UK Lessons : Global Perspective on OSW Supply Chain Opportunities for Maine

March 30 2021

Foreign, Commonwealth & Development Office

GOVERNOR'S Energy Office

mitc Maine International Trade Center

CARBON TRUST

Contents

1. UK introduction
   Peter Abbott OBE, British Consul General in Boston

2. Maine introduction
   Stephanie Watson, Governor's Energy Office and Wade Merritt, Maine International Trade Center

3. How the UK has helped companies pivot to offshore wind
   Jan Matthiesen, Carbon Trust

4. Lessons learnt from Hywind and developing a floating wind supply cha
   Rhodri James, Equinor

1. UK and Maine introductions

- UK 10 point plan – quadruple offshore wind capacity by 2030, invest in ports, infrastructure and green jobs.
- New England has set the pace for US offshore wind and Maine has shown strong political leadership and academic excellence.
- UK and Maine signed a first of its kind energy partnership agreement at the end of 2020.
- Maine – strong manufacturing supply chain, proximity to energy market, political commitment, universities, shipping/working at sea. These will enable Maine to build the offshore wind opportunity.

UK introduction

Peter Abbott OBE, British Consul General in Boston

Maine introduction

For More Information:

To get involved with the State of Maine OSW Roadmap and Floating OSW Research Array:
https://www.maine.gov/energy/initiatives/offshorewind
Stephanie.watson@maine.gov

To learn more about the Maine International Trade Center and their resources:
www.mitc.com
Wade Merritt: merritt@mitc.com

3. Carbon Trust

- The UK has developed the offshore wind industry through market visibility, innovation, learning, economies of scales and investment – help drive the market, reduce cost and risk.
- CfD mechanism provides market certainty and gives confidence to investors which is needed for cost reduction and market scale-up.
- Too many changing targets (or overly ambitious) can create uncertainty in the market having a negative effect on the industry.

3. Carbon Trust

- Offshore wind technology is constantly changing and the supply chain needs to be prepared e.g. increased turbine size, floating wind technology.

- Knowledge from other industries can help and countries should look at complementary skills.

- UK continues to invest and foster the supply chain, collaborating with other sectors and academia.

How the UK has helped companies pivot to offshore wind

Jan Matthiesen, Carbon Trust

Who we are

Our mission is to accelerate the move to a sustainable, low carbon economy

Carbon Trust:

- **works with corporates and governments**, helping them to align their strategies with climate science and meet the goals of the Paris Agreement;
- provides **expert advice and assurance**, giving **investors and financial institutions** the confidence that green finance will have genuinely green outcomes; and
- supports the **development of low carbon technologies and solutions**, building the foundations for the energy system of the future.

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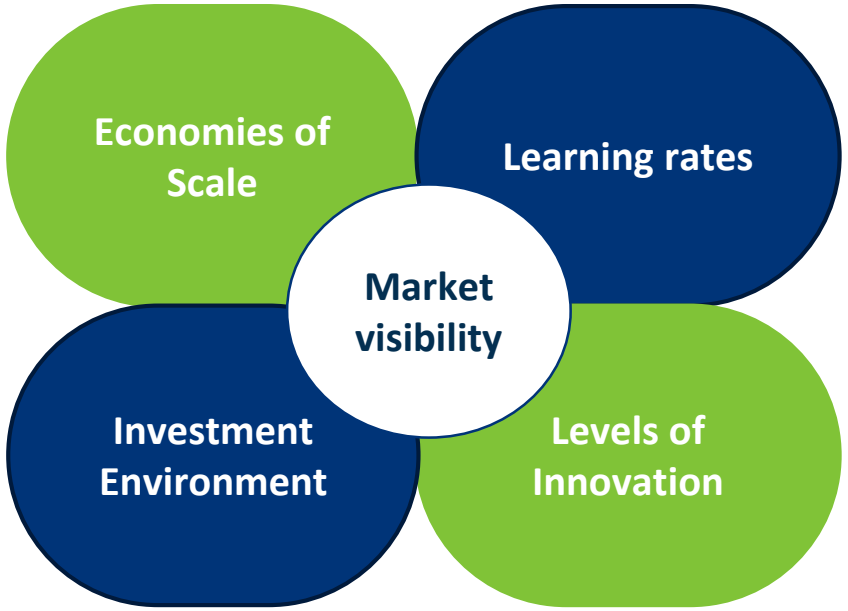
Developing an Offshore Wind Market

