



Offshore Wind – Past, present and future

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Shifts starts with new demand, crises or technology break through



Offshore wind is still under development

10 years (2013-2023) of development in offshore wind

Wind turbines



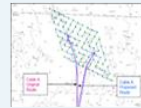
4 MW



14 MW



Wind farms size



300 MW



1300 MW



Distance from shore



30 km



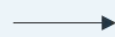
110 km



Water depth



20 meter



40 meter



Access limits



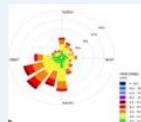
1.5 meter



3.5 meter



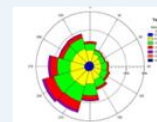
Avg wind speed



8 mps



10 mps



- Reduced LCOE
- Reduced WACC
- Increased targets
- Global industry
- Increased footprint

The difference between oil and offshore wind

Similarities



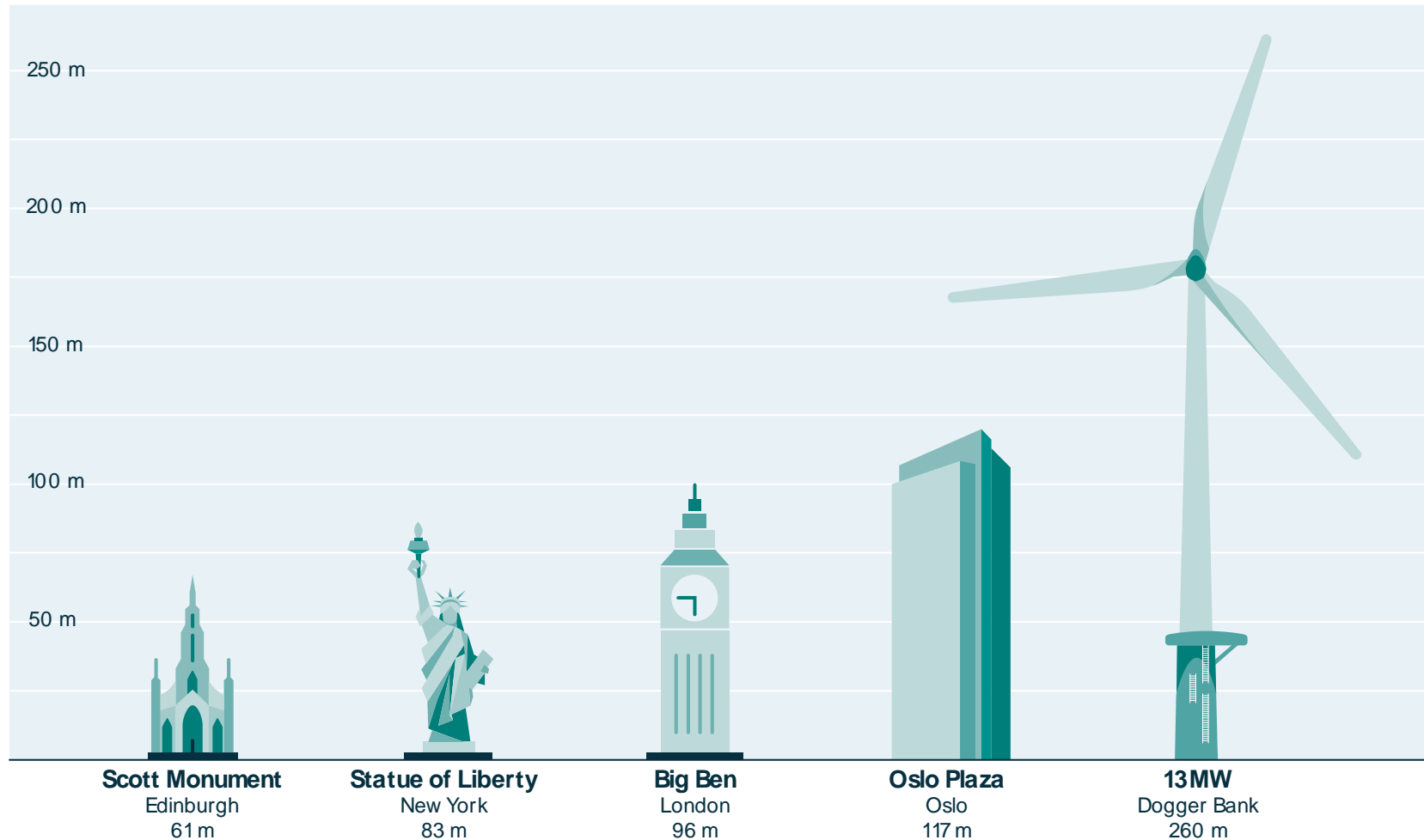
Differences

- The marine environment
- The complexity
- The time line
- The competence
- The supplier industry
- The capital needed
- Part of the technologies



- The product & key technologies
- The key drivers & policies
- The risk exposure
- The regulatory framework
- The project execution model
- The financing
- The partnerships
- The business case/model

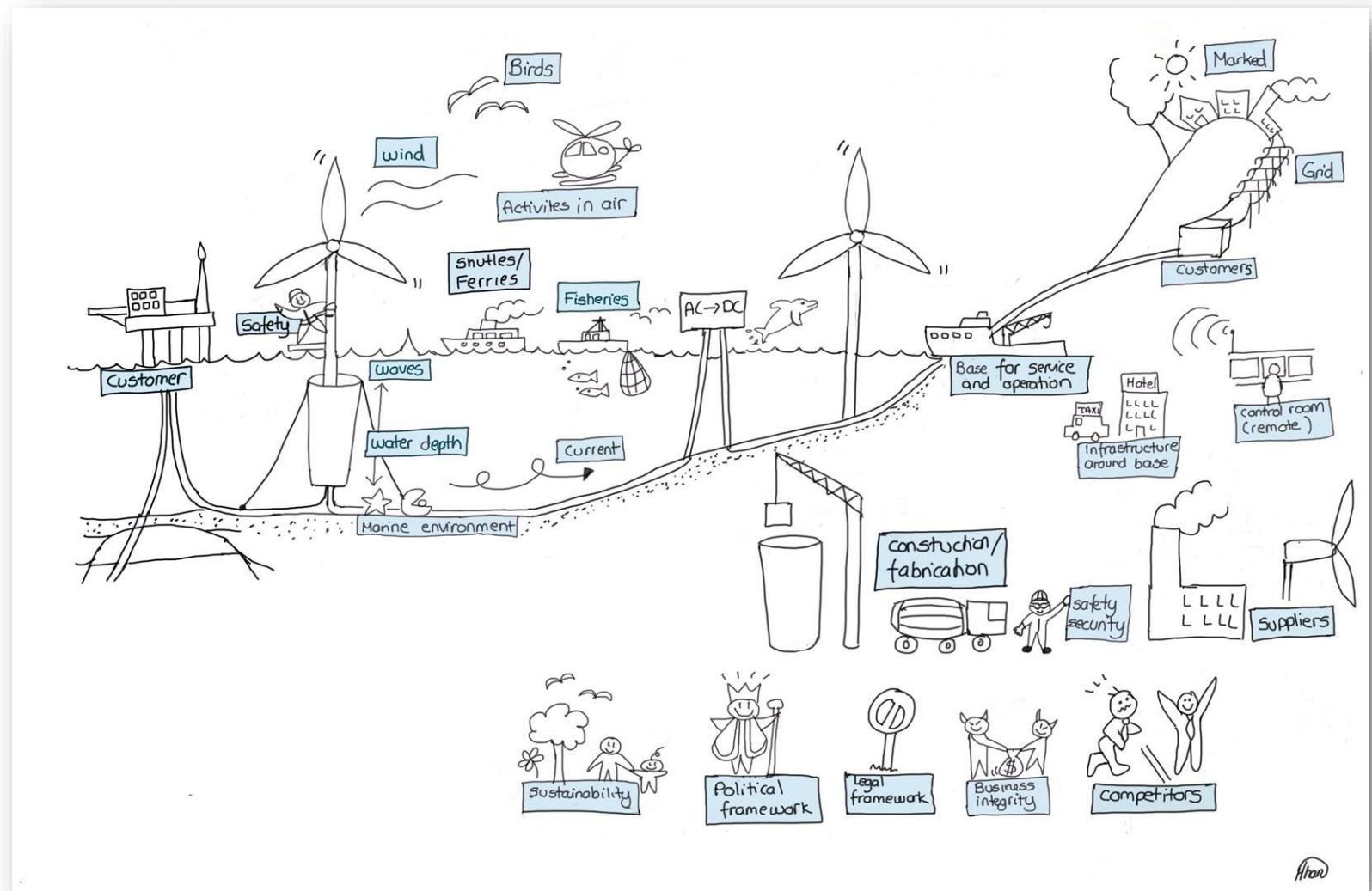
Offshore wind is heavily impacted by scale effects



