

Port of Antwerp-Bruges

In tune with the world.

Tom Hautekiet,
Chief Commercial Officer

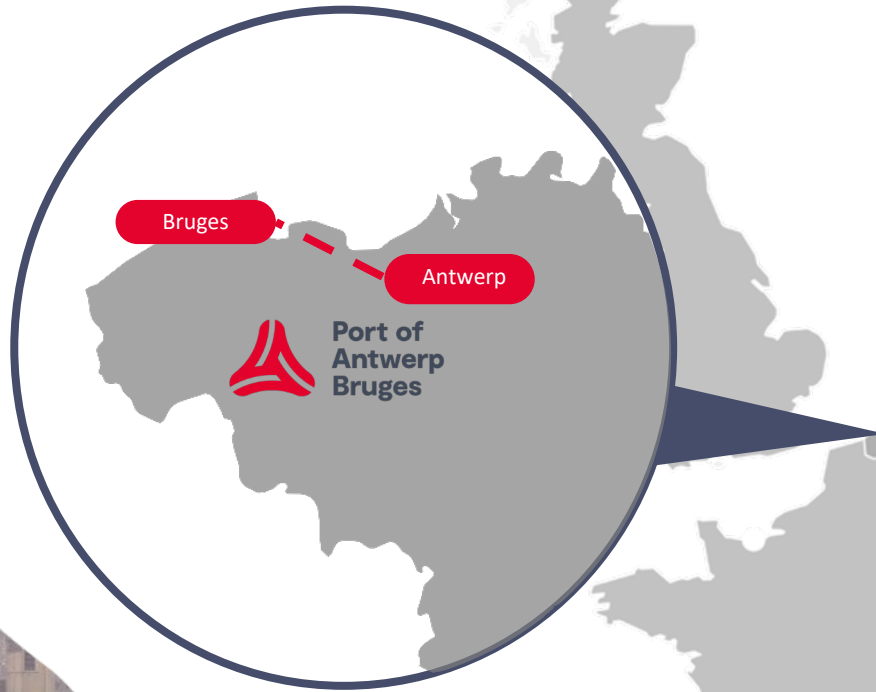


May 9th, 2023

One port, two platforms



Port of
Antwerp
Bruges



**A global port
in the heart of Europe**

**2nd largest
port of Europe**

**One port
Two sites**



**Port of
Antwerp
Bruges**





2nd largest
port in **Europe**



Port of
Antwerp
Bruges



Largest **car handling**
port in Europe
3,507,461 million cars/year



20,675
Seagoing vessels/year



Largest **chemical**
hub in Europe



Number one **export**
port in Europe



Total throughput
287 mio tons/year



Important **cruise**
port in Benelux
547,374 passenger movements

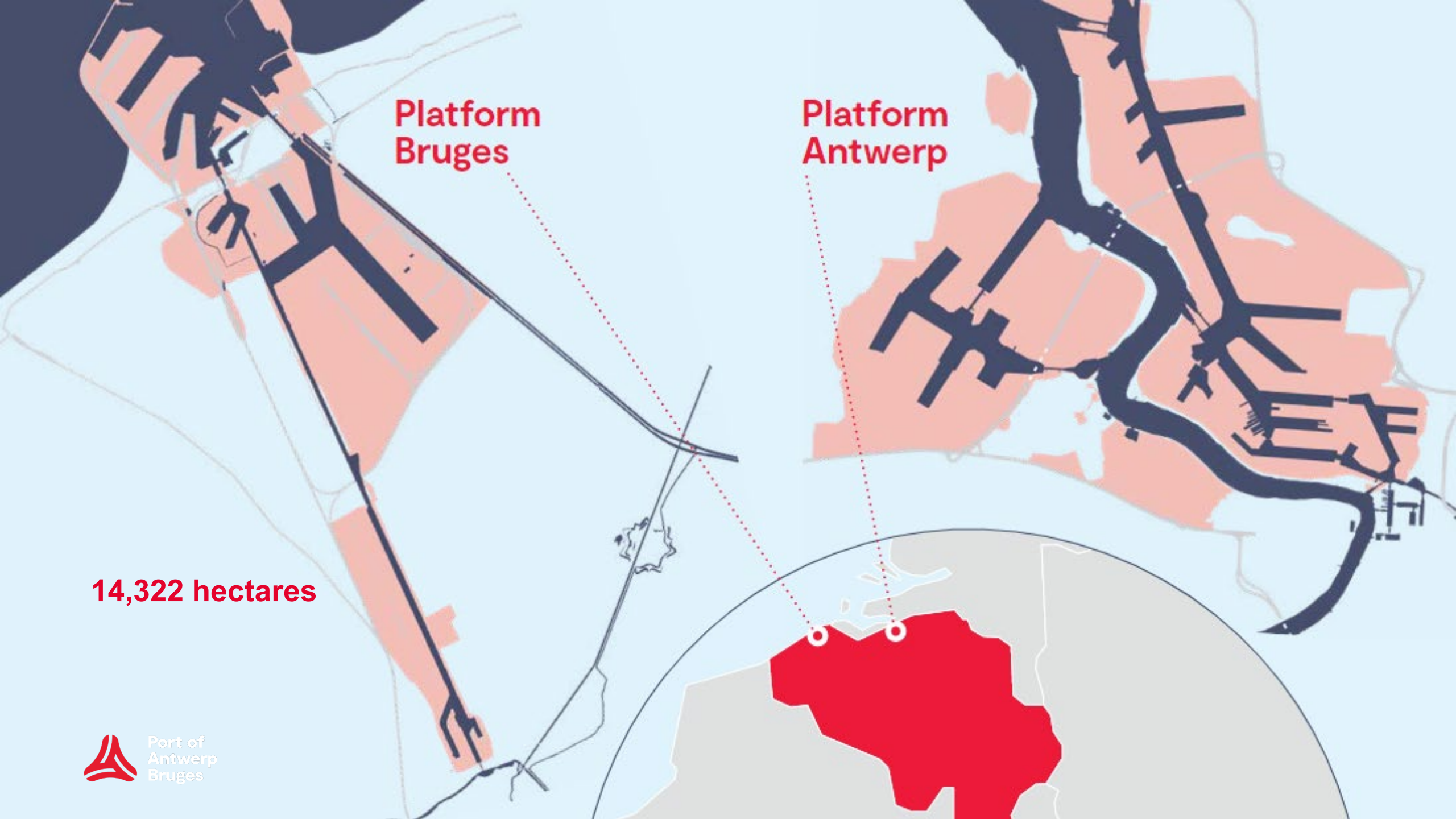


15% of EU **gas** market

