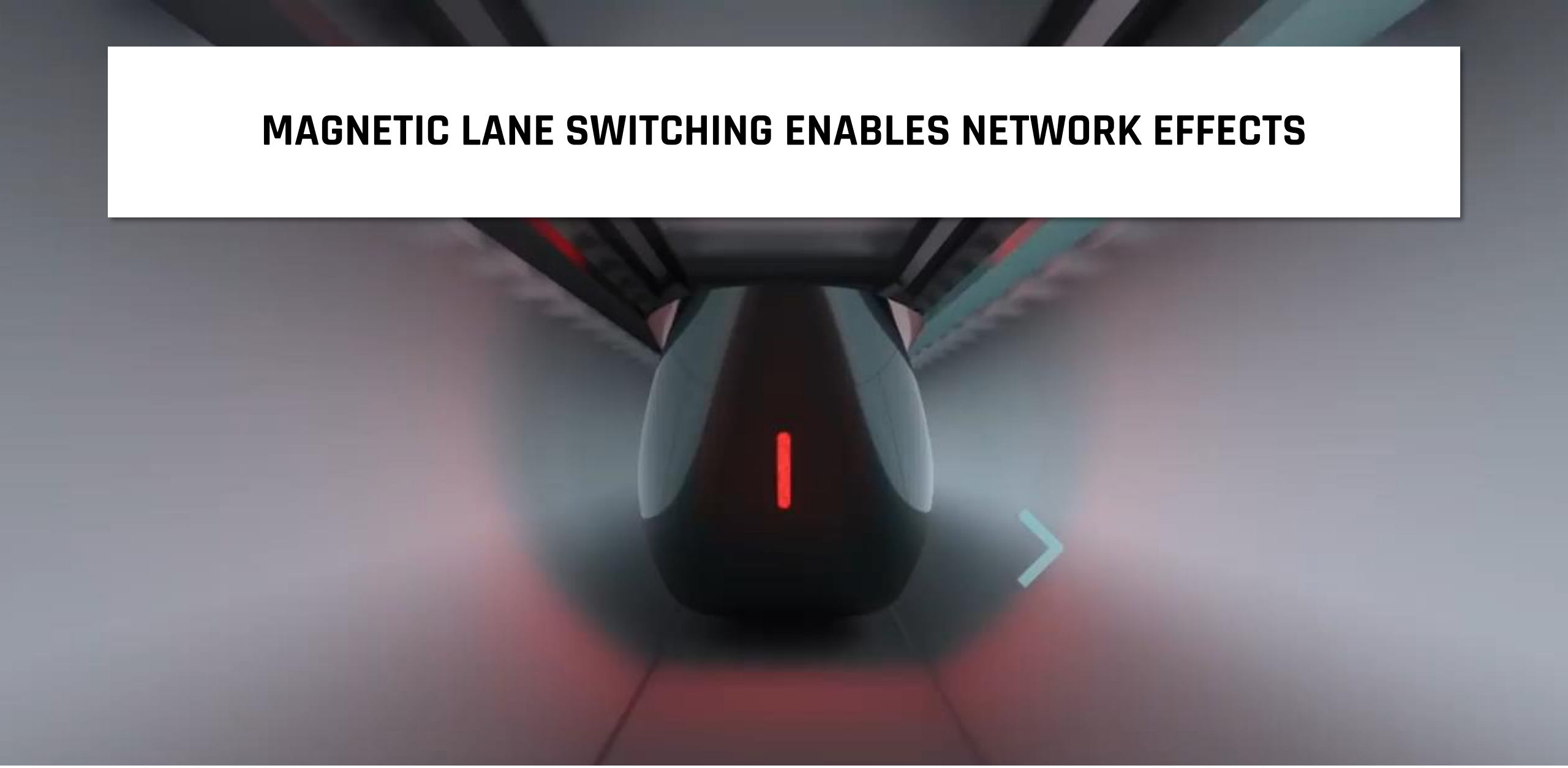
14-26 m



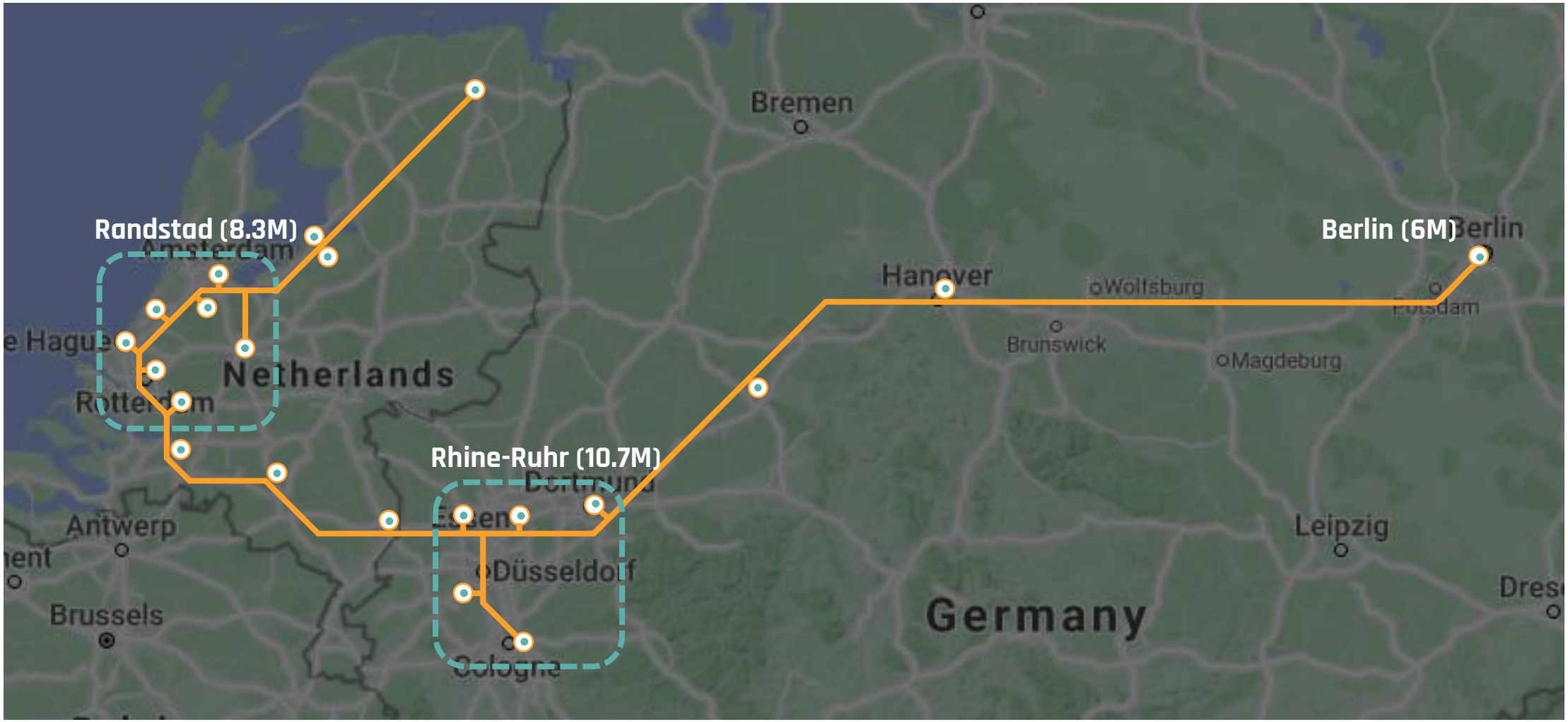
8 m

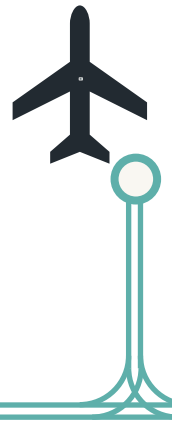
Energy	530 Wh/pax/km	55 Wh/pax/km (@300km/h)	38 Wh/pax/km (@700km/h)
Capacity	8,000 pax/h/direction	7,500-15,000 pax/h/direction	20,000 pax/h/direction

