A virtuous circle?

Opportunities for a circular offshore renewables sector

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European Metal Recycling
A global leader in sustainable materials.
FAMILY RUN WITH A GLOBAL PRESENCE.

- 1M tonnes of non-ferrous metals globally
- 9M tonnes of ferrous metals globally

From recycling toasters to decommissioning aircraft carriers

- £5bn
- 100% privately owned
- 130 operational units
- Over 3,800 employees

emr
OFFSHORE WIND OVERVIEW
WHAT’S IN A TURBINE?

TYPICAL WIND TURBINE COMPONENTS
Source: Zero Waste Scotland, 2021

MATERIAL BREAKDOWN OF WIND TURBINE SUPERSTRUCTURE

- Steel: 78%
- Iron: 10%
- Resin: 6%
- Fibre glass: 4%
- Copper: 2%
- Silica: 0%

Turbine Components: Typical Materials
- Blades: Resin | Fiberglass
- Nose-cone: Resin | Fiberglass
- Blade hub: Cast iron
- Nacelle cover: Resin | Fiberglass
- Bed frame: Iron
- Main shaft: Steel
- Transformer: Silica | Copper | Steel
- Generator: Silica | Copper | Steel
- Gearbox: Iron | Steel
- Tower: Three sections: Steel

Metal Recycling
Reimagined
WHAT LIES BENEATH…

**FIXED-BOTTOM**
- Established technology
- Water depth <60m
- Steel foundations
- Max potential ~2% global oceans

**FLOATING**
- Emerging technology
- Water depth >60m
- Steel or concrete substructures
- Max potential ~10% global oceans

Source: ORE Catapult, 2022
OFFSHORE WIND MARKET SIZE

UK CAPACITY FORECAST
Source: ORE Catapult, 2022

- UK target 50GW by 2030
- Inc. 5GW floating
- 50GW ~ 3,000 – 4,000 turbines

GLOBAL CAPACITY FORECAST
Source: GWEC, 2022

- 2,000 GW of offshore wind by 2050 to achieve net zero emissions by 2050 and maintain a 1.5°C pathway

- 270 GW of offshore wind installations globally by 2030

- 35 GW of offshore wind installed in 2020

- 200GW ~ 150k turbines
OPPORTUNITIES FOR CIRCULARITY
A CHANCE TO LEARN

Onshore wind decommissioning is starting now

In Scotland, by mid-2030s there will be ~150 turbines pa being dismantled

No established routes for blade recycling but huge R&D effort here

Circular economy innovation (e.g., Renewable Parts, ReBlade) and design for decommissioning

Source: Zero Waste Scotland, 2021
ScotWind investment of £25bn in Scotland, average investment of £1.5bn per project (+ Greenports)

- Turbines are replicable; key to low cost will be serial manufacturing
- Need to plan now for material sourcing and resource flows – opportunity to couple with decommissioning
- Closed-loop supply chains = using old infrastructure to build the new

Source: Crown Estate Scotland, 2022
Movement of offshore wind turbines uses much of the same infrastructure (e.g., jack-up vessels, tugs, drilling)
Requires working onshore and offshore with large steel and concrete structures
Cross-over is particularly strong for floating offshore wind (e.g., mooring cables, anchors)
High potential for reuse, refurbishment, repurposing, and influencing future designs

Source: ORE Catapult, 2022
The offshore wind industry has identified skills gaps in many critical areas including electrical, technical and engineering skills; the ability to manage significant sized projects and multiple contractors; and on and offshore logistics.

90% of O&G jobs have high or medium transferability.

Key part of North Sea transition deal is creating high quality jobs for skilled workers in the UK.
FINAL THOUGHTS
The current decade will be the most challenging for global metals supply to keep up with demand.

Serious supply risks are identified in Europe for many metals.

Post-2030 there is a huge opportunity in Europe for secondary supply, if we can embed a circular approach to manufacturing and procurement.

A key part of this will include using old infrastructure to build the new.

Offshore wind is a future decom market – but we must plan for material resilience and sustainability in the investments and decisions we are making now.