**Platform
Bruges**

**Platform
Antwerp**

14,322 hectares



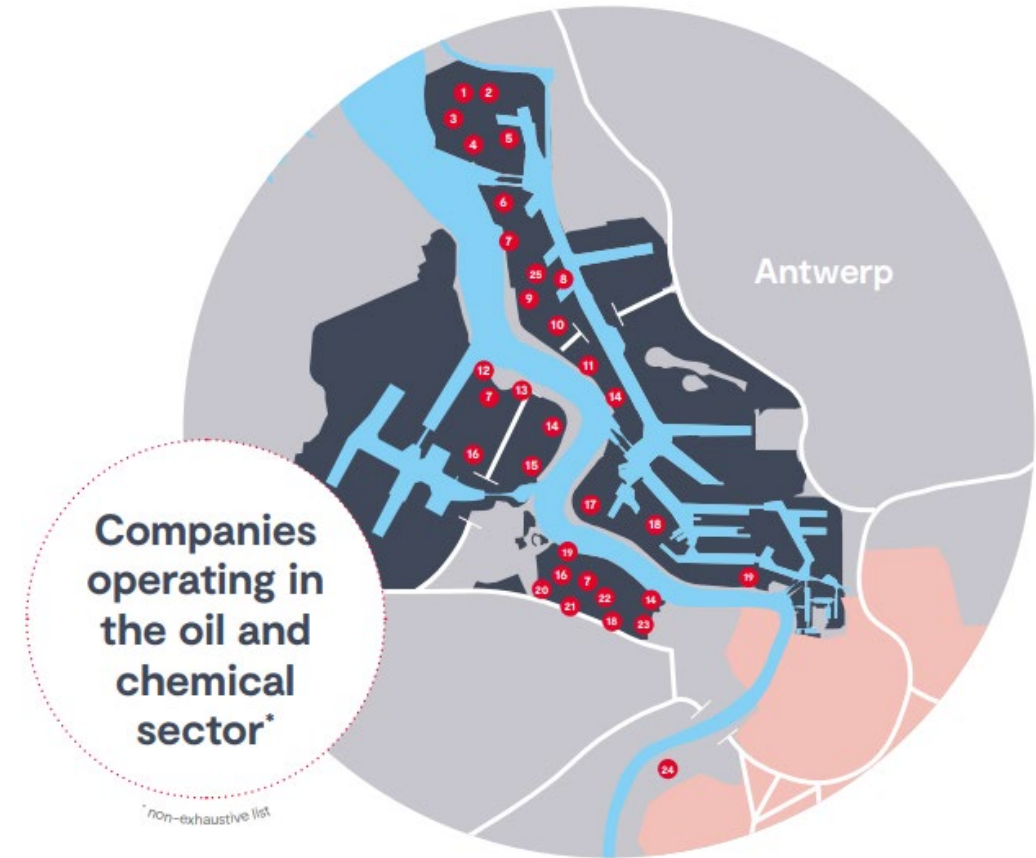
A world class industrial cluster



Port of
Antwerp
Bruges

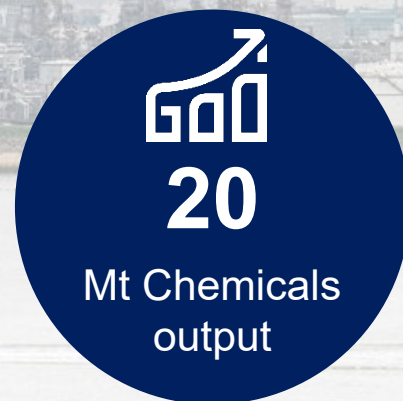
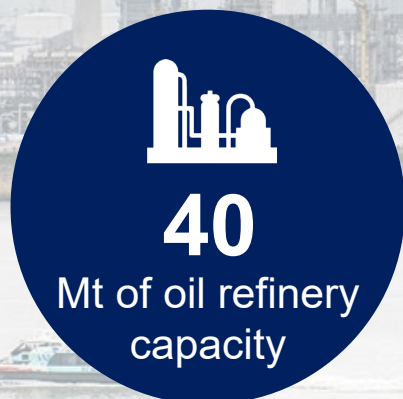
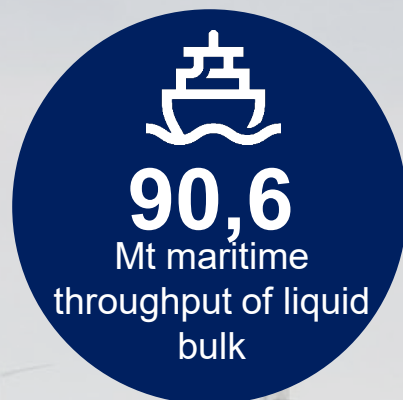
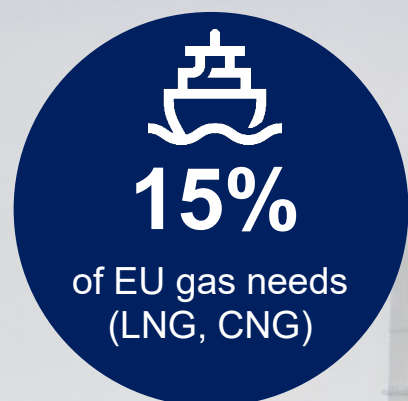
Antwerp: the largest integrated chemical cluster in Europe

- Guarantee of **stable supply of feedstock**, raw materials and intermediates
- Outstanding pipeline **connectivity**, tank storage and product handling
- **Import and production** of chemical commodities for the Global and North-West European market
- **Leading chemical companies** are present in the cluster and continue to invest in Antwerp



