

REDII Ports

*Renewable Energy Development and
Intelligent Implementation in Ports*



We are thrilled to present the next issue of our bulletin. This edition is particularly special as we introduce two new partners who joined us in September, bringing fresh energy and expertise to our team.

In the second half of this year, our partners have published insightful reports on various types of renewable energy. Significant advancements have been made in the research of methanol, hydrogen, and ammonia, pushing the boundaries of sustainable energy solutions.

We invite you to take your time and delve into the remarkable achievements of our partners this year. We hope you find the content both informative and inspiring.

Wishing you a Merry Christmas and a New Year filled with peace, joy, and prosperity!

Warm regards,
Jesper K. Rulffs

Project Lead REDII Ports

Project Lead

Port of Skagen

Jesper K. Rulffs | jkr@skagenhavn.dk

Communication Team

Port of Hamburg Marketing reg. assn.

Johannes Betz | betz@hafen-hamburg.de

Yuqing Ma | ma@hafen-hamburg.de



REDII Port is funded by the **Interreg North Sea Region Programme** and focuses on the Programme's Smart Specialisation area of Renewable Energy from a port authority's perspective.

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Strengthening Our Team: Disposal Collection Care and Blue Power Synergy Join REDII Ports

Disposal Collection Care (DCC)

DCC will extend the market tool in WP3. The Disposal Collection Market (DCM) Platform will facilitate the trading of biomass and waste fractions between suppliers (sellers) and buyers. The platform will streamline the data exchange, tracking, and greenhouse gas (GHG) emission calculations associated with biomass trading, and it will provide a structured and transparent marketplace for stakeholders involved in this sector.

This helps suppliers/operators of the new technologies being developed for alternative fuel production in different categories getting the waste/by-product feedstock they need. This way closed loop operations on handling waste will need to adjust themselves in order to get the optimum use of waste and by-products instead of being in the same position where new developments haven't occurred in line with the current climate transition goals.

System Objectives:

- Supplier and Buyer Interaction
- GHG Emission Calculation
- Inventory and Transaction Management
- Metadata and Document Generation

Blue Power Synergy

Blue power Synergy will be active in WP2, focusing on bio-fuel and electricity energy.

Hybrid Bio-Ethanol Engines and Solar Sails Prototype Vessel

This pilot aims to test sustainable sailing solutions using hybrid propulsion systems. It involves two vessels: one with 520 kW engines and another sailboat with hybrid propulsion technology. Both use bio-ethanol engines, relevant to CCT and trawlers. The sailboat will test solar sail technology to evaluate its scalability for commercial vessels, potentially revolutionizing maritime energy sources.

Mobile Renewable Energy Storage: A Solar-Powered Solution

This pilot focuses on a mobile battery bank in a 20-foot container with a solar roof module, featuring three roll-up flexible panels. It aims to provide quay-based power in ports without grid access, offering a sustainable alternative to diesel generators. The solar-powered solution is mobile, versatile, and significantly reduces carbon emissions.


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Port of Egersund's Feasibility Study Report on Green Methanol

In 2024, the Port of Egersund marked a significant milestone with the early completion of the Green Methanol Feasibility Study Report. The report is published and can be found on the REDII website. [\[Link\]](#). This report explores the potential for producing E-methanol using local resources, such as CO₂ from the fishing industry and green hydrogen from the Kaupanes green hydrogen plant. Additionally, it identifies wood chips within the port's territory as a resource for Bio methanol production.

The study concludes that it is feasible to produce 11,000 metric tonnes of green methanol annually, which is equivalent to the yearly fuel consumption of a container vessel. This production hinges on increasing the capacity of the green hydrogen plant and finding a solution for CO₂ supply during periods of low emissions from the fishing factories.

E-methanol Production:

Two main challenges: seasonal fluctuations in CO₂ availability from the fishing industry and the need for a 16-fold increase in the Kaupanes plant's hydrogen production capacity.

Solutions: Alternative CO₂ supply paths and an ENOVA grant to boost hydrogen production from 1MW to 21MW, which is a significant step towards meeting the required hydrogen output.

Bio Methanol Production:

For Bio methanol, the port plans to use wood chips, though this comes with its own set of challenges, including strong competition for wood chips and fluctuations in biomass availability. The port has an annual availability of 20,000-30,000 tonnes of wood chips, which is sufficient for producing 11,000 tonnes of Bio methanol, which requires 32,000 tonnes.



