

# Hydrogen. In the engine room or the cargo hold?

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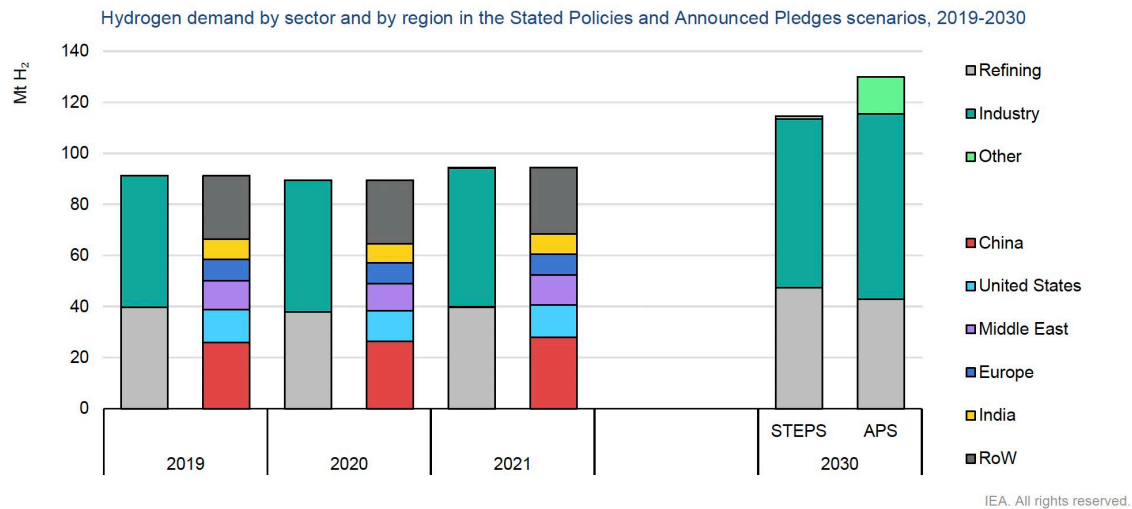
NORDION ENERGI

# Nordion Energi

Sweden's Gas TSO

- Owned by the European Diversified Infrastructure Fund II (EDIF II), managed by **Igneo Infrastructure Partners**, part of the First Sentier Investors Group (FSI)
- Customers - industrial enterprises, energy companies, the transport sector, commercial property owners, and private households
- Growing number of green gas customers
- Strong pipeline of H2 infrastructure projects

