



H2Derivatives@BalticSeaPorts

A cooperation project to develop proof-of concepts
for the uptake of H2 derivative fuels



Interreg
Baltic Sea Region



Co-funded by
the European Union



ENERGY TRANSITION

H2Deri@BSP

H₂-Derivative Market Analysis for Baltic Sea Ports as green energy hubs

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Baltic Sea Region



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ENERGY TRANSITION
H2Deri@BSP



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Swedish Environmental
Research Institute

H₂-Derivative Market Analysis for Baltic Sea Ports

(1 March-31 October)

Identification of **current** national green H₂-derivative energy consumption per involved project country. **Forecast** for future green H₂-derivative energy demand – 2030 and beyond

Methods

Literature review & desktop research – with input from Project Partners

- Journal articles (>150 articles)
- Industry and authority reports, white papers, strategies, non-scientific articles, databases, grey literature, incl. web pages, press releases, etc. (>320 reports)
- Review of EU-level policies, directives and regulations dated between 2020 and 2025 (26 regulatory documents, each having a direct or indirect impact on the formation of the hydrogen and its derivatives market in both the short and long term)

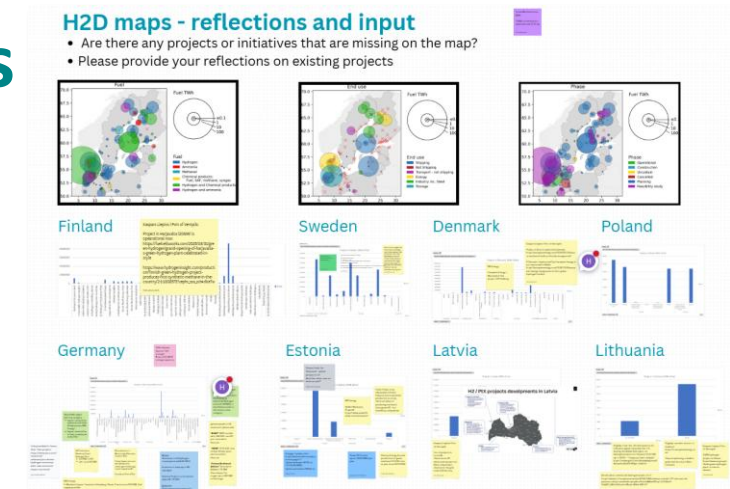
Two workshops

Two survey studies

- Ports
- Energy companies

14 interviews

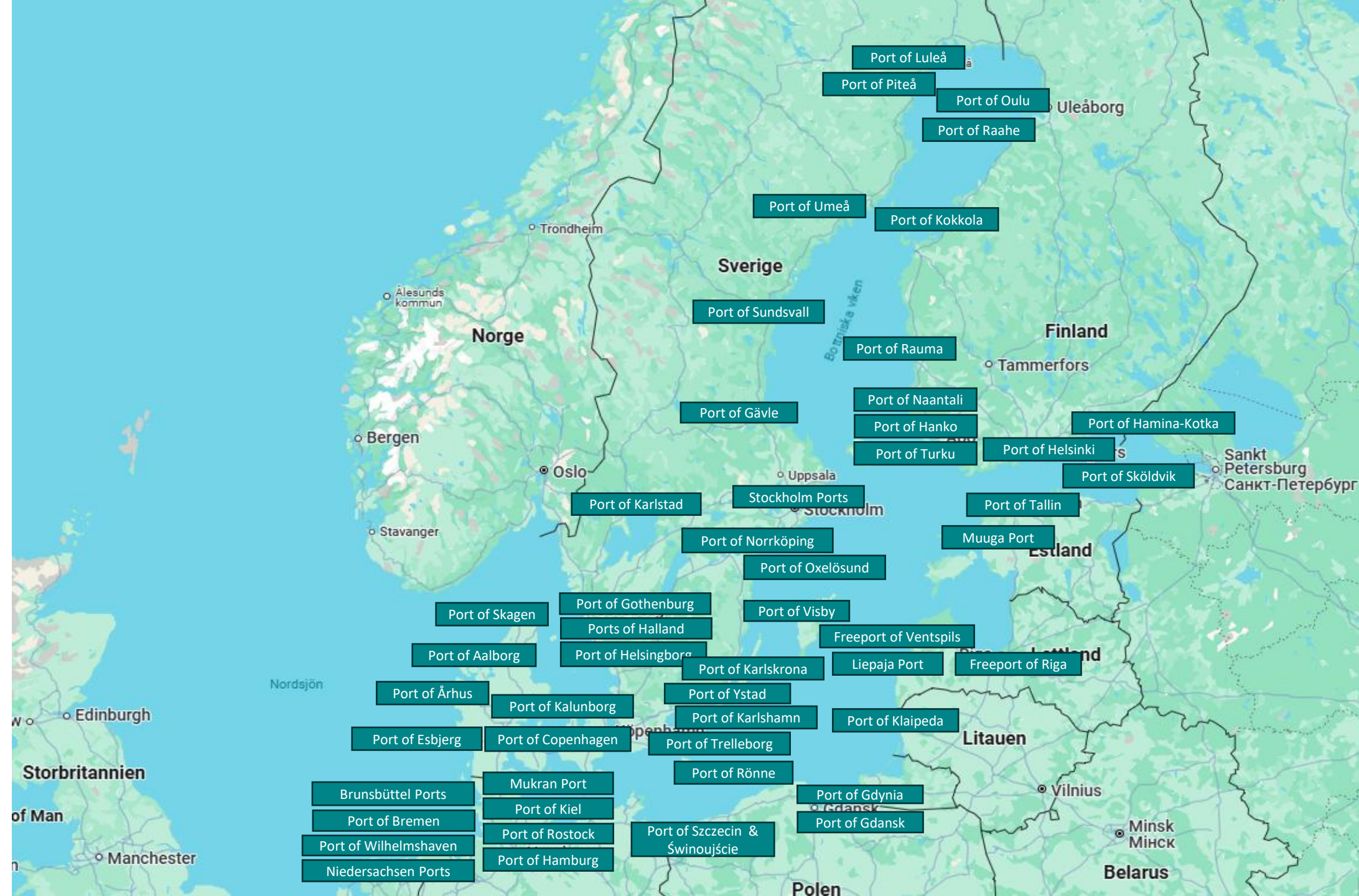
- Ports
- Energy companies
- Energy infrastructure providers
- Bunkering companies



