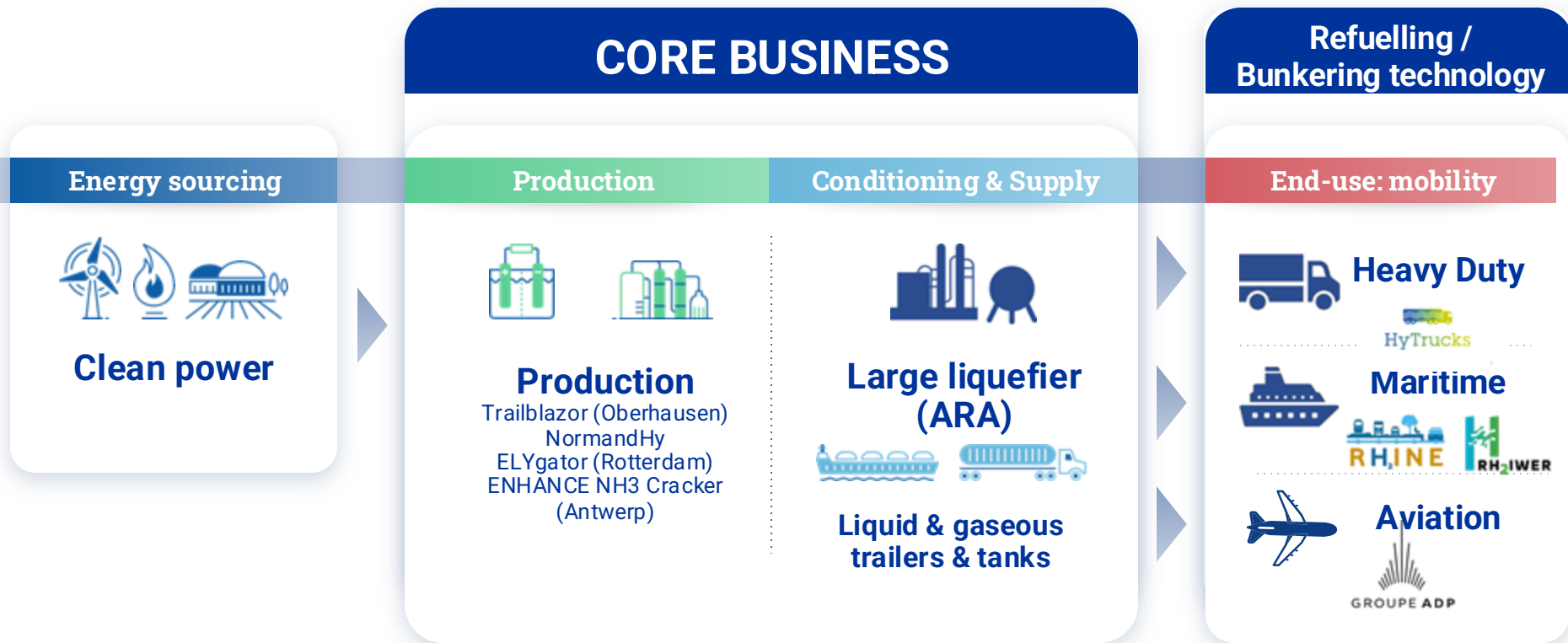




Building a sustainable, low-carbon society

Liquid Hydrogen as a True Zero-Emission Fuel in Shipping

Air Liquide's hydrogen expertise



Air Liquide's H2 production capacity in Europe

- Electrolyser
- Low-Carbon H2
- NH3 cracker

Hydrogen production

NETHERLANDS

- Rotterdam
- Bergen op Zoom

BELGIUM

- Antwerp (Callisto)
- Antwerp (SMR-X)

