Rhenus Offshore Logistics

Logistical challenges and concept for decommissioning offshore wind parks

DecomTools Final Conference 2023

A STRONG FAMILY:
RHENUS AS PART OF A LARGE SERVICES GROUP

Turn-Key logistics services provider

RHENUS LOGISTICS

37.500 Employees

€ 7,0 Mrd.

Water and Lifecycle solutions

REMONDIS®
IM AUFTRAG DER ZUKUNFT

40.000 Employees

€ 11,5 Mrd.

Services and products made from organical sources

SARIA®

10.500 Employees

€ 3,0 Mrd.

Public transport solutions

34 % Shareholding

transdev

82.000 Employees

€ 7,0 Mrd.

EXPERTISE USEFUL FOR DECOMMISSIONING PROJECTS

TSR as part of Remondis:

- Expertise in recycling and metal scrap through > 100-year-experience
- Material Flow Management
- Also on Board: Cable recycling facilities

Rhenus:

- Business unit ports with various port locations
- Project Logistics for heavy-duty transport services
- Rhenus Offshore Logistics

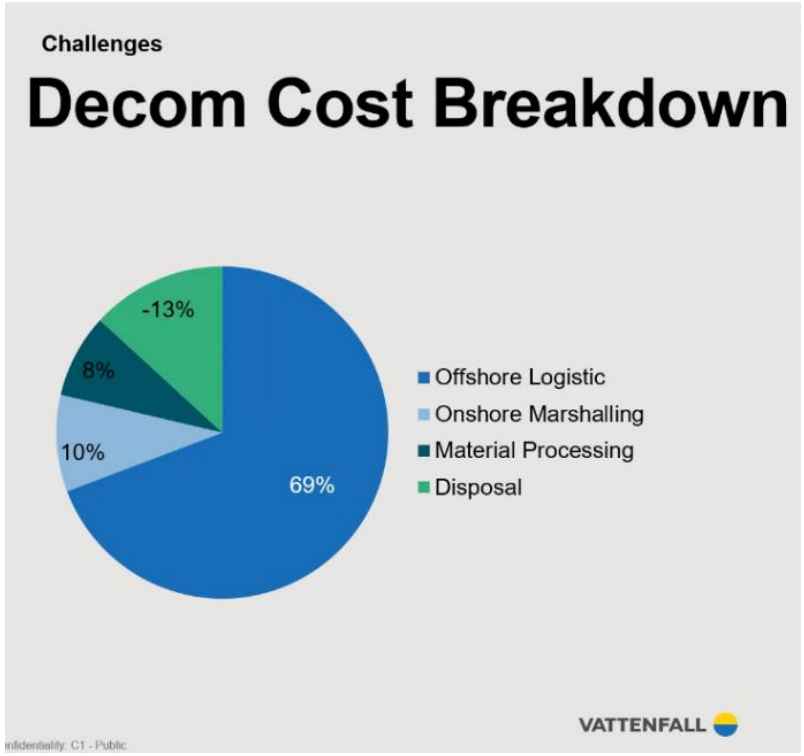
RHENUS OFFSHORE LOGISTICS: SERVICE PORTFOLIO

ALL COVERED BY ONE SERVICE PROVIDER
RHENUS OFFSHORE LOGISTICS

2 – LOGISTICAL PERSPECTIVE ON DECOMMISSIONING

Challenges for the Logistics:

- Generally, high volumes are expected within the next decades in the offshore wind market
- Lack of experience: up until now only very few and small offshore wind decommissioning projects
- Longer preparations: Decommissioning projects will be diverse and complex
- Decommissioning is addressed in the tender, but concrete plans are usually short-term
- Variety of technology offshore: 3 MW – 15 MW



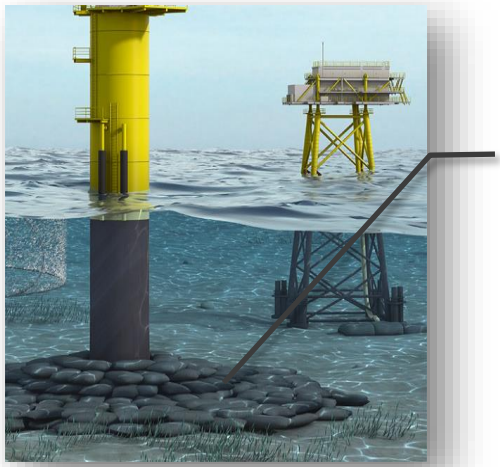
Our Point of View:

- Logistics for decommissioning at sea is unclear at present. Expectations vary from “planned in a structured way” to “purely opportunistic”
- Very cost-intensive: efficient and inexpensive decommissioning will be the most important

3 – WHICH COMPONENTS WILL BE REMOVED AND ARE THEREFORE RELEVANT FOR LOGISTICS?