MAGNETIC LANE SWITCHING ENABLES NETWORK EFFECTS



NETWORK EFFECTS

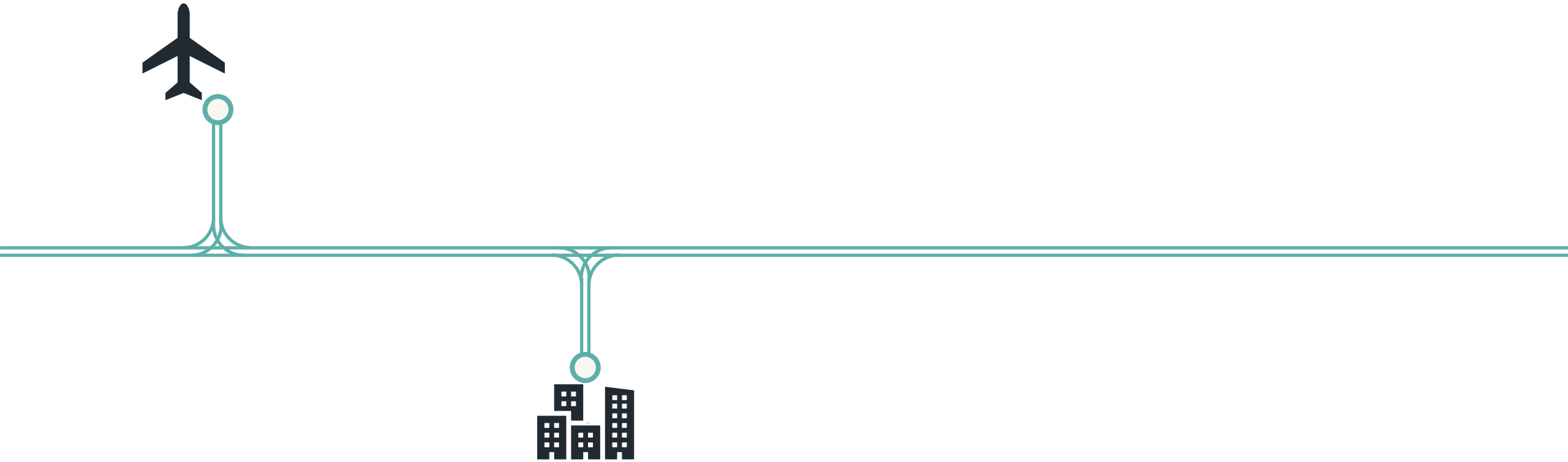


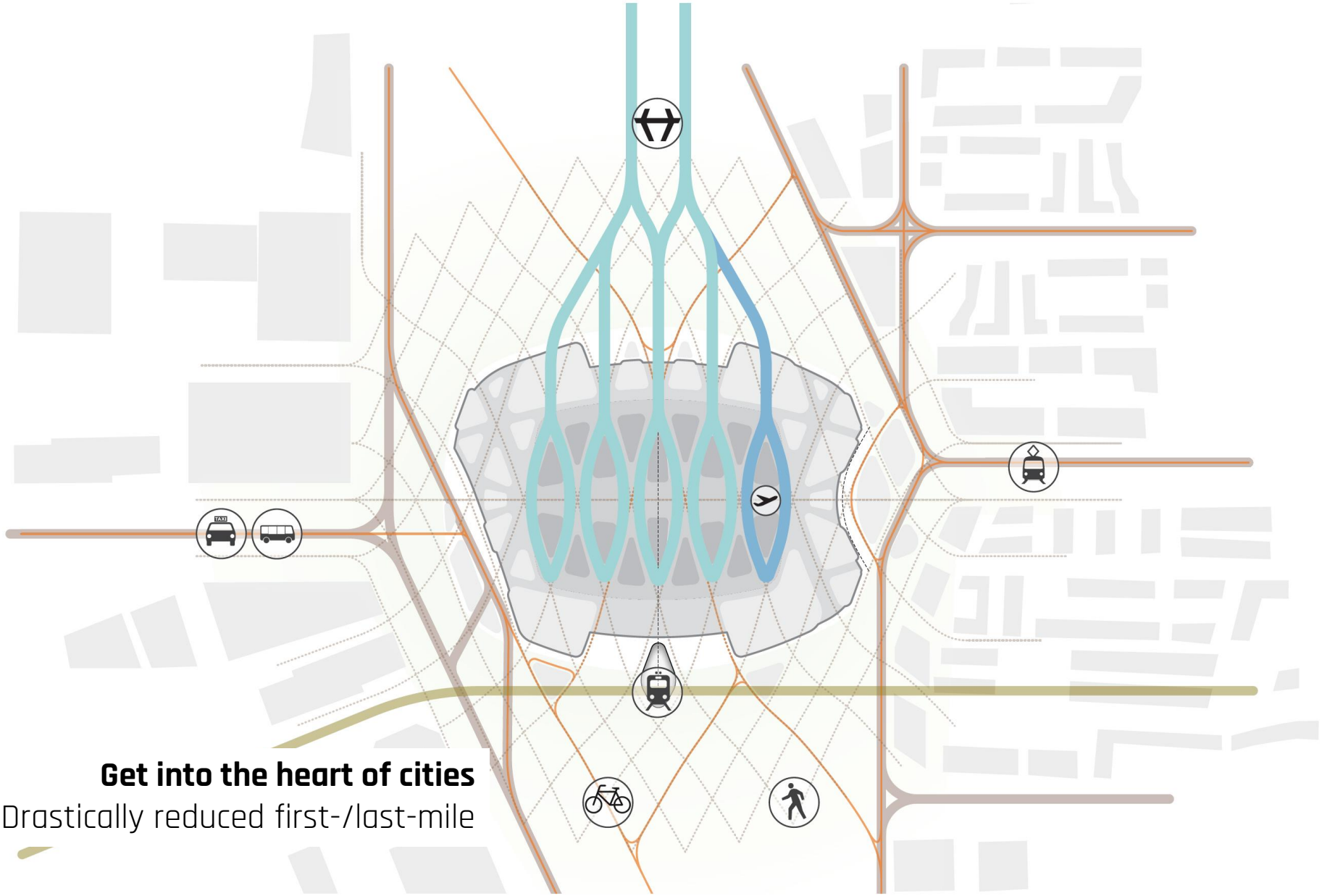