- | | | |
|---------------------|-----------------------------------|--------------------------|
| 1 BASF DOW HPPO | 10 Evonik | 19 TotalEnergies |
| 2 BASF | 11 Covestro | 20 Nippon Shokubai |
| 3 Ineos Styrolution | 12 Ashland | 21 Kuraray |
| 4 Air Liquide | 13 Monument Chemical | 22 Praxair |
| 5 Eurochem | 14 Lanxess | 23 3M |
| 6 Gunvor | 15 Lubrizol | 24 Kuwait Petroleum (Q8) |
| 7 Ineos | 16 Borealis | 25 Inovyn |
| 8 Bayer Agriculture | 17 TotalEnergies | |
| 9 Eastman | 18 ExxonMobil (Ref. + Petrochem.) | |

Europe's largest integrated oil & chemical cluster



Zeebrugge: key natural gas import hub North-West Europe

- Fluxys
- 15% of EU gas market
- Large supplier to the **German** market
- **Expansion** plans ongoing for additional NG throughput capacity and future energy carriers



Strategic partner of the German industry

- Major **German chemical and logistic players** host their production and import/export facilities in Antwerp, linked with German industrial sites
- Supply of **natural gas** through Zeebrugge
- Key port for steel, machinery and car(parts) **import and export to/from Germany**
- **Rail and barge** connections (20Mton/y) for a multitude of products and commodities as well as pipeline connections



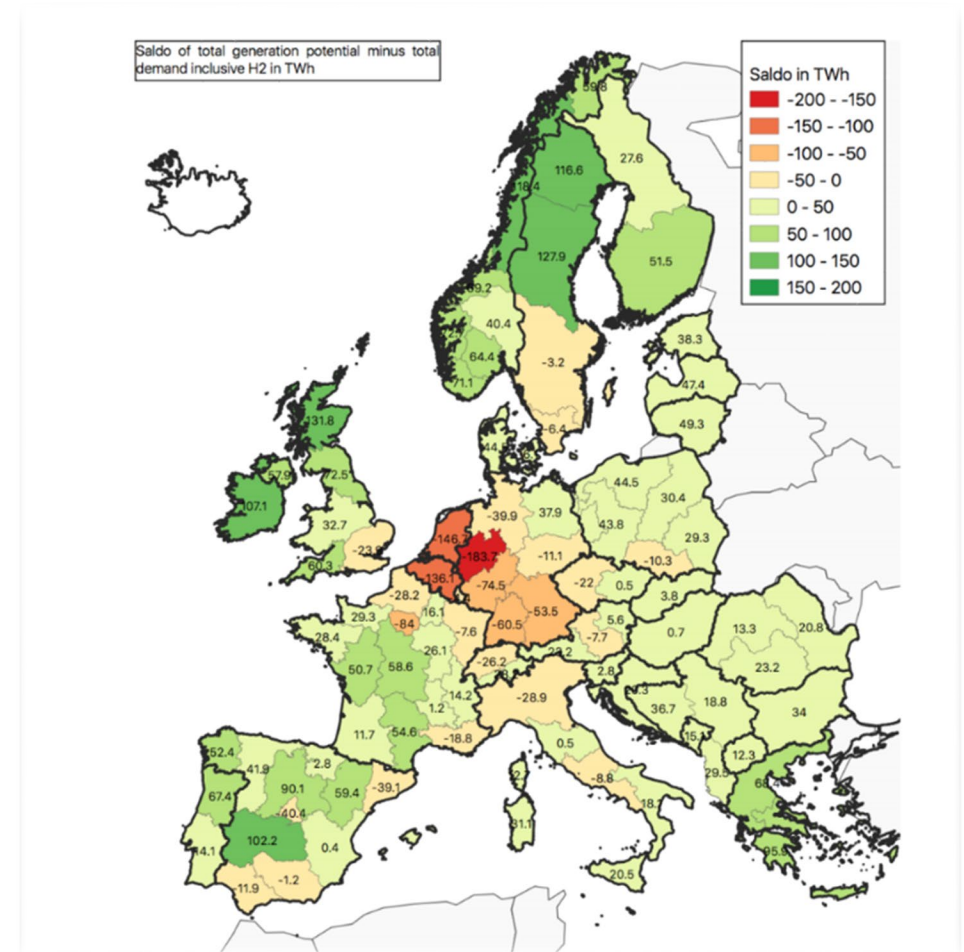
Zeebrugge

14 februari 2023



Energy transition is a European challenge: joint efforts needed

- Tackle climate change AND **security of energy supply** for our economies.
- Belgium and Germany face the **same challenge**: large energy demand/industrialization and insufficient renewable energy potential to match.
- **Interconnection** of electricity grids and gas pipelines will continue to be vital for our economies.
- **Electrones and molecules** will be complementary, as well as European production and imports.



Energy & feedstock hub enabling energy transition



Port of
Antwerp
Bruges

Energy supply transition

3 pillar approach Port of Antwerp-Bruges



Renewable electronics &
interconnected grids



Green/Blue hydrogen
production & pipelines



Hydrogen imports

Climate transition lighthouse projects



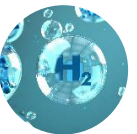
Sustainable Energy



Expand Onshore wind production capacity



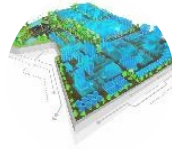
Backbones for sustainable flows
(H₂, CO₂, waste heat & steam)



Hydrogen Import Coalition / Pilots



Sustainable Industry



NextGen District –
hotspot for circular Economy



Antwerp@C – CCUS



Power-to-Methanol
green methanol production (CCU)



