

DecomTools

Decommissioning of offshore windparks

North Sea Conference, Marstrand, 26.6.2019

Isabel Sünnner (HWWI)



University of Applied Sciences

HOCHSCHULE
EMDEN • LEER



Hamburg Institute
of International
Economics

Interreg
North Sea Region
Decom Tools

European Regional Development Fund

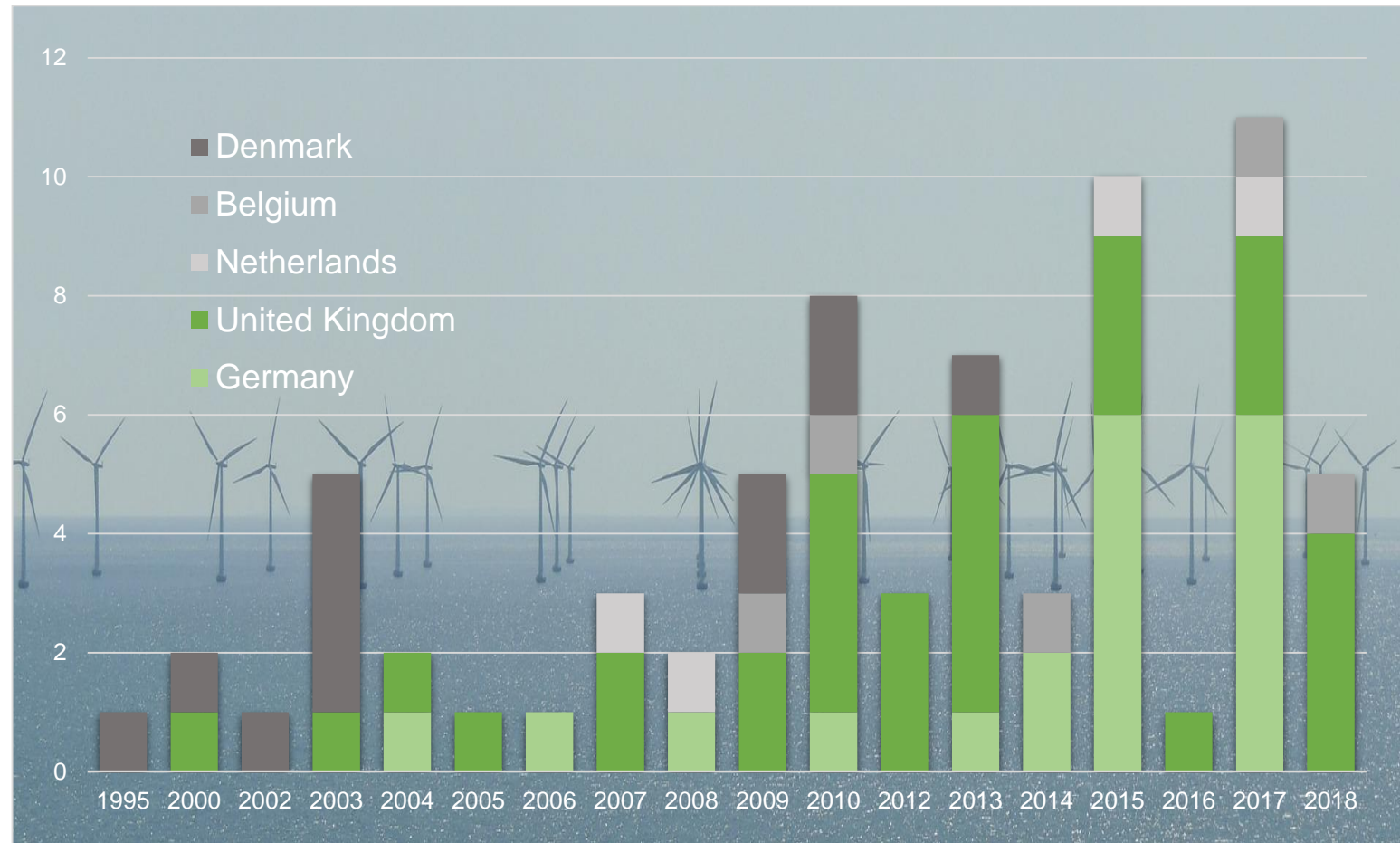


EUROPEAN UNION

DecomTools - Eco-innovative concepts for the end of offshore wind energy farms' lifecycle

