

An aerial photograph of an industrial facility, likely a refinery or chemical plant, situated along a large body of water. The facility features numerous white storage tanks, distillation columns, and complex piping. A red barge is docked at a pier in the foreground. The background consists of rolling green hills under a bright blue sky with scattered white clouds. The image is overlaid with a white circular graphic on the left side and a vertical orange bar at the top right.

# INEOS Hydrogen

## Barge project

20<sup>th</sup> of April 2023

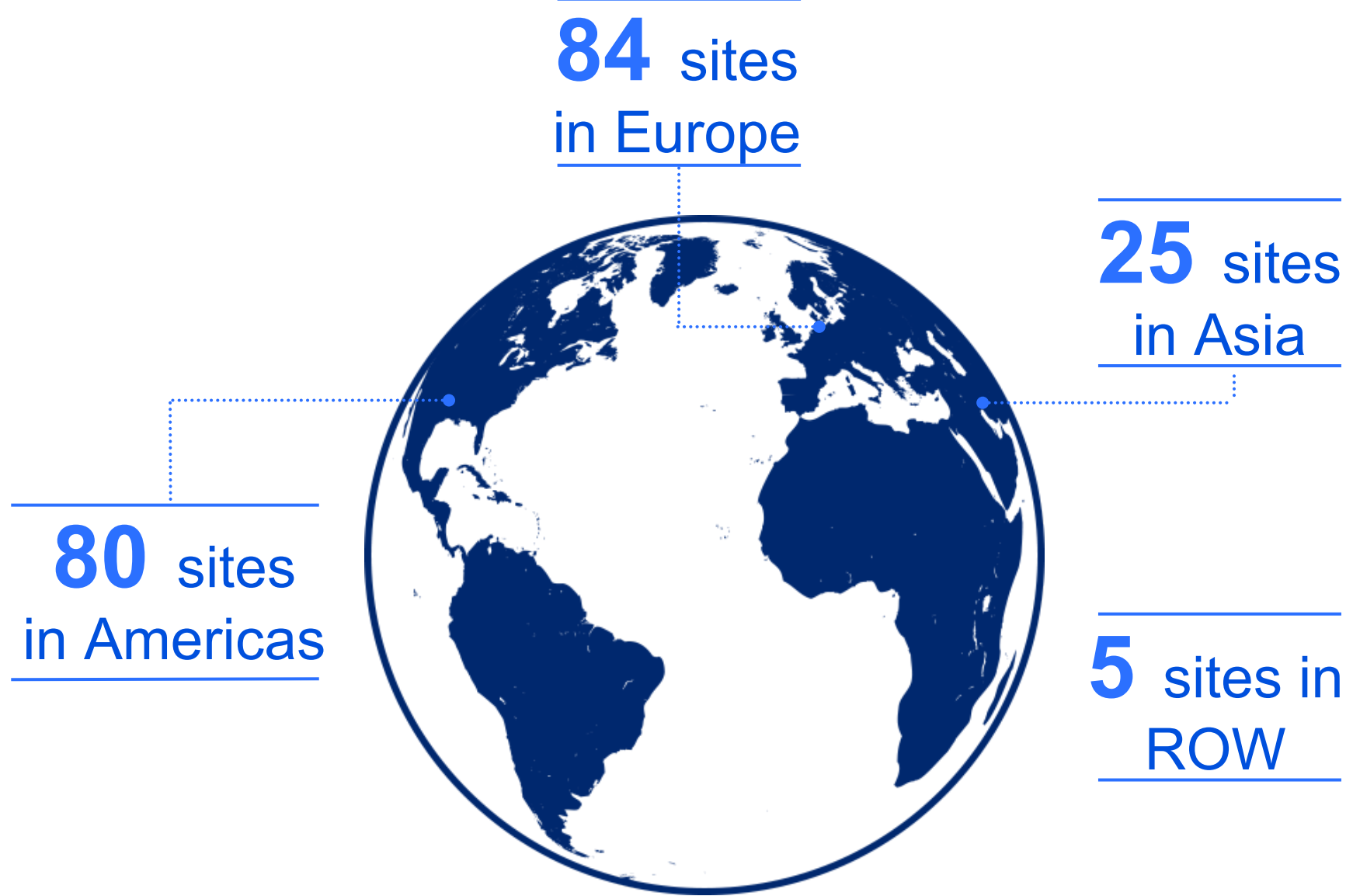


# INEOS Group overview

-  **\$61 bn** Sales
-  **26,000** employees
-  **25** Businesses
-  **66** million tons of chemicals capacity

