Welcome to the final show for

DUAL Ports

Sign of the times...

...toward a North Sea Region sustainable energy independence







Opening and welcome Commercial director Jan Allaert, Port of Oostende Lead beneficiar







Keynote Director Michael Freericks, Represenation of Lower Saxony to the European Union







North Sea Region Intereg programme DUAL Ports and what to come?

Project officer Jesper Jönsson, Interreg North Sea Region Programme









Dual Ports is co-founded by The North See Region Programm 2014-2020; Eco-innovation priority. www.northsearegion.eu/dual-ports J-No: 38-2-7-15

NSR Interreg programme, Dual Ports and what to come? Jesper Jönsson





Co-funded by the European Union

North Sea





Population 60 million



Area 536,000 Km²



Coastline 34,000 km



Funding & Grant Rates

Total funding for Interreg North Sea

• €173.800.000

Grant rate

- 60% ERDF & 40% own funding
- For Norwegian partners the rate is 50% / 50%







Interreg North Sea 2021-2027

How Call 1 looks

Priority 1

2 EOI 7 Full applications

Priority 2

12 EOI 1 Small-scale project 9 Full applications

Priority 3

3 EOI 1 Small-scale project 6 Full applications

Priority 4

1 EOI 1 Small-scale project 2 Full applications



Types of projects



* Limitation

** Average





Thank you



Co-funded by the European Union

North Sea

Sign of the times...

2015-2022

Key learnings from DUAL Ports Partner Jens Henrik Møller,









What is DUAL Ports? Interreg North Sea Region **DUAL Ports**

European Regional Development Fund



DUAL Ports aims to decarbonize Regional Entrepreneurial Ports through a shared ecoinnovation port programme that minimizes their environmental footprint.

The objective of DUAL Ports is:

- ➢ Reducing the environmental footprint of regional entrepreneurial ports.
- >Improving the sustainability of port operational and administration resources.
- Promoting responsible growth and supporting eco-innovation-oriented development.

The project ultimately enhances ports' energy efficiency and performance, facilitating low carbonization at reduced cost, with added value in terms of knowledge and investment.







DUAL PORTS is a transnational cooperation project within the North SEA region, focusing on the decarbonisation of SME Ports, by introducing:

- New products
- New services and processes
- New concepts of port management

Budget: 8.6m euro - Duration: December 2015 - June 2022

The participating ports and local authorities are expected to implement initiatives that will reduce carbon emissions and reduce costs.

- Port of Oostende is Project Leader GEMBA (Front office) + €ureka Consult (Back office)
- Business Vordingborg is responsible for the communication







- Port of Oostende LEAD PARTNER
- Business Vordingborg COMMUNICATION
- 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)



- Hvide Sande Fjernvarme A.m.b.A.
- Laminaria BVBA
- Uppsala University
- Celtic Cruises Ltd
- Seabased
- Greenpipe







DUAL Ports Pilots	Started	Flying	Landed
1. HYDROGEN - use in ports and connected areas – ITM	S. S		B Artes
2. HYDROGEN – training in fueling of hydrogen – Orkney	A Con		8
3. HEAT - optimizing renewable energy – Hvide Sande Fjernvarme	and the second second		B Artes
4. SURFACE & Electricity - Port of Oostende	S. S. C.		R APPE
5. Sea Power and hydrogen – Laminaria			
6. SOIL – optimizing port extension by recycling – Port of Vordingborg	S. S		8
7. SEDIMENTS and test - removing pollutants – Port of Emden	a station		B Artes
8. SURFACE - absorbing and reducing greenhouse gases – Port of Skagen	S. S		8
9. SAILING CARGO – WIND/H2 PROPULSION - FWT	S. S		B Array

DUAL Ports Pilots	Started	Flying	Landed
10. SAIL CARGO TESTING - combining wind and hydrogen – Celtic Cruises	A CAR		B Street
11. Smart and security LED - Lighting in port areas – Port of Oostende	a the second second		8
12. DOCKLAND - green port strategy and industrial co-siting – Port of Oostende	S. S		8
13. Low carbon harbour plan - Port of Zwolle	S.S. C.		8
14. Battery storage Pack – multifuelling systems in ports – Port of Zwolle	S. S		8 Street
15. LNG - as a multifunctional part of REPs – Port of Skagen	S. S. S. C.		B Street
16. Green officer – Port of Emden			8
17. Floating solar and cable protection systems – Greenpipe	and the second		B Artes
18. LED – Port of NPorts and Port of Vordingborg	A STAR		I Street

