

# Hydrogen Hub Mo

Grønt Stål og Hydrogen Hub



H<sub>2</sub>



## 40-50 MW

Kapasitet i startfasen

## 300-350 MW i 2030

- Dialog med Enova og EU om støtte
- Teknisk utvikling av prosjektet pågår
- Aktuelt som maritimt knutepunkt i Norge

## Q4-2024

Planlagt oppstart

# Statkraft: Europe's largest producer of renewable power

Own capacity

**19 700 MW**

61 TWh → 93% renewable

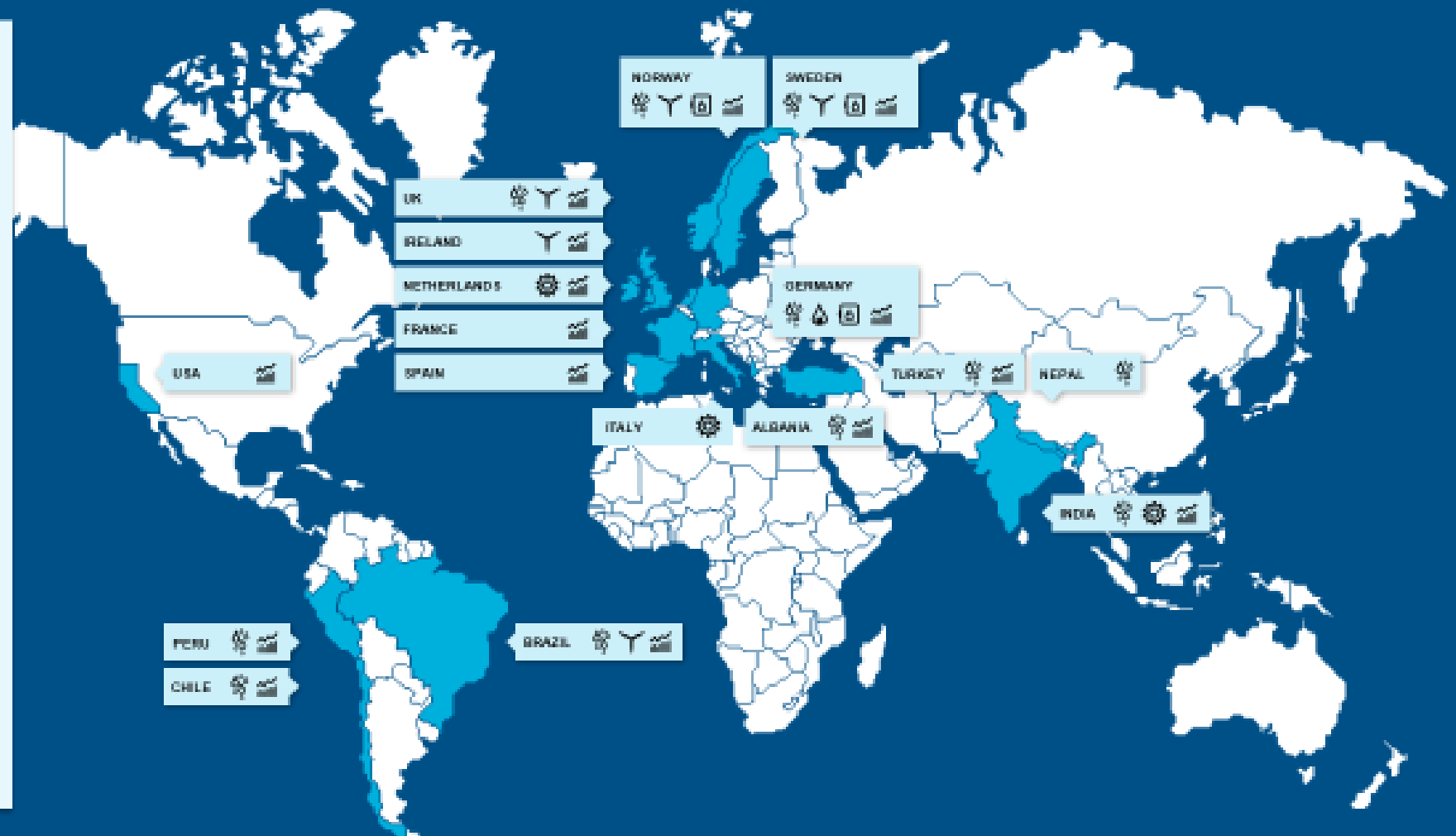
Third party capacity

**28 000 MW**

100 % renewable

Employees

**4 000**



# LOW EMISSIONS SCENARIO

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# Hydrogen for green industry and transport

Hydrogen can replace fossil fuels for ferries, long-haul marine transport, heavy duty transport and construction



With **storage capacity** significantly higher than batteries, hydrogen may play a key role in future energy systems