**194**  
manufacturing sites worldwide

**29** Countries



# INEOS in Belgium

# INEOS

INEOS  
Phenol

INEOS  
Oxide

INEOS  
Oligomers

INEOS  
Inovyn

INEOS  
STYROLUTION

INEOS  
Aromatics

INEOS  
Olefins & Polymers



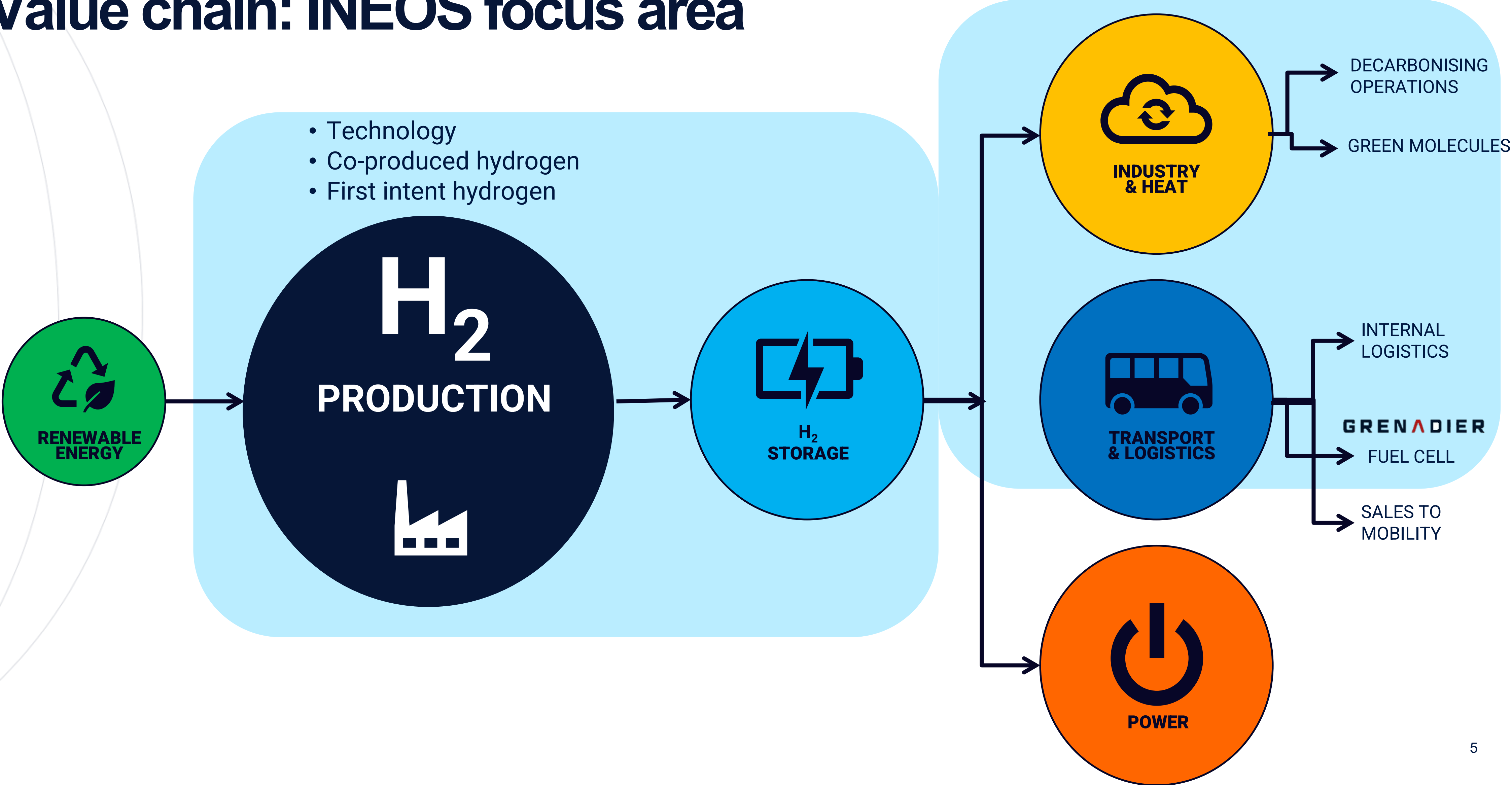
# INEOS

# INEOS Hydrogen – why?

**INEOS launched a new clean hydrogen business in end 2020 under its subsidiary INOVYN with the ambition to invest €2B in the next 10 years**

