

ReWind

Designing in circularity at the lowest cost

MASTS 2023

Captain Stephen Norman – Business Development Director



Agenda

1 – Circularity and planning for Decom

2 - What is ReWind?

3 - Insights

A proud legacy of safeguarding life, property, and the environment

156
years

142,000
employees

100,000
customers

100+
countries

5% invested
in R&D
of annual revenue



Ship and offshore classification
and advisory



Energy advisory, certification,
verification and monitoring



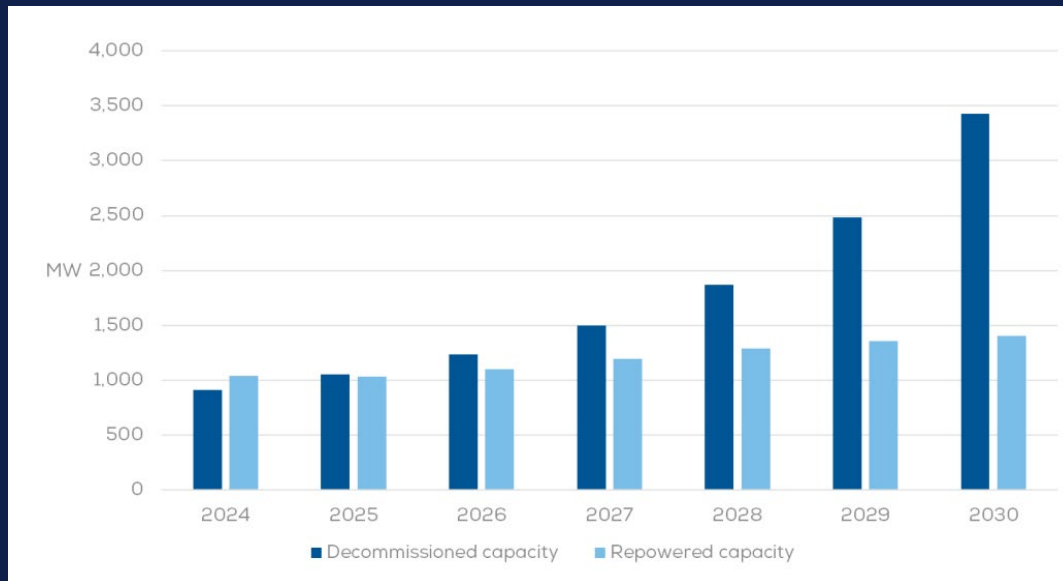
Software and
digital solutions



Management system certification,
supply chain and product
assurance

The Market Today

Wind Europe forecasts that over 13GW of wind capacity will be decommissioning by 2030



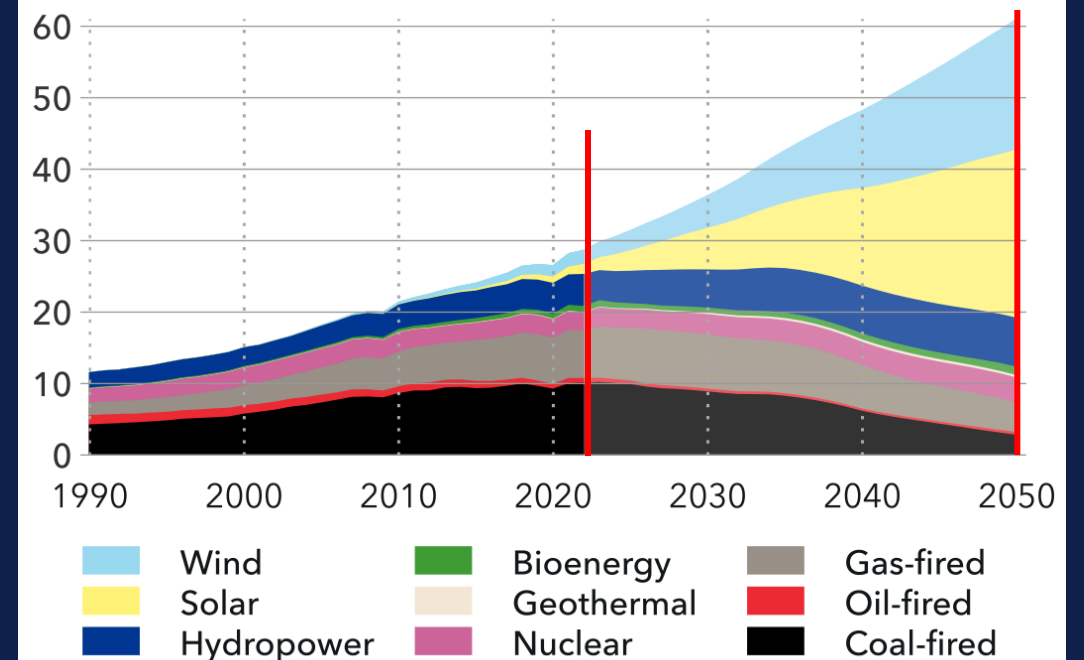
Source: Wind Europe Repowering Forecast November 2023