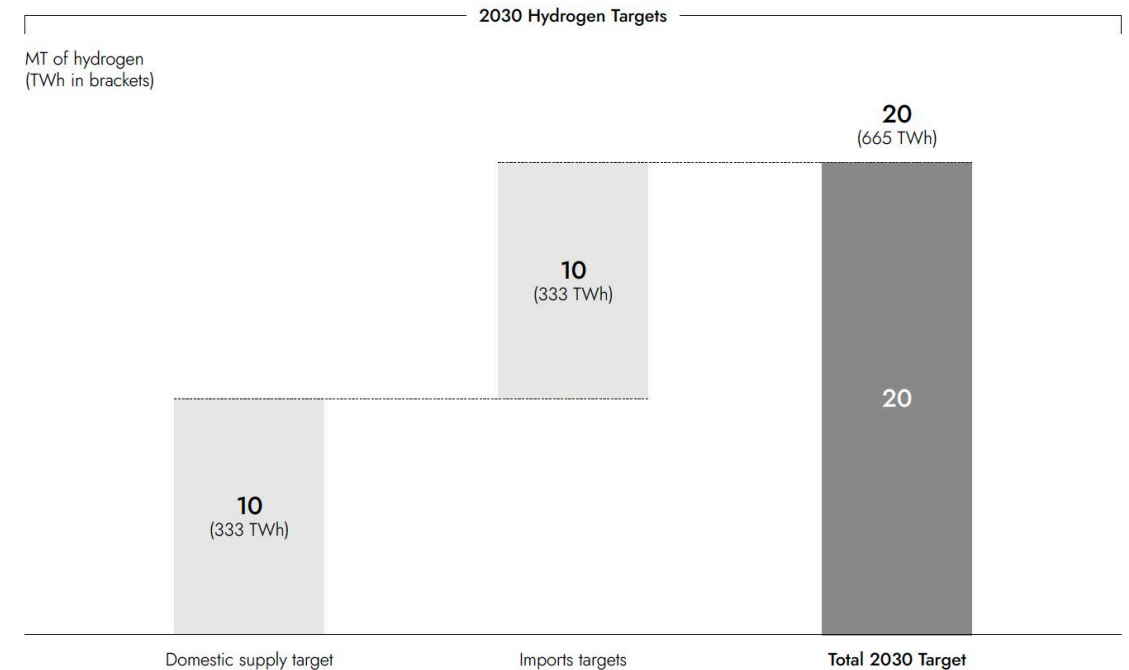




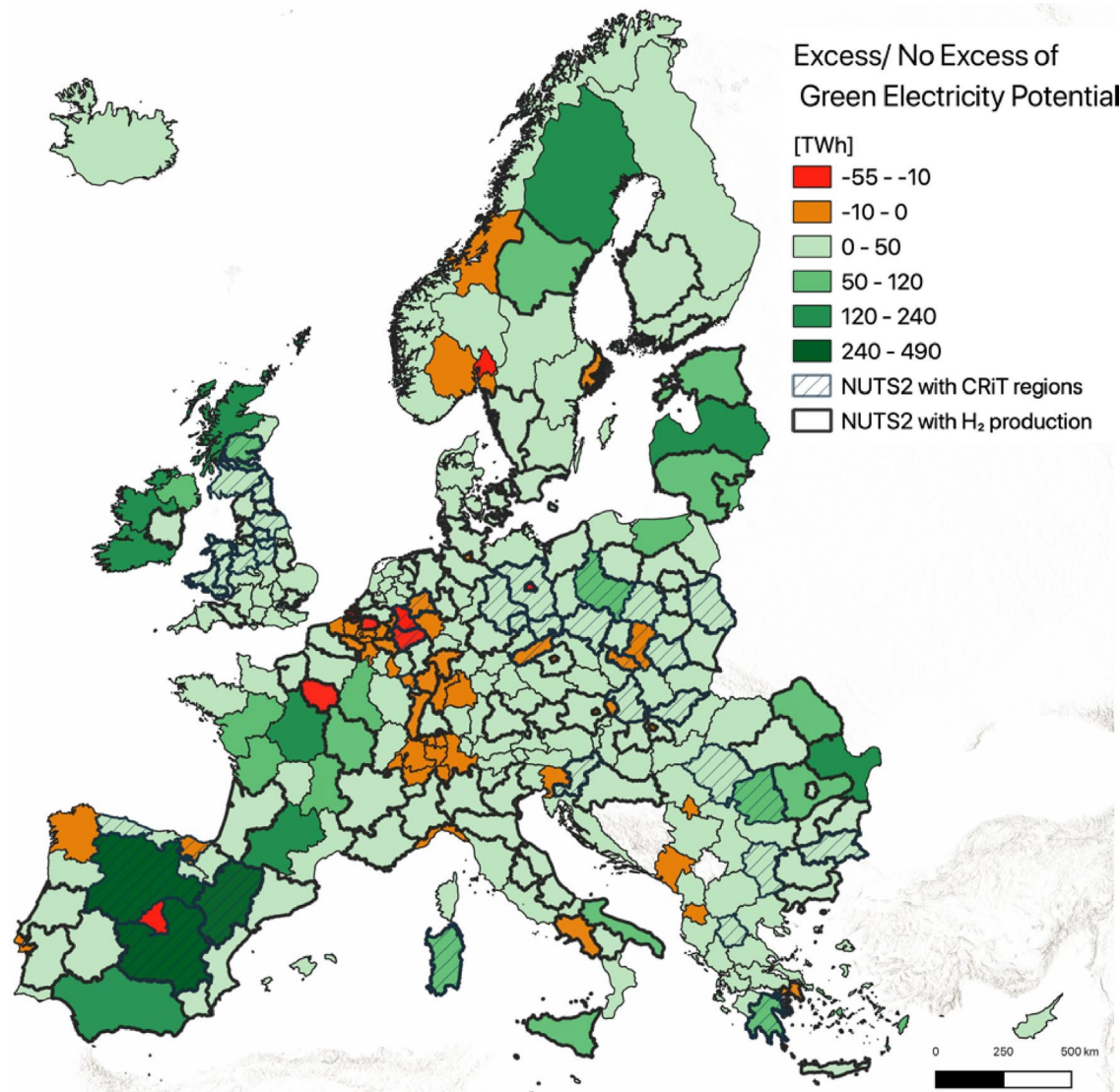
**Current global H<sub>2</sub> production  
 $\cong$  90 million tons per year**



