

H2Derivatives@BalticSeaPorts

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

Project in a Nutshell

H2Deri@BSP is providing a

1. clear perspective on future energy qualities and quantities
2. solution for planning and investing in appropriate port & terminal infrastructure,
3. adapted port regulatory and safety framework, and
4. communication strategy to increase acceptance of investments.

H2Deri@BSP seeks ...

....to increase capacities of Baltic Sea Region's port authorities to be prepared for transshipment, storage, and bunkering of green H2-derivatives.

Implementation Phase: 03/2025 – 02/2028

Project ID: #076, H2Deri@BSP



Project Partnership

-  Port Authorities
-  Fuel Production & Distribution
-  Research Institutes
-  Business Support Organisations



ENERGY TRANSITION

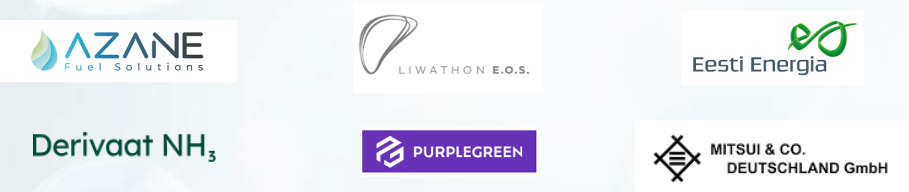
H2Deri@BSP

-  Hamburg Port Authority
-  Freeport of Ventspils Authority
-  Klaipeda State Seaport Authority
-  Port of Kiel
-  Port of Esbjerg
-  Port of Helsinki
-  Port of Luleå
-  Port of Tallinn
-  Alexela
-  Gasum
-  Mabanaft
-  IVL Swedish Environmental Research Institute
-  Lindholmen Science Park
-  Association of German Seaport Operators
-  Port of Hamburg Marketing

Associated Organizations



Energy Producer and Provider



Business Support Organisation



Port Authorities and Terminals



International governmental organisation and Public Authorities



Shipping Lines



Higher Education & Research Institutes



Outcomes



Market analysis-Baltic Sea ports as green energy hubs



Feasibility tests for bunkering of methanol from truck to ship



Technical and economic analysis model for investments



Regulatory framework for ports investing in H2-Derivatives



Mapping tool for port bunkering (terminals, fuel and ship types)



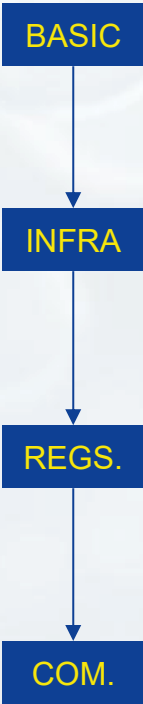
Recommendations for port safety handling manuals