The Future Potential

Global installed wind capacity to grow by over 650% by 2050

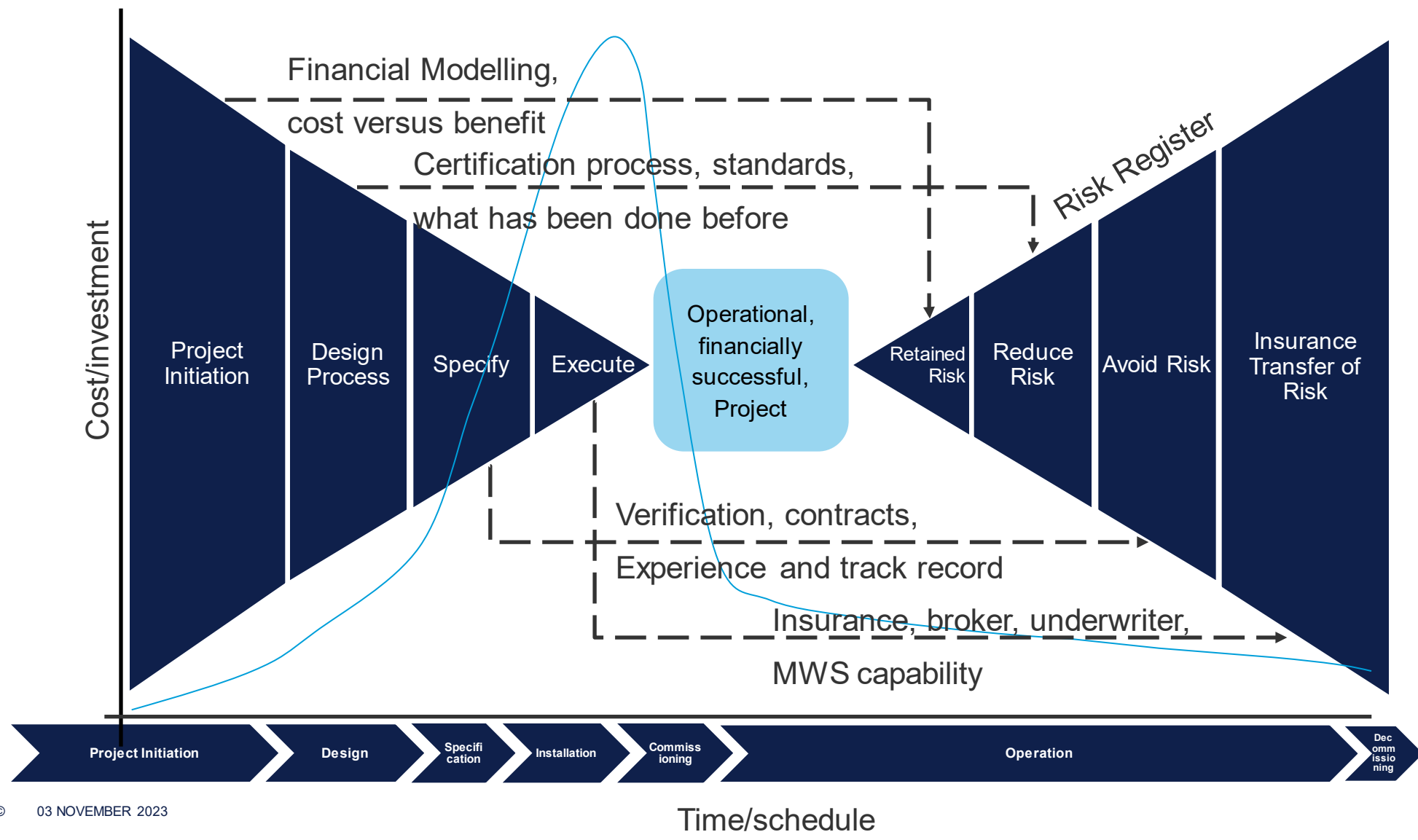
World grid-connected electricity generation by power station type