Sustainable Shipping



Multi Fuel Port –
alternative fuels in offer

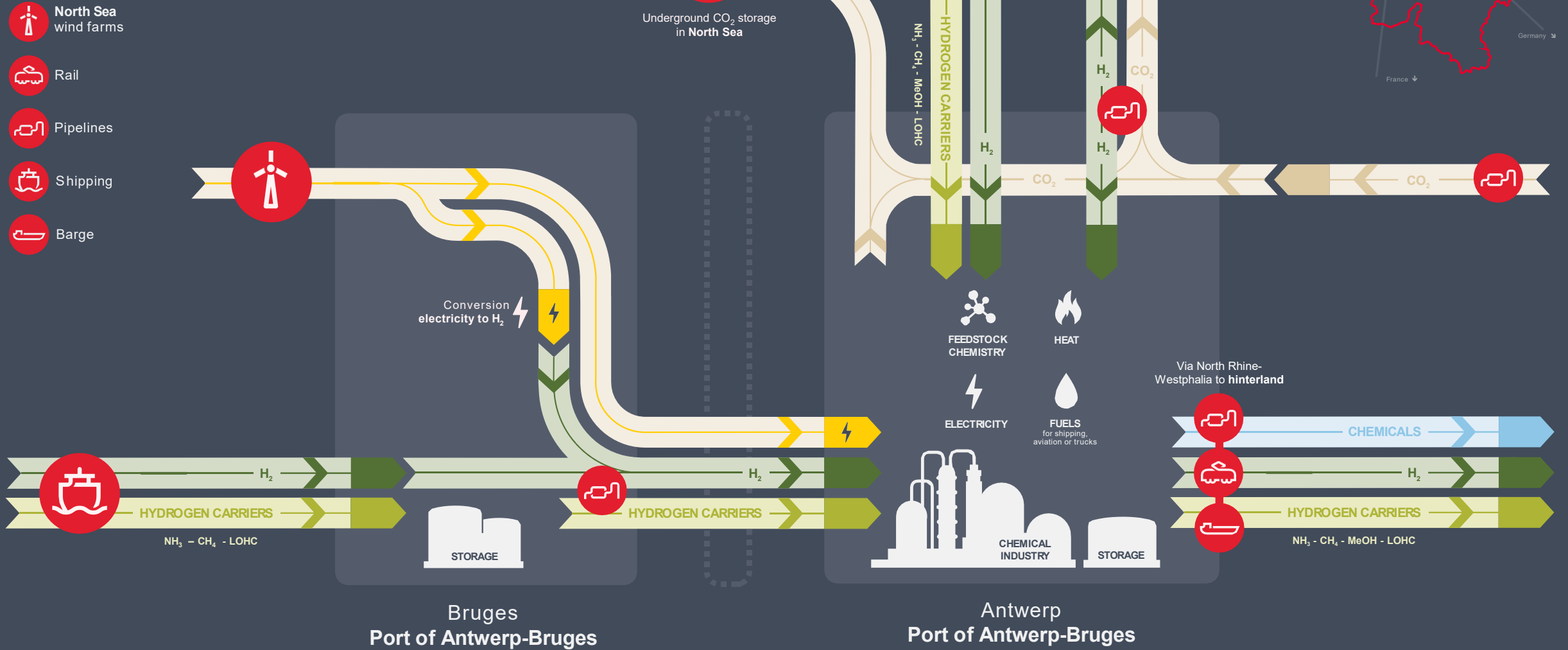


Onshore power supply
for vessels

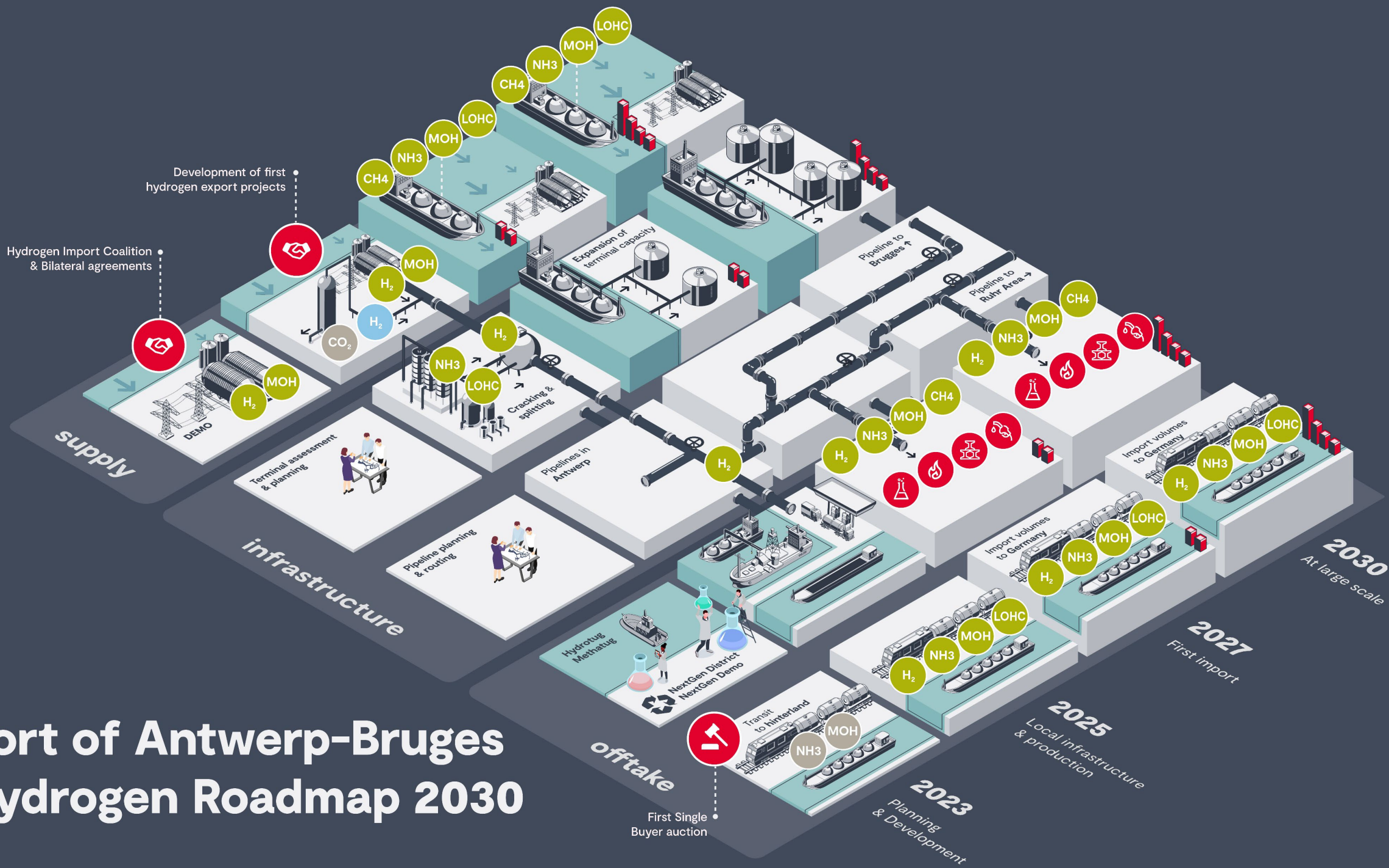


Tugboats on H₂ & methanol

Green Energy Hub of the Future

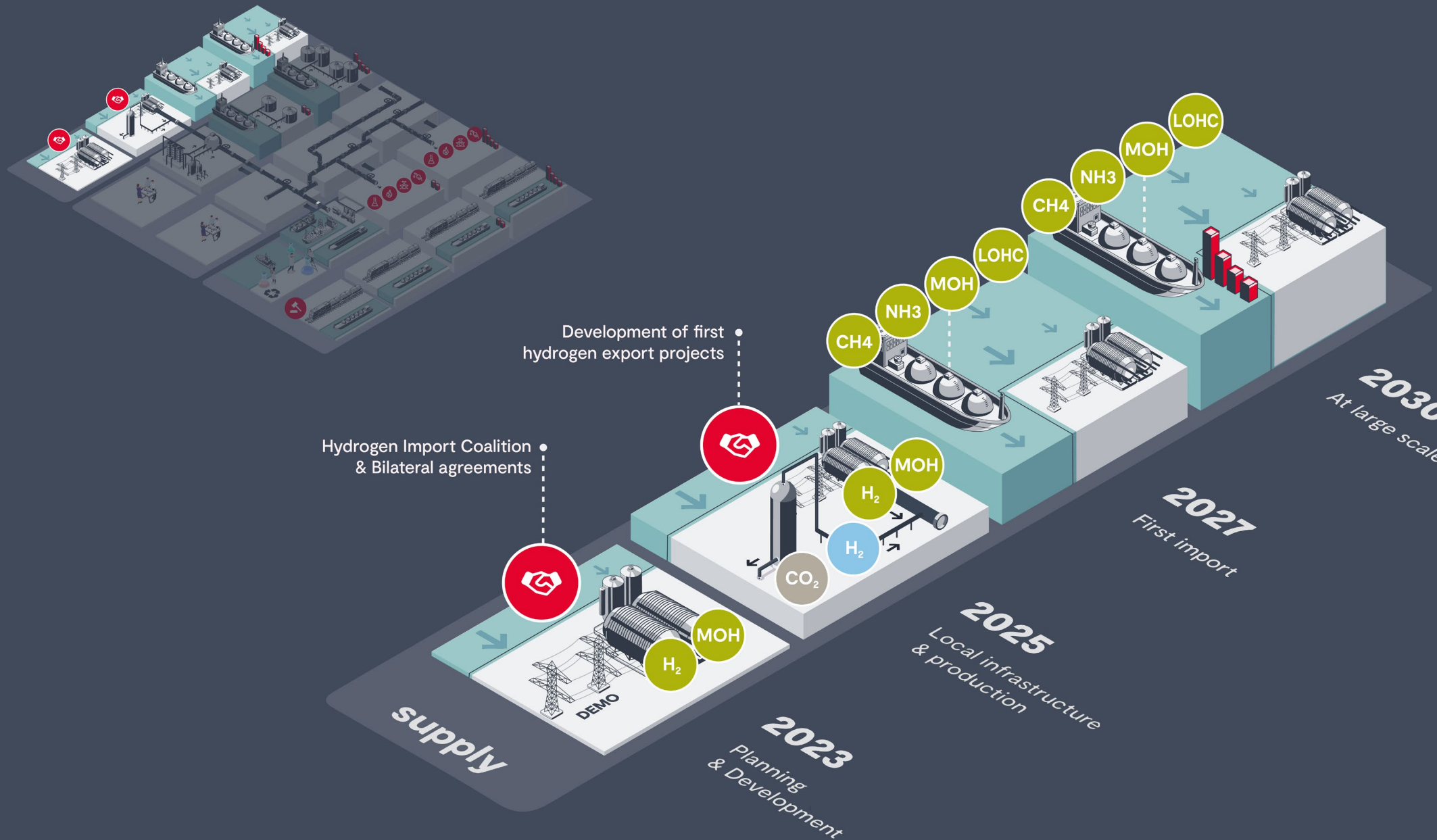


Port of Antwerp-Bruges Hydrogen Roadmap 2030



First Single Buyer auction

supply



Hydrogen Import Coalition & Bilateral agreements

Development of first hydrogen export projects

supply

2023
Planning & Development

2025
Local infrastructure & production

2027
First import

2030
At large scale

H₂

MOH

CO₂

H₂

MOH

CH₄

NH₃

MOH

LOHC

CH₄

NH₃

MOH

LOHC

DEMO

Hydrogen roadmap 2030: supply

Local production (*non-exhaustive*)

Green hydrogen



Hyoffwind consortium – Zeebrugge

Operational by 2024/2025
Electrolyser: 25MW, scalable to 100 MW



Plug – Antwerp/NextGen District

Operational by 2024/2025
12.500ton of hydrogen per year

Green methanol



Power-to-Methanol

Production of sustainable methanol from captured CO₂ and renewable hydrogen.
2023: 8kta methanol synthesis
2030: potential to scale to 100kta

Blue hydrogen

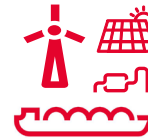


Antwerp@C: Capture and recycling of CO₂ into new feedstock, discharge and disposal in North Sea

1st phase infrastructure operational in 2025.
2030: capture half of the port's CO₂ emissions.

Import (*non-exhaustive*)

Most of our H₂ demand will need to be imported



Hydrogen imports will be key for North-West Europe to feed the growing demand for these derivatives in industry and transport.
Complementary to local production of green and blue hydrogen.

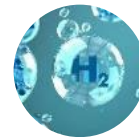
Global partnerships



To facilitate the market ramp-up of this global supply chain we set out several **partnerships** around the world. **Cooperation agreement** with partners in **Chile, Oman, Namibia, Egypt** and **Brazil**.