International workshop 250618: Current and future national green H₂-derivatives: 32 participants among partner and AO

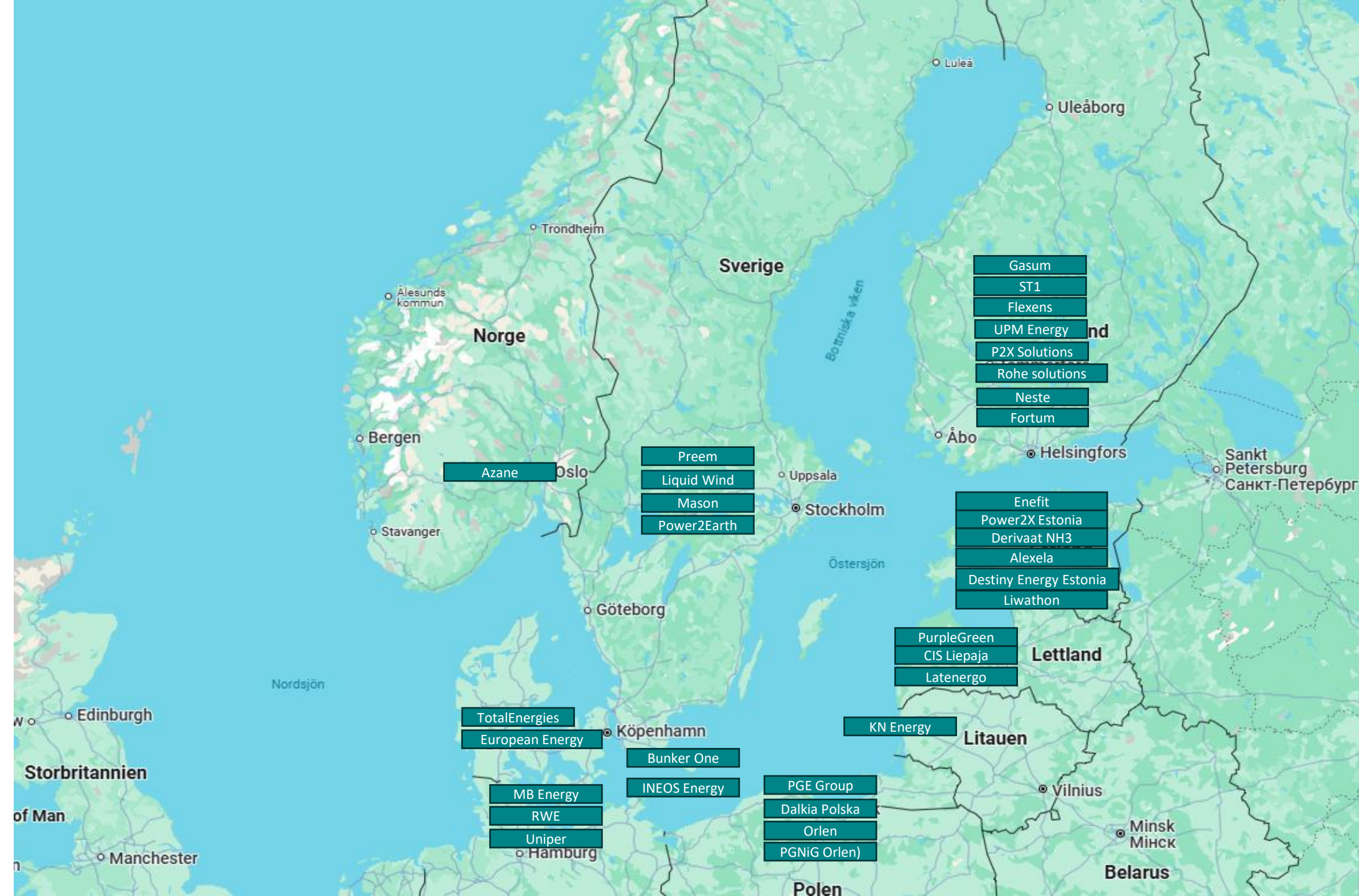


Swedish workshop 250909: Conditions in Region Norrbotten for fossil-free fuel production: 24 participants from 16 organizations



Survey: 28
responses from
ports

Interviews ports:
Port of Luleå
Port of Piteå
Port of Esbjerg
Port of Helsinki
Port of Kiel
Port of Klaipeda
Port of Ventspils
Port of Hamburg



Survey: 13
responses from
energy companies

Interviews (energy
companies, energy
infrastrucutre
providers,
bunkering
companies):

Vattenfall
Uniper
Nordion Energy
Gasum
Bunker One
Interterminal

Renewable fuels

Renewable fuels and propulsion for ships

Biogas/LBM

- Good climate performance
- Ongoing production in Sweden
- Does not require specific adaptation in LNG vessels



Wind

- So far mainly as assisting power supply in marine applications
- Ongoing development for wind as the main propulsion



Hydrogen

- Tested in marine applications
- Low energy volumetric density



HVO

- Requires no specific adaptation onboard
- Does not improve emissions of NOX and PM
- Dependence on imports

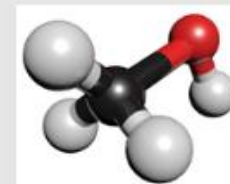
Electricity/Batteries

- Tested and proved
- Smaller ships typically suitable for full electrification and larger ships for hybrid solutions