- Most wind turbines are designed and certified for a 20–25 year service life.
- After this period, they have to be decommissioned or repowered.
- Processes for decommissioning/repowering onshore wind parks are well known, but the experience offshore is limited.
- An overall sustainable industrial approach is missing.
- DecomTools addresses this gap by developing eco-innovative concepts that
 - Reduce the decommissioning costs by 20%,
 - Reduce the environmental footprint by 25% (in CO2 equivalents)
 - Increase the know-how and expertise of NSR involved stakeholders.
- Research will be validated by **demo actions** in the areas of **logistics**, **ship design** and **recycling**

Year of Construction of Offshore Wind Parks in the NSR



Source: HWWI
Partner Survey

Expected Year of Decommissioning of Wind Turbines in the NSR*



Source: HWWI
Partner Survey

* Assumed Life Expectancy of 20 Years

Different Kinds of Wind Turbines, Foundations, Conditions, ...



University of Applied Sciences

HOCHSCHULE
EMDEN • LEER



Hamburg Institute
of International
Economics

Interreg
North Sea Region
Decom Tools

European Regional Development Fund

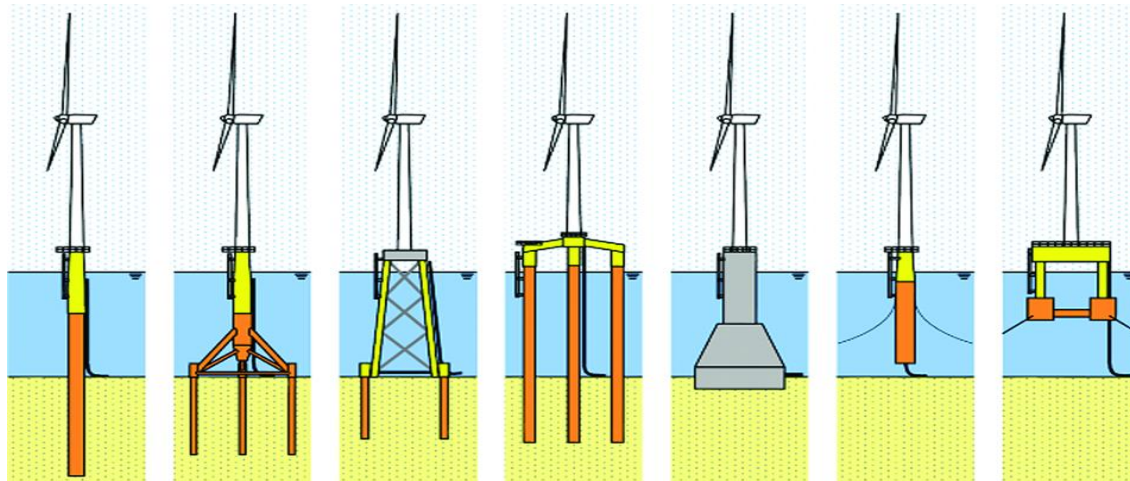
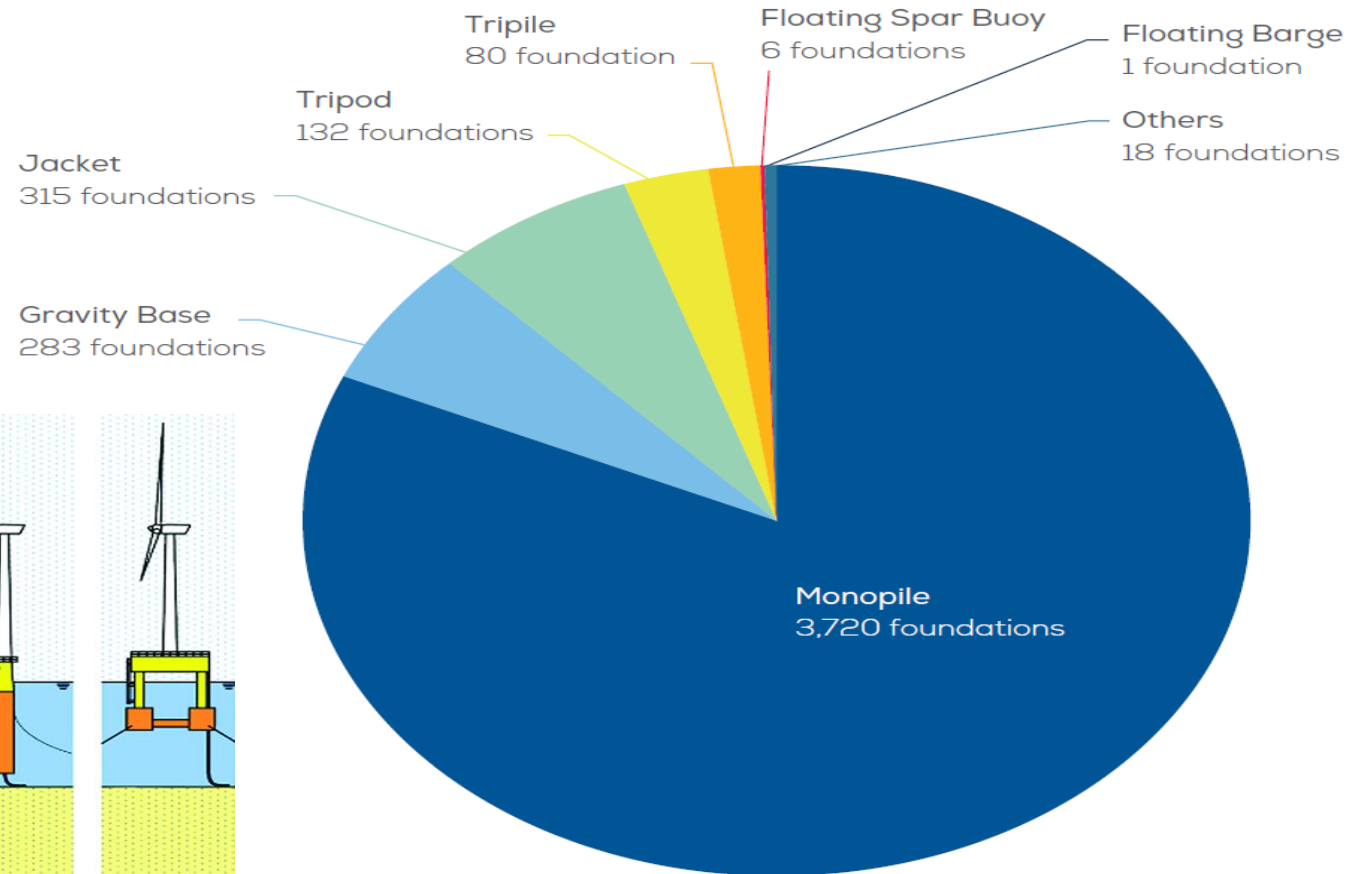


