Final Symposium of the research project

SeeOff – Strategieentwicklung zum effizienten Rückbau von Offshore-Windparks

Development of efficient strategies for offshore wind farm decommissioning

March 30th 2022

SeeOff - Strategieentwicklung zum effizienten Rückbau von Offshore Windparks

(Development of strategies for sustainable offshore wind farm decommissioning)

Project duration:

November 2018 – April 2022

Projekt coordination:

City University of Applied Sciences Bremen

Prof. Dr.-Ing. Silke Eckardt

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

Website:

www.seeoff.de

09.00	Welcome and introduction (Prof. Dr.-Ing. Silke Eckardt, City University of Applied Sciences Bremen)
09.20	Dismantling of offshore wind farms at sea (Bernd Köhler, Deutsche Windtechnik)
09.40	Comminution of offshore wind farm components and recovery of materials at land (Dr. Sven Rausch, Nehlsen AG)
10.00	Q & A Session
10.20	*Coffee Break and Networking in Lounge-Area*
10.35	Economic efficiency of offshore wind farm decommissioning (Janina Bösche, City University of Applied Sciences Bremen)
10.50	Environmental impacts of offshore wind farm decommissioning (Vanessa Spielmann, City University of Applied Sciences Bremen)
11.10	Occupational safety of offshore wind farm decommissioning (Mandy Ebojie, City University of Applied Sciences Bremen)
11.25	Q & A Session
11.45	*Lunch Break and Networking in virtual Lounge-Area*
12.15	Bringing economic efficiency, environmental impacts and occupational safety together: Multi criteria decision making for offshore wind farm decommissioning (Vanessa Spielmann, City University of Applied Sciences Bremen)
12.30	Public acceptance of offshore wind farm decommissioning (Philipp Tremer, German Offshore Wind Energy Foundation)
12.45	Q & A Session
13.05	*Goodbye and subsequent Networking in Lounge-Area*
13.45	Closing of conference platform

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Welcome and introduction

Prof. Dr.-Ing. Silke Eckardt
City University of Applied Sciences Bremen

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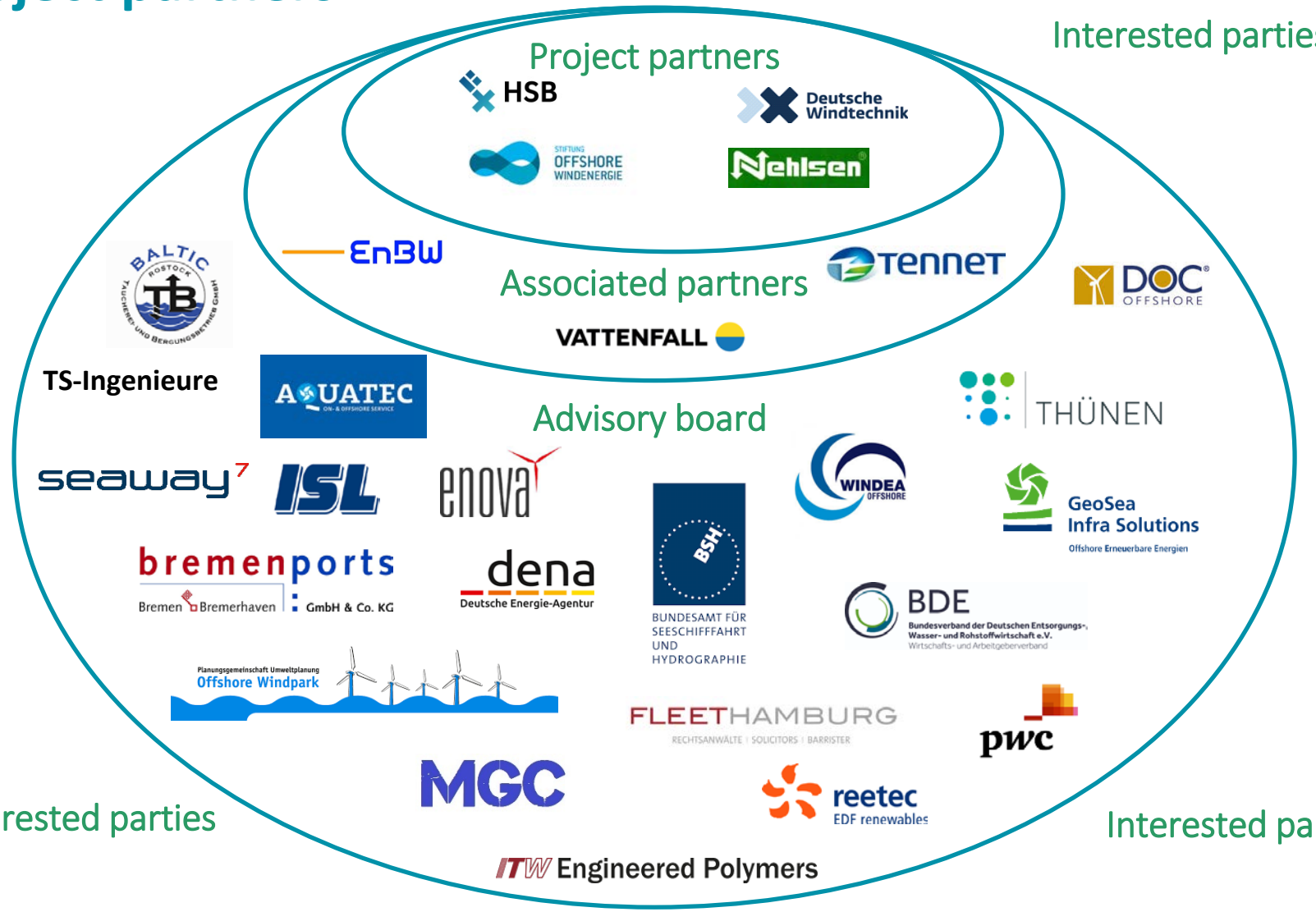
Aim:

Support stakeholders at developing and assessing sustainable, project specific decommissioning strategies

Project partners



Project results

Requirements catalogue

- Legal framework
- Requirements in the different phases of OWF decommissioning

Decommissioning scenarios

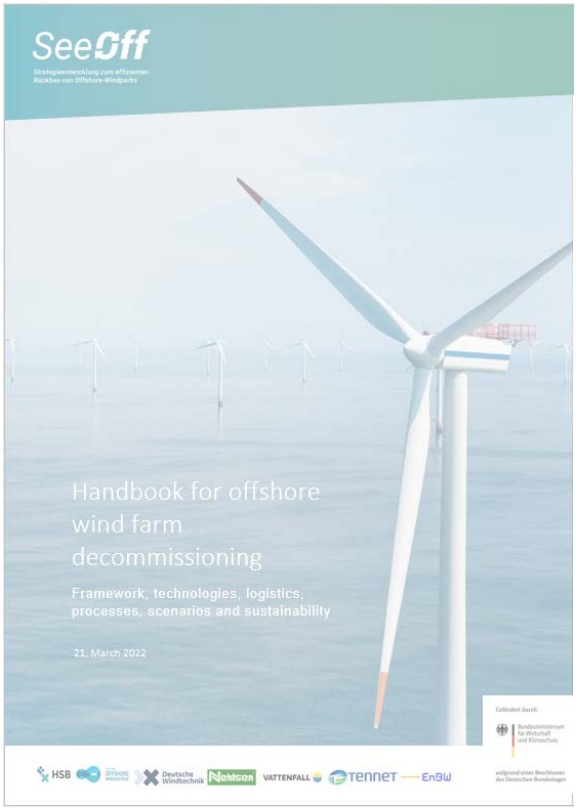
- Selection, description and analysis of decommissioning processes
- Development of decommissioning scenarios

Method for analysis and assessment

- Development and implementation of a methodological approach for analysis and assessment of decommissioning scenarios

Potential for improvement

- Transfer of potential for improvement to design and operation



Handbook for offshore wind farm decommissioning

Requirements, technologies, logistics, processes, scenarios and sustainablility

Objectives for sustainable offshore wind farm decommissioning

Sustainable decommissioning of offshore wind farms					
Category	Economy	Environment			Health and safety
Aspect	Economic efficiency	GHG-Emission	Biodiversity	Resource efficiency	Safety at work
Objective	Economic efficient	Low GHG-Emission	Minor local impact	High resource efficiency	Few hazards
Attribute	(Present) value of costs/ decommis-sioned MW	CO_2-Equivalent	Fraction of species richness maintained	Recovery rate	Hazard measure