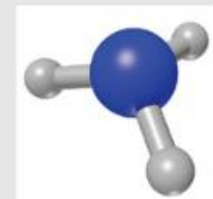
Methanol

- Tested and proved in marine applications
- Planned production in Sweden

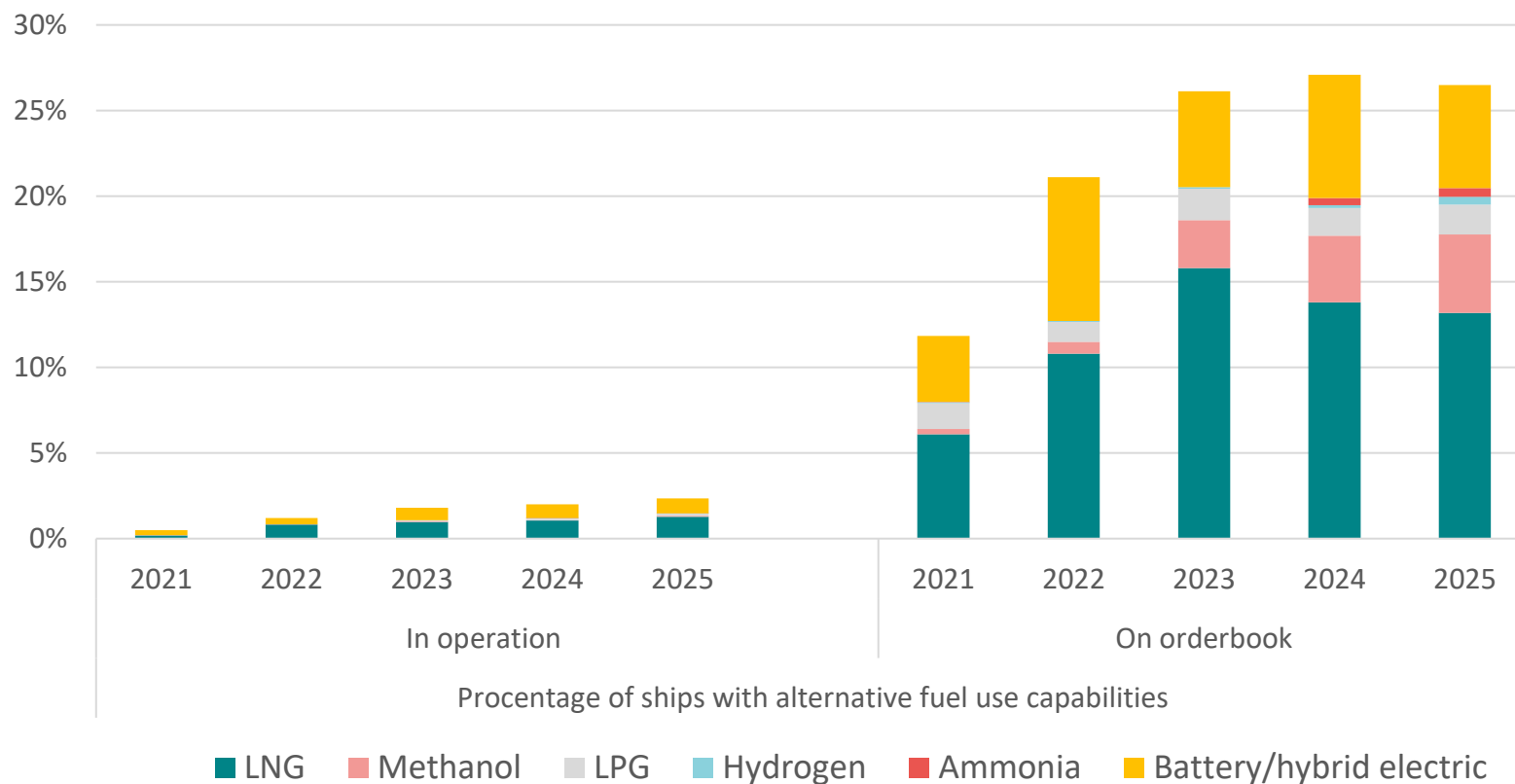


Ammonia

- Does not contain carbon
- Strongly toxic
- Not tested yet in marine applications



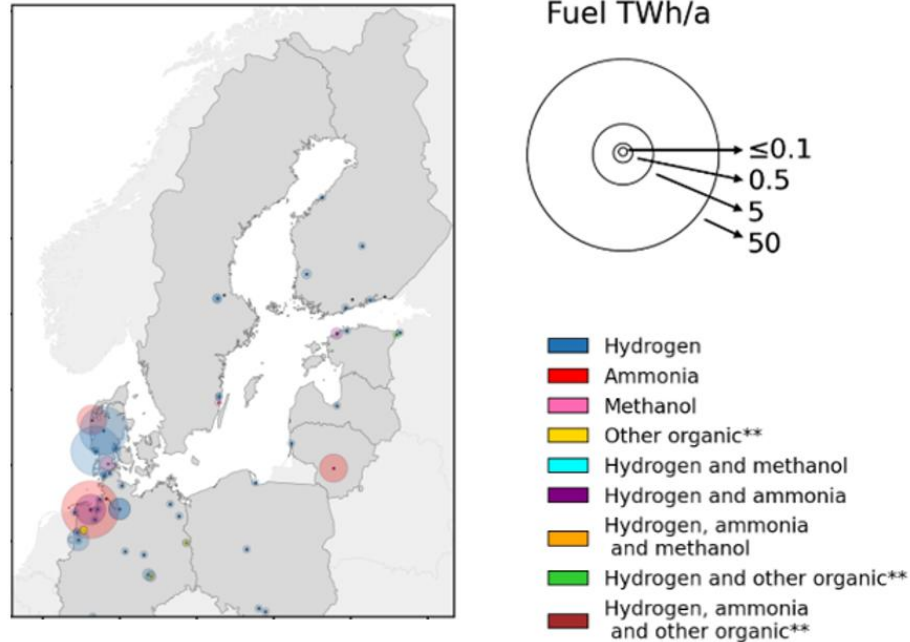
Ship orderbook



- Alternative fuel uptake means that the ship is capable of using the fuel but since many have a dual fuel solution it does not mean the fuel will be used during operation.
- LNG growth as an important bridging fuel.
- Biofuels will be used where available, but volumes are limited by feedstock availability and competition with land transport/industry.
- Volumes of electrofuels (hydrogen, methanol, ammonia) will remain limited and costly before 2030; but is anticipated to accelerate beyond 2030.
- Large-scale ammonia propulsion is unlikely to occur before 2035 since the technology is far from large scale implementation