Indicator	Target	Description	Achieved
COST REDUCTION by concretely implementing tangible low carbon solutions in DUAL Ports Regional Entrepreneurial Ports	20%	DUAL Ports DECARBONISATION PROGRAMME COST REDUCTION (project aggregated level based on pilots' results) - The detailed cost and carbon reduction level of the individual concrete WP3- WP4's pilots will be quantified through targeted WP5 technical assessment	82%
CARBON REDUCTION by concretely piloting and/or adopting tangible low carbon products and green technologies that improve utilities in DUAL Ports Regional Entrepreneurial Ports	12%	DUAL Ports DECARBONISATION PROGRAMME CARBON REDUCTION (project aggregated level based on pilots' results) - The detailed carbon reduction of concrete WP3-WP4's pilots will be quantified via WP5 Carbon Footprint Analysis	23%

Based on calculation done by Hamburgisches Welt-WirtschaftsInstitut (HWWI)







DUAL Ports... this and much more!

- showcased by partners at over 65 international events
- present at various trade fairs with a stand & promoted at participating ports' open days
- mentioned in over 70 external articles in (maritime, port/energy-related, local/international) newspapers/journals/magazines)
- produced 12 newsletters & 40 project articles for DUAL Ports website
- realised 13 videos about the project and its pilots (website/YouTube)
- organized several workshops (LNG, sedimentation, H2-wave-heat, LED, zero-emission shipping, port decarbonisation...) & a demo of Sail commercial Cargo concept during event at St Katharine's Dock (London)







- 36 new green products, services and processes piloted/adopted
- Over 400 companies and about 50 knowledge institutions involved
- Several spin-offs triggered & solutions leveraged by the pilots (e.g. material recycling projects, low carbon lightning, (e.g. material recycling projects, photovoltaic/solar systems in businesses located in ports, new organisation "Zestas")
- **2 Policy papers**: "Action plan: Low carbon regional ports" and "Developing low carbon port potential: Cost benefit & carbon footprint analyses" (HWWI)
- **1 Report** "Feasibility of Hydrogen Bunkering" (ITM)
- 2 Master Theses, 2 project works and 1 publication on wave energy (UU)
- 1 Cost-Benefit & Carbon-Footprint Analysis tool (CBA/CFA) to evaluate the pilots









Thank you to all partners for the well-done pilots, all the work and

the high-level of the indicators!









The future role for SME Ports: Iinking ports and communities Cordinator Wim Stubbe, Circular Economy, Green and smart Ports Aartlink







- 1. Yesterday: the role of SME Ports
- 2. Today : the stakeholders at the SME Ports
- 3. Today: the challenges for the SME ports
- 4. Tomorrow: the new roles of the SME Ports
- 5. Tomorrow: the governance of the SME Ports, linking ports and communities











- 1. Yesterday: the role of SME ports
- Landlord port : elementary care of concessions
- Elementary maritime and road logistics
- Collecting port dues
- Elementary controll
- Basic infrastructure in function of elementary maritime and road logistics
- Shareholder addiction
- Financial profit is key driver







- 2. Today: the stakeholders at the port
- Port users/ shipping companies
- Terminals
- Transport operators
- Industrial companies
- Inland terminals
- Energy companies
- Blue economy operators
- Local communities
- Hinterland connections
- Regional authorities





3. Today: the challenges of the SME ports

- Green deal: greening of shipping and ports
- Energy transition
- Climate change
- Innovation and automation of shipping
- Circular economy
- Diversification of the infrastructure needs
- Blue industry
- Digitalisation
- War and nationalism
- Pandemic and downfall of classical logistical principles







4. Tomorrow: the new role of SME Ports : from an isolated landlord port to an entrepreneurial port

- Balancing public and private business objectives: accelerators of sustainability
- Strategic role of ports in supply chains (pandemic)
- Diversification of regulatory roles: not only maritime safety, but also environmental and social aspects
- More cooperation within and beyond the ports: clustering and merging of ports, and integration of ports
- Partnership between ports
- Investments beyond port areas