GERMANY

- Oberhausen Electrolyser
- Dormagen

FRANCE

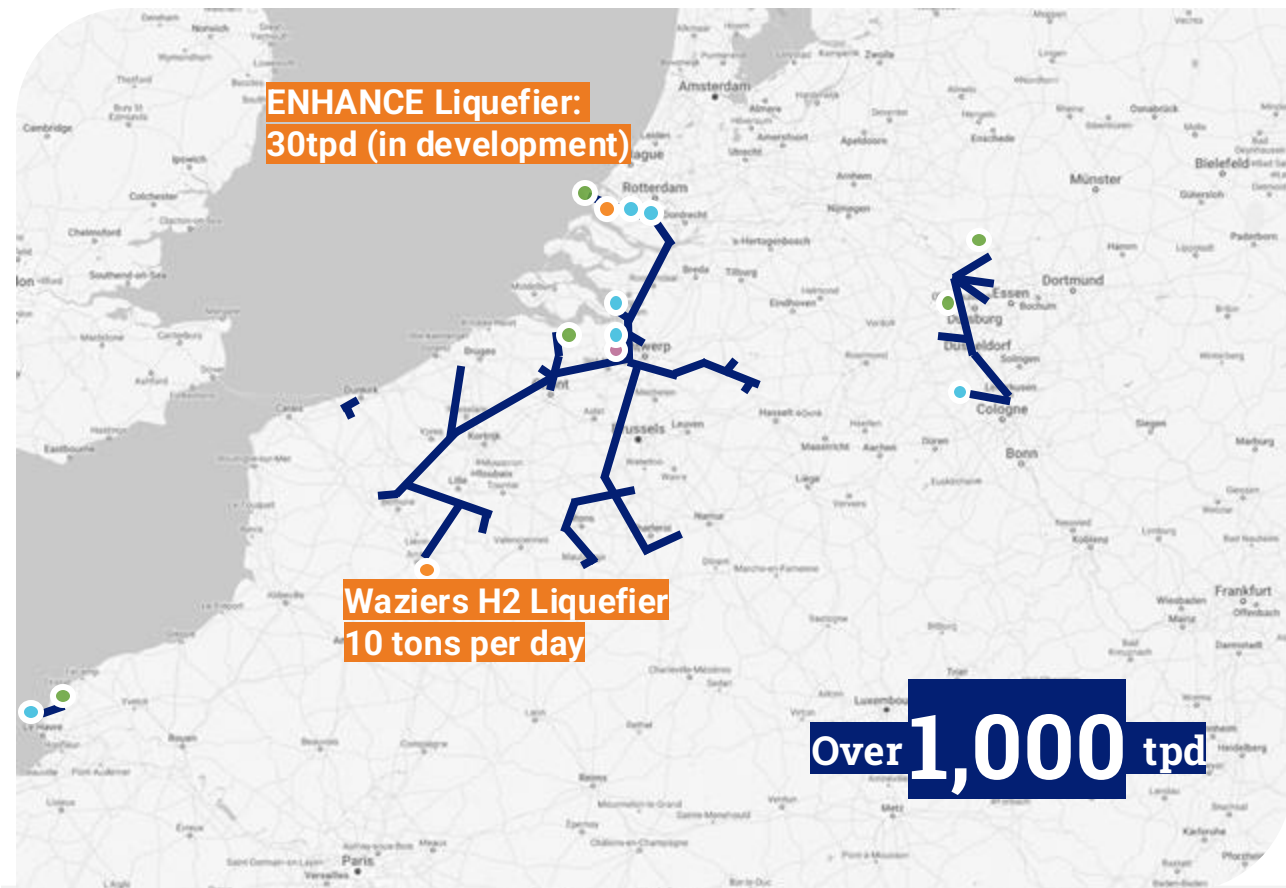
- Gonfreville Biogas + CCS
- Port-Jérôme CCS