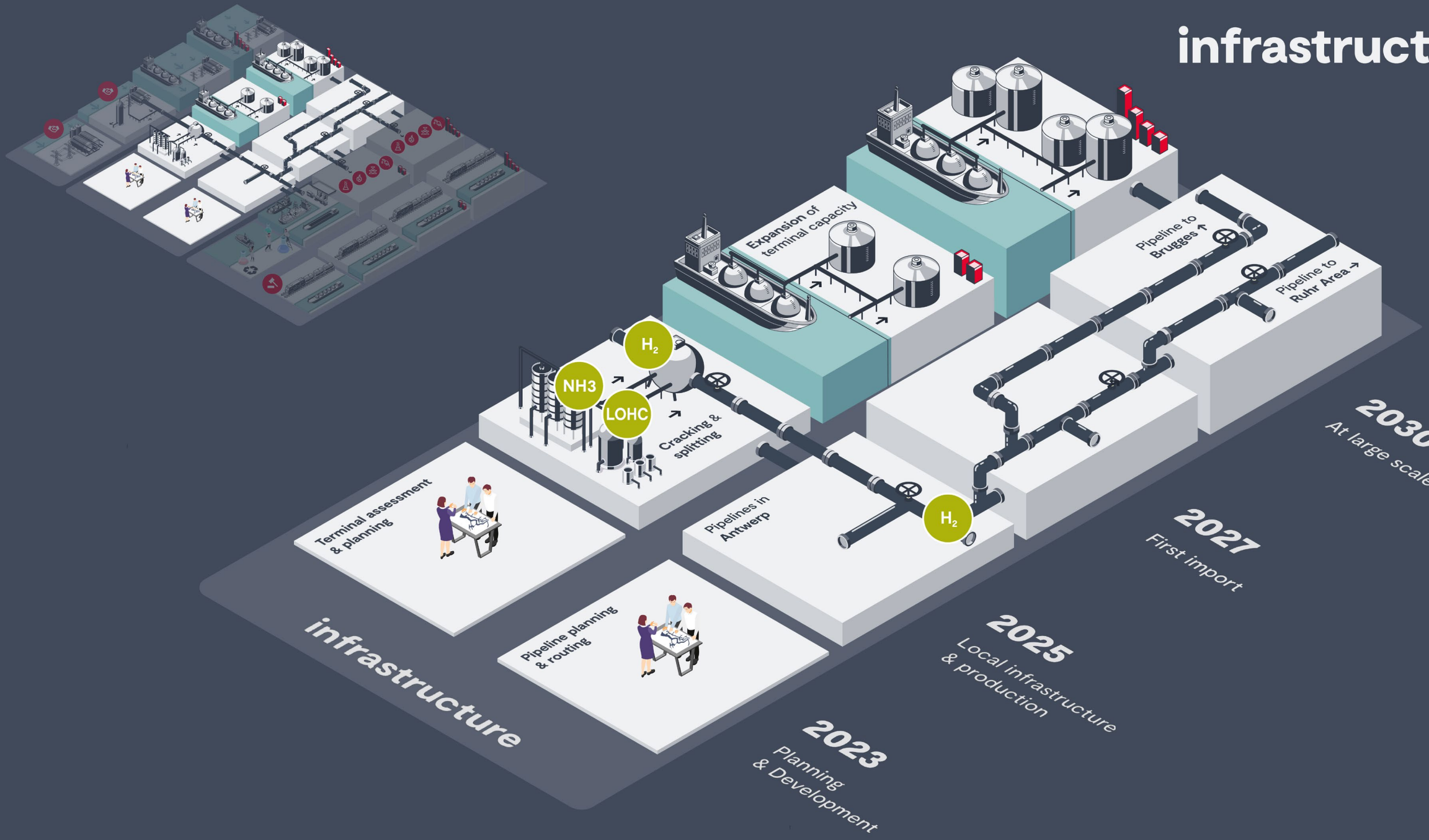
With Port of Antwerp-Bruges International we offer consultancy, management and investments to ports globally. With several locations aiming to become hydrogen production-usage-export hubs.

Hydrogen import coalition



Coalition of industrial partners with expertise throughout the full value chain of hydrogen import proofed the technical-economical feasibility of hydrogen import with their study in 2019. In this next phase all partners are developing separate projects and continue to collaborate on advocating the right framework in Belgium for import.

infrastructure



Hydrogen roadmap 2030: infrastructure

Terminals: import and storage for hydrogen carriers



Further expand hydrogen carrier existing capacity for methanol, ammonia, LOHC and methane. Through reconversion or new built. Several projects in development, coming online 2027-2032.



Hydrogen carrier conversion to hydrogen gas can be consumed directly or converted back into hydrogen gas. **Ammonia cracking** and a **LOHC splitting installations** are coming online from 2024 onwards.

Concrete projects

Fluxys and Advario are studying construction of an open access terminal in Antwerp (2027). Other projects from commercial parties are in development but confidential.

Air Liquide is developing a first Ammonia Cracker in Antwerp, operational by 2024.

Pipelines



Largest hydrogen network

in Europe runs through the port, connected to other clusters.