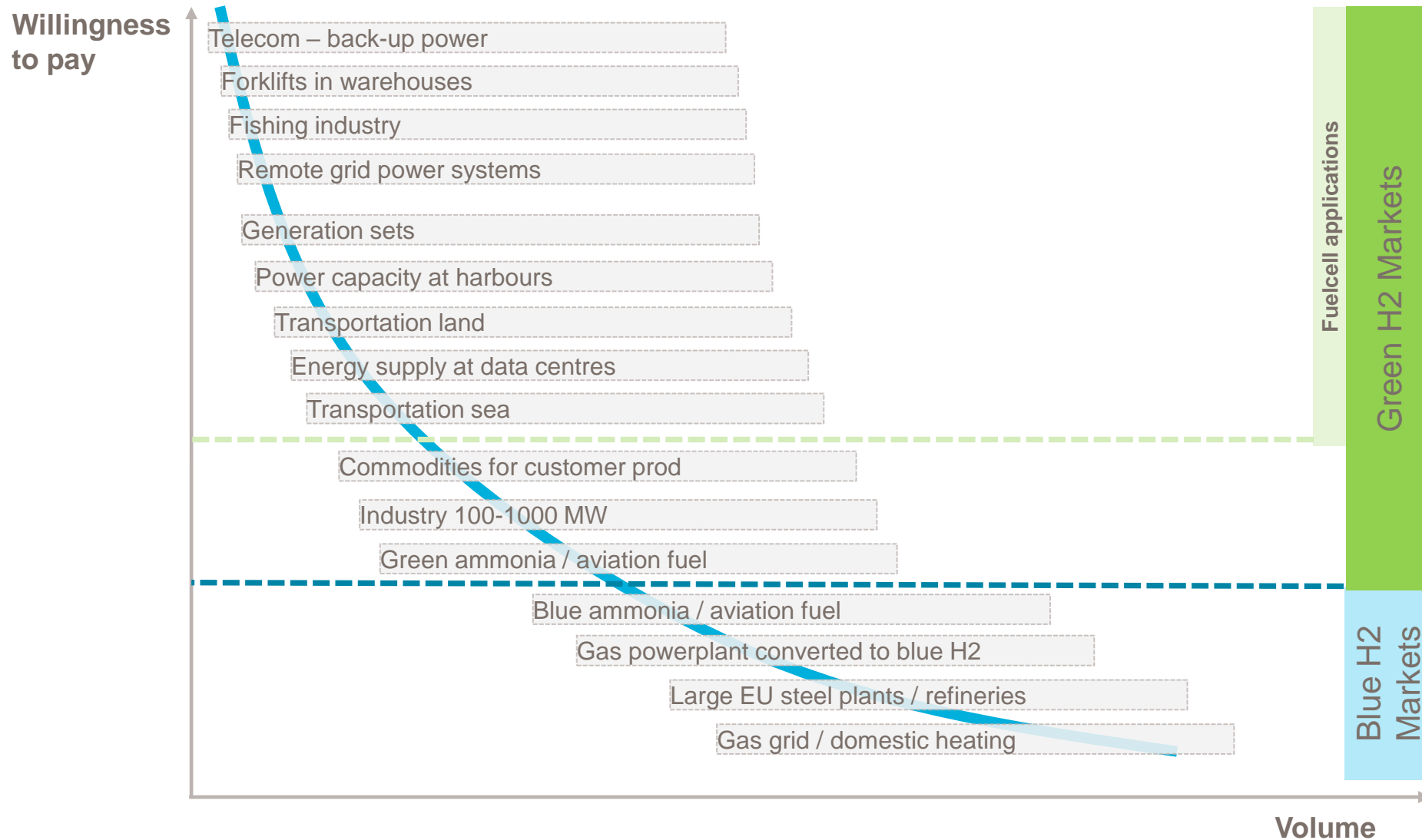
Photo: Brødrene Aa

Within industry, hydrogen can replace carbon and produce **biofuels, e-fuels and green chemicals**