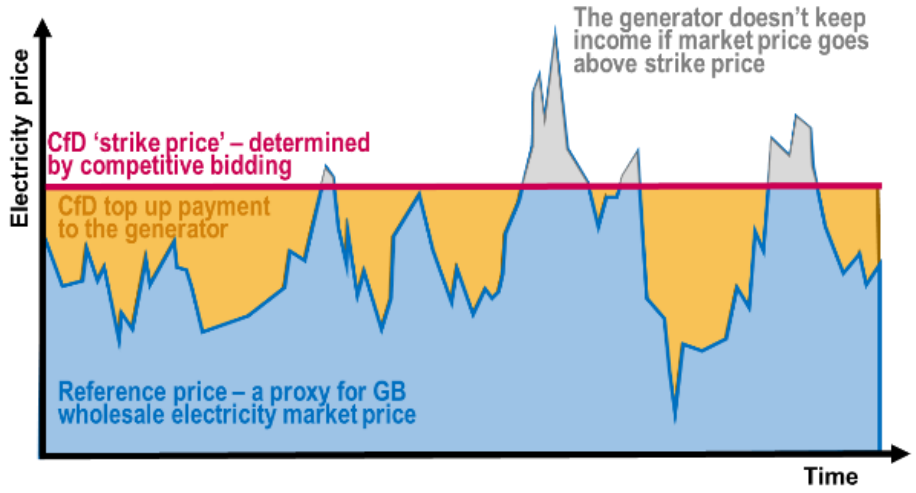
Drivers for creating an offshore wind market