Specifications of a methanol bunkering vessel



Port residential communication strategy for investments



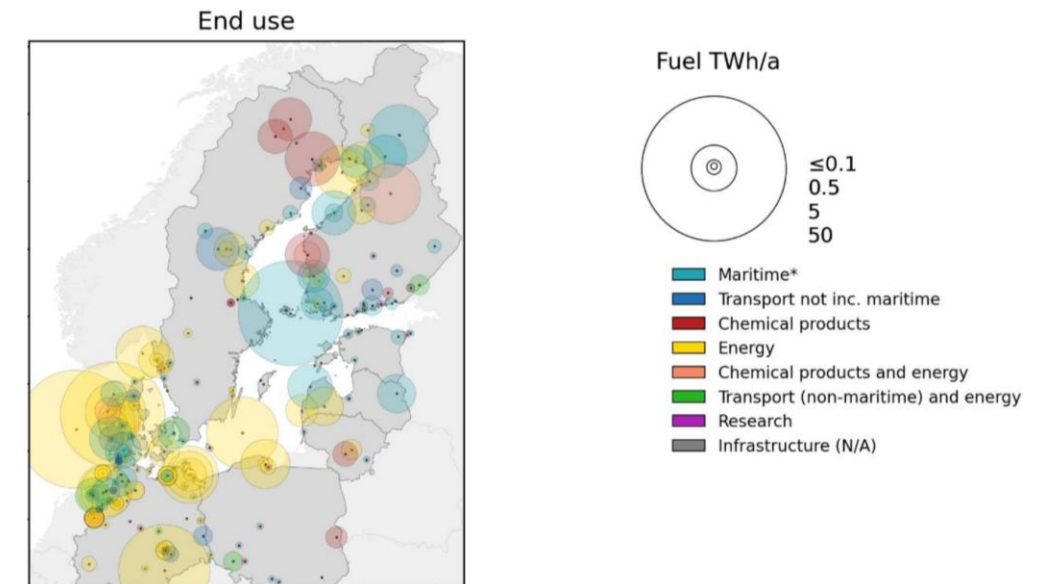
Output



Market analysis for Baltic Sea ports as hubs for green energy

- All non-cancelled projects:
338 TWh/year or **31 Million tonnes** of MGO eq.
- Only 24% available for Maritime:
84 TWh/year or ca. **8 Million tonnes** of MGO eq.
- Majority of the projects are in the planning stage with only **1.4%** in operation
- Nordic countries and Germany aim to produce at least three times the amount of fuel as compared to the Baltic States and Poland

Potential electro fuel production in the Baltic Sea Region



Market analysis by IVL Swedish Environmental Research Institute

Deliverable

BASIC



Market analysis for Baltic Sea ports as hubs for green energy

- Denmark and Finland aim to become major **exporters** of electro fuels
- Germany is focusing on developing **import** corridors and port conversion (consistent with global planning)
- Sweden places emphasis on **hydrogen** for industrial and maritime decarbonisation
- Baltic States and Poland are in early stages, though several ambitious **hydrogen valley initiatives** are emerging



Generated with Gemini

Market analysis by IVL Swedish Environmental Research Institute

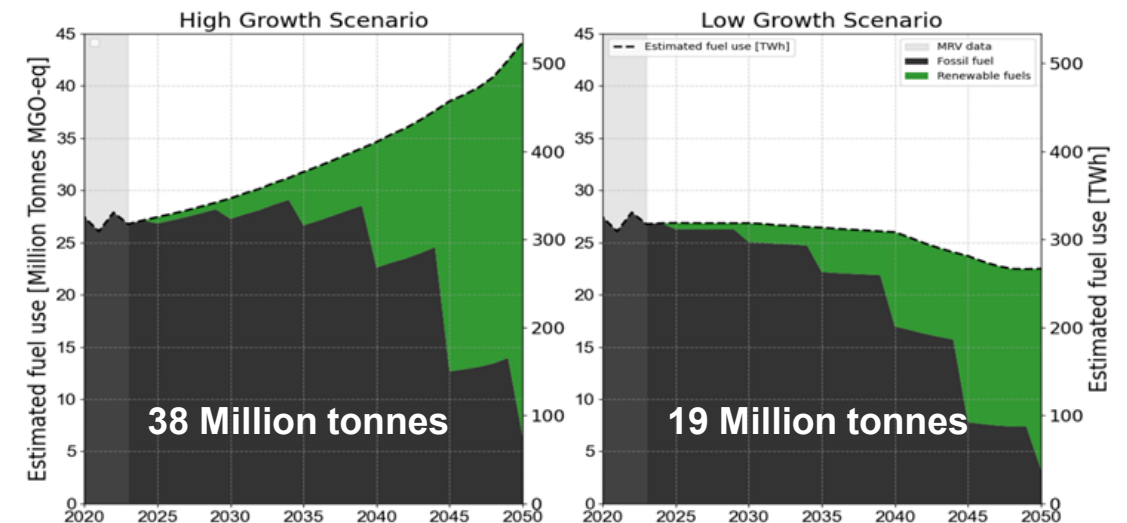
Deliverable



Market analysis for Baltic Sea ports as hubs for green energy

- Global production constraints, regional infrastructure rollout and pace of maritime fuel demand transition point to **2035**
- Need for **targeted policies, stronger market incentives** to spur investment in import/export terminals and related port infrastructure
- Stable market development by **offtake agreements**, stronger carbon pricing, scenario-based planning and collaboration