Area of the feasibility study

Picture: norgebilder.no



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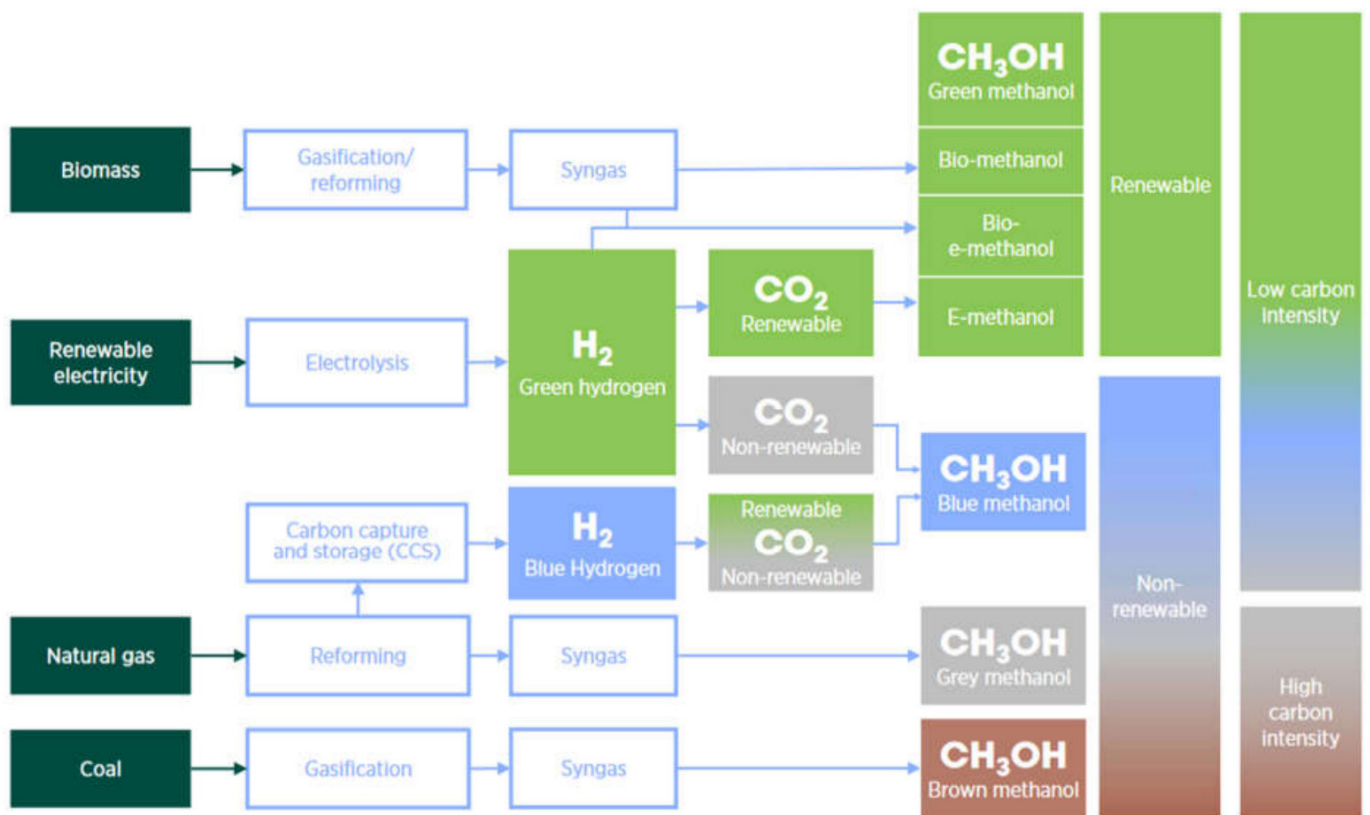
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Next Steps: Looking ahead, the Port of Egersund will develop an Addendum to the Feasibility Study to explore resources beyond the port’s area, expanding the perimeter by 80 km. Large industries that can provide biomass sources will be identified in this expanded research area. Svaahaiea Avfall, the municipal waste-handling company, will be included as a source of ashes and biogases due to its proximity to the port.

Green methanol was chosen for its marine fuel benefits, including compatibility with existing engines, ease of transportation and bunkering, and cost-effective use of existing infrastructure. One of the primary objectives of the feasibility study is to provide conclusions that can be applied to other medium-sized fishing ports or ports with similar resources, thereby building synergies and implementing circularity concepts in practice.



The feasibility study also considers the production costs for both E-methanol and Bio methanol, using data from IRENA and the Methanol Institute. While these costs are currently higher than those of fossil-based methods, the innovative nature of alternative fuel production for shipping is expected to drive costs down over time. To promote the adoption of alternative fuels, the study emphasizes the need for incentives for both producers and consumers.