4. Tomorrow: the new role of SME Ports : from an isolated landlord port to a pro-active initiator

- Increasing role in the energy supply: development of energy hubs and production of energy
- home for industrial clusters : blue industry, construction
- Smart port infrastructure: virtual and concrete
- Hubs for circular economy (unreliability of transport corridors and supply of products from Asia)
- Increasing role in the food production and supply: from fishing to aquaculture (land/seafarming)
- Financial transparancy
- Environmental accountability : air, noise, light







5. Tomorrow : the governance of SME ports, linking ports and communities

- From traditional policing activities related to safety and security towards regulatory functions in the field of the use of drones, autonomous vessels, the use of new fuels, etc
- From the provision of elementary infrastructure to a proactive provider of facilities for industrial clustering within and beyond the port area
- From the traditional operator in nautical services to the development of sustainability and digital transition




5. Tomorrow : the governance of SME ports, linking ports and communities

- From a passive landlord, collecting port dues, to an investor in smart and sustainable infrastructure, developing new sources of income
- From an interlocutor within the traditional local community towards an entrepreneurial port that builds networks beyond the traditional port stakeholders in order to facilitate external logistics and maritime data sharing actions





5. Tomorrow: the governance of SME ports, linking ports and communities

Considering the growing importance and the diversification of the stakeholders that are working closely with the ports, there is need to set up a <u>flexible system of collaborative governance</u> within and outside the port authority.

Several models can be used:

* <u>the lead actor model</u>: a lead actor sets the agenda, pays the bills and inspires the stakeholders. This model is problematic because it is vulnerable to leadership change and often creates legitimacy problems and political opposition since executive decisions are concentrated in the hand of a single leader





- <u>the shared leadership model</u>, where all decisions are taken through joint plenary meetings, involving all participants. This model only works well within small networks with a high level of trust.
- the Network Administrative Organization (NAO): hereby some of the leading functional actors within the port take the lead of the governance process. This model ensures an anchorage of effective leadership decision and tends to lead to successful cooperation between the partners.





Thanks for your attention.

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DUAL Ports The pilot show

A pilot was practicing for the airshow in my town and made my day.





DUAL Ports

Pilot show – LED and Green Officer Project Manager Matthäus Wuczkowski, NPorts















LED Pilot on Sustainable Port Lighting

Project objective: Development of a new innovative sustainable lighting

> Initial Situation: 25% of Energy = Port lighting

> Targets:

- > How can we reduce energy consumption and CO2?
- > How can we make lighting future oriented and smart?
- > How can we improve safety and reduce light emissions?







LED Pilot on Sustainable Port Lighting

Project objective: Development of a new innovative sustainable lighting



LED Pilot on Sustainable Port Lighting

Lessons learned

- > LED technology as most-efficient solution for port requirements
- > Digital solutions are more prone to faults during implementation and special expertise for maintenance and upkeep is crucial
- > 26% CO2 saving with LED technology \rightarrow 43% CO2 saving with LED in combination with smart technology
- > Spin-off: 100% LED Target for all port locations till 2025 (approx. 40% reached already)
- > In Process: Guideline for environmentally friendly lighting



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Three major fields of action in pilot

> Strategy and Management Developing and implementing a sustainability strategy that focuses on economical, ecological and social aspects and a sustainability management

Projects & Measures Triggering and coordination of sustainability measures and projects

> Communication Internal Communication: Intranet, meetings External Communication: Press releases, articles, homepage, conferences Strategy & Management

> Projects & Measures

Communication

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Strategy and Management



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Management
Projects &
Communication

Measures

Strategy &

Climate & air Nature & resources + Strategy & Direct greenhouse gas emissions Four environmental projects have ÷ **Green Port Of** have been reduced by a further 25% compared Management with 2017. NPorts has a certified environmental management system PERS. + 100% of the outdoor lighting on NPorts-operated areas has been converted to LEDS Strategy and Manag Projects & The waste separation rate for our waste Communication Measures has risers. ÷ Number of ship calls to which we grant an environmental discount rises to 500 per year The proportion of passenger cars powered by alternative fuels has risen to 50% compared with 2018. Niedersachsen ∧/Ports hafen⁺ hafen⁺ Nachhaltigkeitsstrategie The average number of hours for continu-The total volume handled increased by Niedersachsen Ports ing education and further train-10 % compared to 2018. ing has risen by 10% compared with 2018.1 2019-2025 Customer satisfaction rose to 75% compared to 2018. * The accident rate remains below the average for comparable industries. # The certification "Work and Family" is preserved. Employees & safety Niedersachsen Final Conference DUAL Ports – Niedersachsen Por ∕∕/Ports 53 | June 16th 2022 - Brussels