Create capacity at air hubs

Free up to 70% of EU air hub capacity

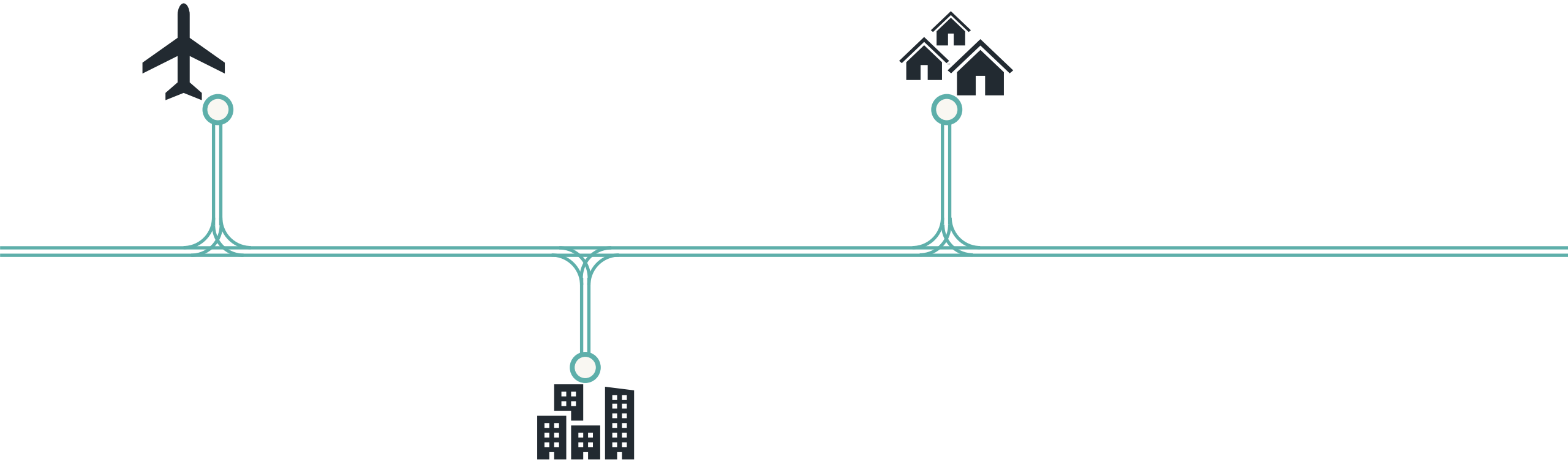
Heathrow 3rd runway buys 600 km of hyperloop