Other CCS projects

- Porthos (Rotterdam)
- Kairos (Antwerp) - Planned

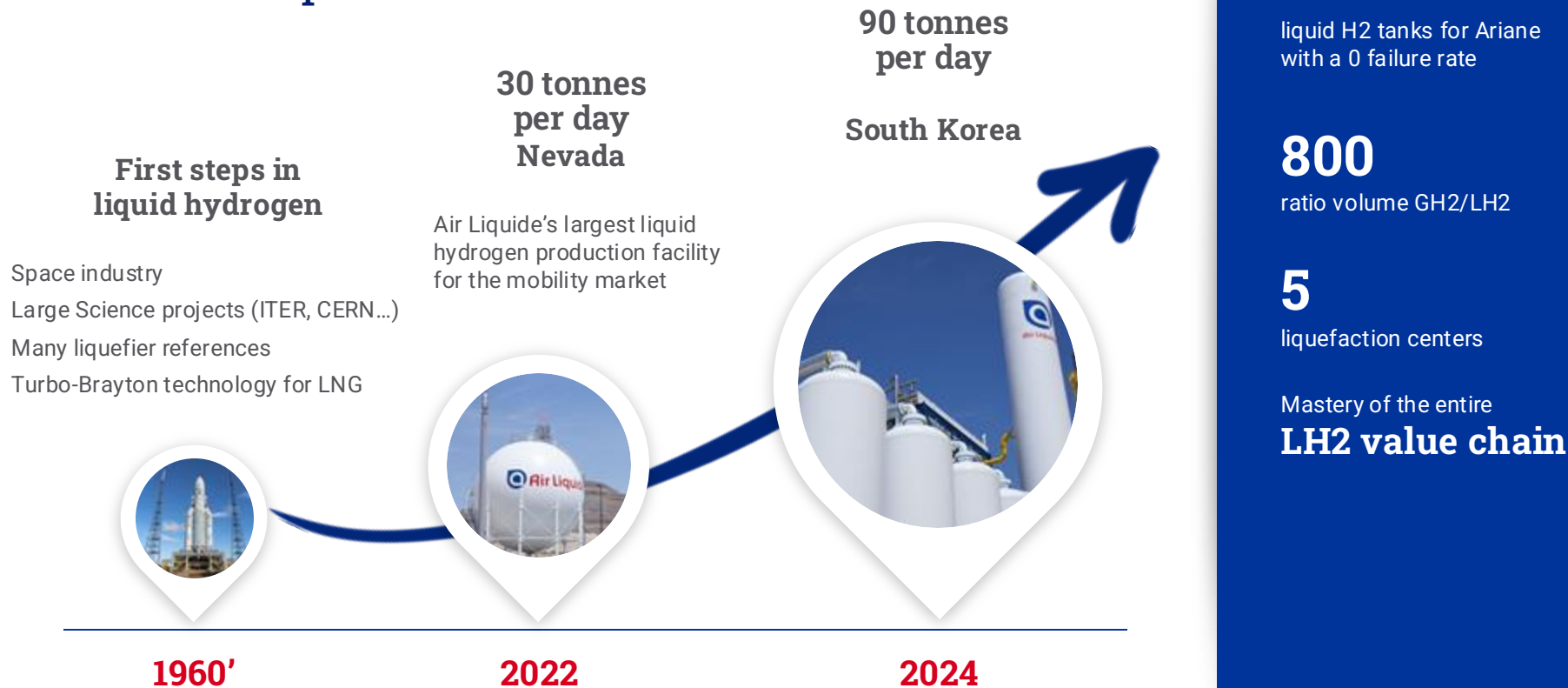
Electrolysis

- Trailblazer (Oberhausen)- operational
- Normand'Hy (Port-Jérôme)- under construction
- ELYgator
- EnergHys



Air Liquide, a world leader in liquid hydrogen

Decades of expertise



Air Liquide's major Liquid H2 industrial references



60+ years

EXPERIENCE IN HYDROGEN CRYOGENIC

60 ton per day

OWNED CAPACITY UNDER OPERATION

800,000

HOURS OF LIQUEFACTION

160

LH2 TRAILERS



What we bring

- State-of-the-art experience in extreme cryogenics
- Proven design in Liquid Hydrogen plant operations
- Proprietary cryogenics equipment, with inhouse manufacturing: Expanders, Cold boxes, Exchangers
- Tailored solutions at each step (liquefier, storage, trailers, maritime)



