Does offshore wind increase emissions from shipping

OWF project development perspective

Ian Bergström
Project Manager
OX2 Åland Ab
Ian.bergstrom@ox2.com

OX2 in brief



SEK
7.3
bn
LTM Net sales Jul-Jun

5.5% LTM Op margin Jul-Jun

1,505_{MW}

47,375_{MW}

Total portfolio
as per Q2 2024

Portfolio

(Year-end 2024)

Development

Onshore wind 11,505 MW



Offshore wind 13,768 MW



Solar power 6,804 MW



Energy storage 996 MW



Construction

Under construction 1,019 MW

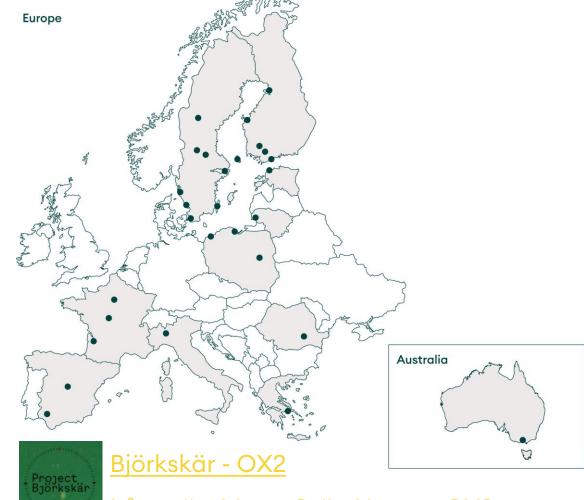


Asset management

TCM

5,050 MW

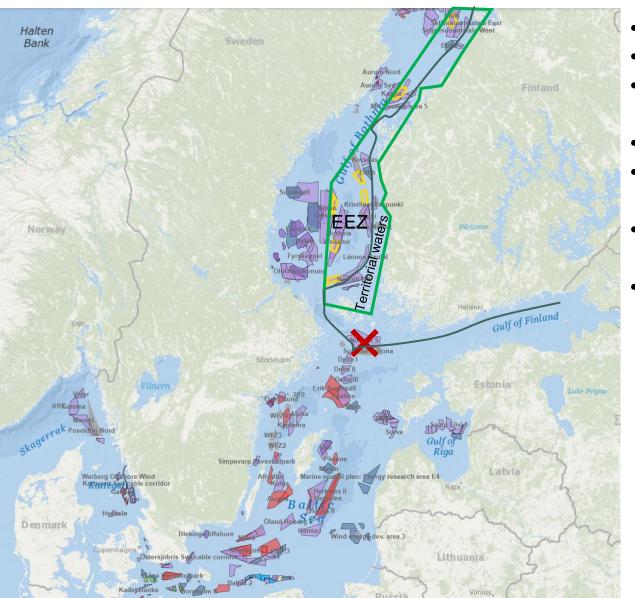




Långnäs: Mega Grön Hamn - OX2

OWF Projects in the Baltic-region – Status before 4:th of November 2024

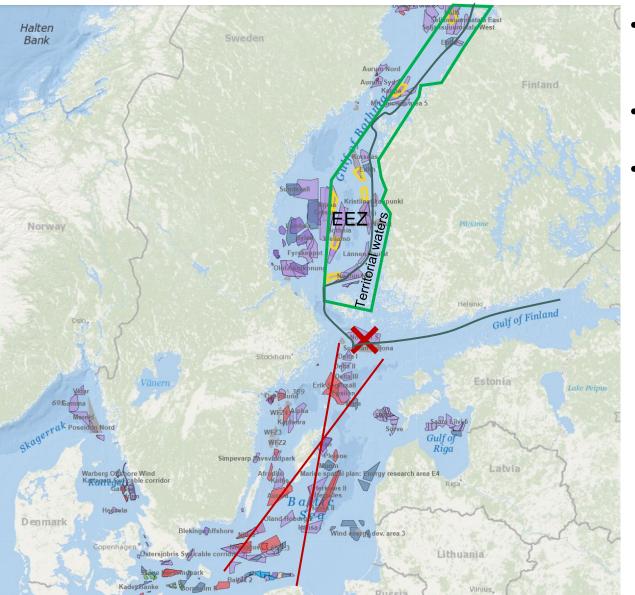




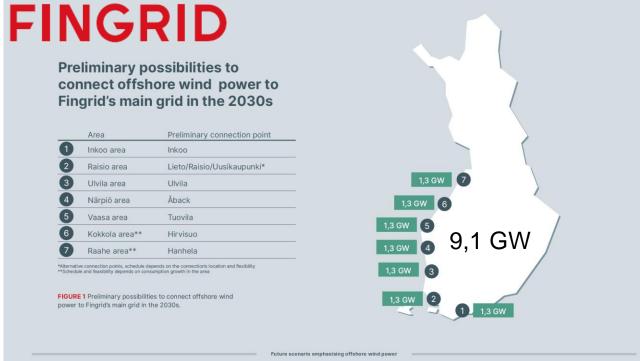
- Most of the projects in the Baltic region was in EEZ
- OWF-projects close Åland are in territorial waters
- Forstyrelsen (Finland) has OWF-projects in territorial waters (auctions & developments)
- New legislation regulating OWF in Finnish EEZ
- Finnish Defense Force are positive to projects north of Åland
- Finnish defense force are negative to project south of Åland and in Gulf of Finland
- Forstyrelsen are proposed to be responsible for handing out exclusivity to OWF-projects Finnish EEZ

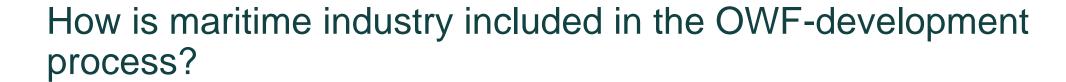