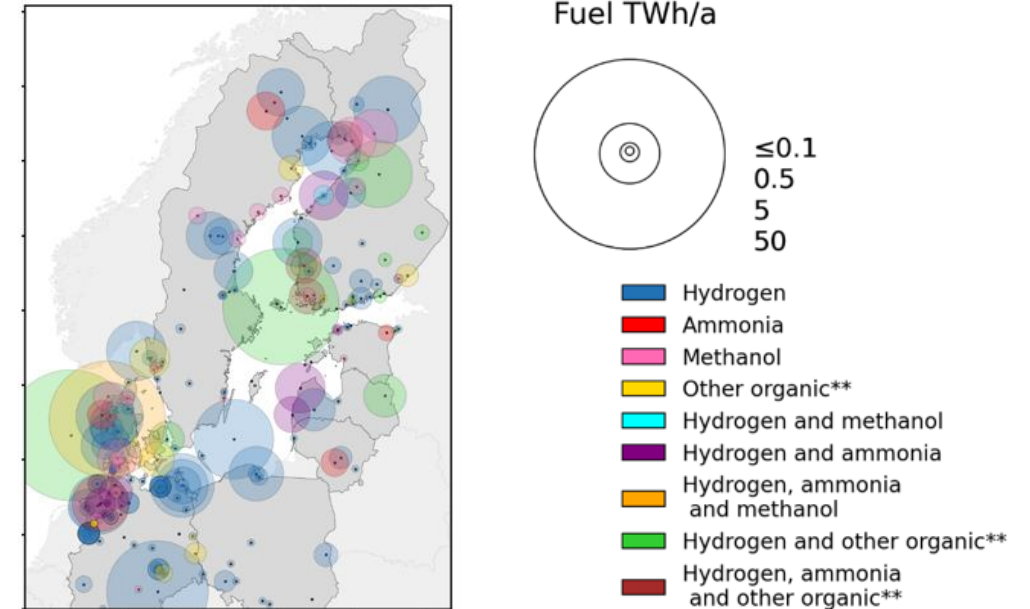
Ongoing and planned projects for electrofuel production

Confirmed production as of 2025



- 38 projects (app 3 Twh) in operation
- Additionally, over 20 projects under construction or with a final investment decision made as of 2025 (app 17 Twh).