(open-access) hydrogen pipeline

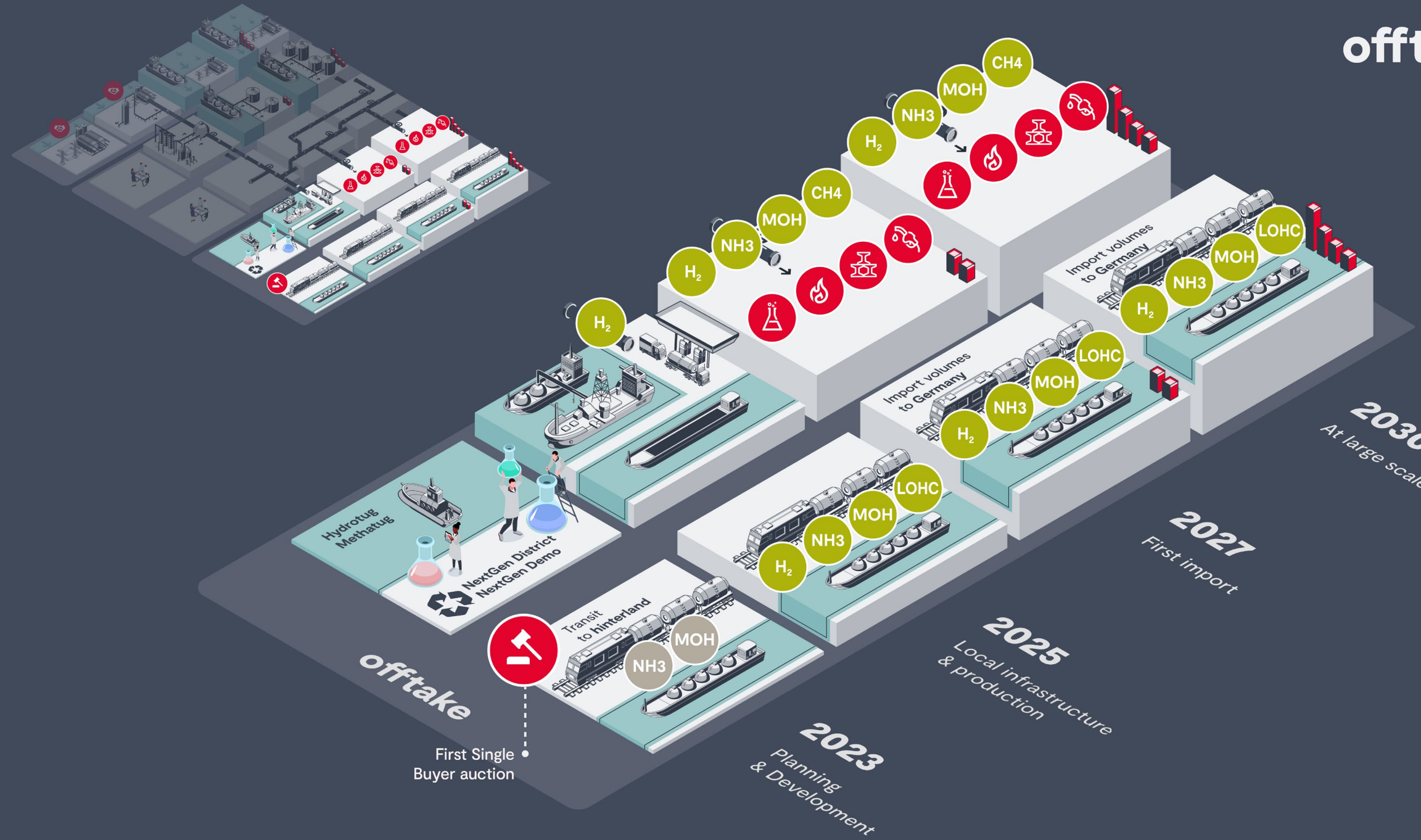
Construction of a pipeline in the Antwerp port area (early 2026) connected to **Zeebrugge and German hinterland**, among others, in the period 2028-2030.



Over 1,000 km pipelines

of other product pipelines connected to the Antwerp platform.

offtake



offtake

First Single Buyer auction

Hydrotug Methatug

NextGen District NextGen Demo

Transit to hinterland

Import volumes to Germany

Import volumes to Germany

2030
At large scale

2027
First import

2025
Local infrastructure & production

2023
Planning & Development



NH3

MOH

H2

NH3

MOH

LOHC

H2

NH3

MOH

LOHC

H2

NH3

MOH

CH4

NH3

MOH

CH4

H2

NH3

MOH

LOHC

H2

NH3

MOH

CH4

Hydrogen roadmap 2030: consumption and transit

Industry

Feedstock



Hydrogen molecules and derivatives like ammonia and methanol are **already consumed** in large quantities today in the Port and Belgium. In refineries and as feedstock for the chemical industry.



NextGen District

At NextGen District, new circular processes on hydrogen will be developed, as well as green hydrogen production and innovation.

High-temperature heat



For high temperature heat production hydrogen carriers can be burned.

Steel production



Steel is currently produced in blast furnaces, hydrogen can replace partially the fossil feed. In new DRI plants the full feed can be hydrogen, where enormous quantities will be needed.

Transport

Heavy duty transport or non-road vehicles



HyTrucks

consortium with Air Liquide and DATS 24 as partners, aims to run 300 hydrogen-powered trucks in Belgium by 2025.



World's first-ever refuelling hydrogen station

where ships as well as trucks, cars and tractors can fill up with **green hydrogen**, operated by CMB.TECH.



PIONEERS project

port equipment on the terminals which cannot be electrified will switch to hydrogen or derivatives. In Pioneers project several pilots will be launched.

Shipping: maritime, inland & tugboats



Multi Fuel Port by 2025

where alternative shipping fuels such as methanol, ammonia and hydrogen, among others are available. For **inland shipping** we also aim for hydrogen.



Hydrotug and methatug

testing tugs running on **methanol** (methatug) and **hydrogen** (hydrotug). This will make our own fleet more climate-friendly.

Supply chain towards hinterland

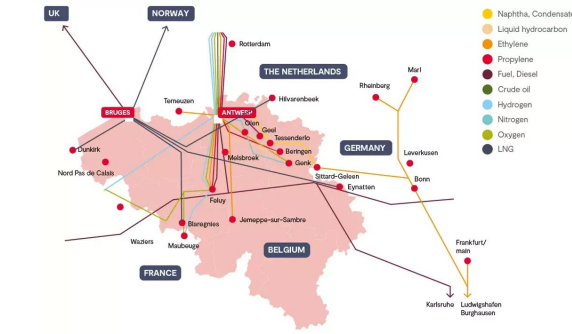
Barge, rail, cables & pipelines: expanding the existing logistics



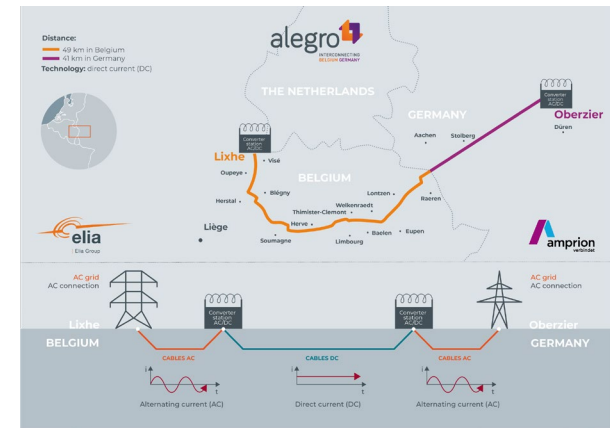
Barge & rail connections to/from Germany