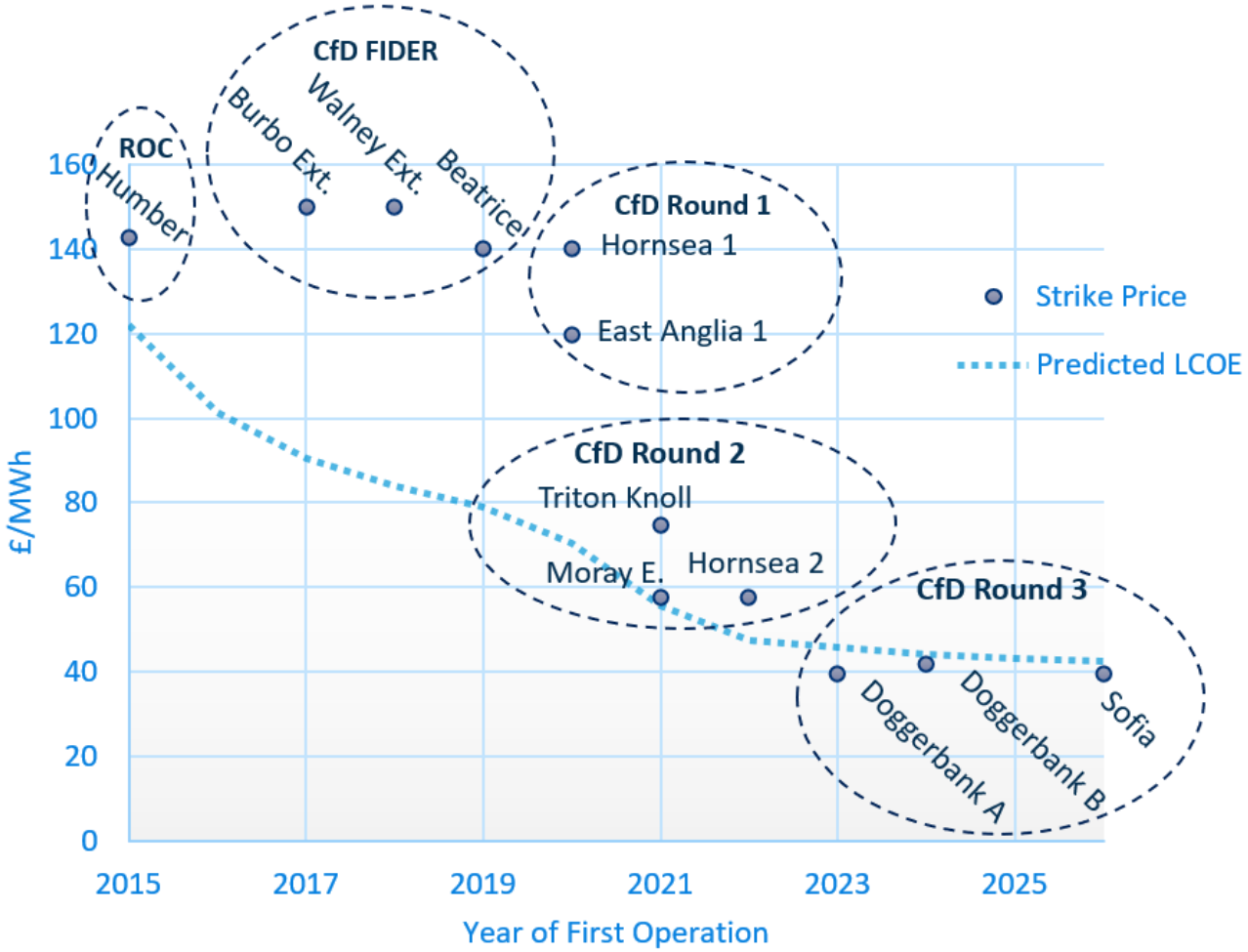
1. **Market Visibility** – the provision of long term targets that with political will give certainty and confidence in a markets ambition to deploy offshore wind at scale.
2. **Innovation** – the application of resources to resolve offshore wind challenges and barriers often through collaboration.
3. **Learning** – the ability of the offshore wind sector to learn by doing to apply learning rates but also leverage off other marine industries.
4. **Economies of scale** – facilitating and capitalising on the cost advantages within the offshore wind supply chain due to the increasing size of projects and wind turbines but also its global expansion.
5. **Investment** – Creating an attractive and well regulated investment environment for offshore wind that reduces the cost of finance and facilitates debt & equity provision.



UK offshore wind has been a success story

- The UK is the world leader in offshore wind, with more installed capacity than any other country.
- The price of offshore wind is less than a third of what it was a decade ago.
- CFD Provide long term stability of income for new-build low carbon power projects (15 years of stability on a 25-35 year project lifetime)