**REPowerEU targets an  
 additional 20 million tons  
 per year by 2030**







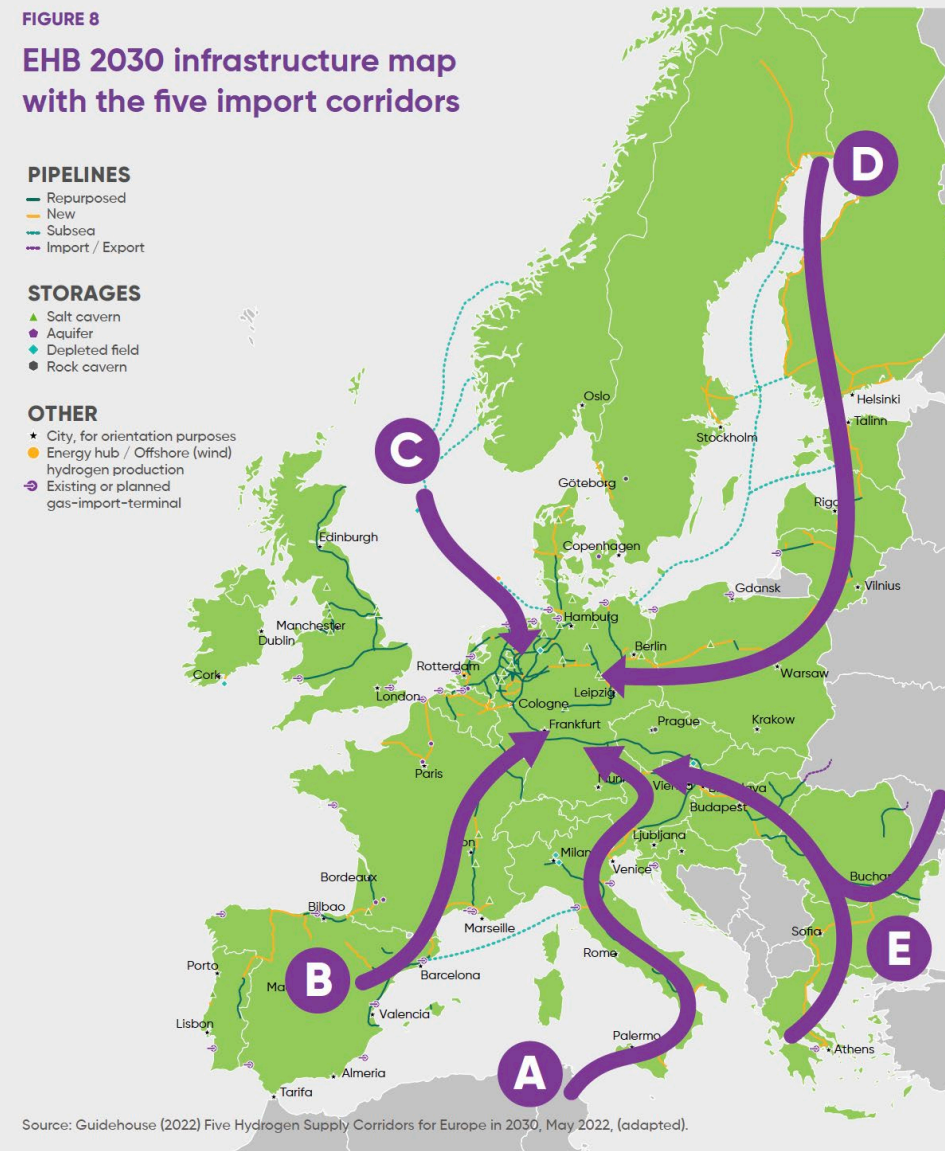
Transporting H<sub>2</sub> from centres  
with high renewable energy



FIGURE 8

## EHB 2030 infrastructure map with the five import corridors

- PIPELINES**
- Repurposed
  - New
  - Subsea
  - Import / Export
- STORAGES**
- Salt cavern
  - Aquifer
  - Depleted field
  - Rock cavern
- OTHER**
- City, for orientation purposes
  - Energy hub / Offshore (wind) hydrogen production
  - Existing or planned gas-import-terminal



To centres of high demand

# Hydrogen – fuel of the future?

## H<sub>2</sub> IS A VERY EFFICIENT CARRIER OF ENERGY



### COMPARISON OF THE CALORIFIC VALUE OF VARIOUS TYPES OF FUEL

Calorific value is a measure of the thermal energy released when a substance is burned. It is expressed in megajoules per kilo of fuel (Mj/kg) or in kilowatt hours per kilo of fuel (kWh/kg).

The table below compares the gross calorific value of fuels commonly used for heating, transport or electricity production.

	Mj/kg	kWh/kg
• Coal	20	8
• Petrol	47	9
• Diesel	44	10
• Natural gas	50	10
• Hydrogen	142	39

But...