Strategy and Management



I. Report During SB Meetings	
Involved Parties:	SB, MGMT
Frequency:	annually
Tasks:	Progress Monitoring and Reporting of the MGMT to the SB
II. Manageme	nt Review
Involved Parties:	MGMT, CDM, SDM, BMM
Frequency:	annually
Tasks:	Verification of Corporate and Sustainability Goals and Suggestions for Improvement for Their Implementation
III. Annual Tal	ks Sustainability
Involved Parties:	SCD/SUSMGMT,BMM, SCs
Frequency:	annually
Tasks:	Planning for the Implementation of the Sustainability Goals and Drafting of the General Annual Planning
IV. Task Force	Sustainability Strategy
Involved Parties:	SCD/SUSMGMT, SCs
Frequency:	Twice a Year
Tasks:	Verification of the Goals, Exchange, and Recommendations for Management Review
V. Specialty W	fork Groups
Involved Parties:	SCD/SUSMGMT, Departments
Frequency:	From 2 to 4 times a year
Tasks:	Exchange of Experiences and Develop- ment of Sustainability Measures





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Z



Green Port Officer Pilot - Measures





Lighting



- Several additional pilots in the ports
- LED Transformation now (40% implemented)

Outlook: Smart, remote controlled LED-lighting in all ports

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Mobility- cars





- Electrification of port fleet (25 alternative cars; 15 e-charging points)
- Alternative fuel for ships (GTL)
- Cargo bikes

Outlook: More electrified vehicels;

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DUAL Ports





Mobility - ships





- Electrification of port fleet (25 alternative cars; 15 e-charging points)
- Alternative fuel for ships (GTL)
- Cargo bikes

Outlook: Real alternatives needed; Concepts in planning



Mobility - bikes



- Electrification of port fleet (25 alternative cars; 15 e-charging points)
- Alternative fuel for ships (GTL)
- Cargo bikes

Outlook: Expand bike fleet

Niedersachsen

5-15



Projects & Measures



Strategy & Management Projects & Communication

Measures

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Communication & Knowledge sharing





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Lessons learned

- > Just do it: Every step helps! A lot of low hanging fruits available out there!
- > Involve others: The port knows more than it knows
- > Ongoing Process: Sustainability is not a project it's a mindset and needs to be integrated into DNA
- > **Be patient:** Culture changes slowly a systematic and strategic approach helps
- > Everybodies business: Every employee needs to be a green port officer
- > Money Talks: Limited budget is a barrier but funding is an accelerator
- > Transformation just started: We are right at the beginning of a transformation

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Thank you for your attention!

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DUAL Ports

Pilot show - SOIL CEO Jan Jaap Cramer, Port of Vordingborg













Developing a Commercial port From vision to construction

Jan-Jaap Cramer CEO Vordingborg Port, 16-06-2022











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Strategy for a Port Expansion

- 1. Expanding the Port of Vordingborg significantly in order to attract new shipping companies and to create growth possibilities for existing companies on the Port.
- 2. Expand the port in 5 phases where every phase has to be financed by new contracts and turnover.
- 3. Phase 1 to 3 of the port expansion to be realized between 2015 and 2019. Phase 4 and 5 from 2019 to 2027.
- 4. Port expansion in a sustainable way.

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How sustainable?

Land fill Projects based on recycling of soil, polluted soil and other recycled resources. (asphalt, incinerated garbage (slag), fly ash, concrete)

LED Lighting of the Port with newest technology and management system

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Port Area	45.000 m ²	177.000 m²	400.000 m²
Quay length	275 metres	1.350 metres	1.500 metres
Cargo turnover	250.000 tons / yr	1 mio. tons / yr	1- 1,5 mio. tons / yr

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Pilot show Director Martin Halkjær Kristensen, Hvide Sande Heating













HEAT PILOT

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Hvide Sande Fjernvarme







WHAT IS FJERNVARME- DISTRICT HEATING

District heating is a system, where heat generated in a central location, through a system of insulated pipes are distributed for heating of buildings - as well as water, for both residential and commercial use.