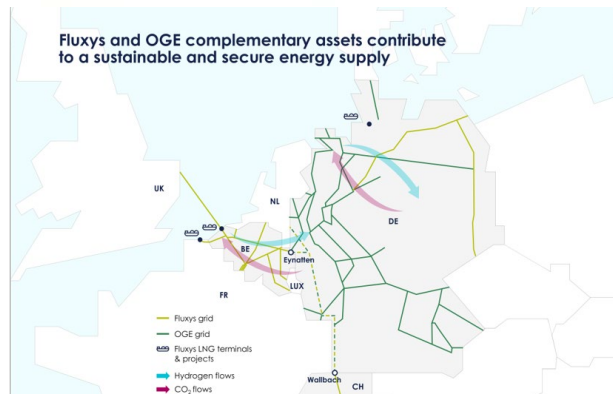
Pipeline connections to/from UK, Norway, Netherlands, Germany, France



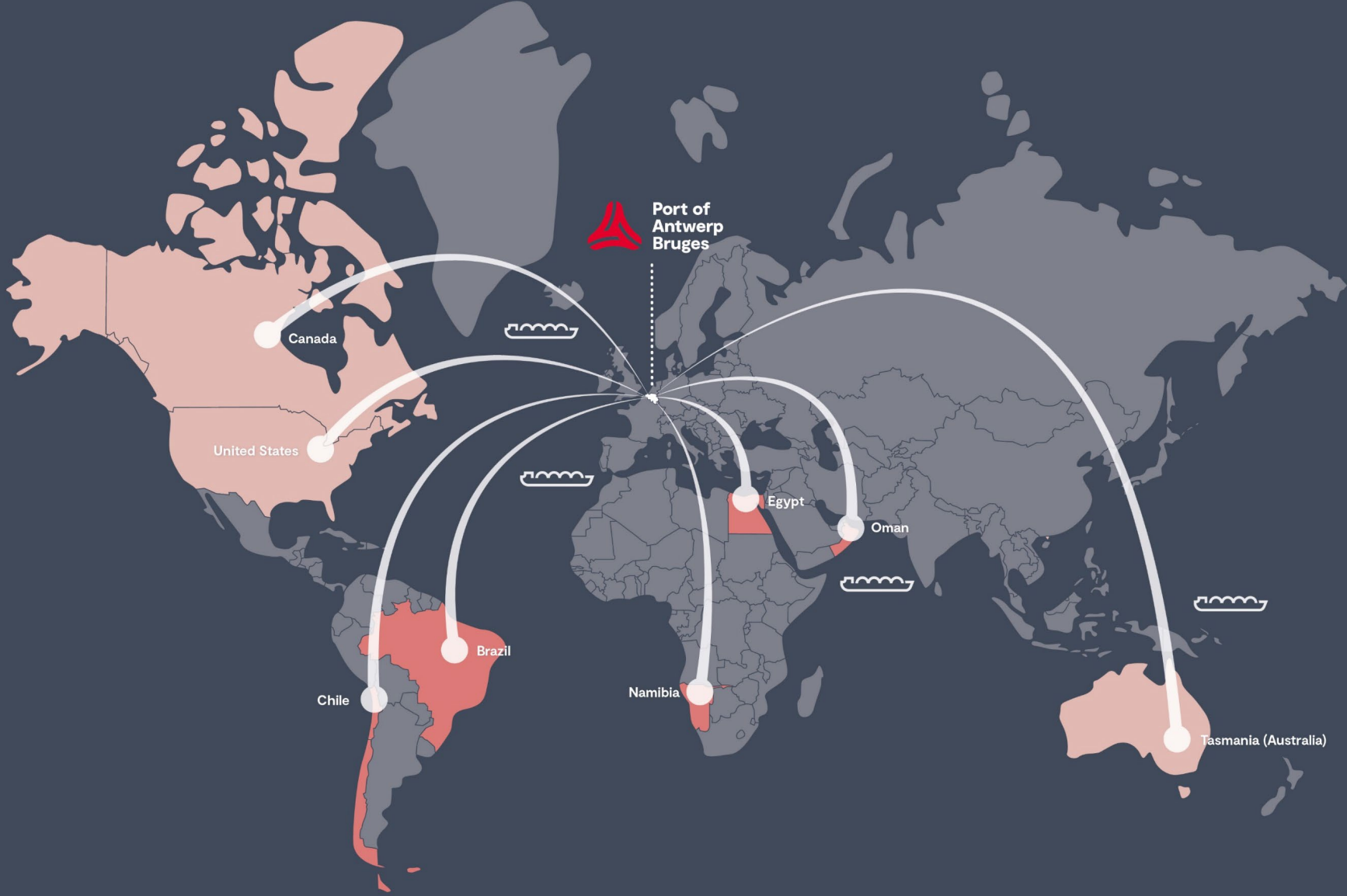
Cable connections to/from Netherlands, France and Germany



Fluxys and OGE complementary assets contribute to a sustainable and secure energy supply



Port of Antwerp-Bruges as lever for a global hydrogen supply chain



Partnerships are the key to success

Active membership of national and international organisations, bring together cross-sector partners



Partnerships & collaboration agreements (*non-exhaustive*)



Innovation/development needed for:

- NH₃-cracking
- Elektrolyzer efficiency/technology
- LOHC dehydrogenation
- ...

But biggest challenge is not technology, but:

- workable policy framework
- business-cases and building real value chains
- skilled work force (blue and white collar)
- ...

BE project BE-HYFE



- Belgian Network for **academic hydrogen expertise** to support Belgian Industry
- Funded by the BE **federal transition fund**
- Core group of **16 PhD-students** at **12** BE knowledge institutes
- PhD theses covering the **whole value chain of H₂**

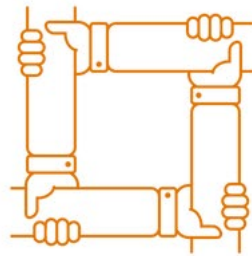
Three pillars in the project



RESEARCH



TRAINING



COMMUNITY

<https://www.behyfe.be/research>

In tune with the world.

