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HYDROGEN FUEL FOR SOUTH BALTIC PORT AUTHORITIES (2026)

FACTSHEET

QUICK REVIEW

- Hydrogen is considered one of the most promising zero-emission marine fuel pathways for long-term maritime decarbonisation. However, major infrastructure, storage, safety and supply chain challenges remain before large-scale deployment in ports and shipping
- Hydrogen has many HGH emission factors assigned to them depending on its origin and thus its' origin certificate will impact its price
- Ports planning hydrogen deployment should prioritize phased development and integration with renewable electricity strategies

TOPIC	HYDROGEN STATUS
Technology maturity	Low–Medium
Infrastructure readiness in Europe	Early-stage
Compatibility with existing fuel systems	Limited
FuelEU Maritime compliance potential	Very high for renewable hydrogen
Main environmental challenge	Storage and energy density
Main investment advantage	Zero CO2 emissions at point of use
Long-term decarbonisation potential	Very high

INFRASTRUCTURE CHARACTERISTICS

Hydrogen infrastructure is significantly more complex than conventional marine fuel systems due to:

- Very low volumetric energy density
- Extreme cryogenic requirements for liquid hydrogen
- High flammability
- Specialized safety requirements

CORE INFRASTRUCTURE

- Hydrogen storage systems
- Bunkering and transfer systems
- Compression or liquefaction systems
- Gas detection systems
- Explosion protection systems
- Ventilation systems
- Emergency shutdown systems
- Safety exclusion zones
- Trained personnel for hydrogen handling

INFRASTRUCTURE DEVELOPMENT CHALLENGES

Hydrogen infrastructure deployment may require:

- Significant renewable electricity capacity
- New storage and transfer systems
- Dedicated safety zones
- High capital investment
- Multi-sector industrial cooperation

INTERNATIONAL SAFETY STANDARDS

AREA	MAIN STANDARD
Low-flashpoint fuel ship safety	IMO IGF Code
Interim hydrogen fuel guidance	IMO interim recommendations
Crew training	STCW Convention
Ship safety framework	SOLAS Convention
Hazardous gas operations	ISO hydrogen handling standards

PRODUCTION PATHWAYS AND COST BENCHMARKS

FUEL	PRODUCTION	RELATIVE COST POSITION (2025-2026)	LIFECYCLE GHG REDUCTION POTENTIAL
Gray hydrogen	Produced from fossil fuels (steam methane reforming) without CO_2 capture	Lowest cost	Low
Pink/Purple hydrogen	Produced through electrolysis powered by nuclear power plants	Moderate to High	Very High / Low-carbon
Blue hydrogen	Produced from natural gas, but using carbon capture and storage technology (CCS/CCU), which reduces the carbon footprint	Moderate	Moderate
Turquoise hydrogen	Produced by pyrolysis of methane, which produces solid carbon, resulting in low CO_2 emissions	Moderate to High	Moderate to High
Yellow hydrogen	Produced using electricity from the power grid (often associated with solar electrolysis)	Moderate to High	Variable (Low to Moderate)
Black/Brown hydrogen	Produced from hard coal (black) or lignite (brown), the least environmentally friendly method	Low to Moderate	Very Low
White hydrogen	Naturally occurring geological hydrogen is found in underground deposits	Unknown / Emerging Market	Very High / near-zero potential

Northern Europe is becoming a major hub for renewable hydrogen development.

Maritime hydrogen bunkering infrastructure remains limited across the Baltic region.

Hydrogen deployment is currently focused on pilot vessels and demonstration projects.

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EXISTING HYDROGEN INFRASTRUCTURE IN THE SOUTH BALTIC REGION

COUNTRY	MAJOR HYDROGEN INFRASTRUCTURE	FUTURE HYDROGEN DEVELOPMENTS
Lithuania	Early-stage hydrogen initiatives and pilot projects in Klaipėda	Green hydrogen production and port decarbonisation projects under development
Poland	Industrial hydrogen production for refining and chemical sectors	National hydrogen strategy supporting renewable hydrogen deployment and port applications
Germany	Extensive hydrogen backbone planning, industrial hydrogen hubs and import infrastructure projects	Large-scale hydrogen import terminals, storage facilities and maritime applications
Sweden	Renewable hydrogen production linked to industrial decarbonisation projects	Expansion of green hydrogen production and export capabilities
Finland	Growing renewable hydrogen sector and industrial pilot projects	Multiple large-scale green hydrogen projects targeting domestic and export markets
Denmark	Advanced Power-to-X ecosystem and renewable hydrogen production projects	Hydrogen export corridors and maritime fuel production initiatives

HYDROGEN INFRASTRUCTURE CONSIDERATIONS

- **Compressed hydrogen** – high-pressure storage, suitable for smaller-scale applications.
- **Liquid hydrogen** – cryogenic storage at −253°C, higher energy density but more complex infrastructure.
- **Hydrogen carriers** (e.g. ammonia or LOHCs) – enable easier transport and storage but require additional conversion processes.

Ports should select the most appropriate storage option based on operational needs, safety considerations and anticipated hydrogen demand.

HYDROGEN STORAGE PATHWAYS

STORAGE TYPE	CHARACTERISTICS
Compressed hydrogen	High-pressure gaseous storage
Liquid hydrogen	Cryogenic storage at approximately -253°C

Contact the DeCoInter project to discuss your port's transition towards alternative fuels and sustainable energy solutions.

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