



REDII Ports

REDII Ports focuses on the Programme's Smart Specialisation area of Renewable Energy from a port authority's perspective.

The project aims to exploit resources for a technically feasible and economically affordable generation, storage and consumption of cleaner energy and fuels with specific reference to 5 alternatives promoted by the REDII 2018/200+AFID 2014/94 Directives that are relevant for a Port Community:

- ELECTRICITY (SHORE/HYDRO POWER/BATTERY)**
- WIND/LOCK/TIDE/SOLAR**
- BIODIESEL**
- HYDROGEN**
- AMMONIA/METHANOL**

To achieve this ambitious goal REDII Ports will work on a 3-step Roadmap moving from local sources to production/storage in ports to market, closing the cycle by benefiting the regions.

REDII Ports (Renewable Energy Development and Intelligent Implementation in PORTS) is an Interreg Europe project running from September 2022 to September 2025 with a budget of approx. 6.8 mio. EURO.

15 project partners from 7 countries participate in REDII Ports project.



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Brittany Region: Focus on Hydrogen

The stakeholder meeting is a great opportunity to communicate about the actual needs in energy, the existing hydrogen solutions and to what extent it can be used in their future activities. By participating this study, they have the chance to contribute to the port's energy future and anticipate the fuel-related need of their activities.

Brittany Region leads WP2 in the project and the study is conducted on the ports of Brest and Saint-Malo.

A study on H2 which aims to initiate H2 ecosystem on the port of Brest was launched. A discussion about hydrogen and related regulations with local stakeholders of the port has been taken place and served as the first step in Brest.

This study also involves numerous discussions with local hydrogen producers and distributors to define together the technical and economic constraints to identify a viable scenario for the development of renewable hydrogen at the port. This event gathered around 30 local activists, their professionals vary from captaincy to a recycling industrial, warehouseman, consignee etc. Last but not least, Brittany Region planned to carry out in-depth interviews to better understand the needs of energy from stakeholders till 2050.

The results of the studies will be the basis for infrastructure's investments required for the hydrogen development from 2027.



Besides the stakeholders meeting, Brittany Region was also working actively on Hydrogen topic during European Maritime Day 2023 and BrittanHy Day last year, gathering more than 300 players of the hydrogen sector.

After attending Meet4Hydrogen HyPorts event 2023 in Marseille, they continued their journey in HyPorts event 2024 in Toulon. This year Brittany Region presented the project and their interim results in Brest's ecosystem.



Intelligent Solutions and Test Fields in Generating and Storing Energy at Port of Emden



Most companies confront the challenge of decarbonization and sustainability nowadays. Generating CO₂-neutral electricity and heat are the two central topics of the energy transition. Ports are facing the problem of overall rising energy costs. Energy potentials that were previously considered uneconomical are becoming more attractive. To achieve carbon neutrality by 2040, Niedersachsen Ports will dive into smaller-scale solutions, as infrastructure like wind turbines have so far been difficult to obtain for approval in ports and photovoltaic projects often fail due to the high investment amounts and the legal framework.

Port of Emden (figure 1) is taken as an example to examine the possibilities for renewable electricity, heat generation and its storage in port facilities.

The study was carried out by the company NettCon Energy.



Figure 1. Port of Emden

I. Applications to reduce CO₂ emissions in ports

The heat in the study area in Emden occurs as space and process heat, generated using natural gas (206 GWh) and LNG (10 GWh). The electrical energy amounts to 293 GWh in the reference area. With the aim of finding best solutions for decarbonizing the port of Emden's, the study included a wide range of options for generating and storing energy. In total, 17 options for renewable electricity generation, 5 techniques for storing electrical energy, 7 variants of renewable heat generation, 3 types of heat storage and thus a total of 32 applications were considered, which can help to reduce CO₂ emissions in the port area. The initial goal of the study was to create a solid data basis to compare the economic efficiency and other advantages of the technologies.