EUROPEAN UNION

Figures for the European market of 2018

Source: Offshore Wind in Europe
Key trends and statistics 2017
Wind Europe

Share of substructure types for grid-connected wind turbines (units)



University of Applied Sciences

HOCHSCHULE
EMDEN-LEER



Hamburg Institute
of International
Economics

Source: WindEurope

Interreg
North Sea Region
Decom Tools

European Regional Development Fund



EUROPEAN UNION

Highly concentrated Market of Offshore Wind in the NSR

Installed capacity – Cumulative share by country

UK	6,835 MW / 1,753 turbines
Germany	5,355 MW / 1,169 turbines
Denmark	1,266 MW / 506 turbines
Netherlands	1,118 MW / 365 turbines
Belgium	877 MW / 232 turbines
Others	328 MW / 124 turbines

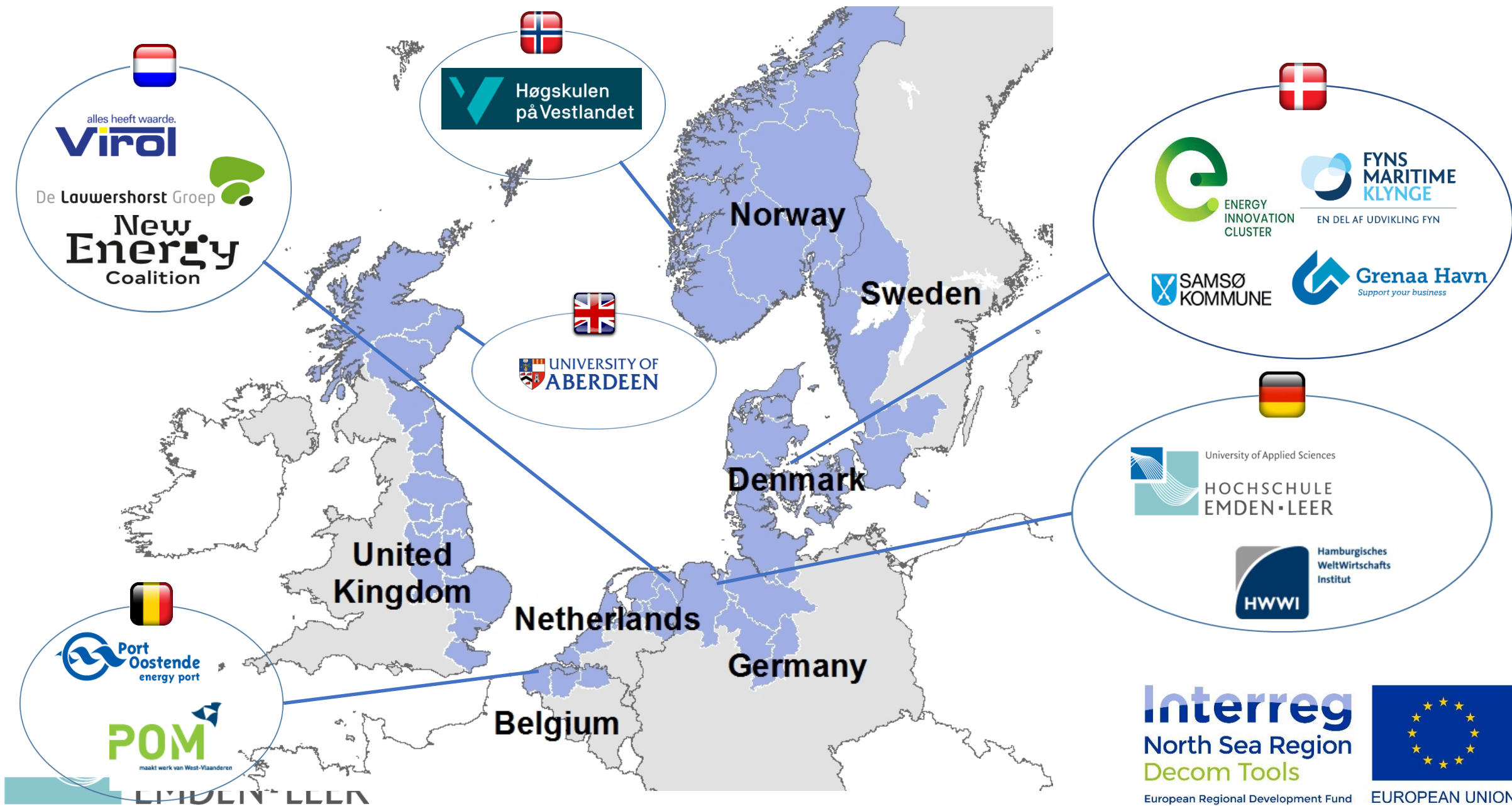
TOP 5 REPRESENTS
98%
OF ALL CAPACITY
CONNECTED



Source: Offshore Wind
in Europe Key trends
and statistics 2017
Wind Europe

Source: WindEurope

The DecomTools partnership



What are the best practices the region boasts?

Decommissioning is a European challenge, so interregional cooperation is crucial!

Different kind of experience has already been gathered, and needs to be interlinked now.

In DecomTools, we take the specialisation of each partner region as a starting point:

- **Norway:** Experience from the oil and gas industry. Can be adapted to the needs of offshore wind industry.
- **UK – Scotland:** Mature oil+gas industry, offshore wind implementations on a large scale and first practical experiences with decom. of wind farms. Strong research base.
- **Denmark:** Mature offshore wind industry, strong cluster and strong knowledge base
- **The Netherlands:** Strong energy Cluster. Strong SME basis specialised in recycling. Demo action on recycling of composite materials from the wind mills.
- **Germany** – Emden/Leer: Strong SME basis for maintenance in the offshore sector
- **Belgium:** Service port for the offshore wind industry – infrastructure for installing offshore wind energy sites, can be expanded to also serve for decommissioning

