Onshore vs Offshore

KTP - Wind Turbine Decommissioning

The Salvage, Decommissioning & Wreck Removal Workshop
Circular economy and offshore wind – Starting with the end in mind.
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Content

• Background on decommissioning
• Challenges
• Possible solutions
Wind turbine decommissioning in context

- UK is a top location for wind power [2], set to expand by 15.2GW by 2026 (4.4GW onshore, 10.8GW offshore)
- 11,090 wind turbines (WT) in the UK (totaling 24.6 GW capacity), of which 2,297 as offshore wind turbines [1]
- Europe had in 2021, a total of 236 GW capacity (207 GW onshore and 28 GW offshore) [5]
  - In 2021, it decommissioned 396 MW and commissioned 515 MW of repowered capacity [5]
  - This onshore capacity inc. 34,000 WT with >15y (eq. 36GW capacity; of which 9GW are 20-24y, 1 GW are >25y) [3]
  - Some EU countries with much older installations
- Operational lifetime of 20-25 years (some on 35y) for onshore WT [3]
  - 50% of Europe’s wind farms expected to have their lifetime extended by 5-10 years (post 20y) [4]

- According to Wind Europe, there is a **massive market for decommissioning of onshore wind over the next decade** [3]
- **Green decommissioning options likely to be key to the credentials of the industry in the long term**

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[1] UK Wind Energy Database, Renewable UK, [www.renewableuk.com/page/UKWEDhome](http://www.renewableuk.com/page/UKWEDhome) 06/03/2022
Key findings

- Around 5,500 turbines will be decommissioned in Scotland (Based on sites that were either consented, in construction or operational in 2020);
- By 2050 onshore wind decommissioning in Scotland could have generated between 1.25M - 1.4M tonnes of materials
- By weight, the biggest material waste arisings from wind turbine decommissioning will be ferrous metals (steel, iron) which are currently exported for recycling.
- The forecast includes over 60,000 tonnes of fibreglass and 90,000 tonnes of resin + balsa, materials all currently landfilled
Circular economy approach

• Reuse: give turbines and their parts a second lease of life
• Remanufacture: bring turbines and their parts back to life
• Alternative use
Regulations

- No harmonised regulation around wind turbine/farm decommissioning in the EU
- Each country has their own rules and regulations, mostly referring to EU Waste Framework Directive (2008/98/EC)
- Only standard existing on the topic is DIN SPEC 4866-2020: “Sustainable dismantling, disassembly, recycling and recovery of wind turbines” – which pushes for parts reuse/recovery and highlights recycling as the last resource
What are the challenges
Market Value & Demand

• What is coming available?
• Second hand market?
• Spare parts?
• Locations?
Technical Info

• Conditions?
• Detailed Bill of Materials?
  • Data source?
  • Trustworthy?
• Compatibility?
  • How many models does it fit?
  • Trustworthy?
Logistics

• How do we achieve it?
  • External contractor?
  • Partners?
  • Capability build up?
  • Mergers?
• Transport?
• Handling & Storage?
• Processing?
Remanufacturing

Mechanical?

Power Electronic?

Electrical?

Hydraulic?

Electronic?
Key common challenges

• Data availability
  • Market
  • Use
  • In-service conditions
• Info and Data sharing
  • Owners
  • Accessibility
  • Integrity and trustworthiness
Possible solutions

• Open collaborations
• Third party hosting the shared data and anonymizing it for everybody to use for good.
Thank you for your attention