Units: PWh/yr

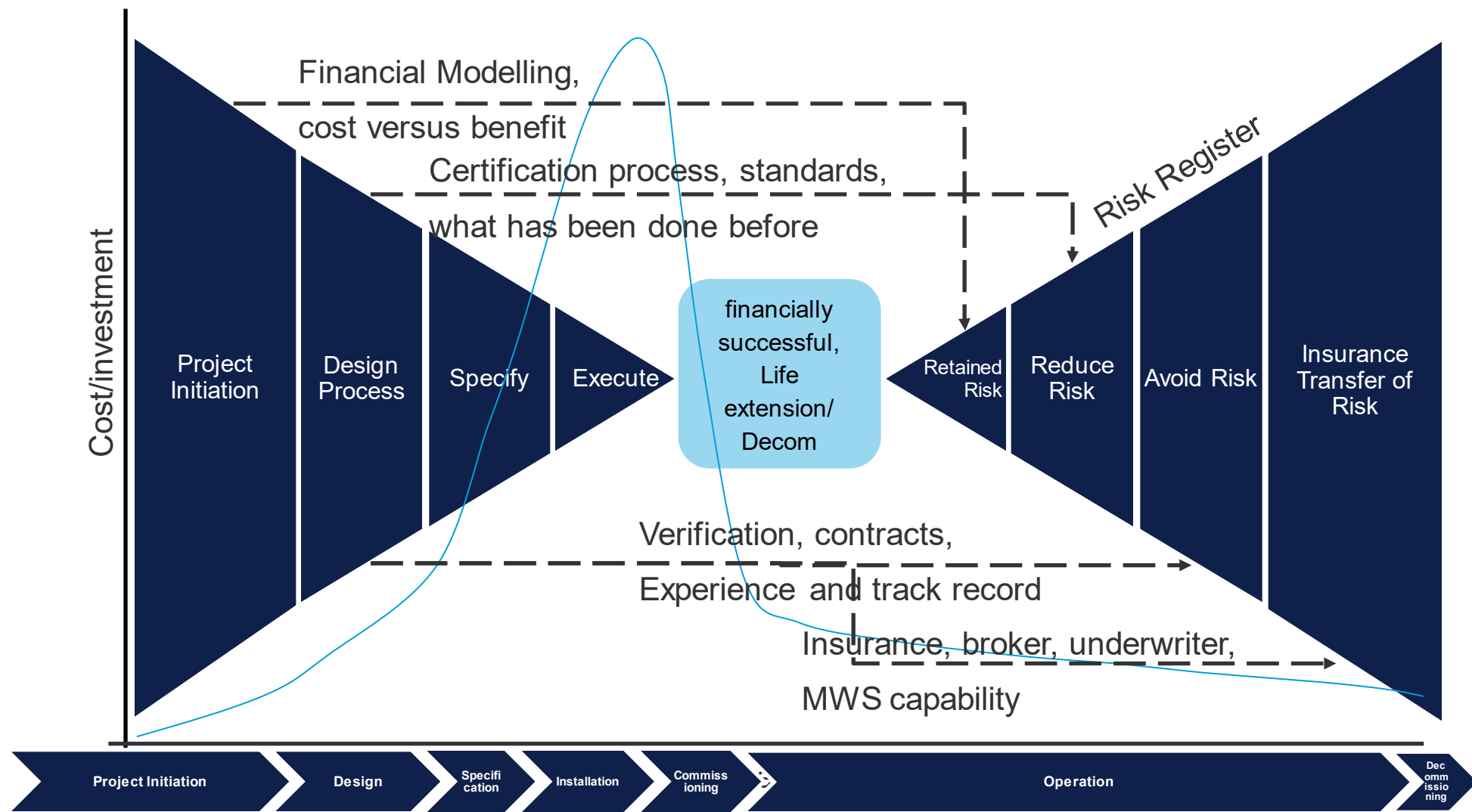


Source: DNV ETO 2023

Risk transfer v Financial Modelling

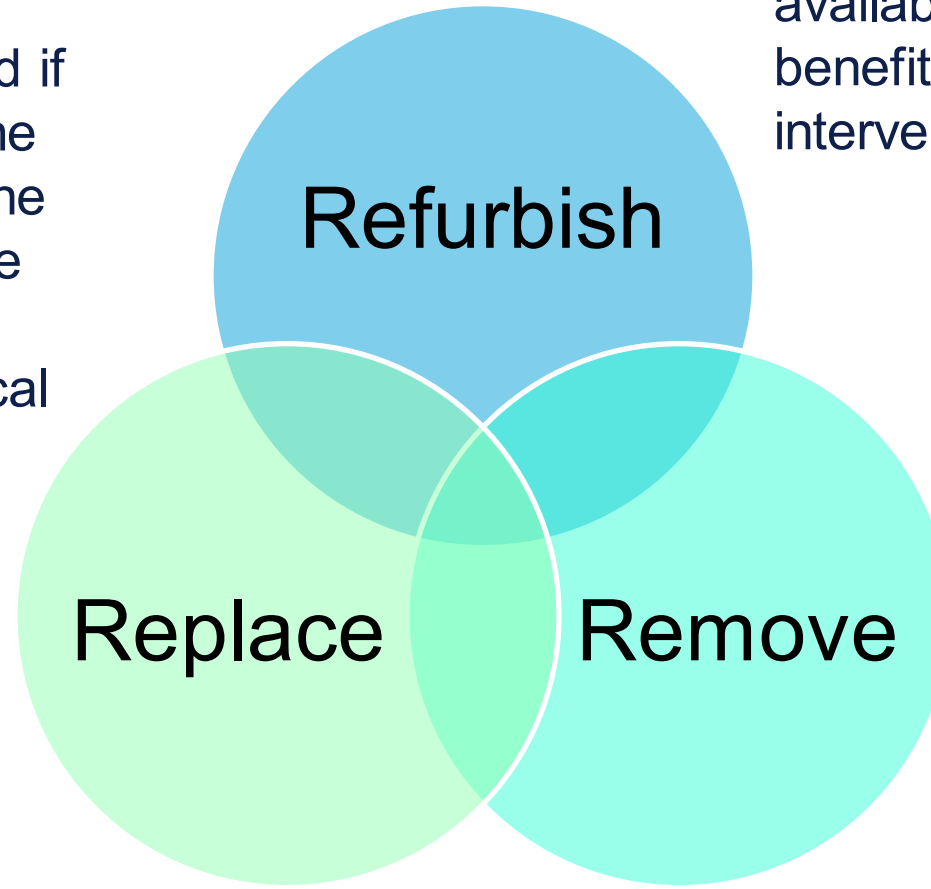


Risk transfer v Financial Modelling in Decommissioning



Lifetime Utilisation

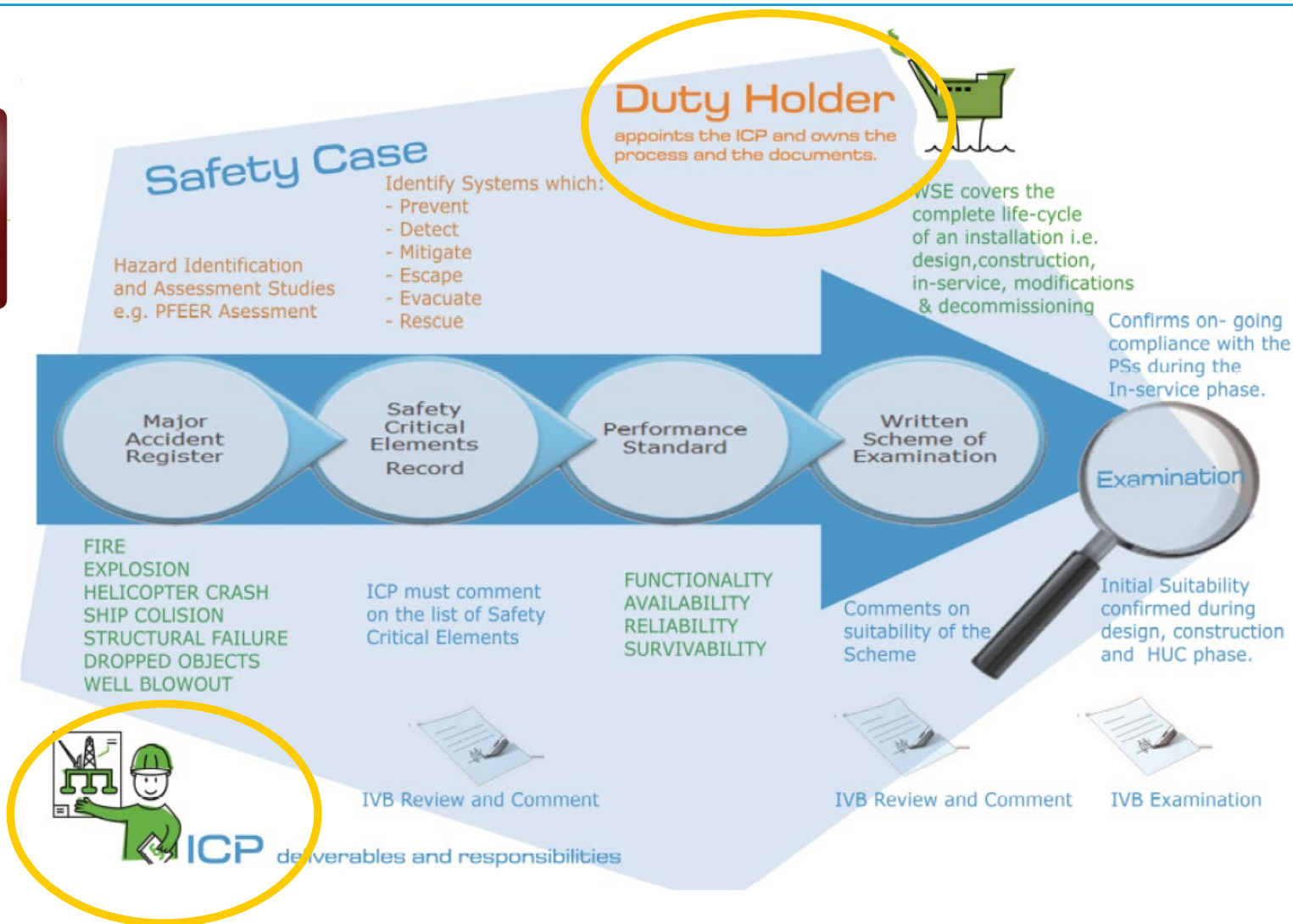
Are the structures able to take alternative models and if so, what does this do for the O&M strategy equally for the remaining fatigue live of the structure. Is replacement compatible with the electrical design or are further mods required?



Can the assets be refurbished, are the replacement parts still available and what is the cos v benefit of like for like intervention?

Are we convinced that we have reached end of life for the asset? What are the removal costs and how do we offset those at the earliest stages to understand our future liabilities? Have the assets been designed for removal?

UK SAFETY CASE REGULATIONS – The Verification Process



What are the biggest considerations governing life extension choices?

Onshore

Scope:

- Permitting conditions, repowering
- Roads, crane pads, cables, foundations, substation, met masts, site buildings

Methodology:

- Crane and machinery costs, labour costs
- Turnkey decommissioning or multi-contract
- Resale, recycling or landfill
 - Minimise cost or maximise circularity

Offshore

Scope:

- Environmental considerations
- Foundations, scour, protection, cables, offshore substation, piles below seabed

Methodology:

- Vessel day rates
- Time to dismantle and transport components
- Availability of material processing at port



These are the most difficult tasks, according to
100+ industry professionals

**Sustainable end-of-
life planning**

(58% of those surveyed)




**Achieving maximum
recyclability**

(74% of those surveyed)

**End-of-life cost
forecasting**

(68% of those surveyed)

When do you need a decommissioning business model?