Challenges ahead

- As yet no established processes, growing need in the coming decade
- Consider “Design for decom” already in the planning stage of new wind farms
- Develop cross-sector competences and value-chains for an industrialized approach
- Optimise processes for dismantling offshore wind energy plants
- Overcome logistical challenges on- and offshore, provide the required infrastructure and training
- Address Circularity issues: Up-/recycling of parts

2030 Goals North Sea Region Strategy

- *New technological innovations in clean energy developed and adopted*
- *Circular Economy opportunities established across the energy sector*
- *Energy efficiency improvements and a reduction in greenhouse gas emissions*

DecomTools' approach to problem-solving

WP4: Process optimization for dismantling single offshore wind energy structures

Expert workshops (4)

T4.1: Assessment of decommissioning technical/operational/environmental requirements

List of process description for offshore decommission (3)

Offshore operation simulation tool for risk and CO2 analysis (1)

T4.2 Knowledge transfer from offshore oil and gas industry and first experiences from dismantling offshore wind farms

Interview protocols of decommission experts from Oil and Gas (1)

T4.3 Pilot case "Decom Ship". Develop concepts for ship design and ROV

Concept study of required vessels and ROV tooling (3)

T4.4 Decision Support System for Offshore Wind Integrated Design

Design Decision Support System for Decommission (1)

WP5: New concepts addressing logistical requirements for decommissioning complete offshore wind parks

Expert workshops (12)

T5.1: Assessment of Offshore logistical requirements

Discrete Event Simulation Model (1)

Product Model (1)

T5.2 Mapping of Onshore logistic requirements

Discrete Event Simulation Model (1)

Product Model (1)

T5.3: Pilot "Develop Decom Concept for wind turbines recycling"

Case study "Dismantling small wind farm"

T 5.4: Scenarios simulation & visualization (baseline vs. new concepts)

VR/AR Models (3)

Operation Analysis (3)

Simulation analysis (4)

WP6: Recycling concept for dismantling / re-powering offshore wind energy structures

Expert workshops (8)

T6.1 Identification & ranking of components/material for recycling

Status Report (1)

T6.2 Recycling concepts selection and development

Conference on Recycling Concepts (1)

Concepts for Recycling of different components (3)

T6.3 Demonstration case "Recycling wind turbines blades"

Pilot "Recycling wind turbines blades"

T6.4 Repowering

Concept for repowering offshore wind farm (1)

Exploitation: Potential solutions/scale-up options?

Outputs of the project fostering the exploitation of results:

- Gap analysis (current situation vs. future market requirements in terms of decom industry, standards/regulations; environmental standards; health/safety training needs)
- **Business model** development for the repowering process
- Business model development for the dismantling services
- **Port infrastructure extension** for offshore decommissioning (pilot; engineering plan)
- **Schooling concepts** (change working practice in decommission and recycling),
- VR model for schooling (pilot; schooling of a disassembling operation at a nacelle)
- **Policy recommendations:** Workshop for regional industry and policy makers

Challenges ahead, how to involve youth?

- **Targeted events** such as the „Ideen Expo“ can be used to raise interest for offshore decommissioning as a part of green energy transition.
- Showcasing pilots using VR tech.
- **Targeted training concepts:** One WP contains the development of training concepts for the uptake of the newly developed tools. It hereby puts an emphasis on VR. An awareness raising campaign addressing youth could be added to that.
- **School projects** / campaigns / „children university“ to raise awareness among young people
- **Modules at universities** / bachelor and master thesis
- Some good practices exist in the partnership:
 - Establishment of an Offshore-Wind-Innovation-Centre is planned in the Netherlands. It can play an important role to close the gap between pupils / students and the industry.
 - Recruitment initiative „Follow Energy“ implemented in universities in the Northern Netherlands

Contact:

Isabel Sünnner

Head of International Cooperation
Hamburg Institute of International Economics (HWWI)

E-Mail: suenner@hwwi.org

More information at
www.northsearegion.eu/decomtools



University of Applied Sciences

**HOCHSCHULE
EMDEN • LEER**



Hamburg Institute
of International
Economics

Interreg
North Sea Region
Decom Tools

European Regional Development Fund



EUROPEAN UNION