# But H2 transportation is very challenging



1 kg Petrol = 1.1 litre bottle

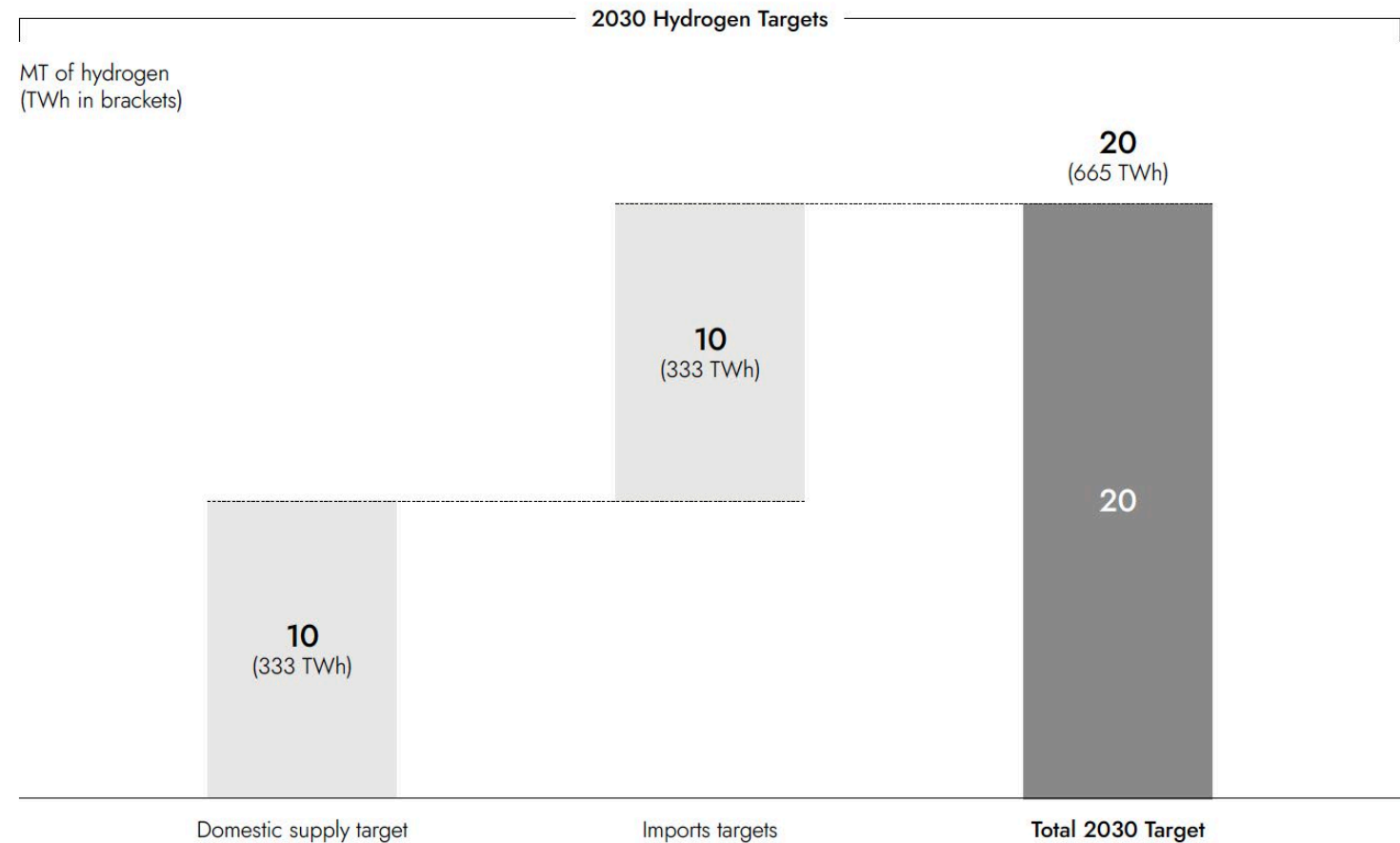


1 kg H2 = 11.2 m<sup>3</sup>  
≅ 1.5 x cement trucks



Valemax vessel = 220,000 m<sup>3</sup>

H2 capacity = 20 tons

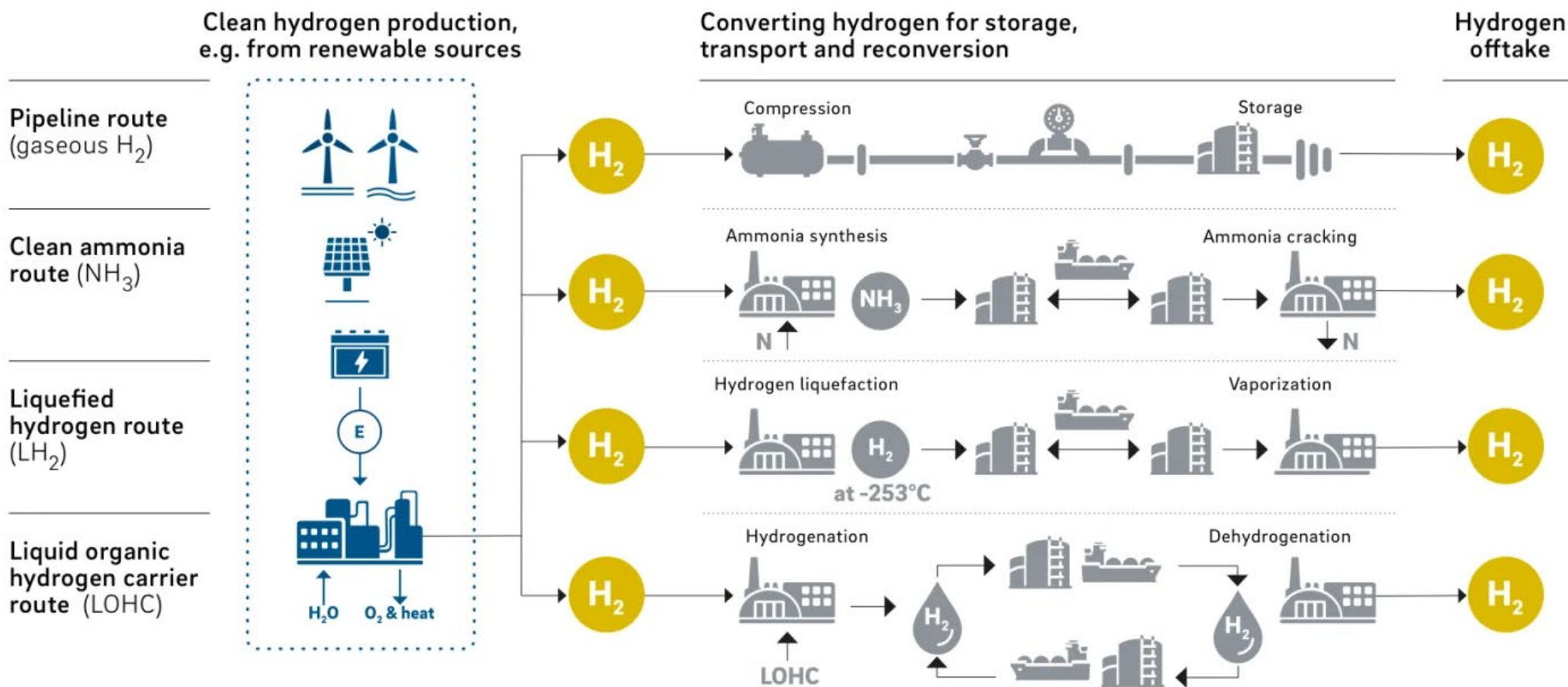


Number of trips required to supply  
REPowerEU targets = 1,000,000



# Leading carriers for large-scale hydrogen transportation

## The most common hydrogen transportation routes

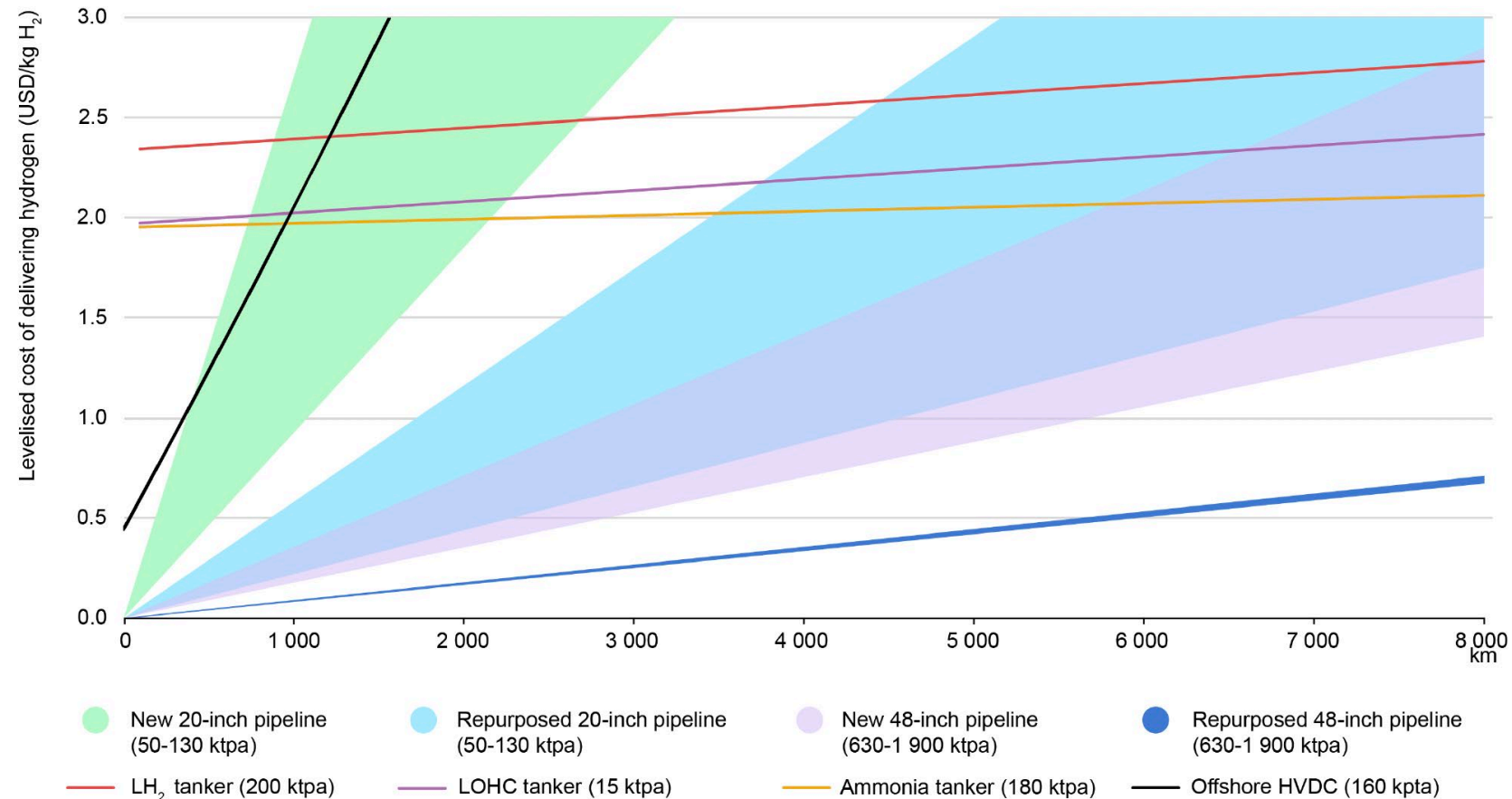


Source Roland Berger



# Cost of hydrogen delivery for various transport distances

Levelised costs of delivering hydrogen by pipeline and by ship as LH<sub>2</sub>, LOHC and ammonia carriers, and electricity transmission, 2030



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Notes: ktpa = kilotonnes per year; LH<sub>2</sub> = liquefied hydrogen; LOHC = liquid organic hydrogen carrier. Includes conversion, export terminal, shipping, import terminal and reconversion costs for each carrier system (LH<sub>2</sub>, LOHC and ammonia). The import and export terminals include storage costs at the port. Pipelines refer to onshore transmission pipelines operating at ranges between 25% and 75% of their design capacity during 5 000 full load hours. Electricity transmission reflects the transmission of the electricity required to obtain 1 kg H<sub>2</sub> in an electrolyser with a 69% efficiency located at the distance represented by the x-axis.

Source: IEA analysis based on data from [Guidehouse \(2021\)](#) and [IAE \(2016\)](#).