# Hydrogen have many different markets.

## Different needs and willingness to pay for the hydrogen

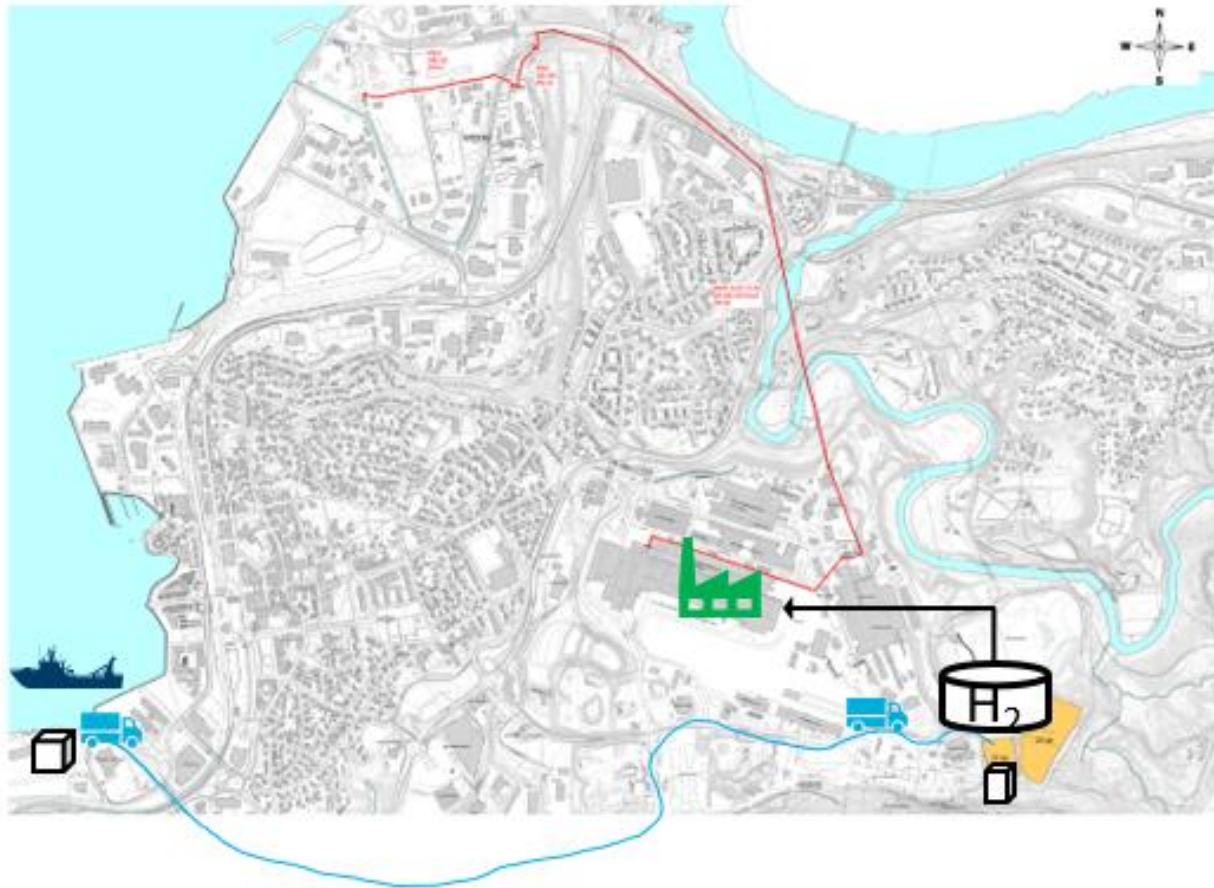


# Hydrogen Hub Mo – how to be a first mover

- Build green industry in Mo. A complete hydrogen value chain. One H<sub>2</sub> production many users.
- MIP with high focus on circular economy
- Selected size phase 1: 40 MW at 75-80% utilization of stack capacity.
- Rebuilding of furnace and digitalization (industry 4.0) is a prerequisite for the H<sub>2</sub> part
- Challenge: H<sub>2</sub> prod. to follow the dynamic energy demand in the furnace