- INEOS's annual hydrogen production is currently circa 500Ktes worldwide
- INEOS Inovyn is Europe's largest operator of electrolysis technology:
  - also develops and licenses this technology to a global market
  - transferable knowledge to water electrolysis for hydrogen production
- INEOS has potential use of hydrogen for production of green molecules or to decarbonise its operations

# H2 Value chain: INEOS focus area



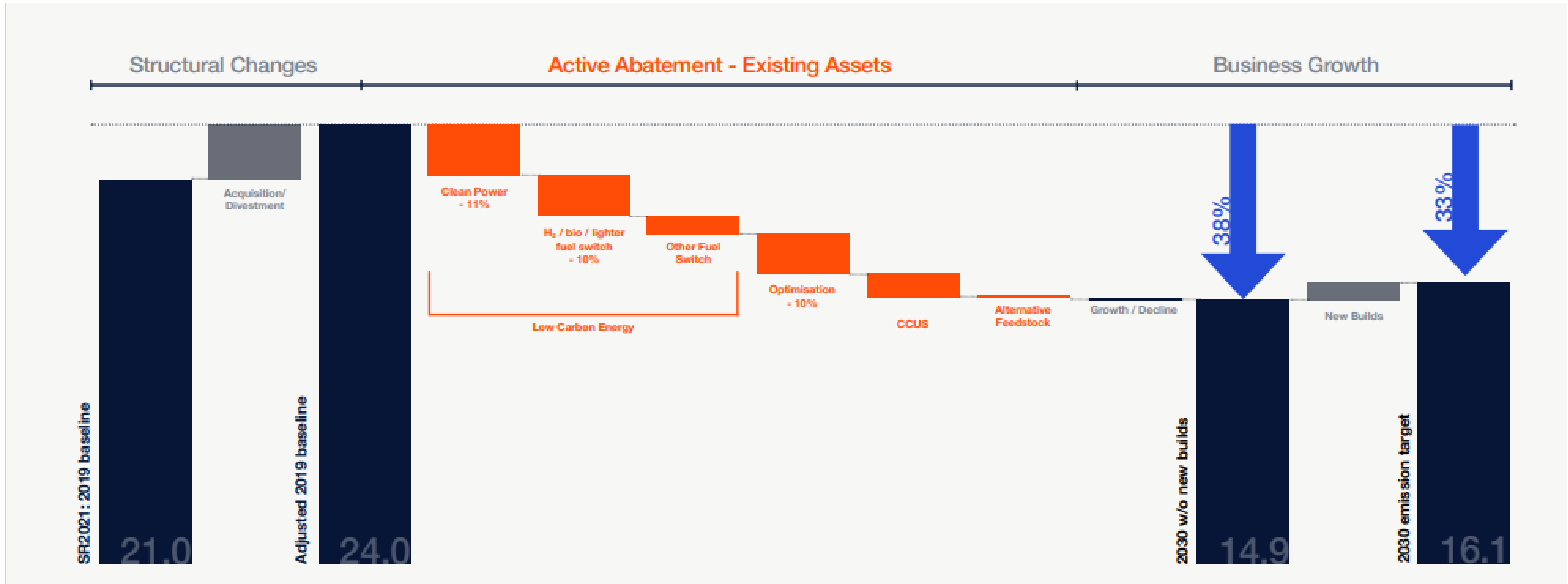


# INEOS H<sub>2</sub> roadmap

- Use existing co-product hydrogen while working with partners to develop hydrogen applications
- Build new hydrogen production in our chemical clusters in Europe and abroad
- Develop hydrogen storage projects
- Develop carbon capture and utilisation projects for the production of green molecules
- Use hydrogen to achieve carbon road map