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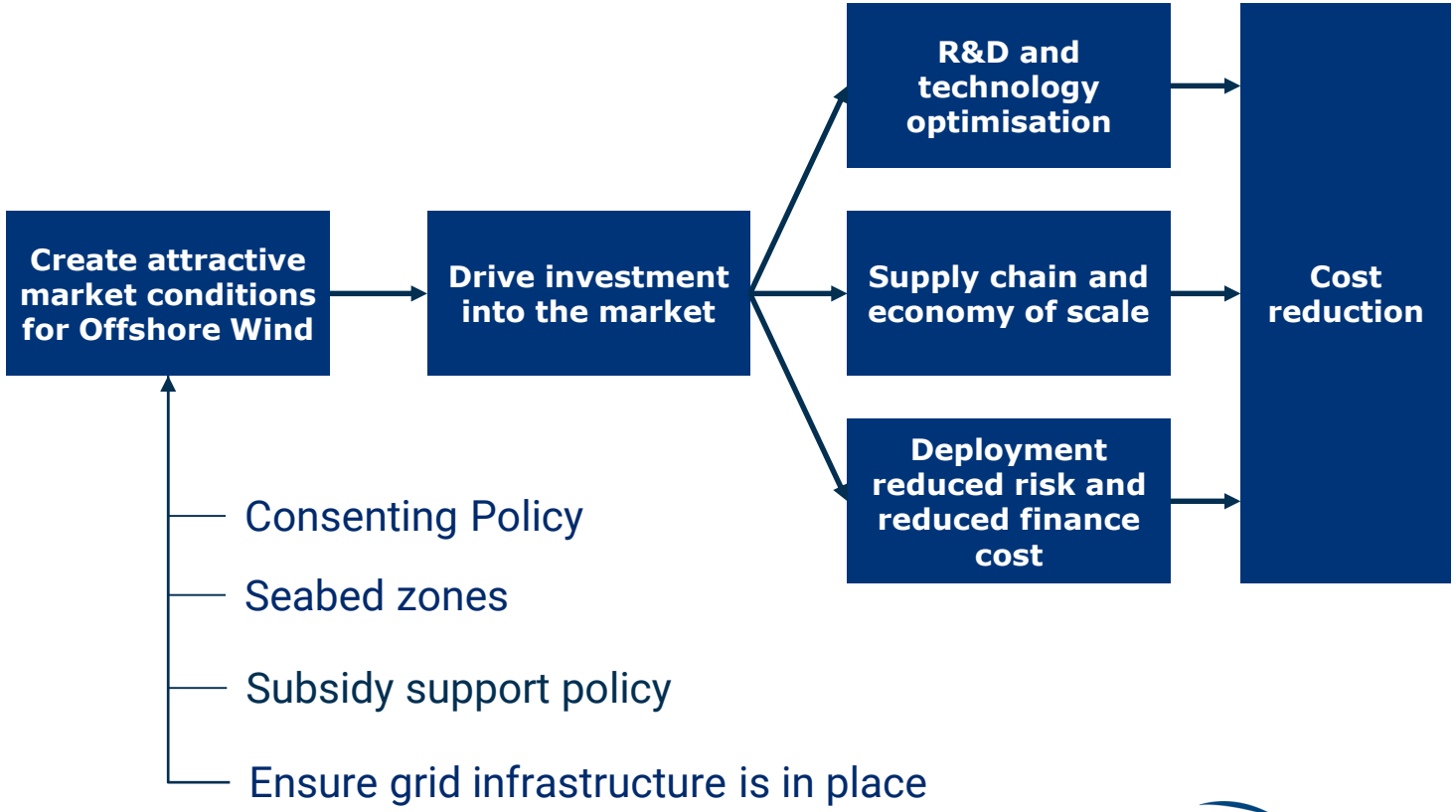
Visibility of a potential market was critical in the UK to drive cost reduction

Creating attractive market conditions



Industry needs to be confident in the market before investing in technology and innovations