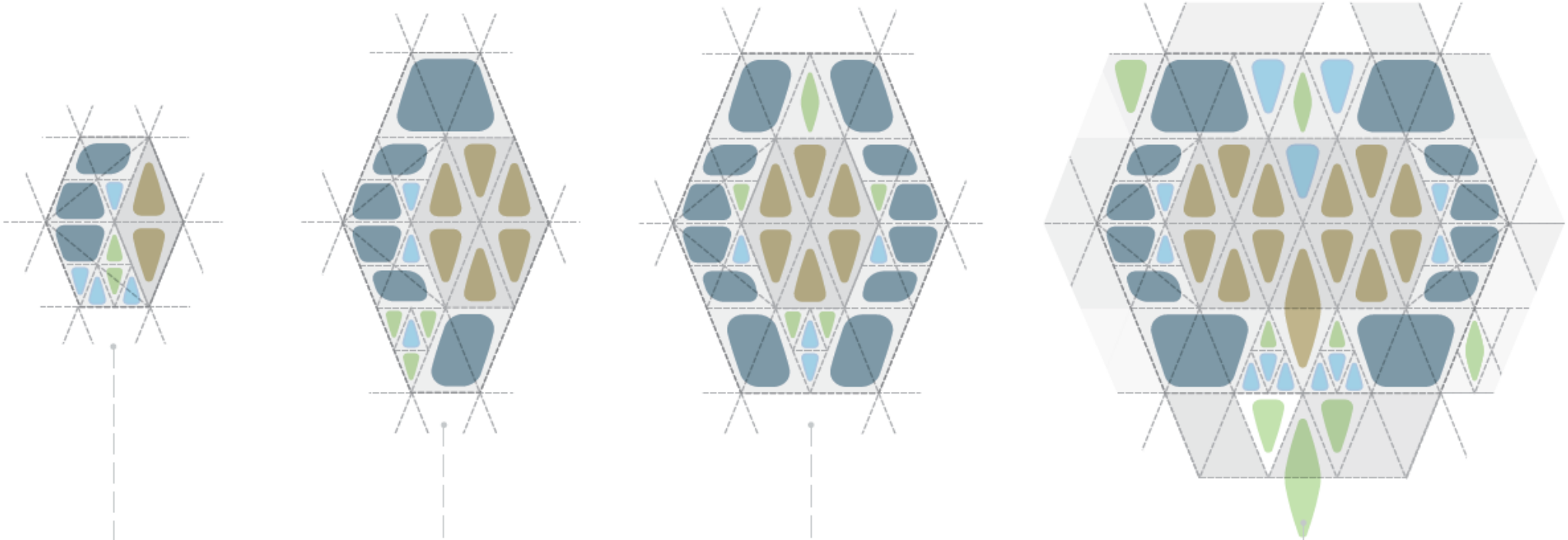




Get into the heart of cities

Drastically reduced first-/last-mile





SIZE
XS

SCENARIO A
City Hopper

LOCATION
City Center

SIZE
S

SCENARIO B
Seamless Link

LOCATION
Small Town Airport

SIZE
M

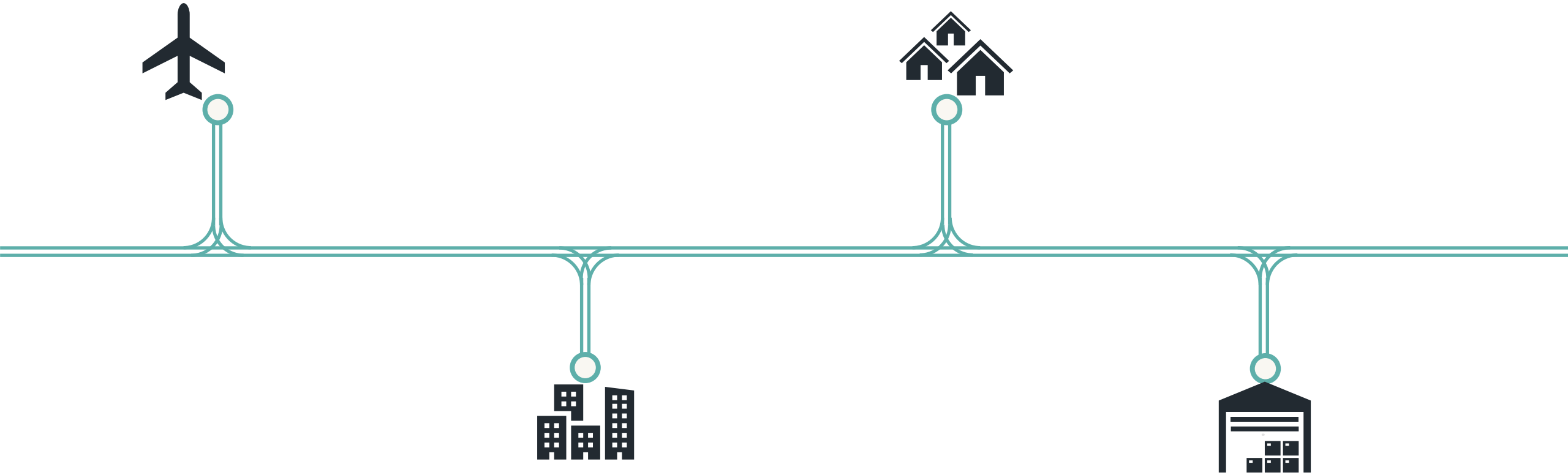
SCENARIO C
Daily Commute

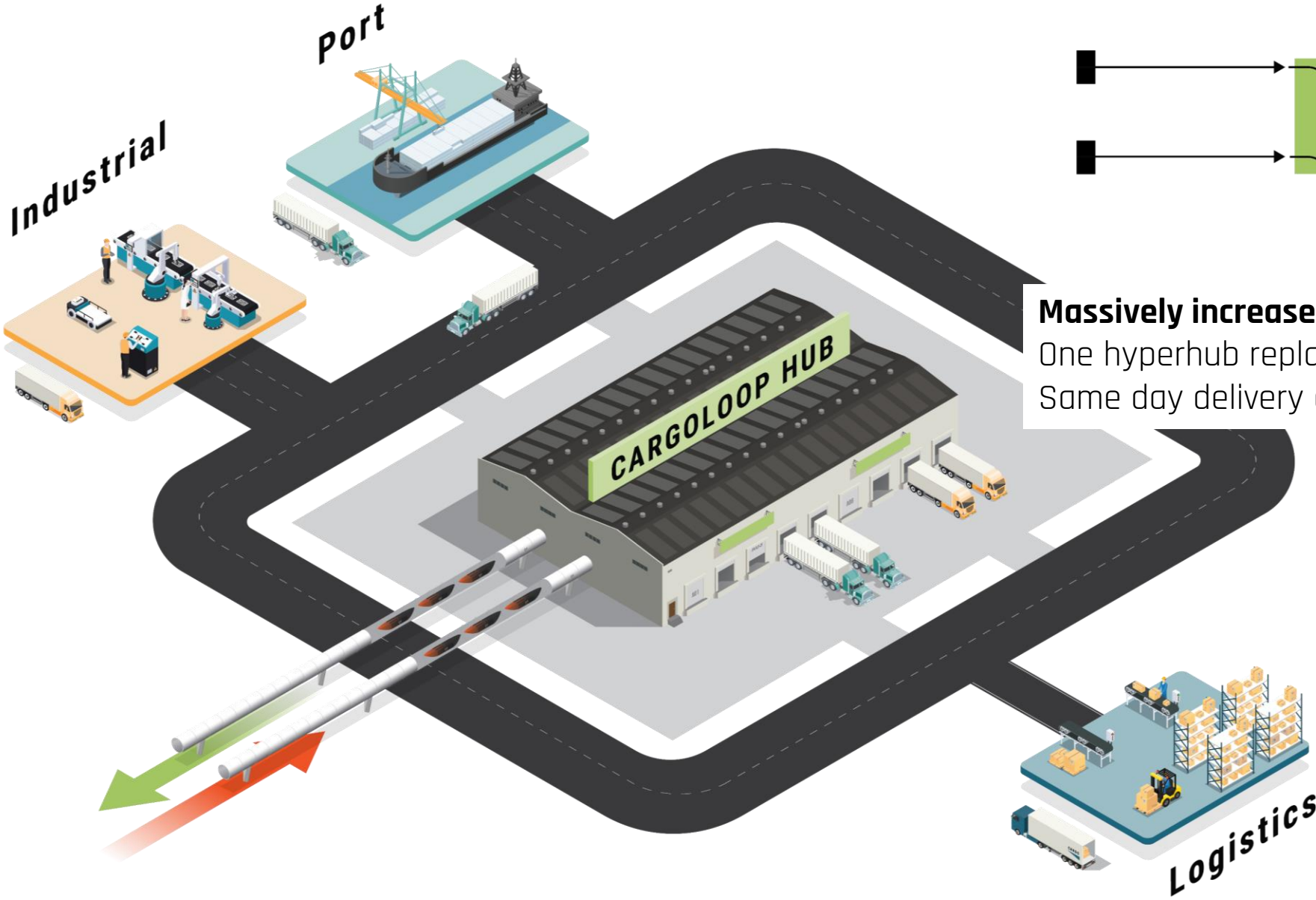
LOCATION
Edge of City

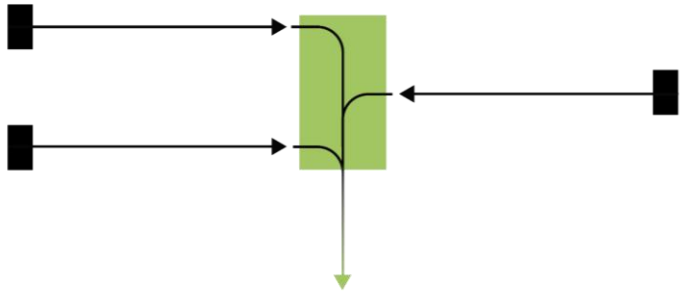
SIZE
L

SCENARIO D
Integrated Hub

LOCATION
New City Development







Massively increase logistics efficiency

One hyperhub replaces 10 local hubs

Same day delivery across the continent

THE SET-UP OF THE EUROPEAN HYPERLOOP STANDARD (JTC20) HAS BEEN OFFICIALLY LAUNCHED

Technical partners

Established market players

Approval by all European countries for setting the European hyperloop standard

A European hyperloop system is exportable worldwide and a leverage to be the global standard