- ✓ Increased production
- ✓ Reduced cost
- ✓ Lower impact
- ✓ Increased complexity
- ✓ Added flexibility

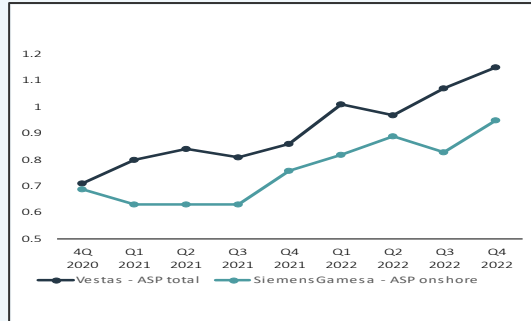
The business environment is different

- Customers
- Stakeholders
- Local community
- Infrastructure
- Local industry
- The politicians and the public



Some headwinds on the way

Increased costs – short term ?



mEUR price per MW for WTGs

Industry profitability as a whole challenged – supply chain costs are increasing making delays inevitable

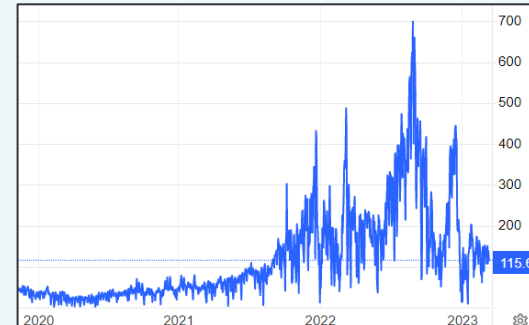
Increasing cost of capital



Cost of capital (Euro 10Y swap rate %)

Impacts investment levels across the board due to higher upfront costs

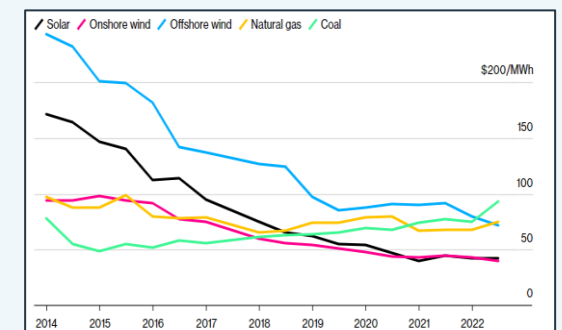
Power price volatility



Germany electricity spot prices (€/MWh)

Set higher requirements to power market capabilities and impacts overall risk position

LCOE down, local content high



Global LCOE development by technology

Lower LCOE urge governments to cut subsidies, while still expecting high local content levels – requiring a constant focus on cost.