# INEOS road map – sustainability report 2022

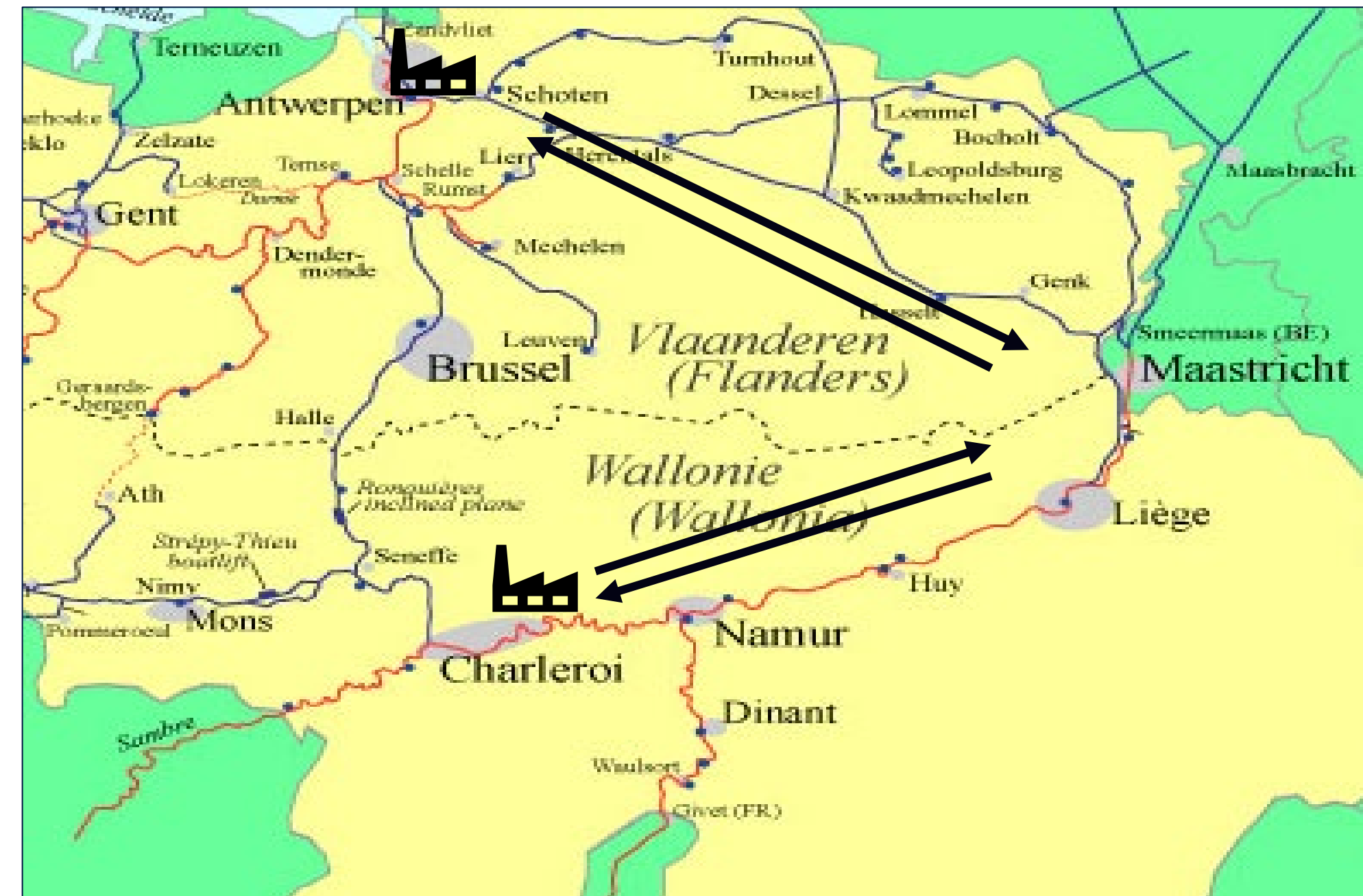


# Trip of INEOS Inovyn Barge

*Identified dedicated time-charter barge with hydrogen availability at both ends: Jemeppe and Lillo*

## *Trip Voyage: Jemeppe and Lillo*

- Time-charter barge in place transporting chemicals between Jemeppe and Lillo.
- H2 availability at both Jemeppe and Lillo.