Reference offshore wind farm

Components

- 80 wind turbines (WTG) (Siemens SWT-3.6-120)
- Transition Piece (TP) with grouted connection to Monopile (MP)
- Scour protection layer (SPL) (filter and amour layer)
- Sea cables: 33 kV inner array cables (IAC) and 155 kV export cable
- Offshore substation (OSS) on jacket foundation

Further conditions

- Located within the German Economic Exclusive Zone
- Water depth of 20 to 30 m
- Distance to reference base harbour of 110 sm

System Boundaries

Investigation of all processes from dismantling at sea to the recovery of secondary raw materials / fuels

Vattenfall (2005)

Decommissioning scenarios
Logistics


Rab (2019)

Baseline scenario

Dismantling and transport of WTG and WTG foundation by JackUp Vessel

Load-Off of OSS at harbor with crane vessel

3 Alternative scenarios: Feeder concept

Feeder concept: WTG (S1)

Feeder concept: WTG foundation (S2)

Feeder concept: WTG and WTG foundation (S3)

Alternative scenario: Load-off OSS with SPMT

Load-off of OSS at harbor with SPMT (S4)

Decommissioning scenarios

Dismantling technology and scope of decommissioning of MP

Baseline scenario

First cut: internal cut below TP, Abrasive water jetting (AWJ)

Second cut: internal cut, 1 m below seabed, AWJ

Alternative scenario: Cut with diamond wire cutting machine (DWCM) (S9)

First cut: internal cut below TP, DWCM

Second cut: internal cut, 1 m below seabed, DWCM

Alternative scenario: Complete removal (S8)

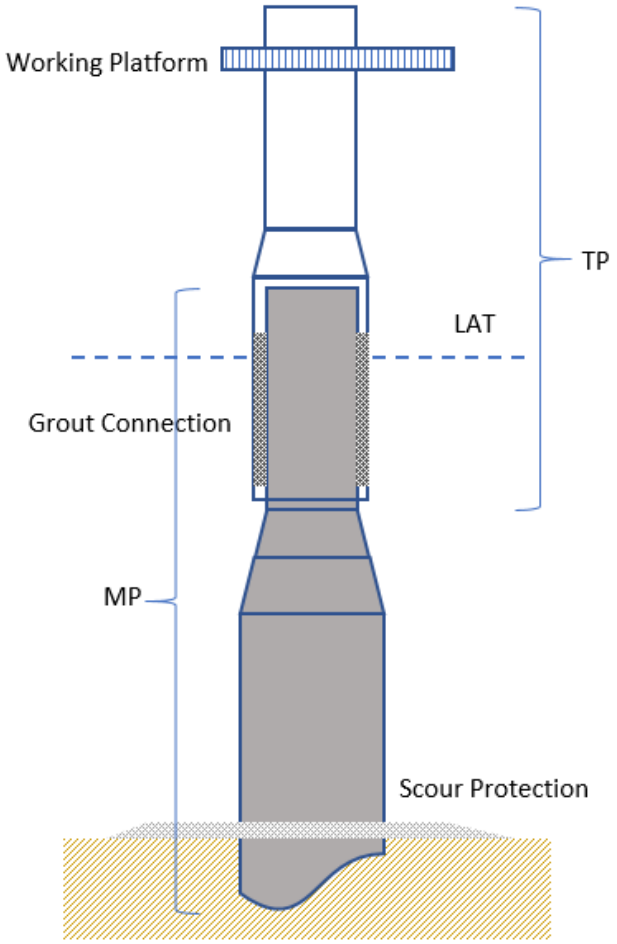
First cut: internal cut below TP, Abrasive water jetting (AWJ)

Complete removal of MP by vibratory extraction

Alternative scenario: cut above seabed (S7)

First cut: internal cut below TP, Abrasive water jetting (AWJ)