Demand of renewable fuel alternatives in European Shipping fleet to meet FuelEU Maritime targets



Market analysis by IVL Swedish Environmental Research Institute

Deliverable

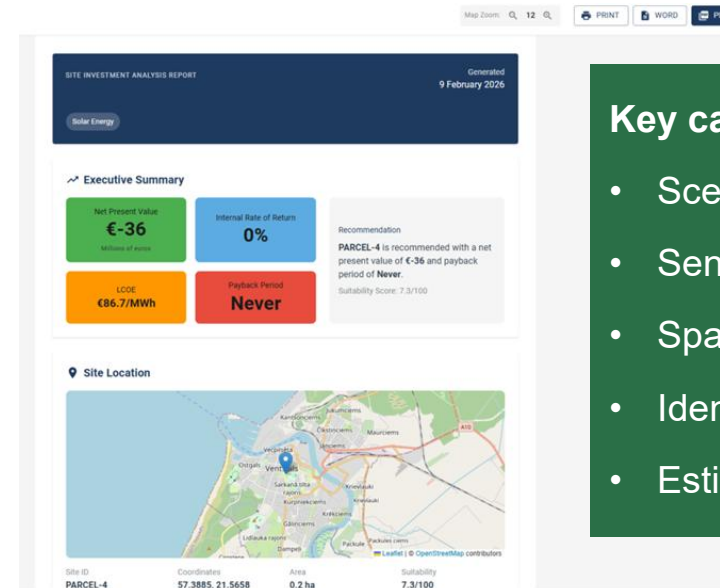
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Technical and economic
analysis model for investments

- Renewable energy, hydrogen and derivative production modules → **Assessment of potential**
- Infrastructure and logistics module → Storage, transport, and bunkering systems
- Economic assessment module → CAPEX, OPEX, and cost **competitiveness**
- Spatial analysis component → Integration of land use and safety constraints

Site investment analysis report



Key capabilities

- Scenario comparison
- Sensitivity analysis
- Spatial optimisation for infra.
- Identification of constraints
- Estimation of levelised cost of fuel

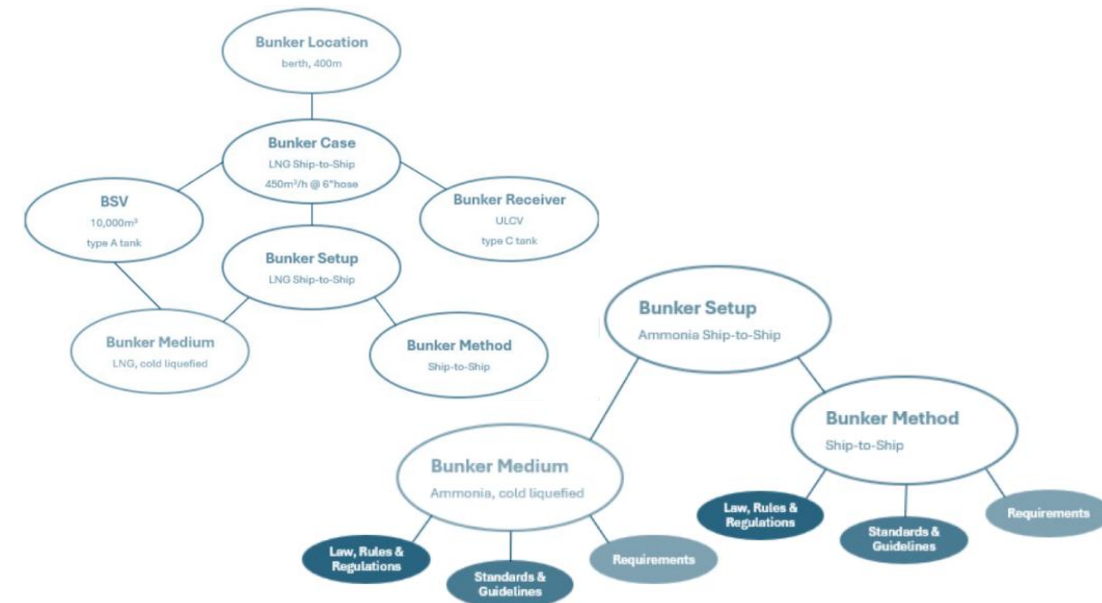
Model developed by Port of Ventspils and Ramboll