HISTORY OF HVIDE SANDE FJERNVARME

- Founded in 1962
- Used HFO as energy source later on coal and waste oil
- Relocated in 1994 in connection with the making of a natural gas driven power plant (CHP) (7,4 MW)
- Electric boiler in 2010 (10 MW)
- Solar thermal energy in 2014 (9.576 m²)
- Wind turbines in 2018 (3x3 MW)
- Heat pump 2019 (4,65 MW)
- Today app 1.650 customers











HEAT – THE IDEA

- Burned natural gas to generate heat while the local wind turbines were stopped due to overproduction on the electrical grid
- Explore if it's possible to directly connect the wind turbines directly to an electric boiler
- Is it possible to increase the efficiency in the setup







HEAT – THE GOAL

- Reduce the heat production made on fossil fuels
- Reduce the costs for producing heat
- Make it energy efficient







FIRST SETUP



HOW TO MAKE IT MORE EFFICIENT

- By installing a heat pump into the system, it has reduced the emission from natural gas-fired combustion systems to an absolute minimum.
- To reach this goal Hvide Sande Havn and Hvide Sande District Heating asked the DUAL PORT project to help financing this specific component.

















FINAL SETUP





- Heat pump produced more than 51% of the energy in 2021
- Heat pump produced 22.183 MWh in 2021
- 22.183 MWh is enough heat for 1.226 households in Denmark (18.100 kWh/household)
- 36.061 MWh from electricity and heat from the surroundings which is a 6.874 tonnes CO2 reduction in 2021
- The heat pump alone made a 4.229 tonnes CO2 reduction in 2021













ENERGY ABSORBER FOR HEAT PUMP

Energioptagere til byens varmeforsyning

Energieabsorbere für Hvide Sande Fernwärme

rearrow and the entropy of the entro

Das Funktionsprinzin einer Wärmenumpe

Die Winneuensperkenzein heur in und erspanisief den Anderstellt die eingenanntes Kältenbeitet. Die Winne einsperkenzein die eine einer einer einer eine Geschnetzenzein der sogenanntes Kältenbeiter, (21 Konnerssaue, (2) Kondensater und (4) Erweiterungsperkt. Die Kältenbeitet die des Arbeitsmeditung das alle diese konnenzeinden derschäuft. Im Weisenderer Fall wer Nethels Sander Sprenzeren Annersein.

Im Gegensetz zu berkämmlicher Heizung (Verbrennung), het die Wärmepumpe Beinen Effektvi Tetelichlich ist der zum Zickulieren des Költenititels erforderliche Effekt viel geringer eis der

Eine nachhaltige Lösung

Je nach Wetter und Audiantemperatur, hat Nede Sande Pjermarmen neue Wärmepumpe eine Wirkungsgrad von 250% - 500%. Zum Vergleich hat der neueste Gaskessel einschließlich Rauchgas Die Wärmepumpe ist in der Tat eine umvekt<mark>reumfliche Läsung,</mark> die nur elektrischen Strom verbraucht. In der Fall Hvide Sande Pjernvarme hauptsächtlic<mark>h eigens, Alima</mark>nautrale Windkraft.