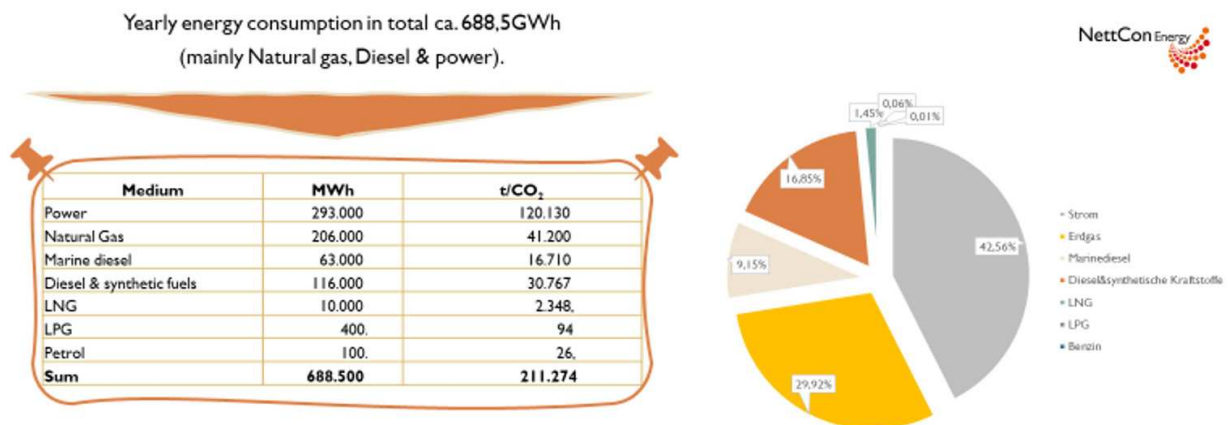


Figure 2. Port of Emden in numbers I

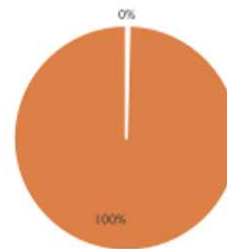
The impact of NPorts owned harbour infrastructure

Medium	t/CO ₂	percentage
Carbon emissions NPorts w/o cars and ships only infrastructure	850	0.4
Carbon emissions Port of Emden total	211.000	99.6

Equals bee in relation to elephant size



Carbon emissions



- Carbon emissions NPorts w/o ships and cars
- Carbon emissions Port of Emden total

Figure 3. Port of Emden in numbers II

II. Economic efficiency evaluating matrix

The essential parameters in the economic efficiency calculations can be processed in a tailored Excel and adjusted by the users of the study. This design ensures that the statements can be individualised as well as dynamic. The result shows examples of costs per kilowatt hour generated or stored of the established technologies (figure 4). The technologies which have good economic viability were selected for the test field.

✓ Thin-Layer PV	0,15€
✓ Standard roof top PV	0,12€
✓ Battery storage	0,93€
✓ Gravitational storage	0,47€ (not pump storage)
✓ Air-water heat pump	0,16€
✓ Harbour water heat pump	0,25€
✓ Pellet heating	0,21€
✓ Solar thermal energy	0,08€

Figure 4. Example of cost per kWh 100 kw plant performance

At the end of the year, the prepared results of the study will be published as a web application. A calculation tool will be integrated into the web application with which the user will be able to carry out individual cost-effectiveness calculations for the different renewable energy solutions.

III. Test fields in Emden

Test fields in Emden were designed and partially established. Among other things, these are:

- Supplying the harbor pumping station with an innovative heat pump in combination with photovoltaics and storage technologies
- Equipping a work pontoon with solar lights and a small wind turbine
- The test of different micro wind turbines that are integrated into different port structures (roofs, facade, light poles etc.)

The test fields are currently in the planning or installation phase. The report on the test fields will be posted via various communication media on a regular basis.



REDII Ports Regular Partner Meeting



The 4th partner meeting in Moss and the 5th partner meeting in Zwolle were held as scheduled.

Both meetings were framed by social- and study visit-activities, enriching project partners cooperation potentials and discussing on transferability of own results to other regions. Communication measures and major changes have been presented by Port of Hamburg and Port of Skagen.



Cooperation between partners: Port of Moss and Port of Korsør



Port of Moss and Port of Korsør established collaboration with the support of the external energy consultant SWECO. During 2023, SWECO has worked on the decision-making basis for the port of Moss.

In the electricity pilot of REDII Ports, Port of Moss and Port of Korsør both search for solutions to integrate battery power into their grid to support port operations. They wish to further develop the electrification agenda of North Sea Region ports and to strengthen its position as a green port.

Port of Korsør visited Port of Moss in August last year. The partners exchanged findings and looked at the common features to support their cases. Though the two ports share similarities, many differences still exist between them.



It was very rewarding to be visited by Port of Korsør and Sweco, and to be able to show them what we are working on in the Port of Moss. As the report of SWECO says, there are several solutions for how we can integrate a battery electric solution in the Port of Moss. After we have analyzed the report, we are one step closer to establish a battery electric solution in the Port of Moss.





