DUAL Ports

Decarbonising port business today

Interreg North Sea Region DUAL Ports
European Regional Development Fund

EUROPEAN UNION

Port Oostende energy port

DUAL Ports is co-funded by the North Sea Region Programme 2014-2020; Eco-innovation priority. www.northsearegion.eu/dual-ports J-No: 38-2-7-15

What is DUAL Ports?

DUAL Ports aims to decarbonise Regional Entrepreneurial Ports (REPs) resources through a shared eco-innovation port programme that minimises their environmental footprint.

The objective of DUAL Ports is to

- reduce the environmental footprint of regional entrepreneurial ports,
- improve the sustainability of ports' operational and administration resources,
- promote responsible growth and supporting eco-innovation oriented development.

The project will ultimately enhance ports' energy efficiency and performance, facilitating low carbonisation at reduced costs, with added value in terms of knowledge and investment.

Project partners

- Port of Oostende
- Business Vordingborg
- Port of Vordingborg
- Port of Skagen
- Orkney Islands Council Marine Services
- ITM Power
- Fair Winds Trust
- Niedersachsen Ports GmbH & Co. KG Branch Emden
- Port of Zwolle
- Hamburgisches Welt-WirtschaftsInstitut (HWWI)
- Port of Hvide Sande
- Hvide Sande Fjernvarme A.m.b.A.
- Laminaria BVBA
- Uppsala University
- Celtic Cruises Ltd
- Seabased

Facts about DUAL Ports:

- Duration: December 2015 - December 2021
- Budget: 8.6m euro
- The participating ports and local authorities are expected to implement initiatives that will reduce carbon emissions
- The Port of Oostende is Project Leader of DUAL Ports
- Business Vordingborg is responsible for the communication of the results of the project

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HYDROGEN - use in ports and connected areas

Hydrogen is a unique zero carbon fuel that can be created using water and renewable electricity. Within DUAL Ports, ITM Power will be applying its expertise in the refueling of hydrogen cars and buses to the refueling of hydrogen vessels in Orkney and beyond.

This will require ITM to design the world's first hydrogen bunkering system, and identify how it will be implemented in the Orkney Islands.

The results will be the design for a ferry refueller.

HYDROGEN II

The Port of Hvide Sande will seek to introduce an internal transport solution in the port area, based on hydrogen generated by rest renewable energy (wind/solar/sea-based power) systems.

This will minimise the carbon footprint and discharge of Sox and NOx in the local area.

Key pilot working group
ITM Power
Orkney College
Orkney Islands Council
Port of Hvide Sande
Fair Winds Trading

HEAT - optimizing renewable energy

The HEAT pilot seeks to optimize the production of rest-energy from wind, solar and sea-based power systems by integrating it to the local heating system. This will greatly reduce the carbon footprint. The knowledge and results from this part of the pilot will have relevance for ports wanting to play an active role as providers of green energy solutions to local users.

As a central part of the development of the energy cluster, an "intelligent" heat pump and exchanger will be introduced, modified, tested and investigated in the project. The introduction will be done in cooperation with the companies in the business cluster of the Port of Hvide Sande.

Experiences and results from DUAL Ports existing pilot HYDROGEN and the new SEA POWER pilot will be used in the process.


Port of Hvide Sande

Key pilot working group
Hvide Sande Fjernvarme
Port of Hvide Sande
Uppsala University
Seabased

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SEA POWER - supplying energy

Laminaria will demonstrate the potential of wave energy to supply energy to ports and hydrogen production facilities. Laminaria has developed a versatile and robust wave energy converter. Its technology shows excellent performance in a very broad range of wave climates and it excels in survivability.

The technology has been demonstrated at scale in the past at sea. In 2014/2015 Laminaria tested a fully functional device 1 km out of the coast of Oostende. Over the last 3 years it has developed and built the first full scale device to be monitored in Orkney. In the pilot Laminaria will deploy this device at the Billia Croo site and feed the produced energy into the Orkney electrical grid. A detailed analysis of its power production and potential for other sites will be performed.