# Retrofit of Existing Barge

## *Retrofit Barge Technology*

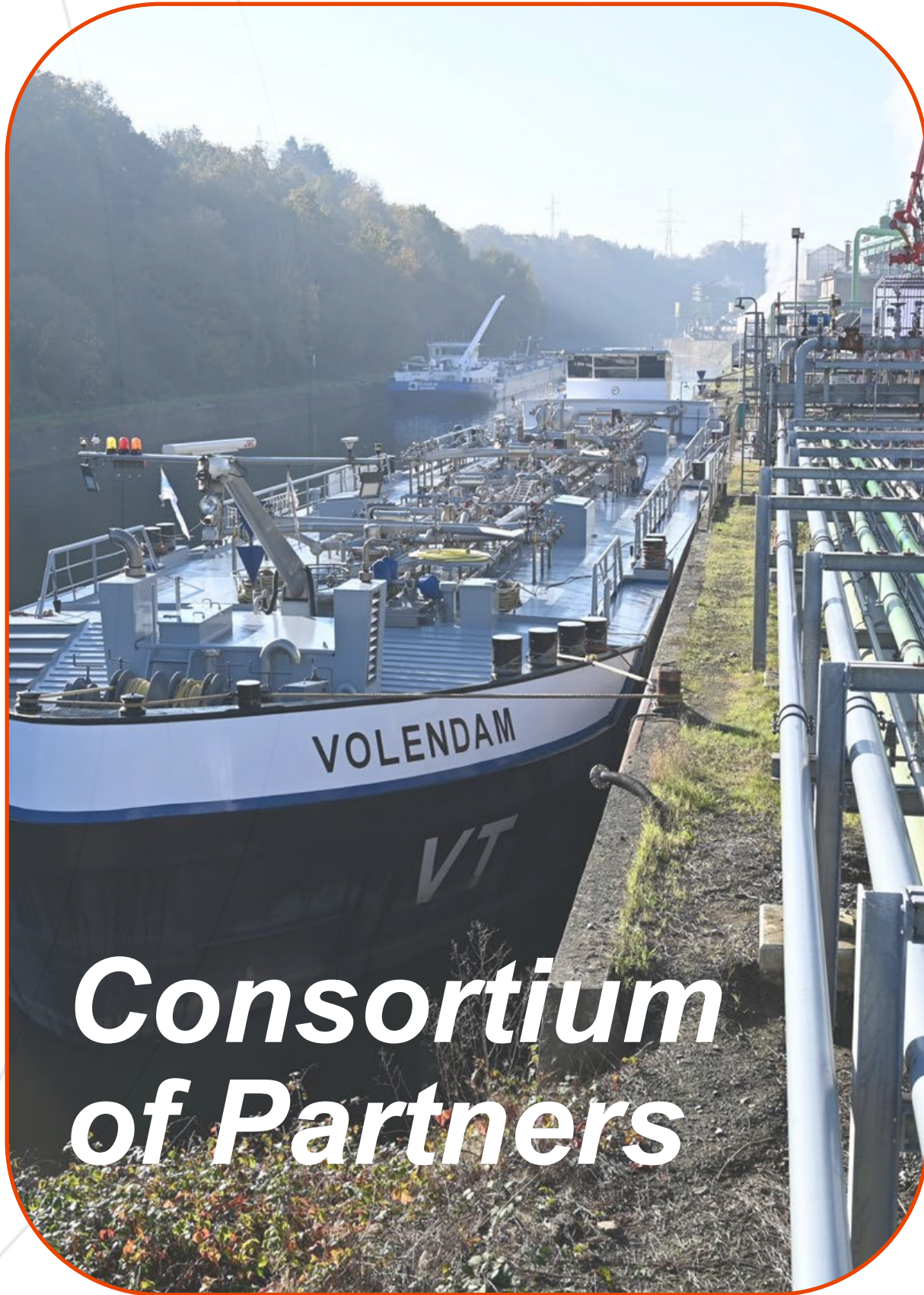
- Replace combustion engine with hydrogen fuel cell.
- Retrofit of current barge (owned by contract partner).
- Feed study done.
- Funding secured via Horizon Europe.