Deliverable



Mapping tool for port bunkering
(terminals, fuel and ship types)

- Criteria catalogue (Core) → Comprehensive **list of factors** influencing bunkering feasibility
- General bunker setup definition → Standardised **configurations** and operational concepts
- Bunker case development → Application to specific port **locations**
- Assessment workflow → Stepwise evaluation from screening to detailed analysis
- Integration of safety and **risk assessment** → Including qualitative and quantitative approaches



Bunker setup and location frameworks, Hamburg Port Authority and DNV

Deliverable

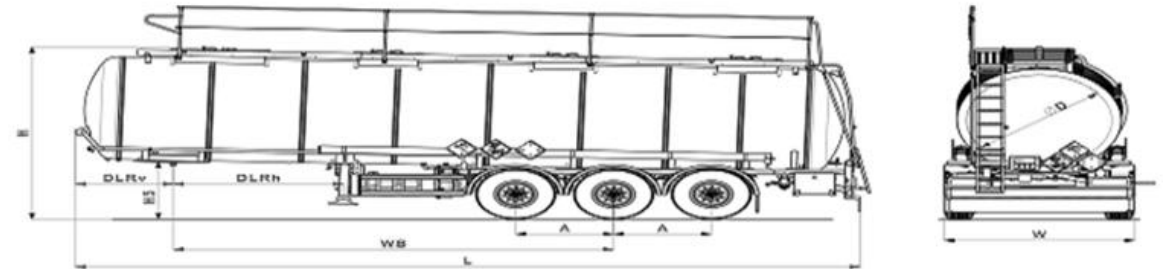
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Feasibility tests for bunkering
of methanol from truck to ship

- Technical **specifications**
- Operational Concept: Truck-to-Ship Bunkering **Process**
- Safety Framework and Regulatory **Compliance**
- Comparative Positioning: Methanol vs. LNG
- Market Context and **Deployment** Strategy

Green methanol bunkering tank trailer schematic diagram



Specifications developed by Alexela

Deliverable

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Specifications of a methanol bunkering vessel

- Carrying capacity: approx. **800** metric tonnes
- Pumping capacity: approx. **250** tonnes/hour
- Methanol volume target: **250,000** metric tonnes/year