- Blades (3 each); Nacelle
- Tower; Transition Piece; Monopile
- Inter- Array-Cabel
- Transformer Platform incl. foundation structure

➢ Logistical Task for Decommissioning: Variety of parts that are heavy and large



Our Expectation:

- A complete removal must be carried out due to the lack of reuse scenarios.
- Only the scour protection can stay in place

4 – LOGISTICS CONCEPT OFFSHORE

- **“backward construction” concept expected**
- Usage of current installation vessels for Decommissioning
- Only exception might be the cable laying vessel
- High pressure on already **scarce capacities,** uncertain vessel availability
- Variations might be possible (Ponton) only if there is very limited availability of jack up vessels
- The longer the park runs the better for the operator: **small time slot** for decommissioning → more pressure on logistics concept due to availability of equipment and weather windows

Our Point of View:

➢ The logistical task itself is feasible: knowledge from installations
➢ Bottleneck: Vessel and equipment capacities

6 – CONSIDERATION OF LOGISTICS IN THE PORT

- **Storage areas:**
  - scarce resource already
  - pressure-adding factor: Decommissioning probably faster than the initial installation – a lot of components at once
  - Cost-driving factor
- **Cost-Optimisation:**
  - As little storage area as possible & quick turnover
  - Cost-adding Factor: transport frames, cranes, SPMT
- Port & port access must be suitable for ships and components
- Usage of the same ports as for the installation process

Our Expectations:

- High pressure on **port area productivity**

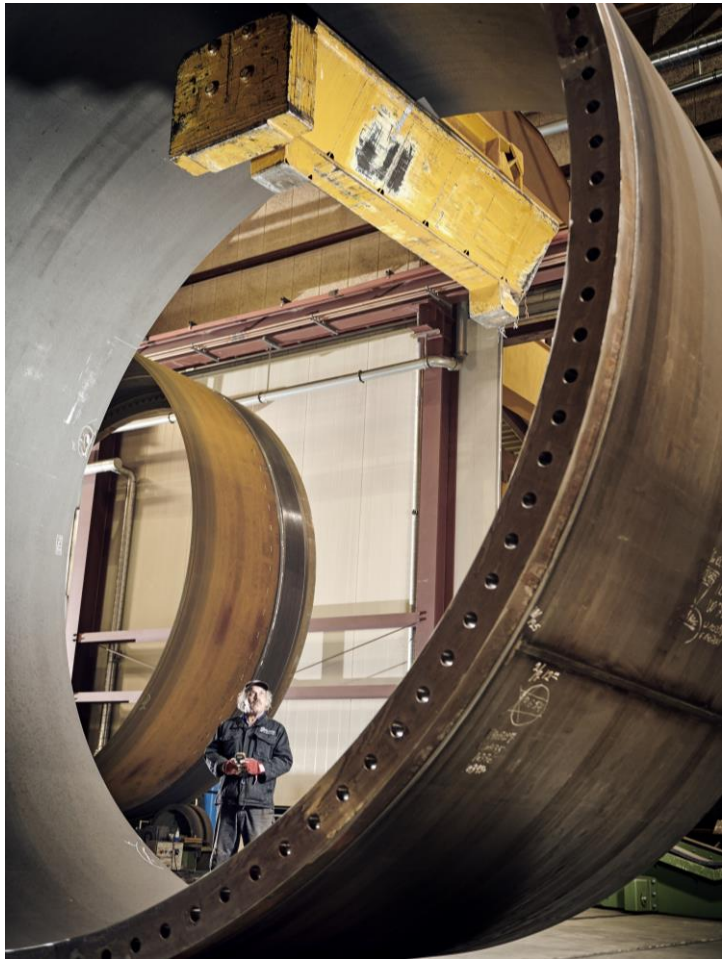
7 – NOT TO BE FORGOTTEN AFTER DECOMMISSIONING: RECYCLING

- Extended supply chain: also Transportation starting from port
- High volumes of mainly steel from Monopile, Transition Piece and Tower
- Recycling of steel, cement, copper wire, aluminium, electronics, composite materials like glass fibre
- Initiatives of manufacturers take place: fully recyclable blades for the future
- Landfill ban on decommissioned wind turbines: WindEurope called for Europe-wide landfill ban by 2025

Our Point of View:

➢ Need for **industrial recycling** for decommissioned offshore windparks which is not set up yet

➢ The downstream logistics starting from the port is very important to **free up storage area** in the port !



THANK YOU FOR YOUR ATTENTION.

QUESTIONS OR COMMENTS?

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