# Project Partners Involved

*Consortium of partners required to undertake complex project design*



**VT** – Barge owner & operator



**INEOS Inovyn** – Hydrogen supply & barge customer



**Nedstack** – Fuel cell manufacturer

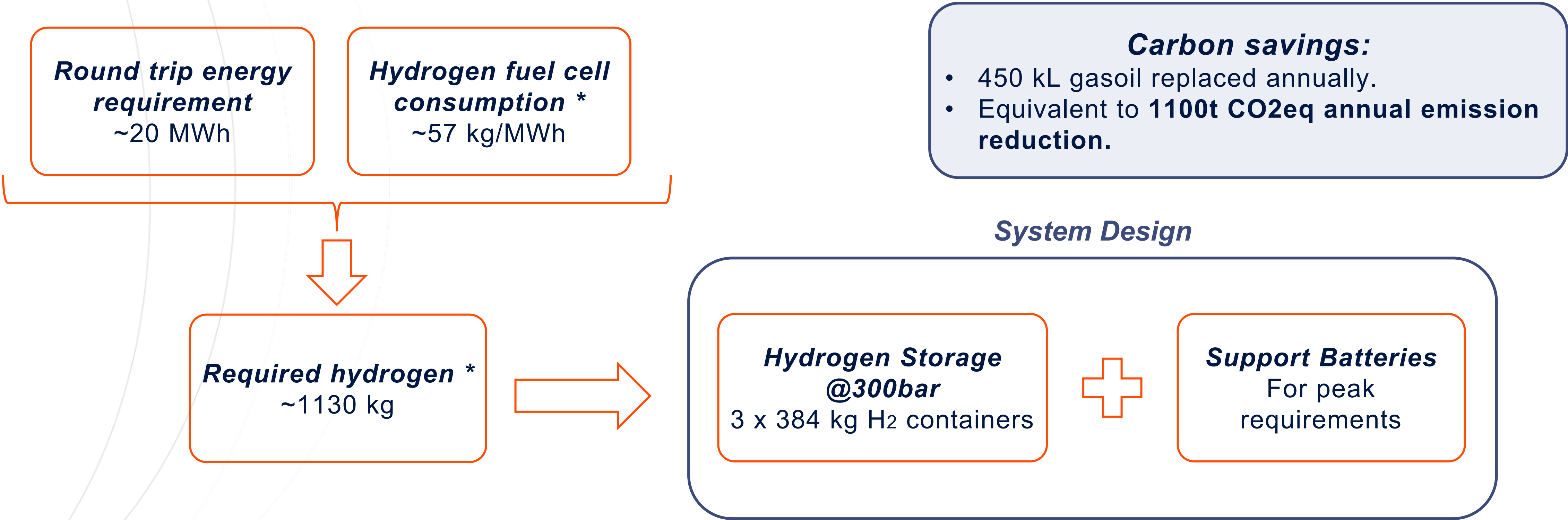


**Kooiman** – Shipyard



# System Design: Fuel Requirement

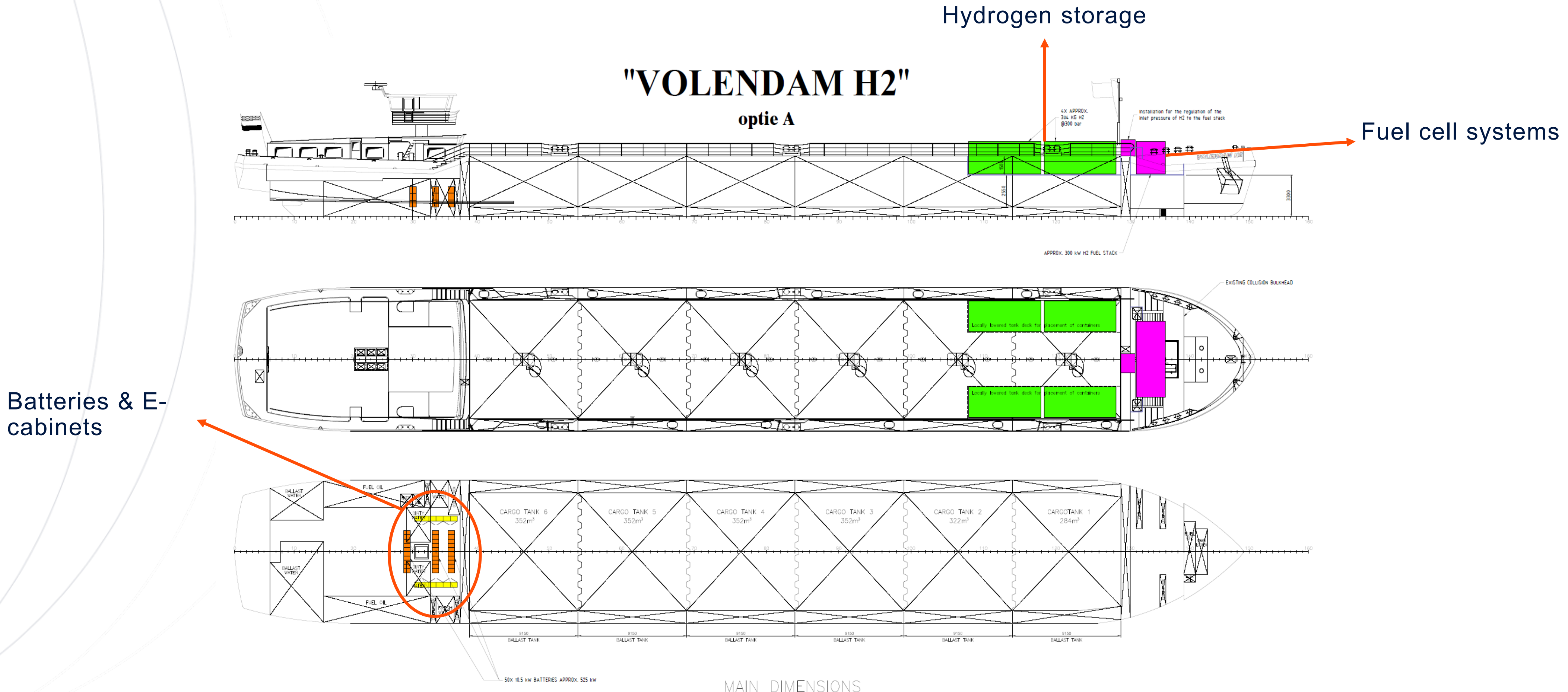
Round trip requires 1.13t hydrogen, this delivers annual carbon savings of 1.1kt CO<sub>2</sub>eq