With a clear pipeline investments in cost reductions are more attractive

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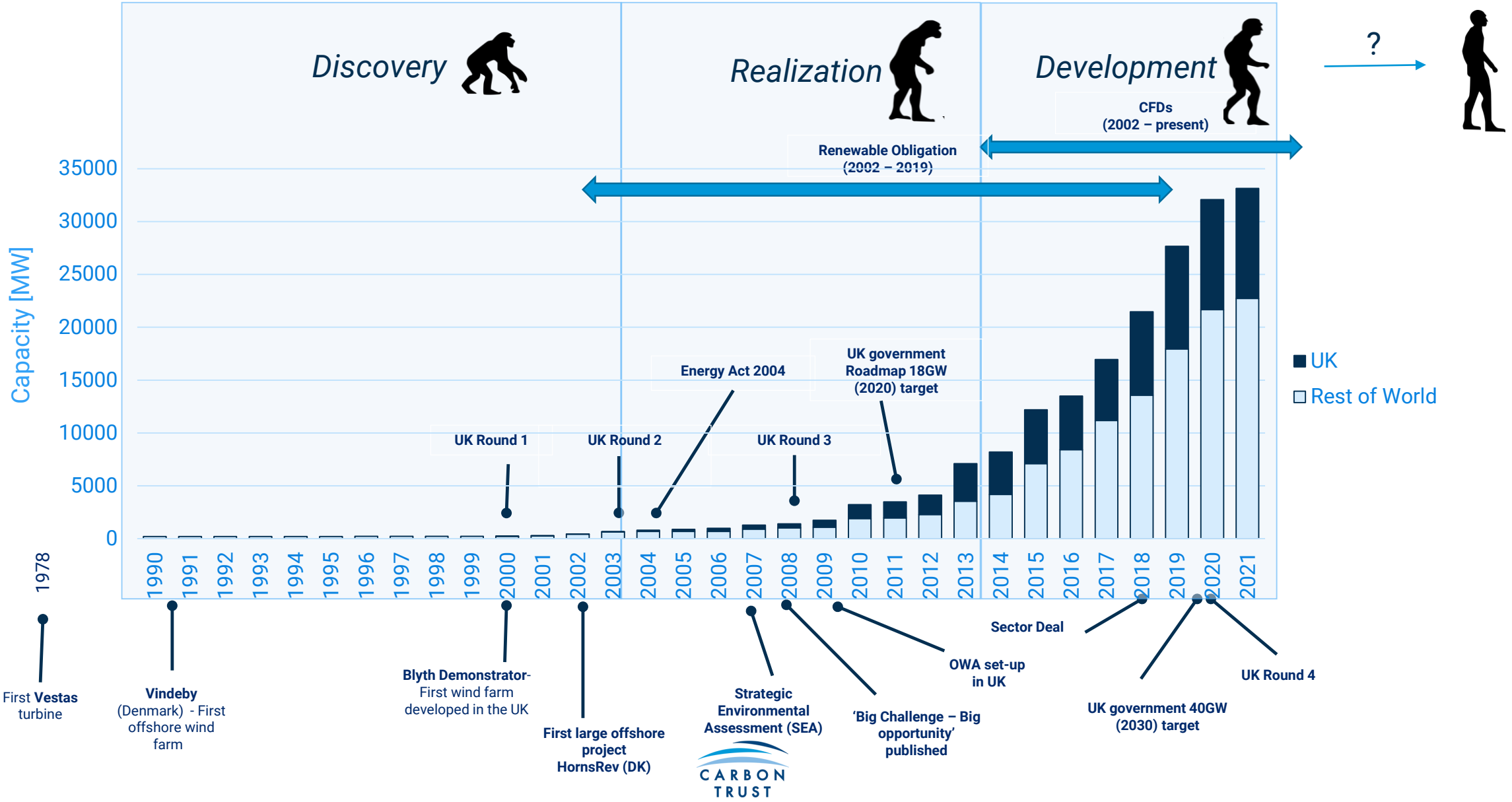
The offshore wind market developed over the last 30 years