Key drivers impacting the success of developing a portfolio



Technology Game – Learn

- Develop technology
- Learn from project to project
- Identify potential

Cost Game – Demonstrate & Mobilize

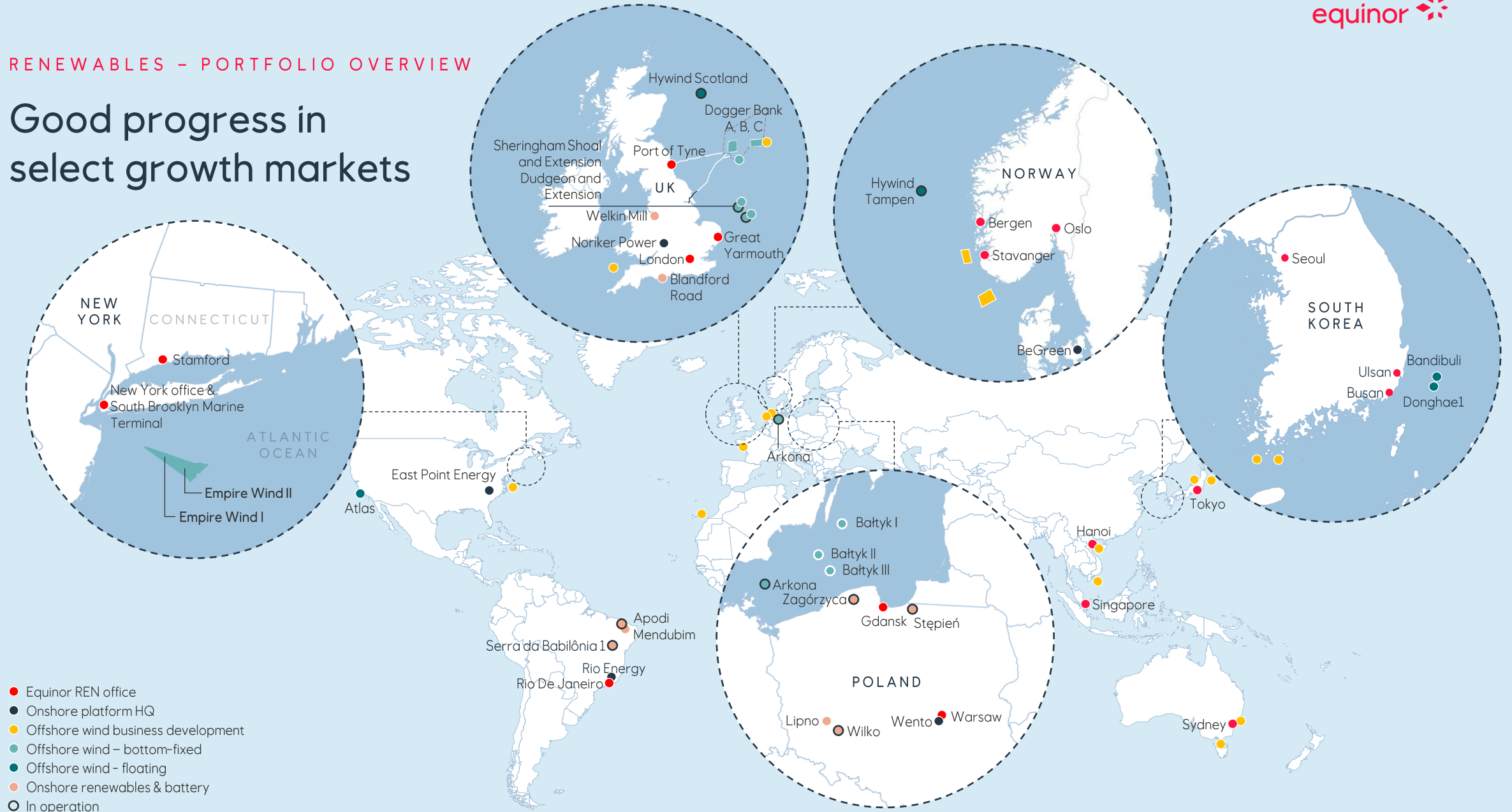
- Consolidate technologies
- Work with suppliers
- Share information and discuss issues

Scaling Game – Commercialize

- Develop local supply chain
- Industrialise and commercialize
- Drive competitiveness & scale
- Work locally

RENEWABLES - PORTFOLIO OVERVIEW

Good progress in select growth markets



What's next ?

- A global industry ?
- An integrated infrastructure
- A digital wind farms
- A remote operated set up
- A broader energy offering
- New type of customers ?





An Ocean of Opportunities

Thank you
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