Main methanol production pathways
(Source: IRENA, 2021, Innovation Outlook Renewable Methanol)



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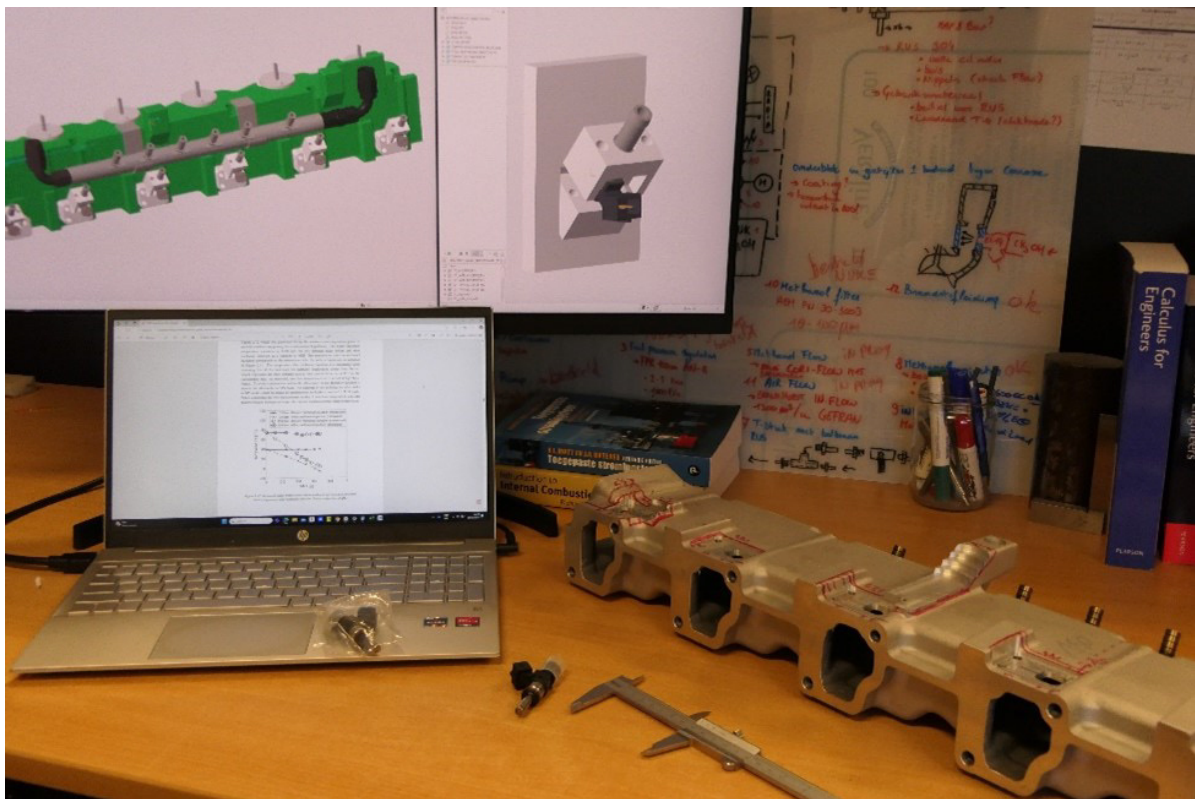
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Advancements in Green Methanol Production and Dual-Fuel Engine Technology at VIVES

VIVES is making significant strides in the pursuit of sustainable energy solutions through two pioneering activities. The first activity involves the production of green methanol using an advanced methanol reactor. This reactor employs carbon dioxide and hydrogen as feedstocks in a thermal catalytic conversion process. With the tender process completed and suppliers selected, the construction phase is set to commence. This development represents a substantial advancement in our efforts to reduce carbon emissions through renewable energy sources.

The second activity aims to enhance dual-fuel technology. VIVES is modifying a 250 kVA diesel generator to operate in dual-fuel mode, utilizing both diesel and methanol. This modification offers a cleaner and more efficient alternative for power generation. Additionally, the team is finalizing a smaller, single-cylinder test engine designed specifically for pilot diesel-methanol testing. With the primary construction and modifications completed, the activity is now in the final assembly stages. These activities bring VIVES closer to delivering innovative and sustainable power solutions, with further updates to be shared in the coming months.



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Further Progress on Hydrogen and Ammonia Pilots from Brittany Region

Hydrogen

Region Bretagne has made further progress in the project, marking several key milestones over recent months.

June 2024

The project reached the end of Phase 2, which focused on analyzing the supply chain necessary to meet the consumption identified in Phase 1. This phase included a thorough examination of available land, various constraints, and the economic viability of the proposed solutions.

August 2024

The project had launched a study on the Port of St Malo, applying the same methodology used for Brest. The significant ferry activity at Saint-Malo is expected to play a crucial role in determining the port's development strategy.

September saw the conclusion of Phase 3, which involved a more detailed analysis of the city's urban planning and the land identified during Phase 2. Development plans were proposed, and a schedule for future development was established.

