Accelerating the adoption of Circular Economy in the Offshore Wind Industry: lessons for Norway

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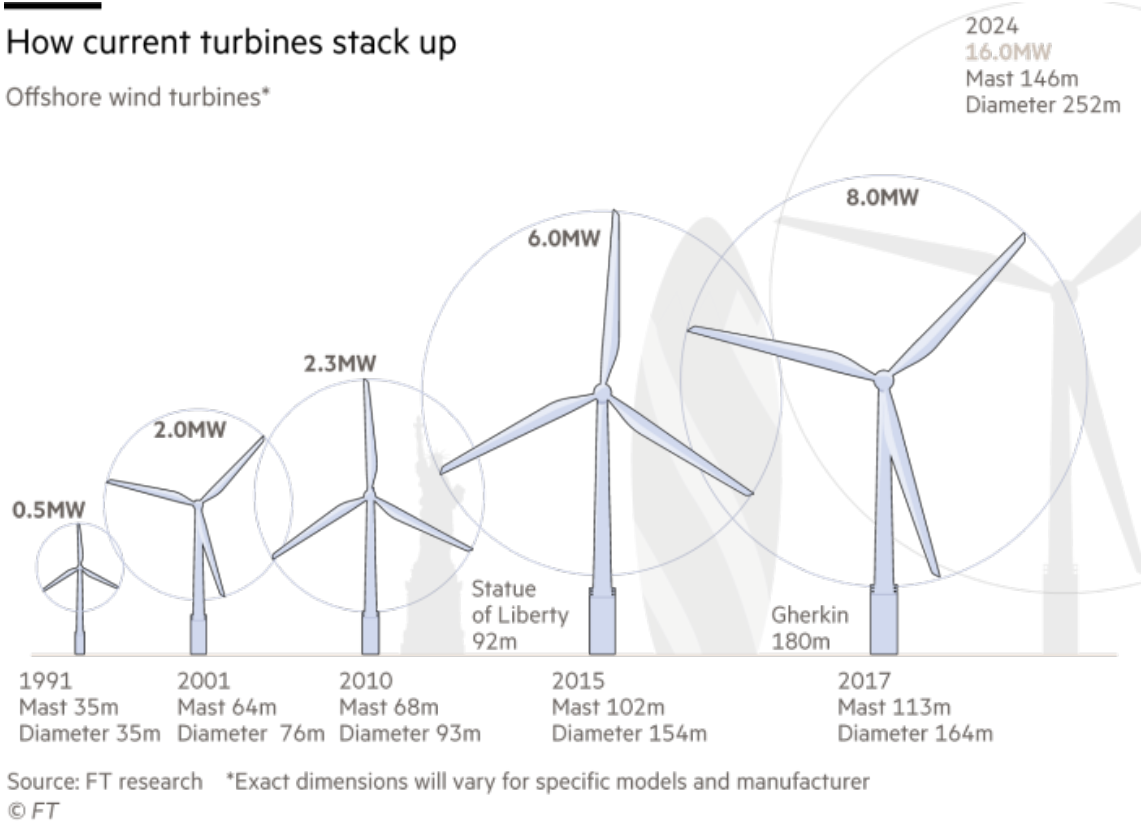
A brief look at the offshore wind industry



- Offshore wind is born-global industry
- 75 GW total capacity in operation by 2023. Overall deployment can reach 487 GW by 2033
- Massive growth in wind turbine sizes
- Large scale decommissioning in next 5-10 years
- CE is looked as a promising alternative to sustainably manage the resources