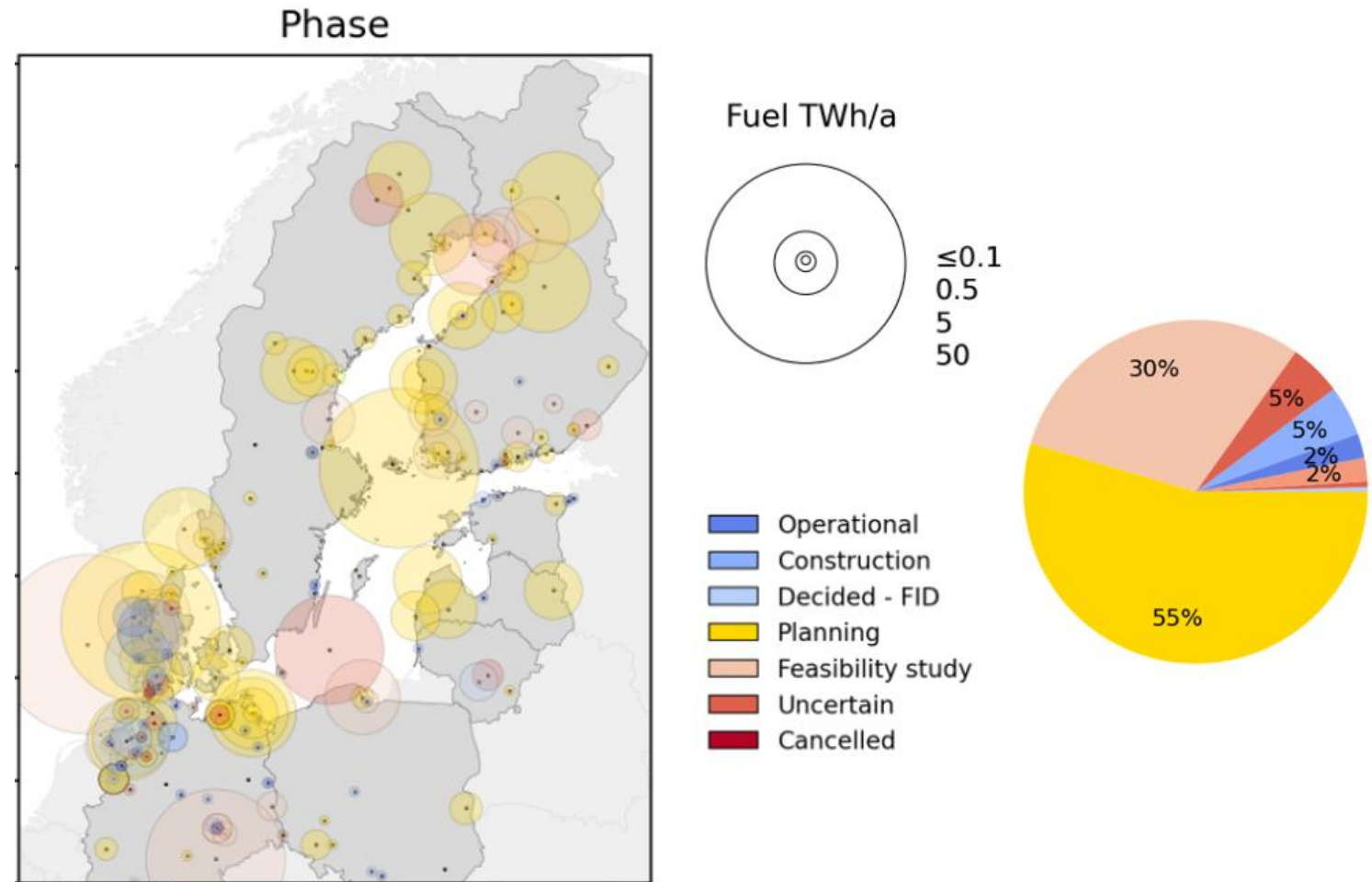
Maximum potential production by 2030



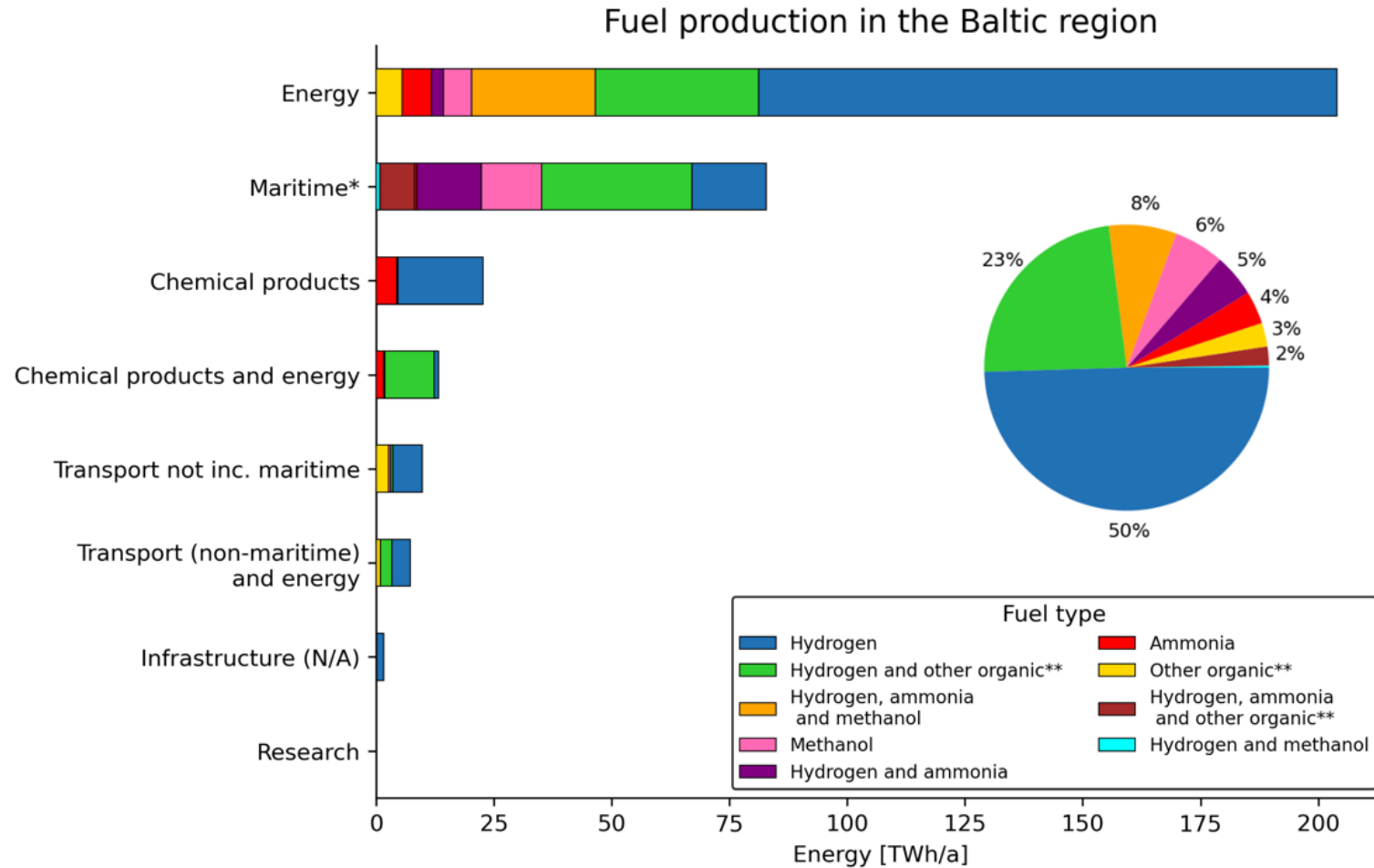
- 298 projects have been identified
- In general, uncertain what fuel will be produced, as it will be developed during the project period.
- The total fuel production capacity for all non-cancelled project across all start-up years equals 338 TWh/year (≈31 million tonnes of oil-equivalents)