Green methanol bunkering vessel design concept, Port of Klaipeda

Technical specifications and Design parameters

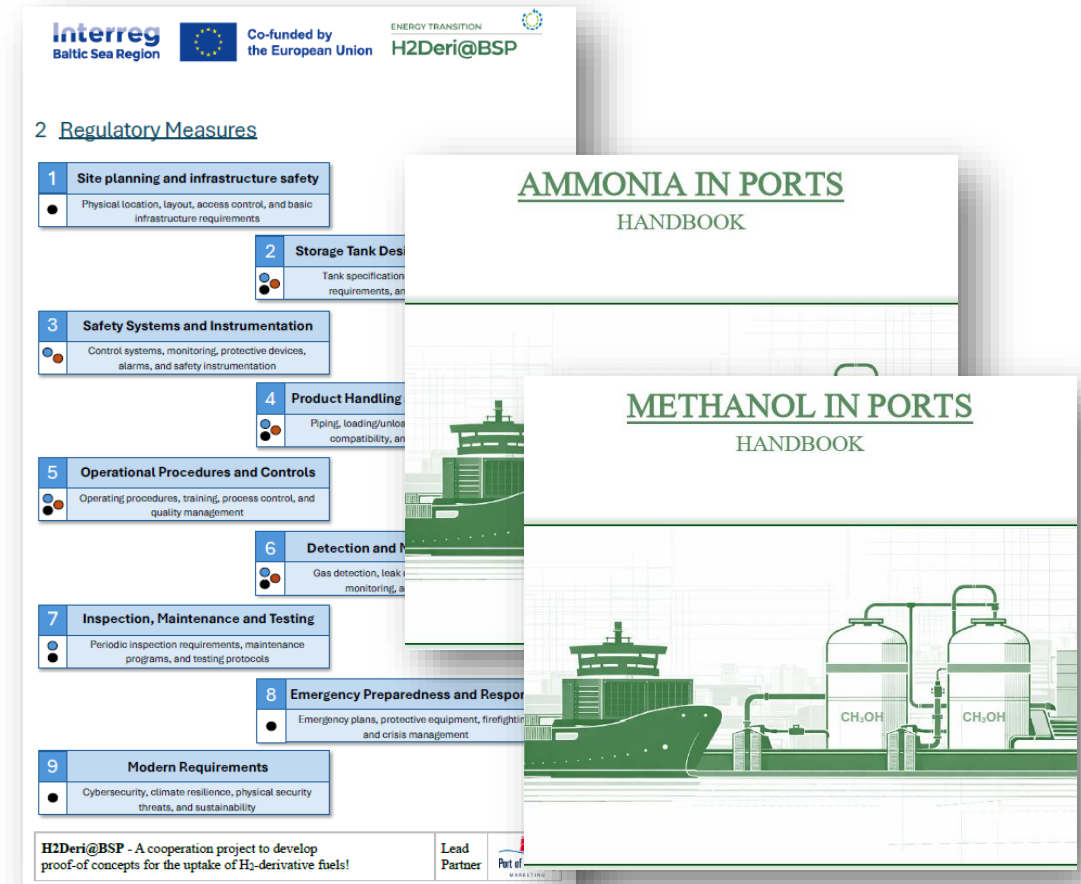
Criteria	Barge Option
Design Criteria	Smaller vessel (not seagoing), flexible for local ports and shallower waters (Storage capacity of about 800 -1,000 MT)
Market Approach	Targets local, niche barging markets
Supply Chain	Local supply chain with short-distance logistics (nothing is committed but there is a project pipeline)
Available Infrastructure	Local tank farms and terminal support (exists and is sufficient)
Demand Volumes	Moderate volumes from local niche customers (demand seems low but at least a good basis for operation)
CAPEX Requirement	Moderate / low investment
OPEX Requirement	Moderate / low running costs
Business Model Feasibility	Achievable and sustainable within its niche
Overall Risk	Medium risk due to local market limitations and competition

Specifications developed by Port of Klaipeda



Regulatory framework for ports investing in H2-Derivatives

- Site planning and **infrastructure** safety
- Storage tank design and construction
- **Safety** systems and instrumentation
- Product handling and transfer systems
- Detection and **monitoring** systems
- Inspection, maintenance and testing
- **Emergency** preparedness and response
- Best practices in **funding** across Europe



Regulatory framework developed by Association of German Seaport Operators (ZDS)

Deliverable



Recommendations for port safety handling manuals

- Ports roadmap to bunkering (**Checklist**)
- Basics of safe bunkering
- Knowledge of fuels
- **Implementation guidance**
 - Port governance and strategy
 - Site selection and planning
 - Risk assessment and safety zones
 - Core operations and emergency management
 - Special cases