Offshore wind development in Norway

11 May 2022
30 GW offshore wind development by 2040

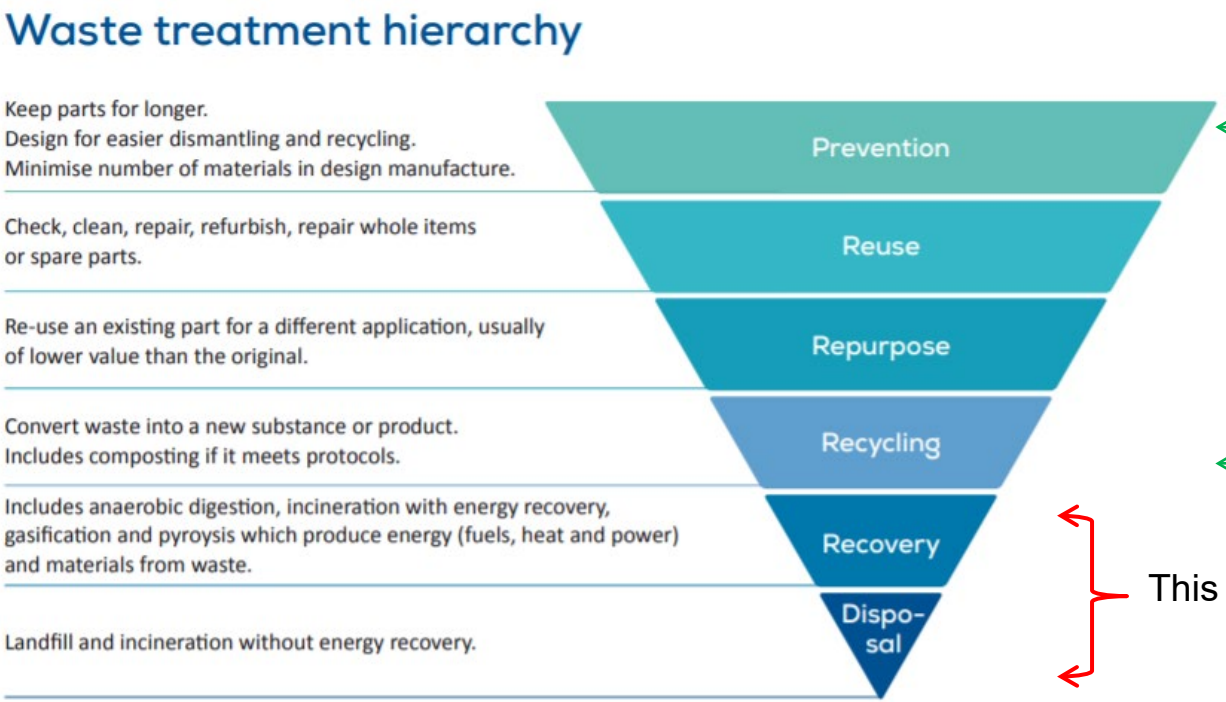
6 December 2022
Tender criteria release for Utsira Nord & Sørlige Nordsjø II with recycling clause at EOL