OWF Projects in the Baltic-region – Status after 4:th of November 2024





- Swedish government rejected all permit applications projects in EEZ south of Åland and East of Öresundsbron
- Projects in Swedish territorial waters are still ongoing
- Fingrid published their final study of possible connection points for OWF-project on the west coast.







Pre-study

Development

Realization

Construction

FIA

- Environmental aspects
- Co-existence

LUP

Maritime risks

Aviation

Defense

Land/Water Access

Grid/WF-layouts

Conceptual design

. . .

Target:

- All Permits submitted
- Primary permits granted

. . .

Basic Design WF/GC
WF Layouts decided
Project area secured
EPC-process started
Implementation agreements
PPA:s
GCA
Business case verified

All permits granted

Final investment decision

. . . .

Detailed Design WF/GC EPC-process continue Construction phase First delivery of energy to grid or consumer

. . .

How is maritime industry included in the OWF-development



Development

EIA

Environmental aspects

process?

Co-existence

LUP

Maritime risks ←

Aviation

Defense

Land/Water Access

Grid/WF-layouts

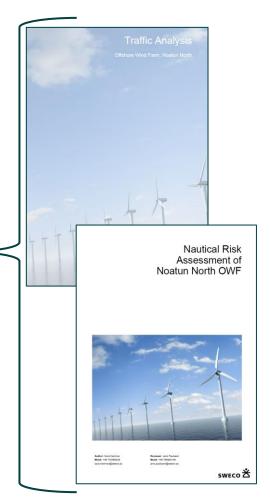
Conceptual design

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Target:

- All Permits submitted
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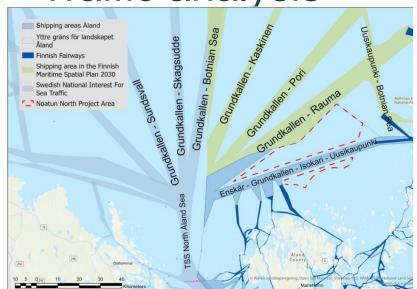