\* Start of life values. Fuel cell deterioration is taken into account in final system design  
Disclaimer: All values shown are duty dependent and shall not be replicated

# System Design: Layout

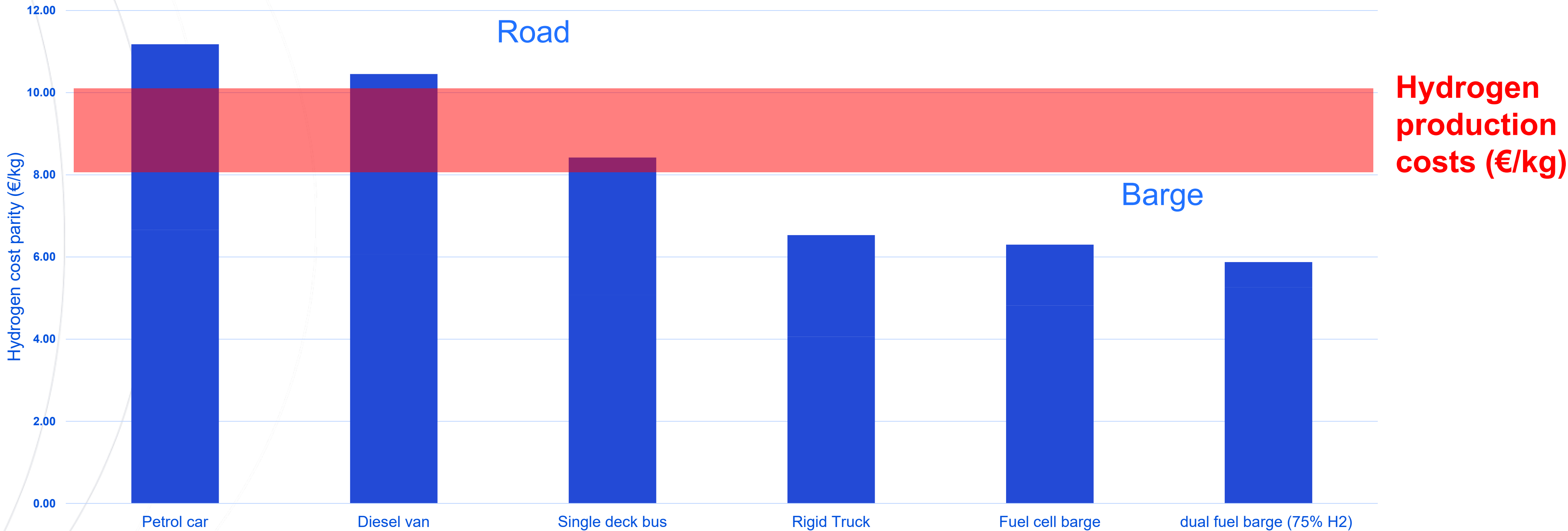
*Layout of barge retrofit to replace gasoil engine with new system design*