29 March 2023
Norway opened Utsira Nord & Sørlige Nordsjø II for auctioning

25 April 2023
The Norwegian Water Resources and Energy Directorate (NVE) identified 20 new potential areas

17 June 2024
35 billion nok state budget allocated for Vestavind B and Vestavind F

Background

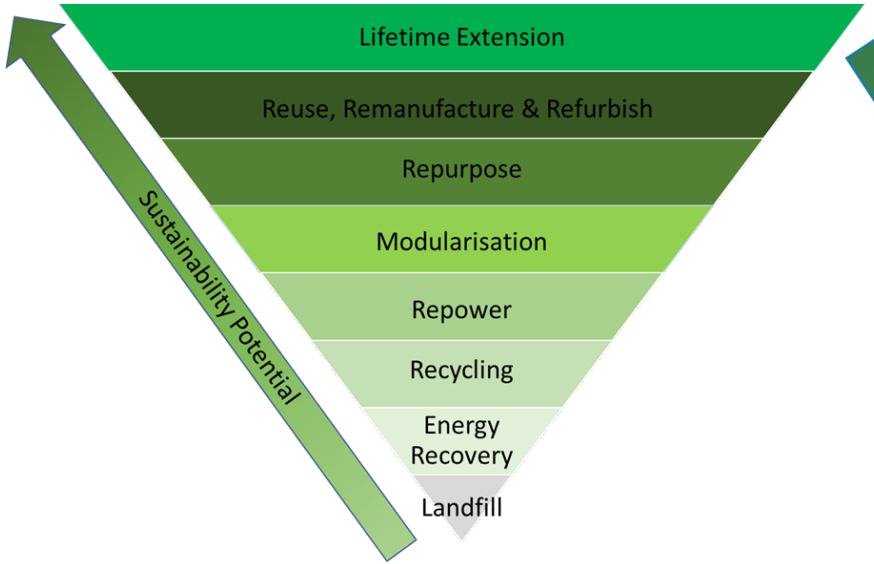


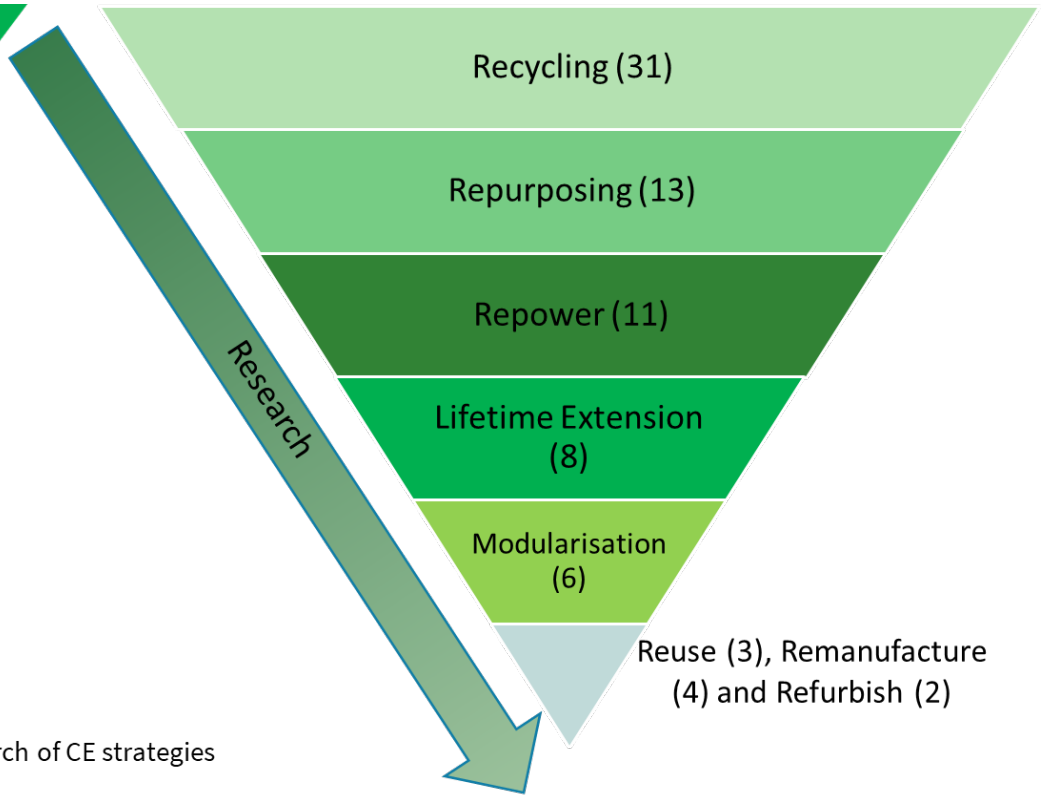
This is where we need to move. The higher, the better!

This is where we are

Waste management hierarchy for wind farm components (ETIPWind, 2020)

Heterogeneity in the development of CE strategies





Variation in the development and research of CE strategies

(Gode & Aspelund, 2024)

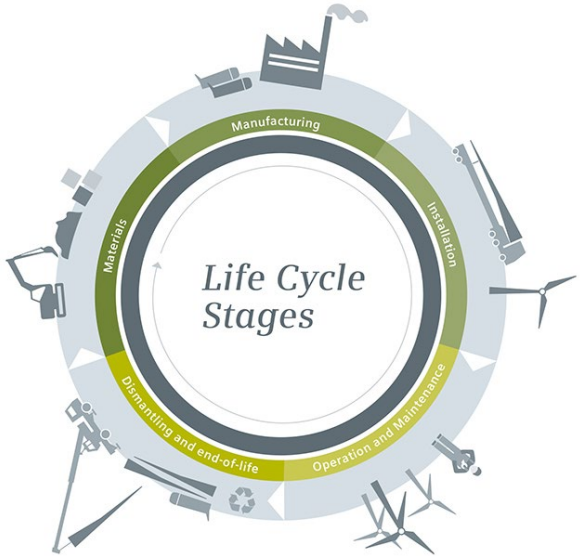
State of CE adoption in the offshore wind industry

- Practical problem: limited adoption of CE in the offshore wind industry
- Denmark, Germany, and the UK are global leaders in offshore wind deployment, however, struggling to find sustainable EOL solution
- Commercialization has just started in Norway
- **Opportunity: derive lessons and become a frontrunner in adopting CE**

Data collection – empirical evidence

- Data sources: document analysis and semi-structured interviews with value chain actors
- Actor profiles of interest:

1. Raw material suppliers - 1
2. Original equipment manufacturers (OEMs) - 3
3. Wind farm owners/operators - 3
4. Decommissioning operators - 2
5. CE business operators - 5
6. Regulatory agencies/policymakers - 2
7. Research centers and universities -5



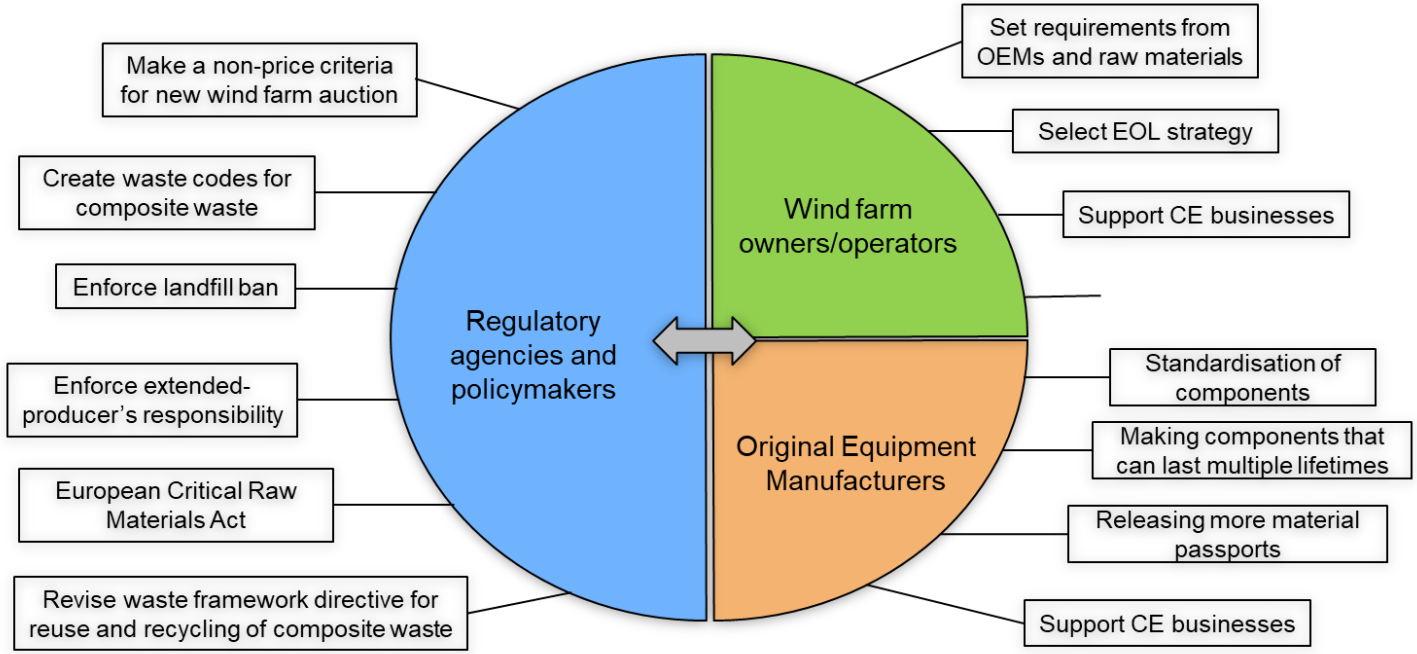
(Jensen & Skelton, 2018)

Reasons for limited adoption of CE

- Value of CE comes late in product lifetime
- No one silver bullet
- Heterogenously developed CE strategies
- Recycling is the most developed and discussed CE strategy
- Business case is affected by scaling, environmental unceartainty and regulatory hurdles
- Lack of standardisation in the value chain
- Circularity discussion is centred around wind turbine blades

Accelerating adoption of CE

- To push for more circularity in the industry someone in the value chain has to play a central role. But who?



How to become a frontrunner?

1. Advanced planning:
   - Designing components and related EOL strategies
   - Defining responsibilities early in the planning stage
   - Setting a non-price criteria: higher order CE strategies when you can, recycling when you must
2. Local solutions:
   - Incentivizing local circular strategies
   - Avoid transboundary export of waste
3. Collaboration & innovation:
   - Engage all relevant value chain stakeholders
   - Foster innovation in materials and processes

Thank you!

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References

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