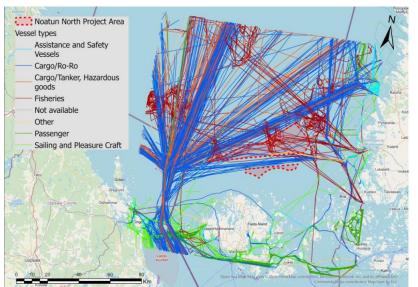
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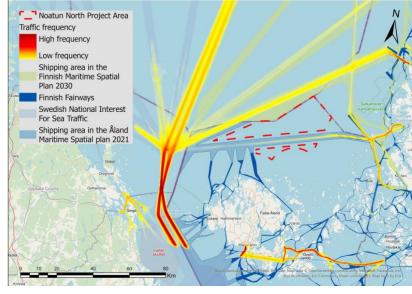
ame	Organization	Formal HAZID
	ESL Shipping	х
	Meriaura	х
	Rajavartiolaitos / Finnish Border Guard / MRCC - Maritime Rescue Coordination Centre	х
	Rajavartiolaitos / Finnish Border Guard / MRCC - Maritime Rescue Coordination Centre	х
	Satakunta Maritime University	х
	Traficom	contribution by e-mail
	Väylävirasto / Finnish Transport Infrastructure Agency	х
	Väylävirasto / Finnish Transport Infrastructure Agency	х
	Väylävirasto / Finnish Transport Infrastructure Agency	х
	Wallenius Sol Lines	х
	Ålands landskapsregering	х
	OX2	х
	AFRY	х
	Sea Focus International	х
	Sweco	х

Traffic analysis

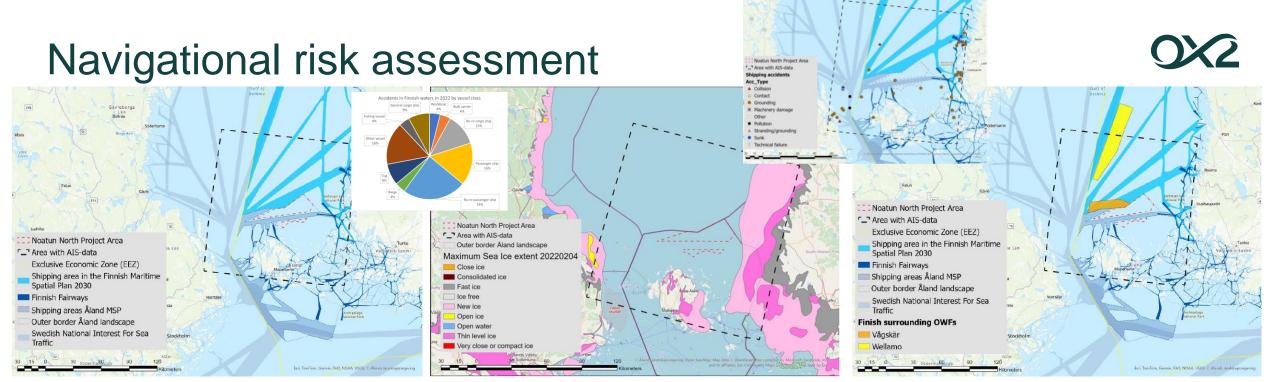








- The basis for finding out how an offshore wind farm and shipping can coexist
- Based on available AIS data from authorities
- Carried out for the first time in the EIA-phase of an OWF project, revisited several times during project development
- Used as base for Navigational risk assessments of the OWF-project and cumulative effect from neighboring OWF:s
- Maritime transports during ice-conditions important topics in Bothnian sea and Bothnian bay
- Part of permit-processes (Env. Authorities, Traficom...)