This project will also demonstrate the sustainability of the device over a longer period of time and offer the possibility to improve operations and maintenance strategies. Combining wave energy and hydrogen production in ports is a win-win situation. H2 installations can be supplied with a steady supply of locally produced renewable energy and wave energy developers have the potential to supply not only the electrical grid, but also ships with “wave energy”. The experience gained by Orkney Islands Council and ITM in the HYDROGEN pilot will help address the technical challenges linked to such a novel measure

Key pilot working group
Laminaria
Orkney Islands Council
ITM Power

WAVE - clean power and surplus energy

The Port of Oostende is currently utilized as an operations and maintenance (O&M) site for the offshore wind energy industry and as an innovation base for the Blue Energy industry. Wave and tidal energy are alternative energy sources that the harbour authority aims to integrate to develop greener utilities. The port of Oostende aims to test the suitability of special technical wave and tidal energy generation equipment to be able to supply clean power, whose surplus could possibly be later transformed into hydrogen and supply local transport and shipping needs.

The port of Oostende has a tradition to support the innovation of Blue Energy technologies and it has foreseen to integrate these new green technologies in the existing wind parks.

The pilot links to the SEA POWER and HYDROGEN activities led by Laminaria and OIC/ITM. Whereas in the other pilots, wave energy is produced, and tests are performed to convert it into hydrogen, the test in Oostende aims first at preparing the port facility to integrate wave/tidal devices into its structure.

Key pilot working group
Port of Oostende
Laminaria
Seabased

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SEDIMENTS - removing pollutants

In some parts of the Port of Emden, the sediments present environmental pollutants. This prevents the use of water depth conservation measures and thus the long-term use of certain parts of the port. Therefore, an innovative and sustainable concept for the removal of pollutants in the ports sediments should be developed, in order to maintain port operations there in the long term.

The pilot will develop an innovative and sustainable concept for the careful and long-term removal of pollutants, including the-presentation of sustainable sediment removal procedures, identification of suitable ways of sediment disposal, estimation of implementation costs and the elaboration of necessary licensing requirements. Based on these concepts, a purification of the respective port areas is to be implemented.

As for the SURFACE pilot, the SEDIMENT pilot will bring especially additional value to the SOIL project. The Port of Emden seeks to find a sustainable way not to recycle the dredging material, but to remove the polluted sediments and chemically clean them. The measure has the power also to improve the port carbon footprint, by avoiding the transportation of contaminated soil to treatment plants throughout Europe.

Key Pilot working Group
Port of Emden
Port of Vordingborg
Port of Zwolle

SURFACE - absorbing and reducing greenhouse gases

The shipping industry is dependent on fossil fuels. Most large vessels have their diesel generators running when moored in the Port of Skagen. The exhaust gases from boats and vehicles contain large amounts of nitrogen oxides (NOx) and Sulphur oxides (SOx), which cause acid rain and smog. The port would therefore like to do real prototyping test of a new technology - a CO_2 reduces and nox absorbing asphalt in the port area of a port expansion.

The air-purifying asphalt contains titanium dioxide, a photocatalytic material that removes the nitrogen oxides from the air and converts them with the aid of sunlight into harmless nitrate. The nitrate is then rinsed away by rain. 25% to 45% reduction in nitrogen oxides (NOx) over the special road is expected.

The test area is a 2000m^2 stretch of road, located at the Port of Skagen's port expansion phase 3, where the port is already conducting a feasibility study on an LNG terminal in the DUAL Ports LNG pilot.

Key pilot working group
Port of Skagen
Port of Emden
Port of Oostende
HWWI

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SAIL - creating a wind cargo platform

The aim of the SAIL cargo pilot is to put transport into the ethical equation with a zero-emissions low-impact cargo sailing ship that can access goods where they are produced.