Ports Roadmap to Bunkering	
CHECKLIST for steps and decision gates for alternative fuels bunkering The ports roadmap is structured into 15 implementation steps, grouped into four development phases, and punctuated by four decision gates.	
Phase A – Strategic foundation (Steps 1–4 Gate 1)	
	Step 1 – Assess the business case and strategic rationale Clarify why alternative fuel bunkering is relevant to the port, which fuels are in scope, and over what timeframe. Strategic drivers ☐ Market demand from shipping lines, bunker suppliers, or other interests has been assessed. ☐ Alignment with national or regional decarbonisation policy has been reviewed. ☐ Competitive positioning relative to neighbouring ports has been considered. ☐ Existing cargo flows and/or fuel handling experience have been analysed. ☐ Strategic positioning (e.g. fuel hub, early mover, follower) has been discussed at leadership level. Strategic clarity ☐ Fuels in scope have been identified (fuel-agnostic approach applied). ☐ Indicative time horizon has been defined (near-term pilots / medium-term deployment / long-term). ☐ The intended port role has been clarified (facilitator, regulator, competent authority, landlord, operator). ☐ Internal strategic risks and opportunities have been documented. Deliverable ☐ A documented internal position paper or briefing note.
	Step 2 – Build internal knowledge and assign ownership Establish baseline fuel knowledge and assign clear internal responsibility across safety, marine, environment, and permitting functions. Organisational ownership ☐ A named internal lead or cross-functional team has been appointed. ☐ Reporting lines and accountability are defined. ☐ Responsibilities across, safety, marine, environment, permitting, legal, and communications are mapped. Technical baseline knowledge ☐ Basic properties and hazards of relevant alternative fuels are understood. ☐ Operational implications for navigation, cargo handling, SIMOPs, and emergency response are reviewed. Institutional capability ☐ Key knowledge gaps have been identified. ☐ External advisory or technical support needs have been assessed. Deliverable ☐ Internal briefing materials or knowledge pack prepared.
	Step 3 – Establish governance and competent authority roles Define decision authority, escalation paths, and internal risk acceptance principles. Authority and legal position ☐ The role of the port authority has been clarified (full or partial competent authority). ☐ Interfaces with national regulators and administrations are mapped. ☐ Legal basis for port decision-making has been reviewed. Decision-making framework ☐ Decision responsibilities are formally assigned. ☐ Escalation pathways are defined. ☐ Cross-department coordination mechanisms are agreed. Risk governance ☐ High-level risk acceptance principles are defined. ☐ Alignment with national risk criteria (where applicable) has been considered. Deliverable ☐ Governance and authority structure documented and approved internally.

Ports bunkering guidebook developed by Gasum, Viereon, Bowwave

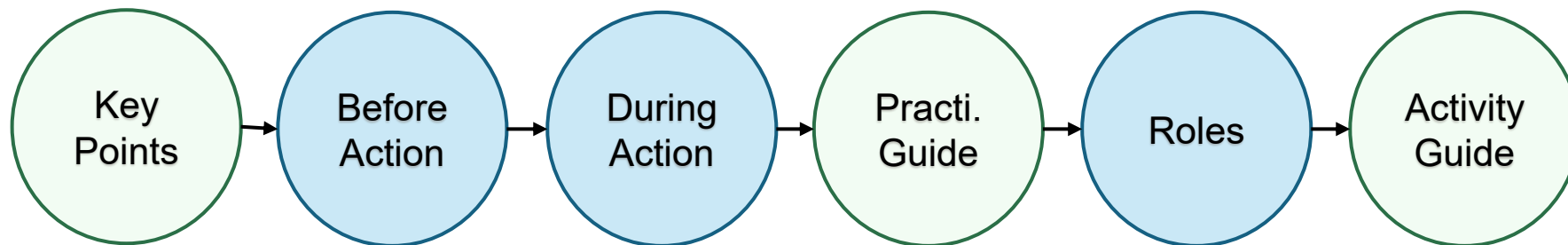
Deliverable

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Port residential communication
strategy for investments

- Strategic **objective** definition
- **Stakeholder** mapping & prioritisation
- Communication plan
- KPI & Measurement framework
- Risk assessment & Crisis communication framework
- Governance structure
- Resource & Budget guidance
- Long-term **communication roadmap**



Strategy developed by Port of Tallinn

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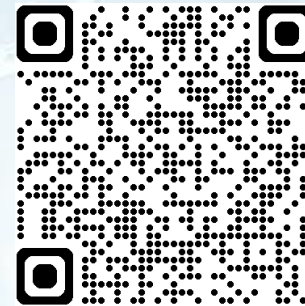
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Scan for Project Outputs