Einige Fakten zur Fernwärme in Dänemark

- Permulierme let Warmonszer aus einem Kraftwerk, das über ein leoßertes Robrsystem, in der Erde, an Neushalte und Unterentmen verteilt wird.
- In den Häusern, wird das heille Wasser zum Helzen über die Helzkörper oder zur Pußbo heizung, und zum Warmusser in Wasserhähnen, Duschen und Bedevannen verwendet
- Wenn das Fernwärmesseser die Wärme abgegeben hat, wird es zurück zum Kraftwerk geschicht, wo as erneut avwärmt wird. Dänemark ist Pionierland auf dem Gebiet der Fernwärme, und setzt seit
- Das erste Farmuärmekraftwerk war die 1903 gegründete Frederiksberg Forbrændinge die jedoch ner Wärme erzeugte. Die erste KNR-Anlags; eine Anlage, die sowohl Strom Wärme erzeugt, van H.C. Örsted Vertreit in Rogenthagen, das am 1253 in Betrieb h.t.
- Die grüßten dänischen Städte erhielten nach dem Zweiten Weltkrieg Fernwärme. In den 1960e und 1970er Jahren, als dänische Nessteller wortsollerte Fernwärmerchre entwickelt hatten, wurde die Fernwärme in der Frenies einsamlicht.
- 1963 wurden etwa 15% der Häuser in Dänemark mit Fermekrme versorgt. 1978 bette alch diese Zahl auf etwa 30% verdennelt.
- l in Dänemerk Pernwärme auf der Basis von Abfällen, Hackschnitzein, Stroh, Wind rme, Geothermie, Drägze, Öl, Kohle, und überschütziger Wärme aus der Industrie
- Inspaxant worden dezwit 1.736.668 dénische Haushalte mit Ferneikrme versorgt. Dies entpricht 64% aller Haushalte, und Yund 3.6 Millionen Nemochen.
- Imperant gibt ex rund 60.000 Kitometer Fernekrmeleitung: 30.000 Kitometer Verso 30.000 Kitometer Ricklahr, Das einheitliche dänische Fernekrmenetz Suzz alché me
- Finnland und Schweden sind andere Länder mit einem hohen Anteil an Pernwärme, ebs Jaland, we Permsärme auf Erdwärme aus dem Untergrund basiert Ist.
- In Dänemark unterliegt die Fernezirme gesetzlich dem Rest-in-nich-Prinzip, so dass die gemeinnötzige Fernezirmeunternehmen kein Geld verdienen dürfen.
- Nvide Sande fjernvarme wurde 1962 als Gesellschaft mit beschränkter Haftung (A.H.B.A.) pagrändet, und gehlirt mit einer CO2-Reduktion von bis zu 97% (pegenüber 1995) heute zu den





Varme (termisk energi) vil naturligt altid søge mod kulde. Det kan derfor virke naturstridigt at tale om at trække varme ud af relativ kold udendørsluft, men det er netop det, et varmepumpeanlæg kan: Varmepumpen 'høster' så at sige luftens termiske energi, selv ved negative udendørstemperaturer.

Sådan fungerer varmepumpesystemet i praksis

y-Lussacs lov ændres trykket på en given mængde gas, ved et givent med samme faktor som gassens absolutte temperatur. kket, øges altså også temperaturen på gassen. Sænkes gassens ur, sænkes trykket tilsvarende.

nputere med et kølemiddel (et stof med et lavt kogepu de Fjernvarmes tilfælde ammoniak), kan man således, re trykket på midlet, samtidig ændre temperaturen, nen fordrænselsen til

fekt, det kræv

En bæredygtig løsning

mnos Sande Fjernvarmes nye varmepumpeaniæg har (afhængig af ve og udendørstemperatur) en virkningsgrad på 250% - 500%, mens va nyeste gaskede, inklusiv røggasanlæg, til sammenliggina hæren va på maximal 10%,

ptimpeanlægget er en særdeles bæredygtig og gran lasning, al den st get alene bruger el; i Hvide Sande Fjernvarmes tilfælde endda oftest produceret - 00

Andre typer energioptagelse

rnvarme arbejdede længe på en vand-til-vand-løsning, hvor ergi skulle høstes fra enten havvand eller grundvand; begge peraturstabile energikilder end luften omkring os. Forskellige bile energiki ertid de løsi per 31. de

I takt med at teknologien udvikler sig, er det muligt på sigt at udvide anlænget andre typer energioptagelse.



Energy absorbers for Hvide Sande district heating

Heat flows naturally from an object at a higher temperature to an object at a lower temperature. Therefore talking about pulling out heat from relative cold autidors air might exem unvatural, but that is auxity what a heat pung door. The heat pung "harvests" themad energy from the sky, even a drogshve

The working principle of a heat pump

The heat pump compresses and expands a working fluid, or so called refrigerant. As you can see below, the heat pump has flow main compressing (L) energy absorber, (L) compresser, (L) conduces and (L) expandent devices. The refrequencies the fluid heat compression compression for the second pump devices and these components. In the

As apposed to traditional heating (burning fuel) the heat pump has no effect loss. Actually the effect needed to circulate the refrigerant are way lower than the autput effect.

A sustainable solution

Depending on the weather and outside temperature, Hvide Sande Pjernvarmes new heat pump has an efficiency of 250% - 500%. For comparison, the newest gas kettle, including flue gas treatment has a maximum efficiency of 110%.

The heat pump is indeed a green solution that only uses electric power. In Hvide Sande Fjernvermex case mainly our own, carbon neutral wind power.