Key innovations

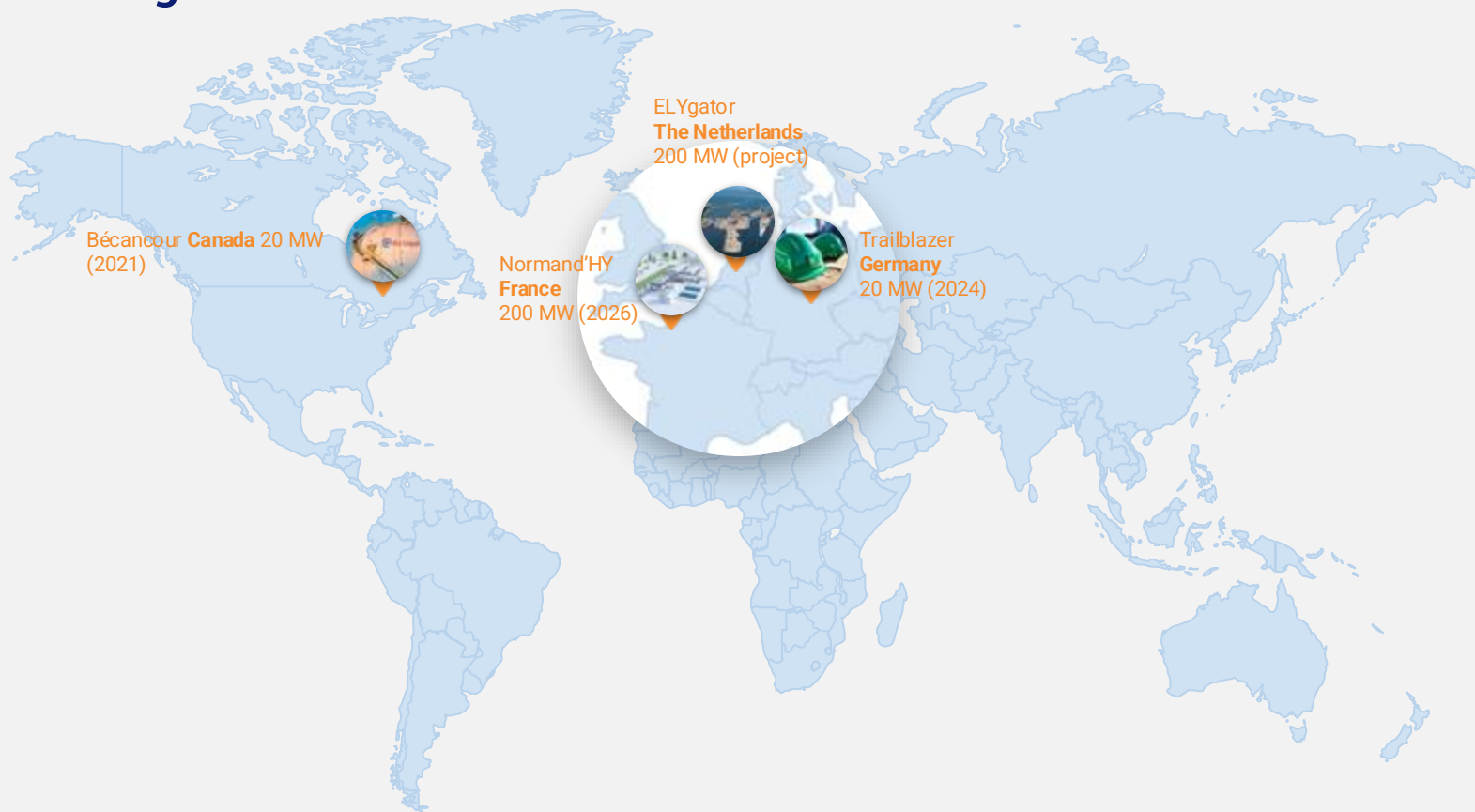
- New boil off gas management & reduced H2 losses
- Reduced installation costs through compact layout and modularization.
- Highly standardized design and replicable project execution.
- LH2 filling for maritime applications

World's first H2 Barge 1 & H2 Barge 2 Future Proof Shipping



- Air Liquide and Future Proof Shipping (FPS), a provider of zero-emission shipping solutions, have successfully commissioned two **hydrogen-powered fuelcell container barges** to sail on the Rhine-Delta.
- **World premiere !** This concrete implementation paves the way for the acceleration of the decarbonisation of inland waterways
- **Two years** in continuous operation without major safety incidents
- The solution can be **easily replicated** to other ships, trains and other applications.
- H2 stored in gaseous compressed form in swappable containerized tanks

Air Liquide's footprint in electrolysis capabilities is increasing





Thank you for your attention

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