The idea is to create sailcargo hubs in small ports and harbours giving local businesses direct access to ethically transported goods.

Advances in racing technology provide the tools to design a boat that is fast, light, and able to sail close to the wind, allowing for sailing trade routes to be opened, that have not existed in modern times.

The project will analyse the socio economic impact of the centralization of shipping and the importance of small ports to local economies.

Key pilot working group
Fair Winds Trust (FWT)
International Wind Ships Association
Port of Oostende

SAIL CARGO TESTING - combining wind and hydrogen

The pilot aims to test the adaptation of a sail vessel to innovatively transport cargo by combining wind propulsion (and, if feasible, solar/wave power) to hydrogen generation. The first step will be refurbishing a sailing vessel to carry cargo up to 52 tons. The next step will be to try and become a zero emissions sailing vessel, using hydrogen to fuel an electric motor, to go in and out of port.

Celtic Cruises will work with the support of FWT (responsible for the monitoring), the Port of Oostende, and the DUAL Ports partners involved in hydrogen production. The pilot will also investigate the market opportunity of establishing a cargo transport network with Oostende as a key node. An internet platform will be created by FWT to give accessibility to this transport mode to industry stakeholder and the wider public, thus facilitating the roll out of Celtic Cruises´ experience.

Key pilot working Group
Celtic Cruises
Fair Winds Trust
ITM Power
Orkney Islands Council
Port of Oostende
HWWI

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SOIL - port area development

The main objective of the SOIL pilot is to expand and develop the port of Vordingborg by using recycled products, such as contaminated soil, concrete and excessive soil from building projects in the municipality.

The effects will be to reduce the CO_2 footprint for the port of Vordingborg and the municipality of Vordingborg.

The construction and expansion of the Port of Vordingborg will use contaminated soil and excess soil and debris from nearby construction projects, such as road works and local investment projects. This will reduce costs and CO_2 emissions from transportation and logistics.

Key pilot working Group
Port of Vordingborg
Port of Oostende
Port of Zwolle
Business Vordingborg

LNG - as a multifunctional part of REPs

The LNG pilot aims to reduce the emission of CO_2 by building an LNG Terminal, that will provide an alternative to heavy fuel driven vessels, local production factories and potentially road transportation.

Existing and future requirements for air pollution emissions have great impact on the production and operation of all kinds of premises and machinery, such as factories, vehicles, vessels etc. Many businesses are being strongly encouraged or even forced by local authorities and EU regulations to significantly lower their air emissions.

Numerous companies, ship- and truck owners etc. are evaluating and planning to change their production methods and propulsion systems to operate cleaner fuel, such as Liquefied Natural Gas. LNG is a very clean fuel which is expected to help reduce CO_2 emissions by 40%. The Port of Skagen will conduct a feasibility study, exploring the possibility of building an LNG Terminal, at a new expanded area at the port.

Key pilot working group
Port of Skagen
Port of Zwolle

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LED - Lighting in port areas

The objective of the LED pilot is to optimise the use of port area lighting. For safety reasons a good lighting is critical in port areas. However, traditional lighting systems in ports typically have short lifespans and are responsible for high levels of carbon dioxide emissions.

The aim of the LED pilot will be to reduce carbon emissions, by installing, managing and monitoring a new intelligent and innovative lighting-system. This is based on energy saving LED lights. Different lighting scenarios are pre-programmed in the system, which makes it possible to provide precisely the legally prescribed light quantity for the respective operation (shunting, loading, no operation etc.). In addition, sensors are being used which allow a largely customised switch-on or switch-off of the lighting scenarios.

Port of Emden

Key Pilot working Group
Port of Emden
Port of Vordingborg
Port of Zwolle

SMART SECURITY - increasing efficiency

The pilot will test an LED-based smart signalization system with blinking lights to warn about security issues. The system is expected to increase the efficiency and security of port operations, whilst reducing the carbon footprint of the port.