# Baltic Sea Hydrogen Collector



**2 x 1 250 km**  
dedicated offshore hydrogen pipelines



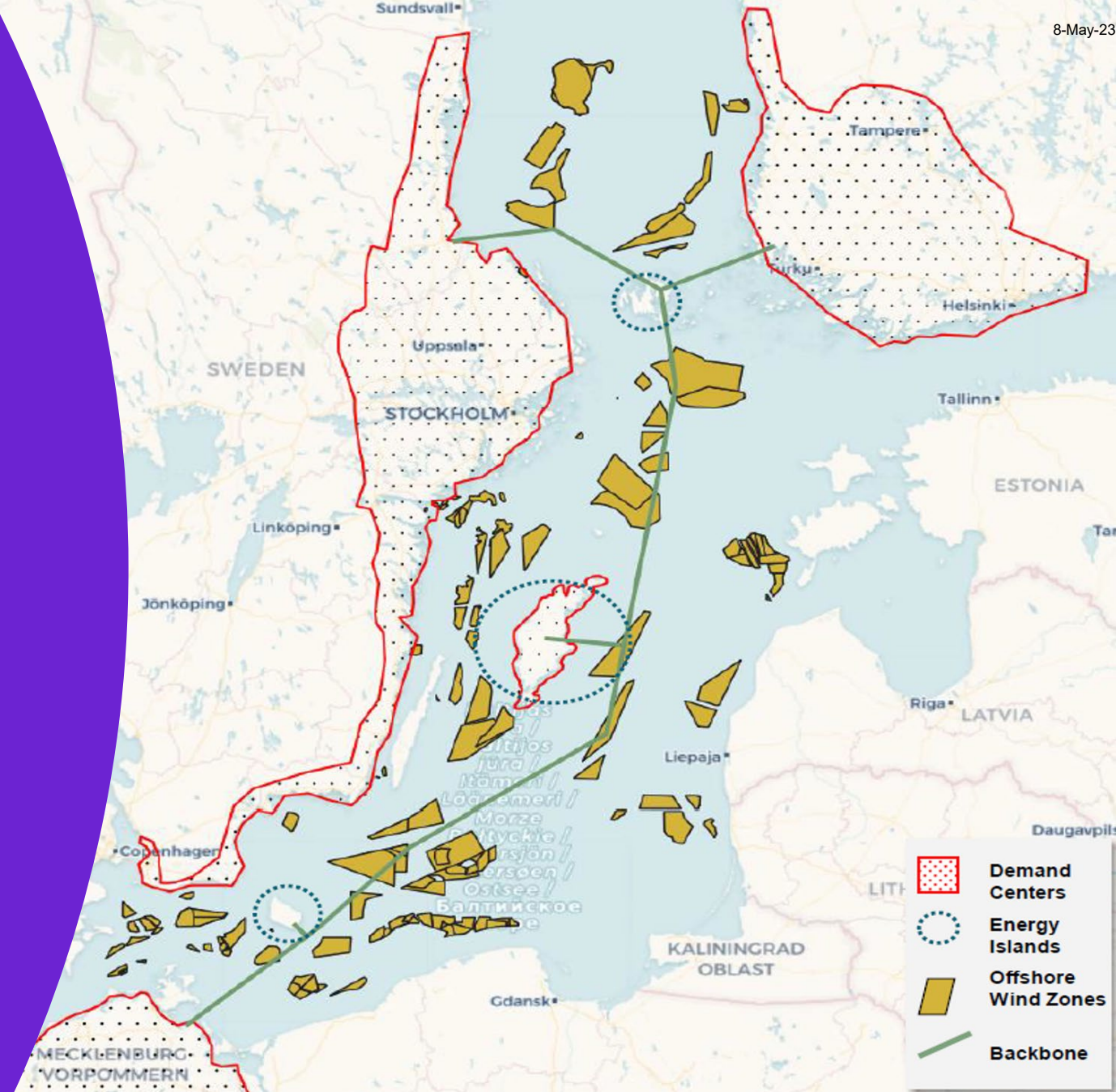
**16B EUR / 165B SEK**  
of investments required