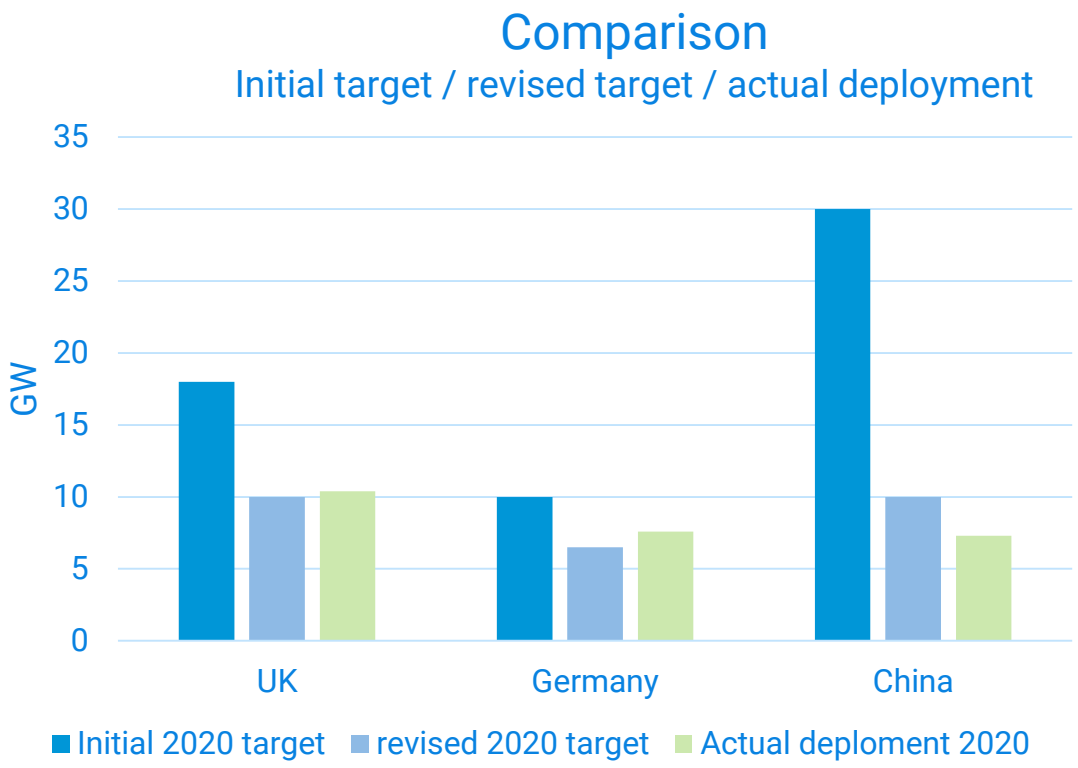
Changing targets created uncertainty in the market

Deployment targets need to be **realistic**

- Failure to meet overly ambitious targets can have a detrimental effect on the industry

A number of countries have been forced to scale-back deployment targets

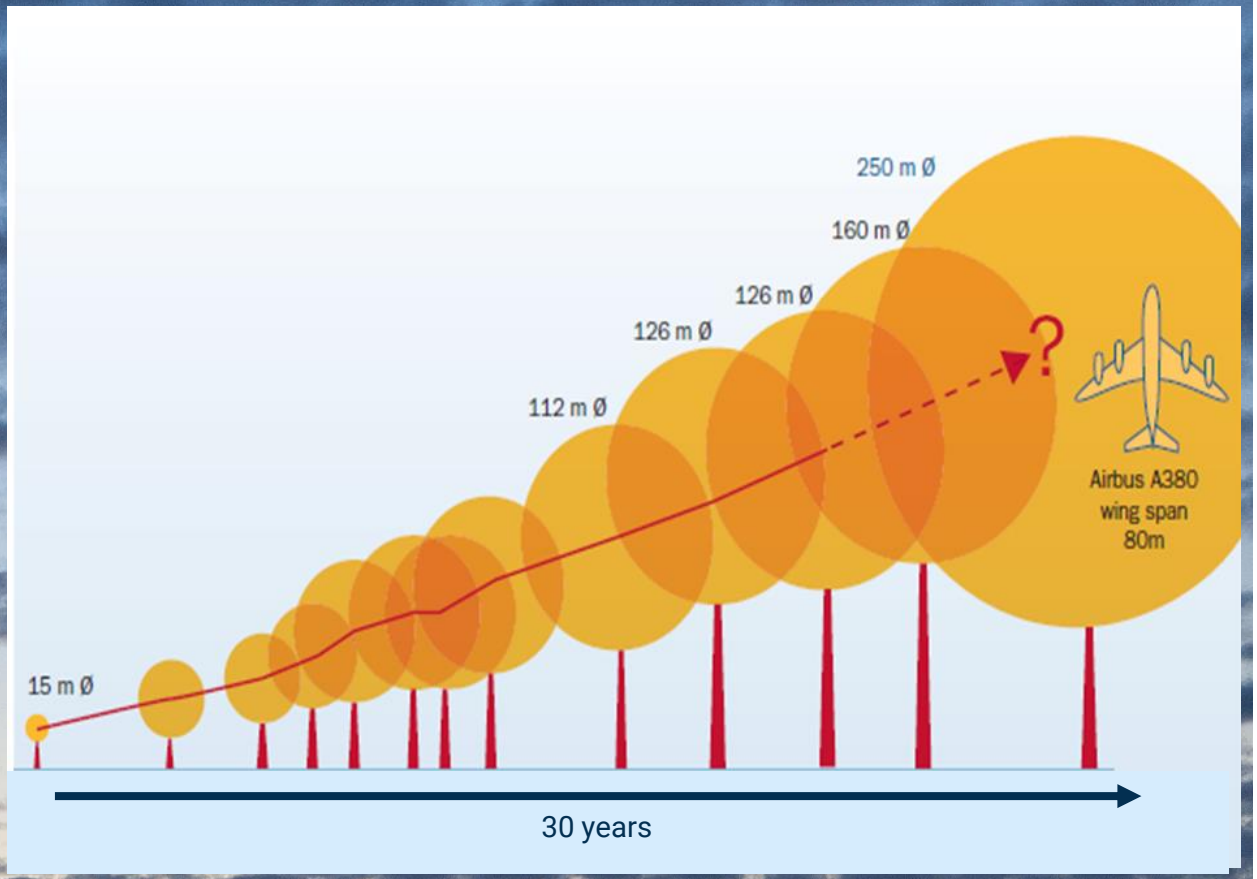
- Scale-backs have been largely a result of high project costs, political uncertainty (i.e. changing subsidy regimes), consenting delays, and an expectation that offshore wind could be built out at the same rate as onshore wind