Year	-5-0	0-20+	20-35
	Project Development	Ongoing operations	End of life and Decommissioning
Job-to-be-done			
	Generate decommissioning costs and circularity rates for: <ul style="list-style-type: none">• Land lease agreements• Permit and auction applications• Project financing	Provide decommissioning cost estimates for: <ul style="list-style-type: none">• Annual audits compliance• Decommissioning bond updates	Plan and execute decommissioning projects at the highest circularity level for the lowest cost

Optimise to

Minimise decommissioning costs

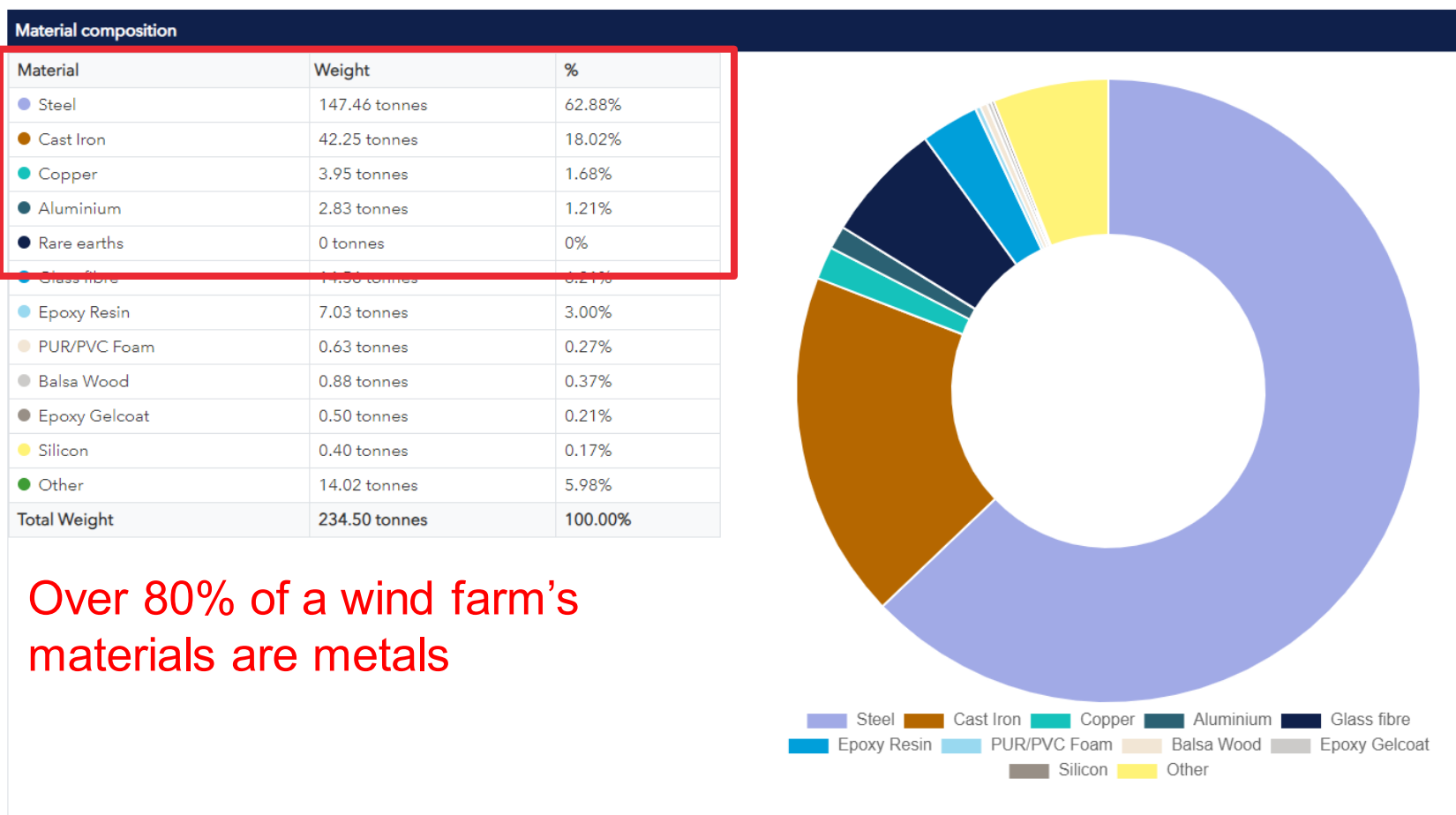
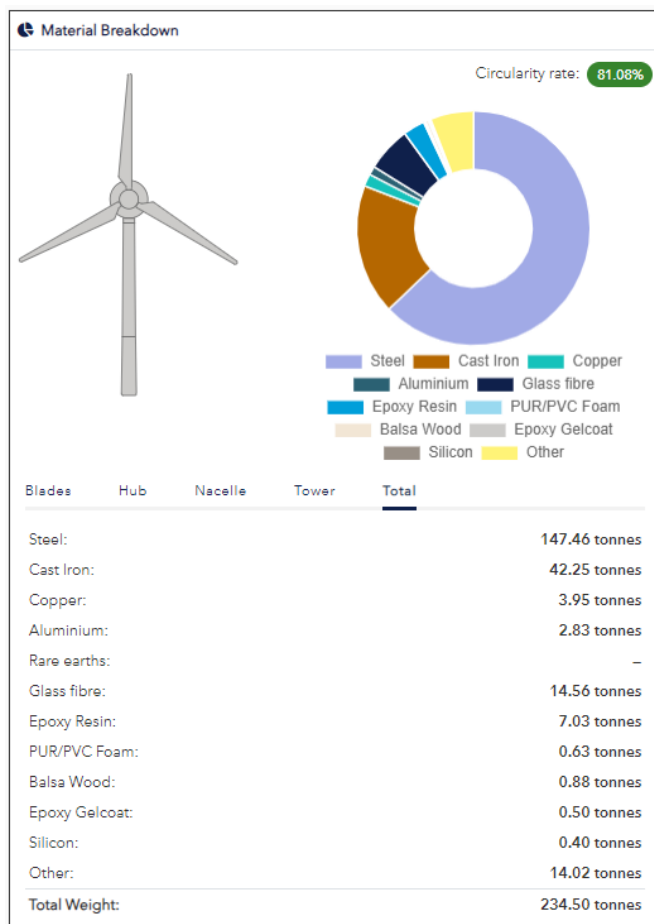
Or

Maximise circularity

ReWind ensures success and saves time at every phase of the renewables project life cycle.