Some facts about district heating in Denmark

- District heating is hot water from a power plant, which is distributed to homes and businesses via an insulated pipe system in the ground.
- In the homes, the hot water is used for heating via the radiators or underfloor heating, and for hot water is taps, showers and bathtubs.
- When the heat from the district heating water has been transferred, the water returns to the source clast, where it is heated egain.
- Denmark is a pioneer in the field of district heating and has used district heating for many year
- The first district heating plant was Frederikaberg Forbrændingsanstalt founded in 1902, which, however, only preduced beat. The first cogeneration plant, is: a plant that produces both electricity and heat was HLC. Brated Worket in Cogenhagen, which has been in operation since
- The largest Danish cities received district heating after World War II and in the 1960s and 1970s, when Danish menufacturers had developed pre-insulated district heating pipes, district heating
- In 1963, about 15% of homes in Denmark were supplied with district heating. By 1978, that number had doubled to about 30%.
- Today, district heating is produced in Denmark on the basis of wasts, wood chips, straw, wind, solar heat, goothermal energy, natural gas, oil, coal, and surgius heat from industry. A total of 1,736,668 Danish households are currently supplied with district heating. This corresponds to 64% of all households and approximately 3.6 million people.
- In total, there are about 60,000 kilometers of district heating pipeline: 30,000 kilometers of supply, and 30,000 kilometers of return. The unifying Danish district heating network holds no less than 1,000,000,000 there of hot were
- Finland and Sweden are other countries with a large share of district heating, as is Iceland, where district heating is based on peethermal heat from underground.
- In Denmark, district heating is by lew covered by the rest-in-itself principle and thus the consumer owned district heating companies are non-profit.
- Hvide Sande fjernvarme wax founded back in 1962 as a limited liability company (A.H.B.A.). With a CO2 reduction of as much as 97% (compared to 1995) today we are among the frontrunners

















DANISH DISTRICT HEATING AWARD 2020

Hvide Sande Fjernvarme (district heating) receives the Danish District Heating Association Award 2020 for the work for the green transition.

It was a recognition for Hvide Sande Fjernvarme showing the path chosen, was a step in the right direction of a green transition







Thank you for your time







Floating Solar & Cable protection CEO Polina Vasilenko, HelioRec/Greenpipe















The Movie







DUAL Ports and how to fit? Project officer Jesper Jönsson, Interreg North Sea Region Programme









Dual Ports is co-founded by The North See Region Programm 2014-2020; Eco-innovation priority. www.northsearegion.eu/dual-ports J-No: 38-2-7-15

Dual Ports and how to fit? Jesper Jönsson





Co-funded by the European Union

North Sea





Dual Ports is co-founded by The North See Region Programm 2014-2020; Eco-innovation priority. www.northsearegion.eu/dual-ports J-No: 38-2-7-15

Call Call 1 April 2015: Eol and FA

1.1 Project title Developing Low carbon Utilities, Abilities and potential of regional entrepreneurial Ports

1.2 Project acronym DUAL Ports

1.3 Lead Beneficiary Autonoom Gemeentebedrijf Haven Oostende

1.4 Start Date 01/12/2015

1.4 End Date 30/06/2022

1.5. Programme Priority Priority 2 Eco-innovation: Stimulating the green economy
The Dual Port project has been a major success and we have by far proved that ports play a vital role in the green transition. The project turned out to be a frontrunner in creating green and climate friendly solutions in ports around EU.

Jan Allaert, Project Lead





Co-funded by the European Union

North Sea



17 change requests

European Regional Development Fund

9 reports

Interreg



Co-funded by the European Union

North Sea

Total/budget: €8.696.640

Lisbon Agenda

Gothenburg Strategy

Europe 2020



EU Green Deal

Interreg



Co-funded by the European Union

North Sea

Cooperation Programme 2014-2020

Joining efforts to lead the way to stronger, more sustainable economies and societies.







2. Green transitions



2.1 Energy efficiency & low emissions

2.2 Renewable energy

2.3 Smart energy, grids and storage

2.4 Circular economy

2.5 Multi-modal urban mobility

4. Better governance

4.1 Better cooperation governance



Thank you



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North Sea

Ports and new energy transition By Policy Advisor Valter Selen The European Sea Ports Organisation (ESPO)







The impact of ports on the uptake of hydrogen in commercial shipping By CEO Madadh MacLaine, ZESTAS







ZEM Tech Confidential

Green Hydrogen Production in Regional & Entrepreneurial Ports

North Sea Region







Regional ports are integrated into the Hydrogen Backbone

European Hydrogen Backbone (EHB) in 2030



ZEM Tech Confidential

Svelgen

Stord

Lysekil

0

0

ShipZERO26 @ COP26 Zero is Possible Now!