ROADMAP

2013 — **HYPERLOOP ALPHA + FIRST STARTUPS**

2015 — **HYPERLOOP COMPETITION**

2017 — **PROOF OF CONCEPT**

2020 — **EUROPEAN HYPERLOOP CENTER GRONINGEN**

2023 — **PILOT ROUTE**

2029 — **NETWORK**

2030+

HYPERLOOP DEVELOPMENT PROGRAM

Accelerate development of hyperloop in Public Private Partnership

Q&A time!

Hyperloop Development Program

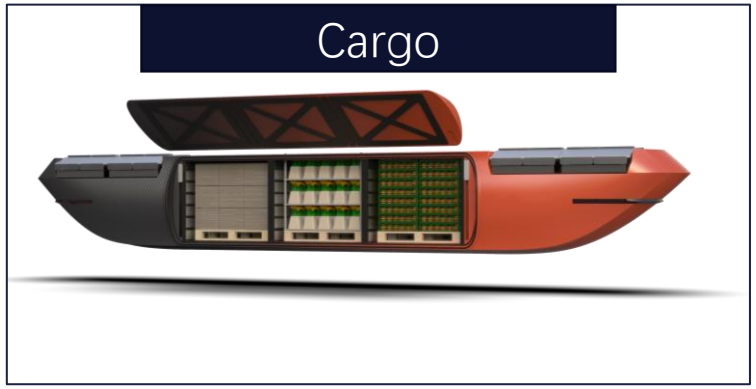
Public-private partnership bringing Hyperloop to reality

Hyperloop Development Program

Public-private partnership bringing Hyperloop to reality

European innovation platform aiming to:

- Prove all aspects of the hyperloop
- Develop and test products, services, technologies
- Bring the hyperloop to commercialization
- Partners work on various elements of the hyperloop in four interconnected working groups



Initiated in 2017 by a small group of partners, the hyperloop ecosystem is expanding rapidly

HDP in key figures

- **19** private sector partners cooperate on hyperloop originating from >5 countries within EU/Global
- **7,5** MEUR public sector investments from Dutch National and Regional Government
- **>12** MEUR private sector investments committed to the Program over the next three years
- **>237.000** person-hours committed to the Program over the next three years, spread over 4 working groups.

Program Board & Management

The HDP is governed by the *Stichting HDP*, composed of:

Jeroen in 't Veld (Chair) – Rebel Group

Bertrand van Ee. – Hardt

Mars Geuze- Hardt

Joris van Papenrecht - BAM

Stefan Marges (Program Manager) - Hardt

Hyperloop program results to date - selection

Feasibility study for cargo – Cargo Hyperloop Holland

Pre-feasibility for passengers– Amsterdam Airport Schiphol short distance network

Cargo Hyperloop Holland - Project Overview

Project Objectives

- Reduce levels of road traffic and congestion on A4 between Amsterdam and Rotterdam;
- Reduce carbon and other emissions from transport
- Deliver the future economic growth for North and South Holland by improving accessibility and connectivity between logistics and industrial centers in the region;
- Initiate the development of the European hyperloop network by implementing a pilot hyperloop project
- Deliver savings and improve efficiency of other transport infrastructure development schemes in the region

Project Scope

- Development of the hyperloop **linear infrastructure** between Aalsmeere / Amsterdam Schiphol Airport and Maasvlakte / Barendrecht
- Development of the **cargo hyperloop hubs** in 12 locations along the corridor, identified in cooperation with wide stakeholders community
- Provision of **cargo hyperloop vehicles** to be operated in the corridor.
- Provide **transport services** for hyperloop.

Cargo Hyperloop Holland - Conclusions

- Cargo Hyperloop Holland fits very well with EU and Netherlands policies, by providing an additional logistics solution which:
  - **Improves competitiveness of the businesses in the region** (enables optimization of logistics processes to achieve tangible gains in transit time and reliability)
  - **Improves trans-European connectivity** (significant network effects expected after the Dutch and European hyperloop networks are completed)
  - **Reduces emissions from freight transport** (operational savings close to 1 mln tonnes of CO2 emissions expected by 2050, further work with industrial partners are conducted to minimize hyperloop construction emissions).
  - **Improves living environment** (in 2050 it is expected that more than 2.5 thousand trucks will be removed from the A4 corridor and shifted to hyperloop, which accounts for 17% of 2050 truck traffic along the corridor)

Hyperloop to decongest AAS by substitution of short-haul flights

Hyperloop Network:

- Connection to major airports and cities in 600 km radius
- Network Length: **+-2.200 km**
- Investment: **€ 143-156 billion**
- Ticket fare: **€0,10** per passenger-kilometer
- Annual economic benefits: **€5 – €7 billion**
- Travel time reductions - **78%**

Hyperloop is projected to decongest AAS by substituting 12.1-12.5 million passengers in 2050

The hyperloop network could also supply services for passengers of the international trains and domestic trains

The estimated maximum market share for hyperloop between all cities in the network accrues between 97 – 127 million passengers in 2050.