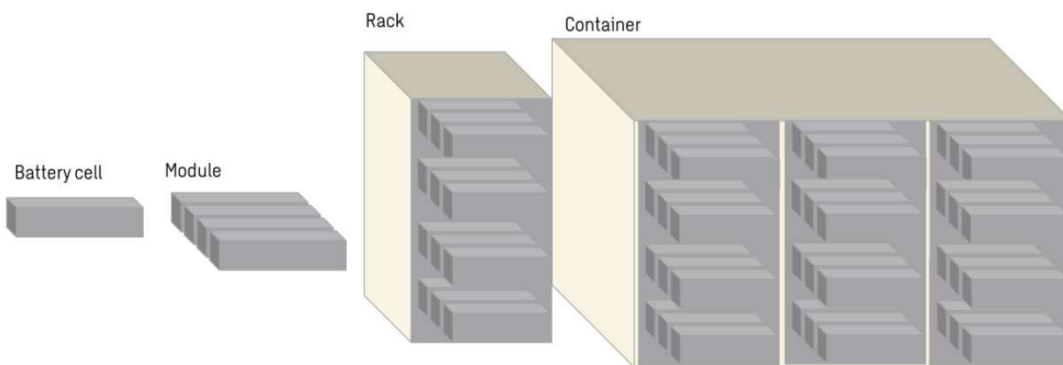
Port of Moss: Implementing a battery energy storage system



The port of Moss is in the process of electrifying the port operations. High ambitions of reaching zero emissions by 2023 will have a significant impact on the electrical energy and power need. During 2023 we have analyzed the port's current and anticipated energy use.

As a part of REDII Ports project the Port of Moss aims to reinforce the electrification agenda of the North Sea Route ports and straighten its position as a green port. The aim of this project is to look at the opportunity of implementing a battery energy storage system (BESS) in the Port of Moss.

There are a number of suppliers of batteries in the market, and many of them are big industrial companies such as Siemens, Hitachi, ABB and GE. The Figure below shows an overview of the different levels of a battery, from cell level, to module, rack, and container.



"We are facing an exciting time. The next step is to analyze the data and the batteries in the market. Once we have analyzed this, we will see if it is possible to integrate a stationed battery in The Port of Moss."

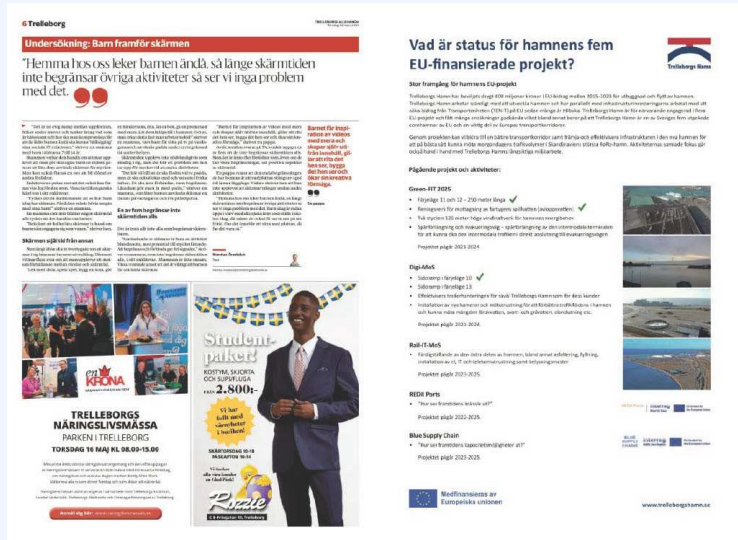




REDII Ports in Swedish Newspaper



The Port of Trelleborg is continually enhancing its infrastructure and has been actively seeking grants from the EU's transport unit (TEN-T) for several years. Projects like REDII Ports enable the port to improve transport corridors, upgrade infrastructure, and accommodate future traffic demands more effectively. This integrated approach aligns with the Port of Trelleborg's ongoing environmental efforts. The study offers Trelleborg a opportunity to show its stakeholders, markets and EU regions the future needs at port areas.



Recently, Port of Trelleborg made actively news posts in their local newspaper. In "Trelleborgs Allehanda" there is a detailed introduction about what is happening in the port and how is the EU-funding being used. It shows that every EU-funded project is helping Trelleborg move towards a bigger picture of being an environmental friendly port.

"BTJ" is the international Baltic Sea Journal newspaper. The news published in English informs the public how the funding is being used and clarify that their main focus is environmental related projects.



Port of Skagen found new cooperating partner – PowerCon A/S

The Port of Skagen participates in Interreg projects REDII Ports and Blue Supply Chains. After receiving the proposal, they chose PowerCon A/S as the new cooperating partner. To finalize and further discuss the two projects, Port of Skagen had a visit to their facilities.

COO of Port of Skagen Mikal Nielsen and Business Developer Jesper K. Rulffs met with Head of Sales from PowerCon, Jacob Bjarkam, Partner & CEO Kim Brøndum Larsen, and Partner & CCO Peter Castberg Knudsen at their new production and office facilities in Hobro, Denmark. PowerCon A/S is a Danish engineering and manufacturing company, focusing on power conversion solutions and test equipment.

Port of Skagen started the meeting with short description of each project and went through all the steps needed and their wishes for both systems. After the project meeting, the small group had a visit to their new production facilities.