Second cut: internal cut, 3 m above seabed, AWJ



Decommissioning scenarios
Scope of decommissioning

Baseline scenario

Sea cables (inner array cables and export cable) are removed

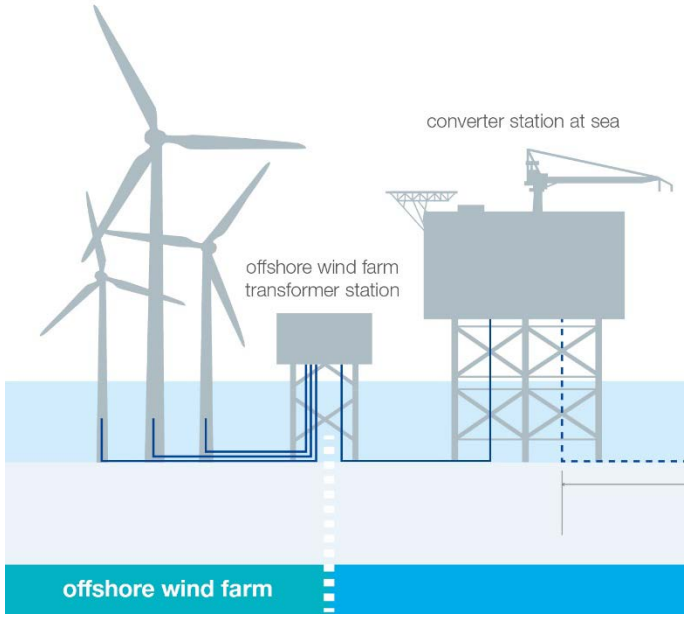
Scour protection layer is removed

Alternative scenario: Sea cables left in situ (S4)

Sea cables are not removed

Alternative scenario: Scour protection layer left in situ (S5)

Scour protection layer is not removed



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Publication of SeeOff results

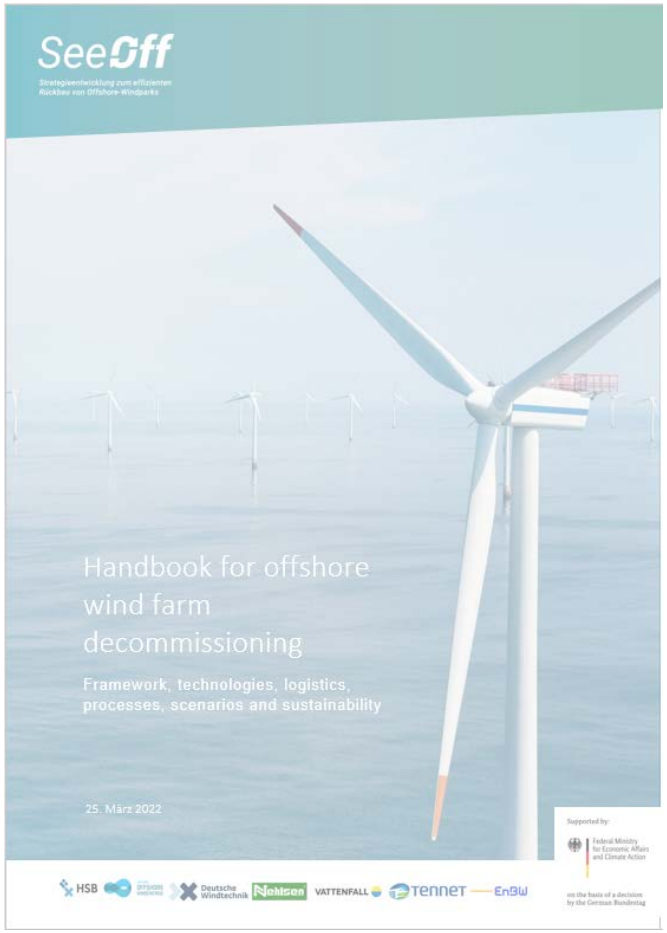
Today‘s presentations

- will be uploaded to the *SeeOff* website

Report

Handbook for offshore wind farm decommissioning

framework, technologies, logistics, processes, scenarios and sustainability



- open-access publication via b MEDIA
- link to handbook will be on *SeeOff* website

www.seeoff.de

Thank you for your attention!

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References

Rab (2019): Brave Tern Berthed @ Esbjerg-Denmark 03-07-2019. Licend under CC BY 2.0. https://wordpress.org/openverse/image/7c825929-3b88-43a1-9449-8160d80c4672/?referrer=creativecommons.org

Vattenfall (2015): Windpark DanTysk / DanTysk wind farm. Licend under CC BY-NC-ND 2.0. https://wordpress.org/openverse/image/0f873bf5-9fdf-4bef-8382-d3aafef80aa0/?referrer=creativecommons.org