Conclusions and recommendation

- Implementing European network of hyperloop will:
  - Replace short haul flights
  - Decongest existing transport infrastructure (airports, roads)
  - Reduce carbon emissions
  - Reduce journey time
  - Improve affordability (lower transport costs for users)
- Further steps are required to fully understand opportunities created by the European hyperloop network and facilitate its implementation
  - Plan and design a complete concept of the European hyperloop network
  - Identify and assess economic, transport and environmental impacts of the network
  - Prepare guidelines for network implementation, including infrastructure integration concepts and a methodology to select locations of hyperloop hubs

Q&A time!

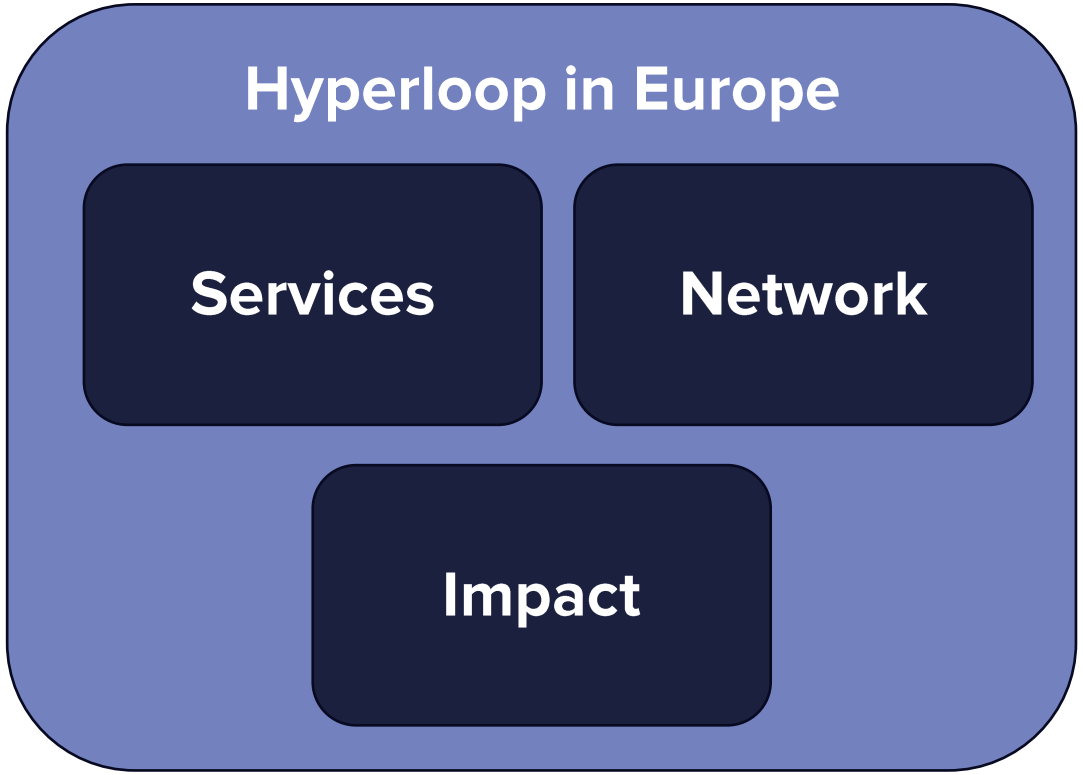
Hyperconnected Europe

Jointly designing the European Hyperloop Network

Hyperconnected Europe – what is it?

Hyperconnected Europe

- A community of European cities and regions creating a vision for the European hyperloop network
- Jointly design the system that radically improves connectivity while eliminating emissions, enabling the goal of net zero by 2050
- Creating support for the new, future-proof mode of transport

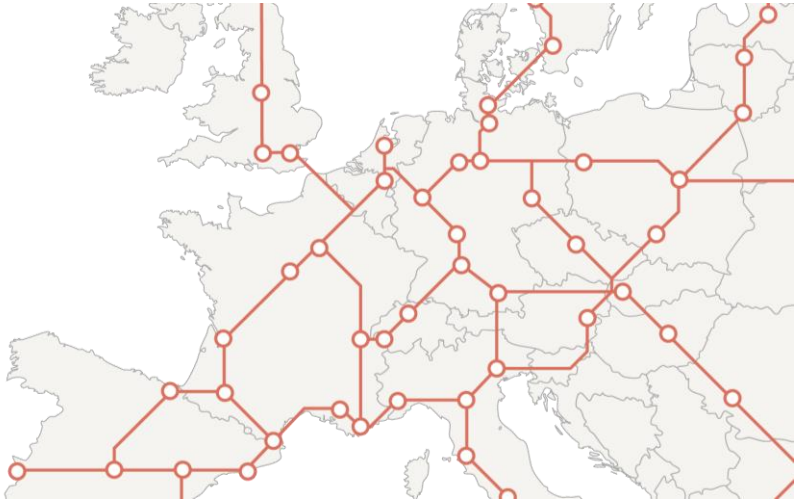


Hyperconnected Europe - topics

Hyperloop services

- What is hyperloop and how can it serve our future needs?
- How does it complement existing modalities, like rail, road and air?
- How can it improve the way we travel and ship goods?
- Whom does it serve and how should it be priced?