# OUTLINE OF THE PLANT, CELSA, CONTAINERS AND HARBOUR



 17-20 tonn  
H2 pr/dag

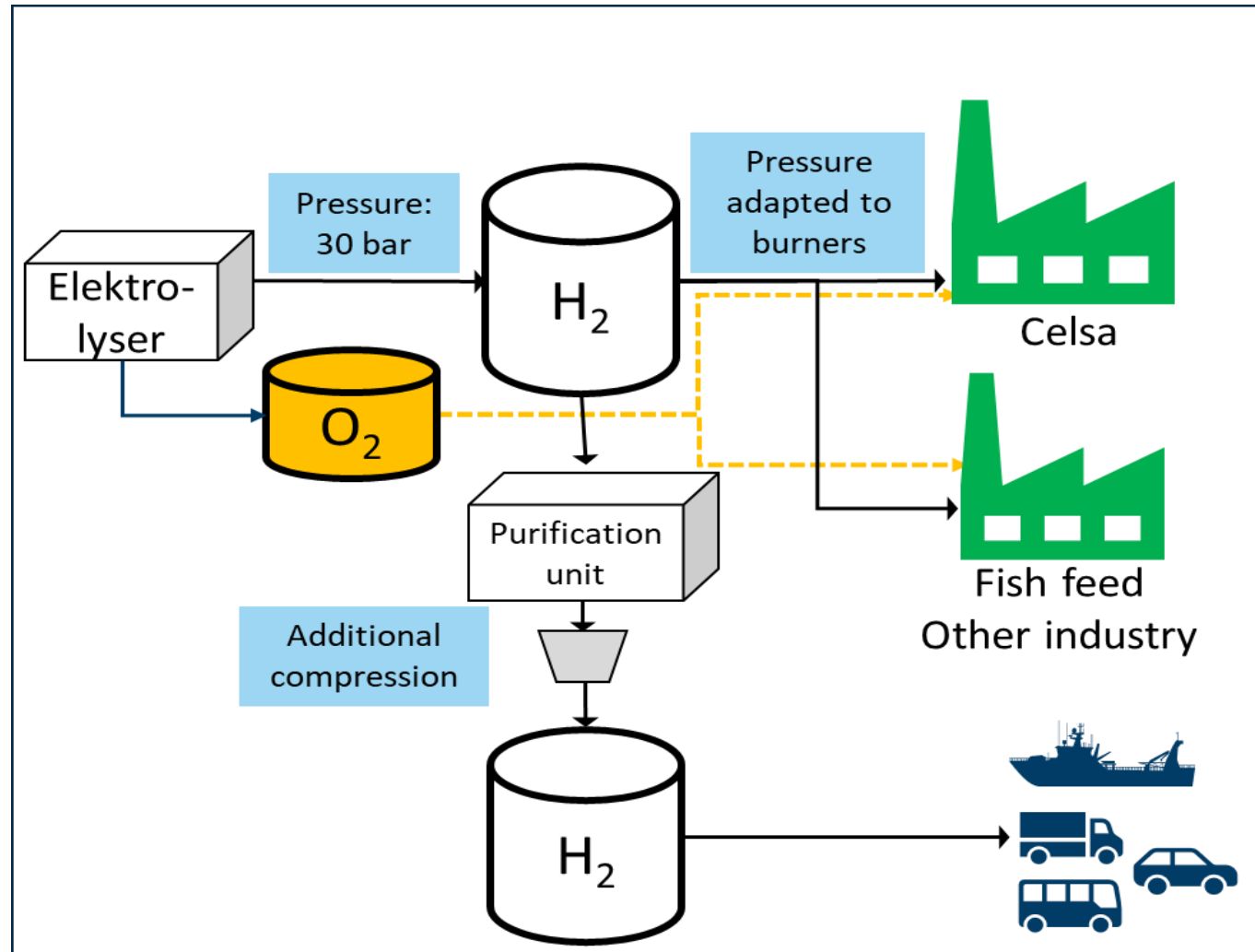
PRESSURE:  
30 BAR (PEM) OR 16 BAR

 5 tonn H2  
pr/dag

PRESSURE MARITIME:  
350 BAR

Plant layout and electrolyser exsample 16 MW from NEL

# Main elements of the H2 project in Mo.





# Statkraft's hydrogen activities - starting point Scandinavia

- Concrete pipeline
  - Norway
  - Sweden
  - Germany
- Combination of industry and transport
- Norwegian and Swedish initiatives well interlinked
- Interesting potential in other European countries



# Maritimt forbruk av fornybar energi

- Batterisystemer og direkte lading
- Komprimert hydrogen i containere, 3-6 tonn/båt. Eller bunkring av komprimert hydrogen via slange
- Fornybar ammoniakk (annen bunkringslokasjon mest aktuell)



## HMM Prosjektet jobber nå med å realisere:

- Kystnære lasteskip med hydrogenforsyning i containere
- Felleskjøpet/Heidelberg-løsningen mest aktuell
- Nullutslipp pasasjerskip med hybrid batteri/brenselcelle løsning. Komprimert hydrogen i kontainer eller fylleslange til tanker om bord.
- Langtgående store lasteskip kan benytte ammoniakk, men kommer litt senere

Konseptrisikovurdering for lastefartøy med drivstoff fra hydrogenkonteinere

Statkraft AS



## Risikoanalyser og estimering av ulike sikkerhetssoner for ulike aktiviteter gjøres i alle prosjekt

Tankbrudd	Hullstørrelse		Totalt	
		45 mm	Brudd	
<b>Bruddfrekvens/år</b>		<b>7.8E-5</b>	<b>2.4E-4</b>	<b>3.2E-4</b>
Fysisk eksplosjon	400 mbar	N/A	11 m	
	100 mbar	N/A	24 m	
	20 mbar	N/A	90 m	
Forsinket antennelse		0.33	0.33	
<b>Gasseksplosjon</b>	<b>Frekvens/år</b>	<b>2.6E-6</b>	<b>8.0E-5</b>	<b>1.1E-4</b>
Gasseksplosjon	400 mbar		16 m	
	100 mbar		40 m	
	20 mbar		170 m	



**Statkraft**

[geir.brekke@statkraft.com](mailto:geir.brekke@statkraft.com)

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[statkraft.com](http://statkraft.com)