Ports have to face various security threats, from goods smuggling to people trafficking, illegal immigrations, etc. To introduce a smart monitoring measure will improve the security level for both the port and its town. Sensor-based security systems are widely spread, but they need to be tailored to the specificities of the port and its requirements. An innovative solution utilizing sensors and LED lighting can serve to this purpose and at the same time minimize the carbon emissions in the port area.

The pilot directly links to the LED pilot aiming at testing environmentally friendly equipment and technologies in North Sea Region ports and hence decarbonising port operational resources.

Key pilot working group
Port of Oostende
Port of Emden
HWWI

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LOW CARBON HARBOUR PLAN - making ports carbon neutral

The objective of the LOW CARBON HARBOUR PLAN pilot is making the three ports of Zwolle, Meppel and Kampen more carbon neutral.

The municipality of Meppel was partner in the Interreg project Lo-Pinod for the last 4 years. In this context, they worked on a LOW CARBON HARBOUR PLAN. This is an inventory document of what actions in the port may be carried out to promote sustainability. Actions in the areas of water, air and energy are investigated.

The pilot aims to determine the effective measures to apply in port areas, concerning not only the port administration, but also plot owners and companies within the port area.

Port of Zwolle

Key pilot working group
Port of Zwolle
Port of Emden
HWWI

GREEN OFFICER - implementing sustainability management

The GREEN OFFICER pilot is implementing and coordinating the sustainability management of ports and initiating sustainability projects throughout the ports. The pilot will test innovative management solutions, that can help the ports promote greener services and operations.

The sustainability management and strategy will primarily focus on port activities. Furthermore a sustainability action plan will be developed with measures that contribute to the objectives of the strategy. Concrete projects will be initiated, e.g. the installation of LED lighting, solar systems, sustainable mobility, i.e. e-vehicles etc.

The progress made and the best practice examples are shared within Niedersachsen Ports and other ports within the DUAL Ports project and beyond.

Port of Emden

Key pilot working group
Port of Emden
Port of Zwolle
HWWI

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DOCKLAND - green port strategy and industrial co-siting

The DOCKLAND pilot aims to develop a new green port strategy by the introduction of industrial co-siting. Focus is on co-siting within the sector of the fine chemicals, in correlation with the sector of the renewable energy and the sector of the circular economy.

The practical base of the pilot is situated within the back-port of the Port of Oostende.

The pilot will identify the conditions required to establish co-siting in close exchange with the Flemish government. A business case will be developed, related to the site in Oostende.


Port of Oostende

Key pilot working Group
Port of Oostende
Port of Vordingborg
Port of Zwolle

CAPACITY BUILDING PROGRAMME

During the prolongation of DUAL Ports, the partners will exploit the experience obtained from all completed activities and pilot-projects and develop a CAPACITY BUILDING PROGRAMME.

The capacity development, based on training course packages, workshops (on hydrogen, Wave-to-H2, Sail Cargo, pollution absorbing material) and knowledge sharing via a documentary movie, will allow the partners to better achieve the original target, i.e. management of resources that are low carbon based and introduction of economically feasible solutions for ports.

Key pilot working group
Port of Oostende
Port of Zwolle
Port of Emden
Port of Vordingborg
Port of Skagen
Port of Hvide Sande
Niedersachsen Ports

Port of Oostende

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DUAL Ports is a 6 year project, started in 2015.
It is 50% co-funded by the European Union and the European Regional Development Fund (ERDF) through the Interreg North Sea Region Programme 2014 – 2020; Eco-innovation priority.

DUAL Ports addresses the Programme objective of promoting resource efficiency and stimulating the adoption of new products, services and processes to reduce the environmental footprint of regions around the North Sea.

DUAL Ports will be measured in the concrete success of the pilots and the pilots' tranferability to other Regional Entrepreneurial Ports. The aim of the project is to collectively reduce carbon emissions by 12% and lower costs by 20%.

Follow the progress at www.dualports.eu and www.northsearegion.eu/dual-ports

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