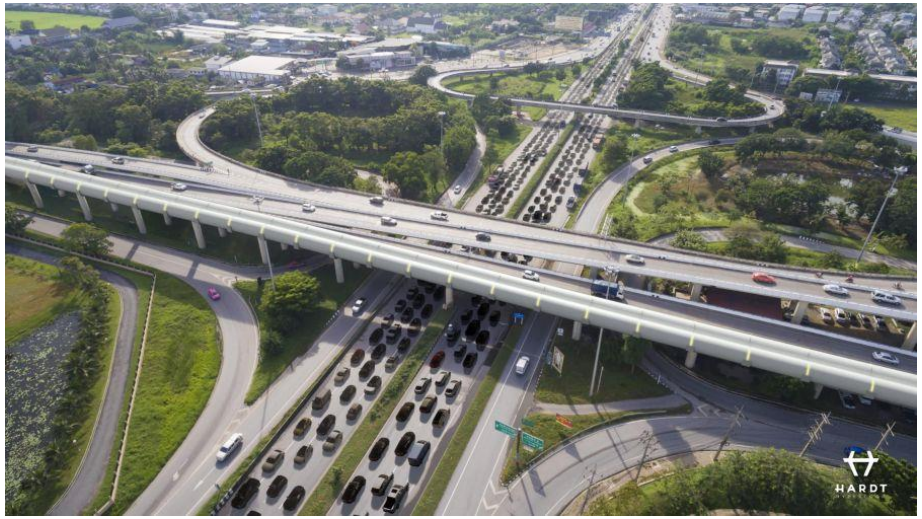
Hyperconnected Europe - topics

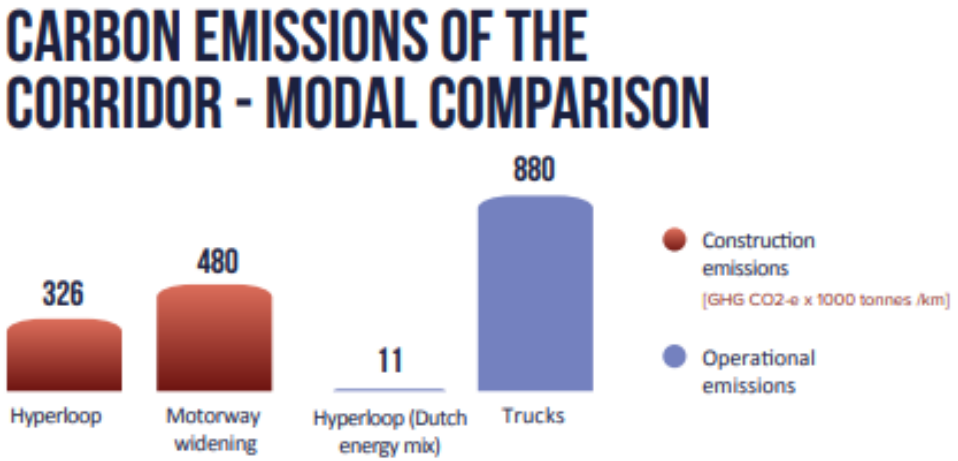


Hyperloop network

- What should be the layout of the network?
- What should passenger stations and cargo hubs look like and where should they be located?
- How does it connect to other modalities?
- How do we smartly integrate the tubes into the existing built environment?

Hyperconnected Europe - topics





Hyperloop impact

- How does hyperloop help us achieve the Green Deal goals of zero-emission transport?
- How does hyperloop relieve pressure on existing infrastructure like highways, railways and airports?
- What is the economic impact of improved connectivity between European cities?
- What is the impact be on the fabric and livability of cities?

Hyperconnected Europe - support

Involvement and support of European cities

- The Hyperloop Development Program so far is mostly focused on technical development. Now we are turning to the market
- European cities will be the ultimate beneficiaries of a future hyperloop system and should be involved in these critical phases of hyperloop development
- Realizing a European hyperloop network and a completely new modality is a massive task
    - We need to go beyond fancy renders and buzz-word stories
    - Sensible application of the technology is key
    - It needs the support from cities and regions, in every phase

Hyperconnected Europe – Letter of Support

Cities can become a Supporting City by signing a Letter of Support

- Signatories indicate their willingness to think along about the potential of a European hyperloop network to help facilitate growth sustainably, and confirm their interest in hyperloop as an additional mode of transport
  - *No costs*
  - *No obligations*
  - *Modest time investment*

- HDP will engage in a **custom, city-specific 2-hour online workshop** with a Supporting City
  - Learn about local mobility and transport challenges
  - Potential local impact of hyperloop
  - Passenger and cargo hub locations
  - Most promising routes/connections, as part of the future European network

Hyperconnected Europe - planning

Until June 2022, we have a full agenda!

Date	Topics – main focus
February 10	Official kick-off event
February 24	Webinar cargo services / network
April 5	Webinar passenger services
May 10	Webinar network and integration
May 26	Webinar demand and impact
June 23	Road to realization / overall results webinar

Invitations will follow. Webinars typically start at 16.00h CET

+ individual city/region-specific workshops / route studies

Q&A time!

Hyperconnected Europe – next steps

- Please show your support by signing the Letter of Support – will be sent to you this week, together with the invitation for the official kick-off event

- Keep an eye on your inbox and www.hyperconnected.eu for the invitations to the thematic webinars

See you at the official kick-off on February 10, 16.00h

Questions or remarks: stan@hardt.global