- **FINANCIALS** - Calculate the decommissioning cost and residual value of renewables projects with our market-leading materials database and cost models
- **PROJECT PLANNING** - Identify project planning, bidding, and reporting inputs such as asset material breakdown, project circularity rate, and decommissioning costs
- **SUPPLY CHAIN** - Discover local decommissioning partners and new recycling methods through our supply chain database - an industry first!

The material composition of your wind farm



The decommissioning scope is the largest cost driver

Full Decommissioning

1

Choose project

2

Select providers

3

Define scope

4

Summary

Decommissioning scope

Access roads to be removed?

☒ Yes

Are there geotextiles beneath the road to be removed?

☒ Yes

Are the level crane pads at each turbine base to be removed?

☒ Yes

Are there geotextiles beneath the crane pad to be removed?

☒ Yes

Do the cables need to be removed?

☒ Yes

Deeper reclamation of foundation required than 1m bellow ground?

☒ Yes

Is there a top-soil storage area on site possible?

☒ Yes

Does the HV substation need to be removed?

☒ Yes

Is the met mast to be removed?

☒ Yes

Any other building or constructions on site?

☒ Yes

Building to be removed?

☒ Yes

Cost

Chart

Table

Category	Value
Disassembly cost	1,500,000
Removal cost	1,000,000
Material disposal cost	1,000,000
Blade disposal cost	1,000,000
Foundations removal cost	1,000,000
Cable removal cost	1,000,000
Removal of other on-site constructions	1,000,000
Access roads removal cost	1,000,000
Crane pads removal cost	1,000,000
Reinstale cost	1,000,000
Project overhead cost	1,000,000
Turbine metal scrap value	2,500,000
Total	11,000,000

Include scrap value of wind farm

☒ Yes

← Previous

Next →

Remove scenario

Turbine removal only

1

Choose project

2

Select providers

3

Define scope

4

Summary

Decommissioning scope

Access roads to be removed?

☐ No

Are there geotextiles beneath the road to be removed?

☐ No

Are the level crane pads at each turbine base to be removed?

☐ No

Are there geotextiles beneath the crane pad to be removed?

☐ No

Do the cables need to be removed?

☐ No

Deeper reclamation of foundation required than 1m bellow ground?

☐ No

Is there a top-soil storage area on site possible?

☒ Yes

Does the HV substation need to be removed?

☐ No

Is the met mast to be removed?

☐ No

Any other building or constructions on site?

☐ No

Building to be removed?

☐ No

Cost

Chart

Table

Category	Value
Disassembly cost	1,500,000
Removal cost	1,000,000
Material disposal cost	1,000,000
Blade disposal cost	1,000,000
Foundations removal cost	1,000,000
Cable removal cost	1,000,000
Removal of other on-site constructions	1,000,000
Access roads removal cost	1,000,000
Crane pads removal cost	1,000,000
Reinstale cost	1,000,000
Project overhead cost	1,000,000
Turbine metal scrap value	2,500,000
Total	2,000,000