October 2024

On 29 October 2024, the Brittany Region unveiled the results of a comprehensive study aimed at identifying energy loops for the development of hydrogen use in Brest ports. The presentation, attended by port stakeholders and representatives from the energy and mobility sectors, outlined clear steps and identified key partners for the project. The Brest region, in collaboration with the Brittany Regional Council, will play a crucial role in bringing this innovative project to fruition.

Ammonia

May 2024

Region Bretagne launched the study on ammonia, aiming to gain deeper insights into its potential future in maritime transportation.

- 1 Introduction
- 2 Ammonia : General presentation
- 3 Production
- 4 Regulation
- 5 A subject at the heart of geopolitical issues
- 6 Mapping of principal actors
- 7 Uses of ammonia : prospective elements
- 8 Ammonia for maritime transportation

September 2024

The project had successfully completed Phase 1. This phase involved a state-of-the-art review conducted by our consultancy, covering actors, production methods, current uses, regulations, and potential future applications of ammonia. As the project moves into Phase 2, the focus will shift to analyzing the impact of developing an ammonia ecosystem on the Port of Brest.



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Decision Report "Stationary Battery in the Port of Moss"



Port of Moss is exploring innovative energy storage solutions together with the Port of Korsør in REDII Ports project. As part of the electrification efforts from Port of Moss, they are investigating the installation of a battery energy storage system (BESS) and alternative energy sources like solar cells to meet rising energy demands and achieve a zero-emission target by 2030.

In collaboration with Sweco and Fagskolen Oslo Akershus, the port has developed reports on energy storage and charging facilities for electric container trucks. This battery solution aims to mitigate grid load during peak consumption times, potentially serving as a crucial alternative. The report presents a comprehensive analysis of the energy usage and BESS deployment at the Port of Moss. Explore their report on REDII Ports website to discover the recommendations for battery solutions at Moss harbour [\[Link\]](#).



Summary

The Port of Moss is in the process of electrifying the port operations. High ambitions of reaching zero emissions by 2030 will have a significant impact on the electrical energy and power need. The port is a part of the REDII ports project and has through this received funds to investigate the possibility of installing a battery electric energy storage system (BESS) to compensate for some of the effects from this transition.

This report aims to analyze the port's current and anticipated energy usage, including solar power production potential, and explores various business models for BESS deployment, including frequency regulation and peak shaving. The report also considers different placements for the BESS within the port, such as centralized or decentralized locations.

The report also outlines the future energy needs based on the growth of zero-emission vehicles and shore power requirements. It acknowledges the current limitations of the shore power system and the grid, proposing that a BESS could be an integral part of a solution.

Finally, the report emphasizes the necessity of an Energy Management System (EMS) for optimal battery operation and provides cost and saving estimates for implementing a BESS system at the Port of Moss.

The report concludes with a recommendation of investing in a 1 MWh to 2 MWh battery, in combination with a solar panel system with 302 kWp and an associated microgrid to both peak shave the loads in the port, relieve some of the strain on the local power grid and contribute to the flexibility and frequency reserve markets. The necessary investments in the battery system and solar panels are estimated at 6 400 000 NOK for 1 MWh to 10 000 000 NOK for 2 MWh. This does not include the costs associated with establishing the microgrid.



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WHAT'S NEXT ?



With the extension of the REDII Ports project, the upcoming year promises to be filled with new opportunities and challenges. We will leverage the lessons learned to propel us forward in 2025.

Expanding Facilities and Infrastructure

We are upgrading our infrastructure to enhance efficiency and environmental friendliness, keeping us at the forefront of maritime innovation.

Sustainability Initiatives

Sustainability is key. We'll intensify efforts to reduce carbon emissions, use renewable energy, and implement green practices. Focus areas include cleaner energy and fuels like shore power, wind, solar, biodiesel, hydrogen, ammonia, and methanol. Project partners will actively participate in exhibitions and events in the North Sea region.

Strengthening Partnerships

Collaboration remains crucial. We'll continue to build strong partnerships with stakeholders to address challenges, share best practices, and create a resilient, sustainable port ecosystem.

Looking Ahead

As we approach 2025, we are optimistic and determined. The challenges are significant, but so are the opportunities. With your dedication, the REDII Ports project will reach new heights.

Congratulations to all partners for this year's outstanding work! We wish you a Merry Christmas and a prosperous 2025!

BULLETIN

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REDII Ports Project Partnership



Project Lead

Port of Skagen

Jesper K. Rulffs | jkr@skagenhavn.dk



Port of Egersund



Port of Zwolle



Multimodal Container Services



Port of Korsør



Niedersachsen Ports



Noordelijk Innovatielab Circulaire Economie



Maritime Equity Partners



Bretagne Développement Innovation



Disposal Collection Care



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