Demonstrated:

- Hydrogen supply chains
- Uptake of hydrogen in shipping
- Liquefied and compressed hydrogen bunkering
- Safety
- Crew training
- Integration
- Key sectors for uptake



Port development and considering future needs By CEO Willy Hansen, Port of Skagen







Port of Skagen - Dual Ports Pilots



LNG Pilot - LNG Feasibility study



Surface pilot – Green NOx Reducing asphalt

- To pave 7,300 sqm road area with the lowest environmental footprint using state of the art technologies
- Decrease CO2 in production and operation and absorb NOx





- An LNG Cryoboxes (three units) is price competitive to other LNG suppliers in the area of Skagerrak/Kattegat/North East North Sea, the current demand for LNG is rising and, this indicate a firm business case on initiating a production in Port of Skagen.
- It is recommended that a nano-scale LNG production with three Cryoboxes at the Port of Skagen focus on PTS rather than STS service due to better rentability.
- An analysis of the added value an STS bunker barge might bring to the operation at the Port of Skagen is needed.





GGD - LNG produktion, Skagen Havn

Surface pilot results



Results are documented in a report

- 25% reduction of CO² emissions in asphalt production, (Reduction is increased if heated with Biogas)
- 15-20% reduction of NOx in the air passing the 7.300m² test road
 - Removing yearly 100-146kg of NOx
 - Equal to 146 cars yearly driving 16.000 km





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Port Development



1907 Port of Skagen
officially established
1967 Port expansion
1979 Port expansion
2007 Port expansion Phase 1
2015 Port expansion Phase 2
- Cruise facilities
2021 Port expansion Phase 3



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PORT OF SKAGEN SUSTAINABILITY STRATEGY



SUSTAINABILITY! FOR US THAT MEANS TO BALANCE THREE SUB-AREAS IN THE FORM OF ECONOMIC, ENVIRONMENTAL AND SOCIAL SUSTAINABILITY



7 WORLD GOALS IN FOCUS FOR OUR EFFORTS





CLIMATE NEUTRAL IN 2030 – HOW FAR ARE WE?

We have initiated a detailed survey of the Port of Skagen's CO2 emissions in the period from 2015-2020. The aim of this survey to continuously observe whether the efforts we initiate in the area can be read in the port's climate footprint.

In this way, we can ensure that we are constantly working towards the goal that the Port of Skagen in 2030 must be CO2-neutral.



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Realized Projects – SETS II - Interreg



New Shore Power facility Constructed by PowerCon A/S An investment of DKK 10 million

- Max load 4MW
- 5 stations each with 2 * 350A IEC 80005-3 connections.
- Current: 400V til 690V
- Frequency: 50 til 60Hz
- Digitalized user interface







THE COMMISSION'S PROPOSAL TO CUT GREENHOUSE GAS EMISSIONS BY AT LEAST 55% BY 2030 SETS EUROPE ON A RESPONSIBLE PATH TO BECOMING CLIMATE NEUTRAL BY 2050.



Which renewable energy technologies should ports implement to stay relevant and competitive in a European and global logistic framework?

To support this target, ports and knowledge partners in REDII Ports will identify and implement novel solutions that ensure a contribution to the local economy and strengthen their competitiveness.

REDII Ports will provide a new energy infrastructure for ports based on renewable energy!



REDII Ports will determine the conditions for a Strategy that enables ports to become springboard for new green energy development.



This will include:

250 ports/involved external organizations, increasing their capacity to take informed decisions on the matter of identifying local excess green resources.

13 pilots' technology solutions, tailored for onshore-sea/inland waterwaysthe hinterland, with public and private stakeholders.

REDII PORTS: 9 Port Partners and 8 Business/Scientific Partners





Thank you for your time















Closing and valorization of DUAL Ports Commercial director Jan Allaert, Port of Oostende Lead beneficiar







Sign of the times...

••• toward a North Sea Region sustainable energy independence

Enjoy the drinks and stay tuned!







European Regional Development Fund