Include scrap value of wind farm

☒ Yes

← Previous

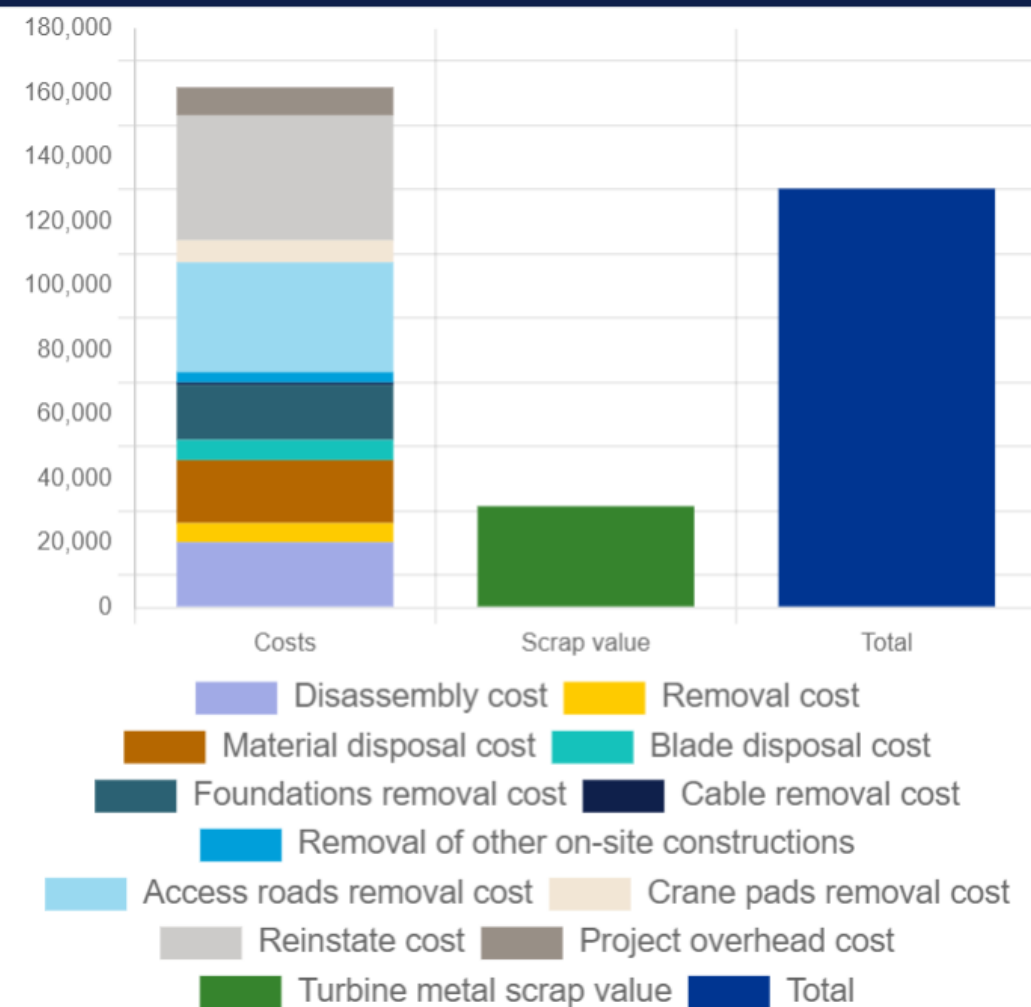
Next →

Remove scenario

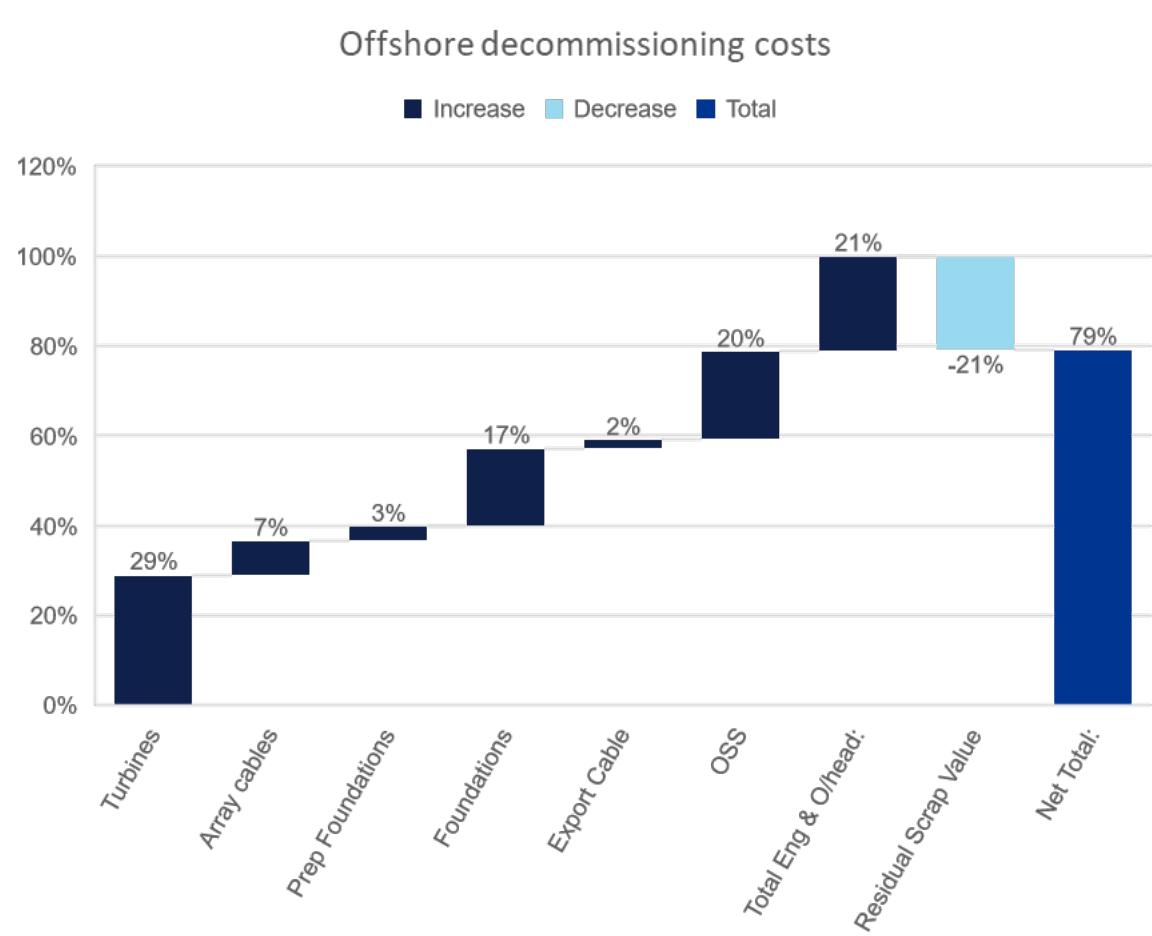
Cost scenario breakdown - €/MW

V80-2000KW-2G 2MW

● Turbine disassembly cost	20.313,15 €
● Turbine removal cost	5.951,93 €
● Material disposal cost	19.586,31 €
● Turbine blade disposal cost	6.298,59 €
● Turbine foundations removal cost	17.122,23 €
● Cable removal cost	647,54 €
● Removal of other on-site constructions	3.318,70 €
● Access roads removal cost	34.112,41 €
● Crane pads removal cost	6.822,47 €
● Reinstatement cost	38.947,13 €
● Project overhead cost	8.713,60 €
● Turbine metal scrap value	31.517,69 €
● Total decommissioning costs	130.316,35 €