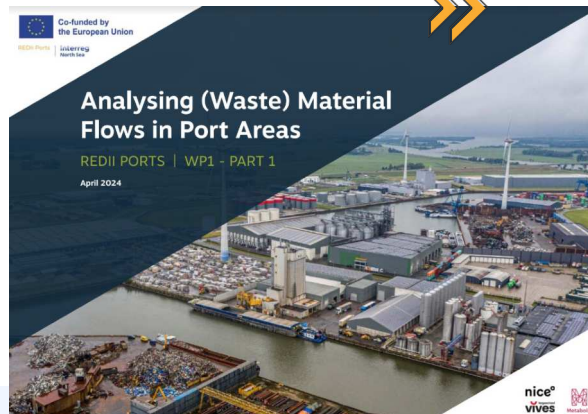




Report published on analysing excess materials in port regions

REDII Ports work-package 1 wrapped up its first activity on analysing excess materials in three North-Sea port regions. The report is published and can be found on the REDII website. [\[Link\]](#)

VIVES and nice° together lead WP1 and subcontracted Metabolic for the material flow analysis. Port of Skagen, Port of Eigersund and Port of Zwolle collaborated for the case studies.



Challenge:

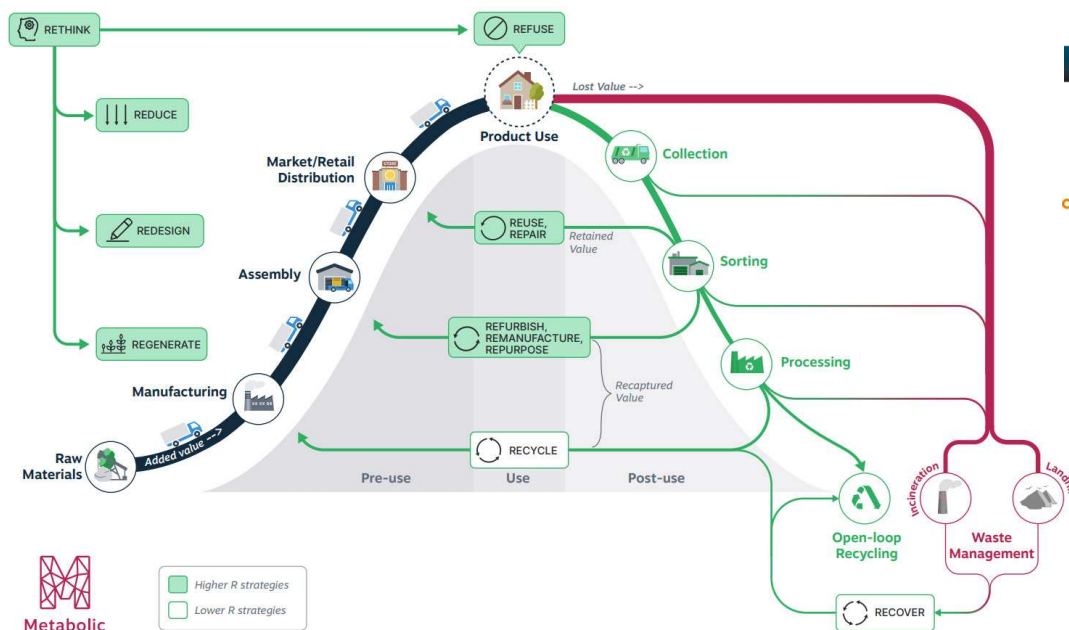
As our current global economy exceeds planetary boundaries and fails to meet socio-economic needs, there is an urgent need to shift towards a more sustainable system. Ports and their industrial hinterlands can play a key role in the transition towards a more sustainable economy as they handle over 70% of the materials traded globally.

Approach:

The REDII Ports project aims to enhance sustainable energy usage in ports. Work package 1 aims to analyse excess (“waste”) material flows in port regions. Initially, the aim was solely to identify opportunities for using excess materials as (bio)fuels. However, the energy and material transition can not be solved in isolation. Energy and materials are deeply interconnected, think about the energy that is needed to recycle materials but also the materials that are needed to generate renewable energy with solar PV or windturbines. This is why a holistic approach is required. Therefore, work package 1 widened the scope and set out to identify opportunities for more circular material usage.

Outcomes:

In the next posts we will share more about the outcomes for each case study port. Spoiler alert: there are numerous opportunities for more circular material usage.



Interreg North Sea



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REDII Ports

WHAT'S NEXT ?

European Maritime Days:

- It is a great opportunity for the Europe's maritime community to network, discuss and outline joint action on maritime affairs and sustainable economy. This year REDII Ports together with other four Interreg North Sea projects (Blue Supply Chains, Green Supply Chains, SPIES and DIOL) will be presented at the event.
- Looking forward to an indepth discussion with you in Svendborg on 30-31 May 2024!



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