# Hydrogen Price Parity vs Fossil Fuels

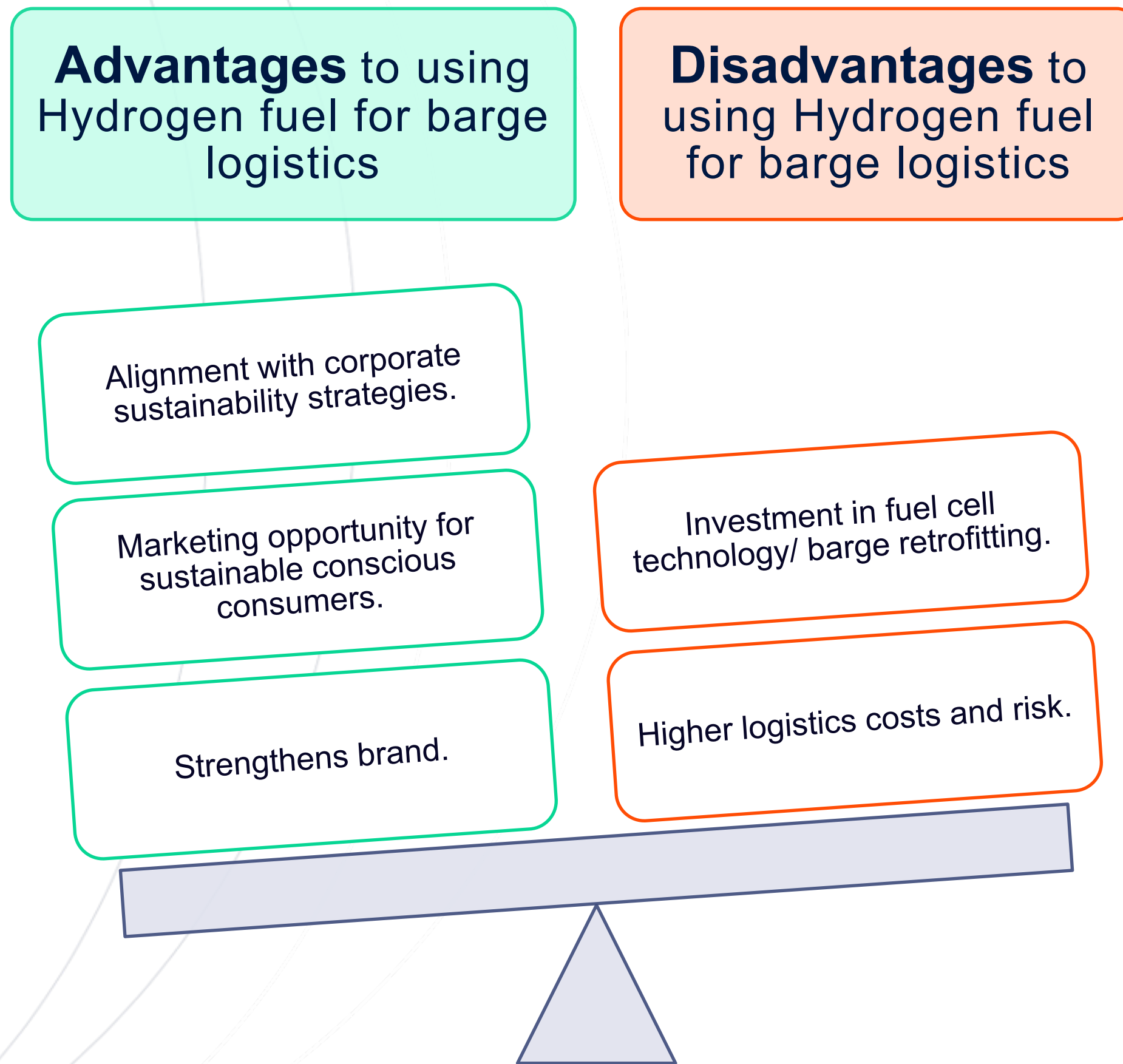
*Significant variation in price parity due to different taxes and levies for fossil fuels*



Data source: Road/Train: Element Energy Study for Centurion project, April 2020. Barge: from flagship project Je/Lillo with H2 on site  
Prices are average of 2021-2023(to date)

# Conclusions

*Do advantages outweigh disadvantages using hydrogen as fuel for barge logistics?*



- **Chemical companies**, such as **INEOS**, often don't interact with end user → difficult to influence entire value chain to pass on increased costs?
- **Consumer facing companies** → able to more easily pass on increased costs to final consumer?