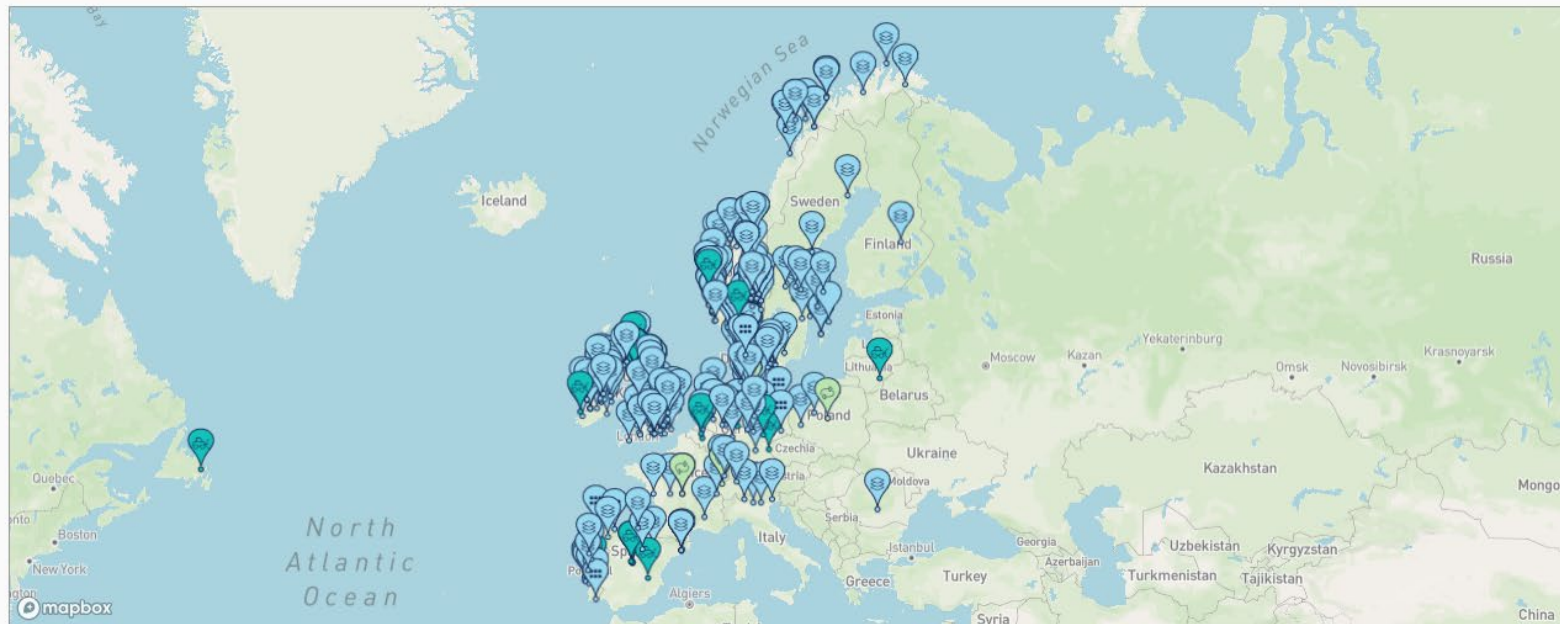


Offshore decommissioning costs



Cost category	% of total cost
Dismantling and transportation of offshore wind turbines	29%
Removal of array cables	7%
Preparation for removal of foundations	3%
Removal of foundations	17%
Removal of export cables	2%
Removal of offshore substation	20%
Overhead costs	21%
Scrap value	-21%

Service providers

[+ Add new provider](#)


Filter

Facility type

Materials

Services





20 providers / page

Saved providers

Drafts

Company	Location	Status	Facility type	Materials	Services
Morecambe Metals	United Kingdom	● Operating	Material Processing	Metals	Recycling
Franzefoss AS_Hareid	Norway	● Operating	Material Processing	Concrete, Metals	Recycling
Franzefoss AS_Haugesund	Norway	● Operating	Material Processing	Concrete, Metals	Recycling
Franzefoss AS_Kristiansand	Norway	● Operating	Material Processing	Concrete, Metals	Recycling

ReWind's is used throughout the full wind farm life cycle

Year	-5-0	0-25	30-35
Phase	Project Development	Ongoing operations	Decommissioning
Customer Segment	Wind farm developers	Wind farm owners and operators	Wind farm owners and operators
Customers	  	  	  

Testimonials

“We joined ReWind as we saw exciting potential in this new service from DNV. ReWind's easy to use, market-leading decommissioning and recyclability software provides material breakdown assessments of our wind farms, along with automated decommissioning cost assessments. We believe the industry-leading platform will enable us to calculate the residual value of our assets and maximize the circularity of our projects, whilst unlocking significant time savings.

We have been impressed with the support and customer centric approach of the ReWind team as they continue to develop the service based on our feedback.”

Senior Circularity Specialist

“ReWind offers a comprehensive process, with an end product that’s presented in a very user-friendly format. Some key areas were identified to address at various stages of a project, including development, construction, operation and end of life. It is also a valuable tool for assisting with end of life financial accruals. ReWind gives a very thorough assessment of recyclability options for your assets and considerations to take on board – it’s a highly recommended process to complete.”

O&M Engineering Manager

ReWind

Captain Stephen Norman – stephen.r.norman@dnv.com

Tel - 07801 078019