Project phases for electrofuel production

- Most projects are in the planning stage
- Many projects cancelled or on-hold, but with large uncertainties
- Estimated that 7-25% of planned production is realised by 2030, but the growth rate of derivative fuel supply is impacted by uncertainties in market development
- Region specific differences – country analysis important



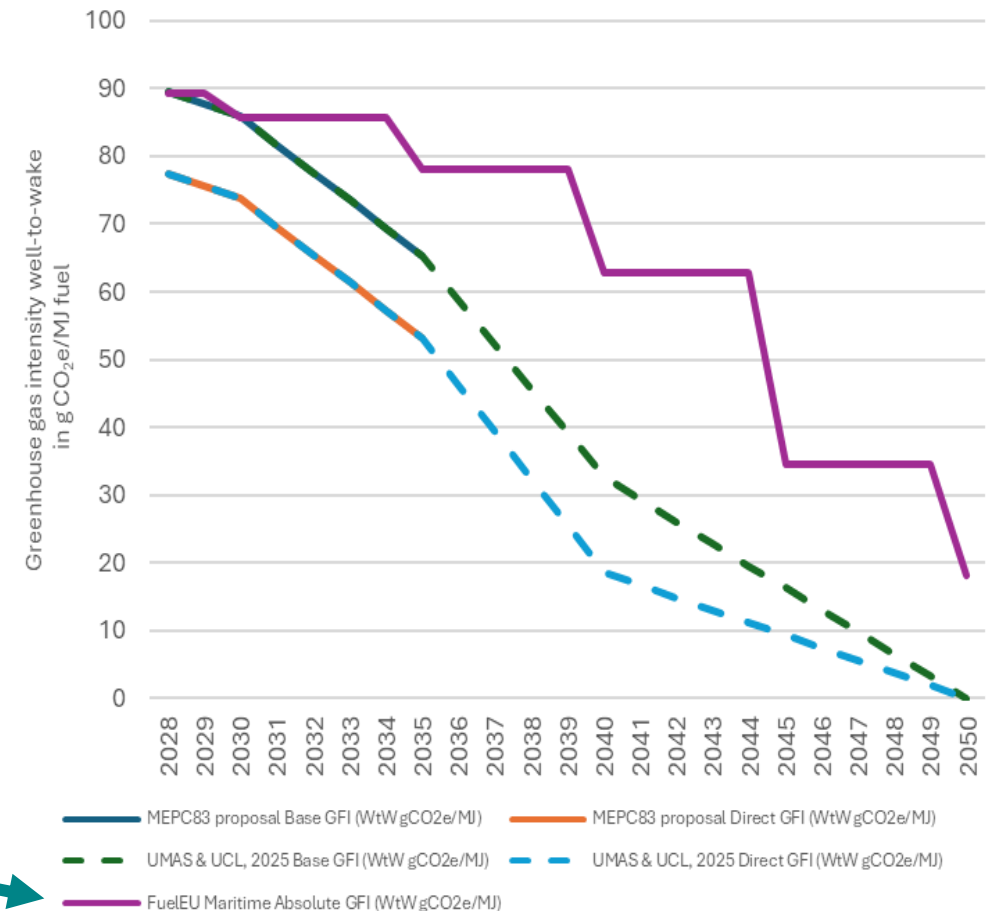
Total potential electrofuel production by end-use sector and fuel type