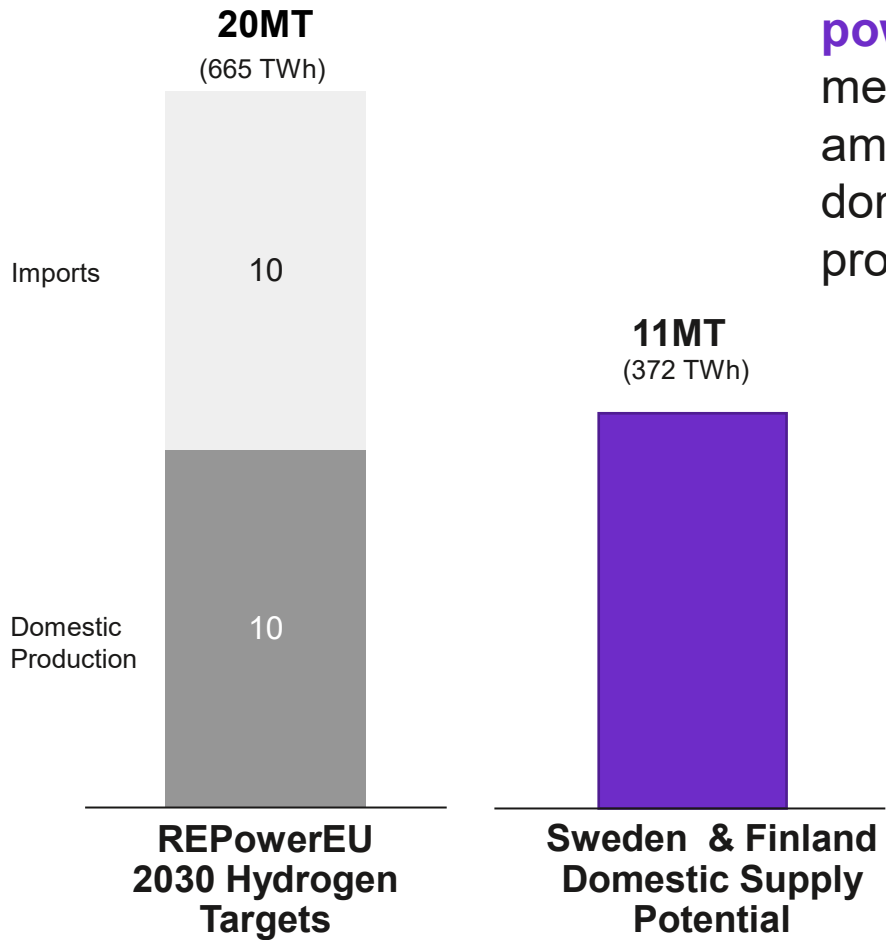
**66B EUR / 720B SEK**  
investments in wind power and  
electrolysis enabled



**33,000+ jobs**  
created during construction phase



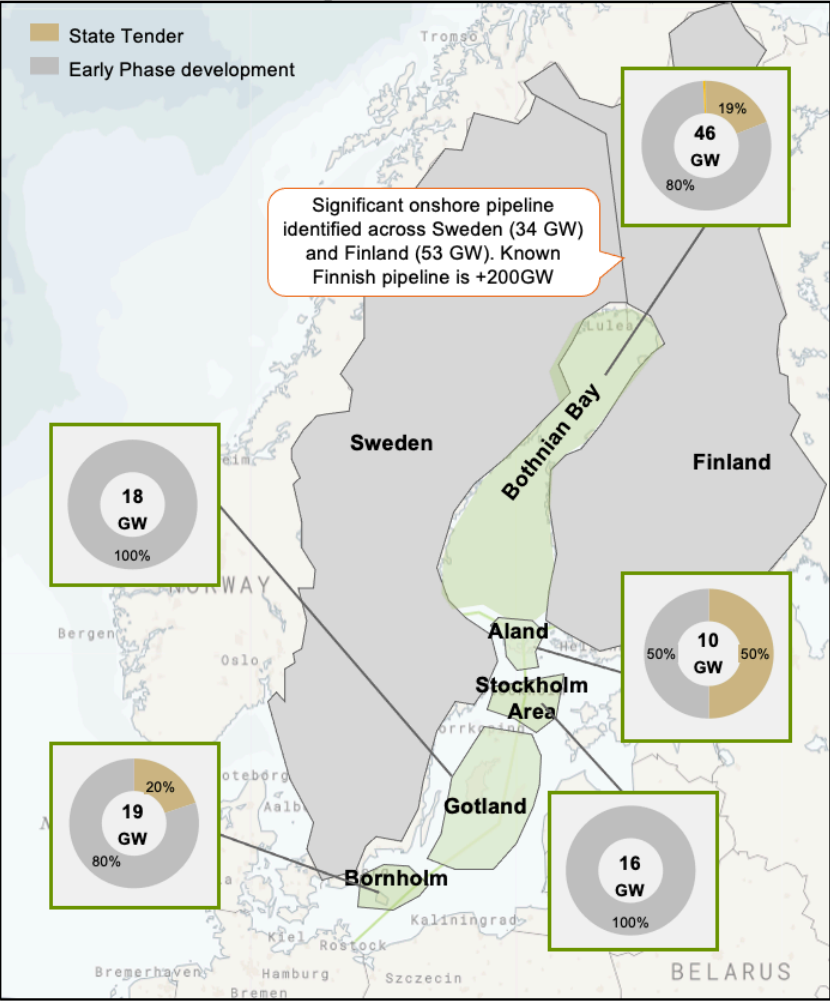
# Supporting European energy independence



The Nordics are a **renewable energy powerhouse** that can meet a significant amount of Europe’s domestic hydrogen production target.



## >100GW Of Offshore Wind In Early Phase Development



Analysis by Copenhagen Infrastructure Partners

# Thank you.

# Questions?

Now

Or Later  
Via  
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