- Risk workshops with relevant stakeholders (FI, SE, AX) including cumulative effects from other OWF:s
- Participants form Authorities, coast guard, SAR, shipping, developers, municipalities, icebreakers a.o.
- Carried out for the first time in the EIA-phase of an OWF project, revisited several times during project development
- NRA will be used as fact base for permit applications → Describes risk level & mitigating measures
 In Finland/Åland;
- Traficom & Väylä Permitting authorities for OWF:s



Climate effects of an OWF-project

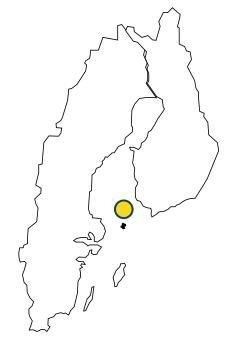


From OWF lifecycle perspective, including:

- Development
- Construction
- O&M
- Deconstruction







Björkskär - OX2







Yearly production: 15,6 TWh Effect: 4 GW

11.56 million tons less CO₂ emissions per year (>20 % of Finlands yearly emissions)

Långnäs: Mega Grön Hamn - OX2





- No, not from a lifecycle perspective →OWF-energy production will compensate the CO2– emissions form the whole development and construction phase.
- Co-existence is a topic in several permit-processes (EIA, Env. Permits, Maritime special plans, Land use plans, Aviation, Maritime...) and will be assessed from a holistic perspective by authorities → Unlikely that maritime aspects not are included in permit.process (at least by Finnish

authorities)

- All initiated projects will not be realized!
 - Limited capacity at TSO:s
 - New legislation regulating project-process in Finnish EEZ-zone
 - Financial aspects

Administrative and organizational measures		Te	Technical and physical measures	
A. B. C. D. E. F. G. H.	Emergency shutdown procedures for WTs. Procedures for environmental accidents. Emergency preparedness plan. Dialogue with maritime stakeholders. Marine coordinator. Construction risk analysis. Work vessel procedures. Information. Ice management. Enhancing winter traffic collaboration, coordination, and regulation.	K. L. M. O. P. Q. R. S.	Emergency shutdown function for WTs. Equipment for spills. Visual marking. Radio and radar marking. Foghorn. ID tagging. Measures against radar interference (los target). Navigation lights. Virtual fairway.	

The cumulative effects of the establishment of several OWFs in the area do not entail any additional risks beyond those identified when analysing the OWFs individually.

The overall conclusion is that the risk induced by Noatun North OWF is acceptable, presuming that reasonable mitigating measures are taken. Risks related to winter navigation and ice are not assumed to have severe consequences for human health and safety or for the environment but are classified as ALARP to assure that the uncertainties do not lead to underestimation of risks.

Conclusions – Is there a risk that OWF:S will increase CO2-emissons from maritime industry



- No, not from a lifecycle perspective →OWF-energy production will compensate the CO2–emissions form the whole development and construction phase.
- Co-existence is a topic in several permit-processes (EIA, Env. Permits, Maritime special plans, Land use plans, Aviation, Maritime...) and will be assessed from a holistic perspective by authorities → Unlikely that maritime aspects not are included in permit process (at least by Finnish authorities)
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- OWF-projects can help reduce CO2-emissions form maritime industry -

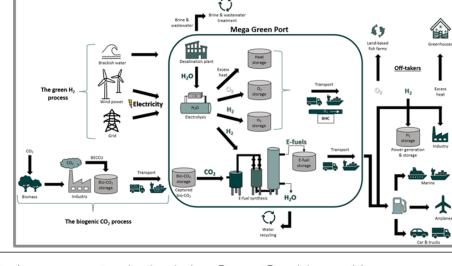
How can OWF-projects reduce CO2 emissions in Maritime industry?

0×2

Sustainable e-fuels produced from <u>biogenic CO2</u> and <u>green H2</u> produced with fossil free energy from OWF:s close to areas where Green corridors will be established

Emissions & Maritime Activity: Vessel density maps

Density maps of passenger vessels support that both domestic and international RoPAX routes may be a major contributor to Aland and Finland's CO₂ emissions connected to maritime activity





The Pre-Feasibility Assessment unlocked nine Green Corridors, with an additional nine options introduced at the Consortium Incubation Workshop