- Among the planned projects, half of the potential production is hydrogen
- The announced fuel production capacity available for the maritime sector is app. 84 TWh/year (24%)

EU-level policies, regulations and other instruments with impact on hydrogen fuel market formation

Document Type	Short title
Communication	Ocean Pact
Communication	Clean Industrial Deal
Communication	Affordable Energy Action Plan
Communication	Competitiveness Compass for the EU
Regulation	Net Zero Industry Act
Report	Hydrogen for a Sustainable Europe
Directive	Rules for the internal market for renewable gas, natural gas and hydrogen
Regulation	Regulation on the internal markets for renewable gas, natural gas and hydrogen
Other	Innovation Fund Hydrogen Auctions 2024
Regulation	EU Methane Regulation for the energy sector
Other	Methodology for evaluating the emission saving of low-carbon hydrogen and fuels
Regulation	European Critical Raw Materials Act
Directive	Renewable Energy Directive (RED III)
Communication	European Hydrogen Bank (EHB)
Directive	Energy Efficiency Directive
Directive	ETS Directive
Communication	A Green Deal Industrial Plan for the Net-Zero Age
Regulation	Alternative Fuels Infrastructure Regulation (AFIR)
Regulation	FuelEU Maritime Regulation
Regulation	Carbon Border Adjustment Mechanism
Communication	REPowerEU Plan
Communication	EU Fit for 55
Regulation	European Climate Law
Communication	Proposal for restructuring Energy Taxation Directive
Regulation	EU Taxonomy
Communication	EU Hydrogen Strategy



Different greenhouse gas targets and their development over time.

Hydrogen strategy and targets for national production

- Most of the countries have a hydrogen strategy with the goal to export hydrogen derivatives:
 - Finland, Denmark, Germany, Estonia, Lithuania and Poland have adopted hydrogen strategies
- Two countries has strategies with export goals: Denmark and Finland
- Germany and the EU at large have import goals for RFNBO
- 45-90 TWh
- 40 GW



Dark blue/purple: Developed hydrogen strategy
Light blue/pink: working on hydrogen strategy
Grey: no work started

Future supply and demand for the region in a global context, including export/import

- EU instruments (FuelEU Maritime, ETS) and stricter (future) IMO measures will increase demand for low-carbon fuels in the Baltic trading area and will be crucial to stimulate local production
- If 7-25% of the projects are realised: Production is estimated at between 14 and 50 TWh around 2035
- There are feasible production capacities beyond 50 TWh

In line with German
import targets

Conclusions

Mixture of renewable fuels: Which fuel will come to dominate is uncertain with a diverse mixture of fuels likely to be embraced across the sector, including hybrid solutions.

Strategic hydrogen opportunity: The BSR emerge as a hydrogen and electrofuel hub, supported by abundant renewable energy resources and its strategic industrial and transport position. Around 373 TWh of hydrogen-derived energy (≈ 31 million tonnes of MGO-equivalent) could be produced by 2030 if all announced projects proceed—but only about 2% of this capacity is currently operational.

Uneven national progress but complementary strengths: Denmark and Finland aim to be major exporters of electrofuels; Germany focuses on import and port conversion; Sweden integrates hydrogen into industrial and maritime decarbonisation. The Baltic States and Poland remain in early development stages but are establishing hydrogen valley initiatives

Need for stable policy support and regional cooperation: Stronger, long-term global, EU and national incentives, risk-sharing mechanisms (e.g., contracts for difference, long-term offtake agreements, and EU Innovation Fund support), and cross-border infrastructure collaboration are essential to secure investment and competitiveness against global players.

Maritime sector as early driver: Hydrogen derivatives are central to decarbonising shipping, but investment uncertainty, unclear offtake markets, limited bunkering facilities and uncertain long-term supply contracts hinder progress. Current readiness levels are still low across the region.