Deployment targets which are ambitious but realistic.

The sector is constantly evolving

Be prepared for future technology and supply chain needs



New technology solutions are required to meet future demands

Supporting knowledge and skills transfer from other sectors helped offshore wind development

Maritime Industry

Robotics

Navy

Aviation

Sensor technology

Power Generation

Electrical Infrastructure

Automation

Artificial Intelligence / Machine learning

Oil and Gas

Subsea Industry

Drones

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connect ideas, people and communities

Examples of how the UK continues to foster the supply chain

Press release

New plans to make UK world leader in green energy

The announcement is part of the government's commitment towards net zero emissions by 2050 and will support 60,000 jobs

Supergen Offshore Renewable Energy

- £160 million will be made available to upgrade ports and infrastructure
- This will create 2,000 construction jobs and support up to 60,000 jobs directly and indirectly by 2030 in ports, factories and the supply chains, manufacturing

- Investment in R&D including a new £20m floating wind demonstrator programme
- Focus on mid-technology readiness level (TRL) technologies that are ready to be proved

- Academia are encouraged to work collaboratively and engage with industry
- Funding is awarded to fill gaps or add cross-cutting activities to explore the transfer of research findings between sectors

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Recommendations

Create a strong domestic market

Market visibility (e.g. targets, leasing round, subsidy support)

Invest in key enabling infrastructure

Port and manufacturing facilities, grid reinforcement

Support innovation in the supply chain

Ongoing technology development and R&D

Increase coordination of supply chain by allowing knowledge and skills transfer across different industry sectors

Identify and support new market entrants, capacity building

Align decarbonisation and energy goals with industrial strategy and green recovery

Beyond LCOE – job creation/safeguarding, export opportunities

4. Equinor

- Equinor are making significant investments in the US and are developing the supply chain which will bring many jobs and significant economic opportunities.
- Development and scale-up of floating wind. Pilot projects have proven to be successful, giving confidence for future cost parity (economies of scale).
- Similarities in the supply chain between fixed and floating, although it is important to consider the differences e.g. mooring systems, dynamic cables etc.
- Equinor have worked closely with the supply chain to develop capabilities and build up the offerings.

4. Equinor

- UK is well positioned for growth with a long term market demand, enabling environment, focus on attracting inward investment and strengthening and growing the domestic supply chain.
- Important action for policy makers – market demand with certainty and scale, collaboration, specialisation to offer world class services, advocate Maine and create a business environment to enable inward investment
- Important action for suppliers- understand the market, know your customer and understand the tier levels and where you sit, private sector partnerships and innovate to develop market needed solutions.

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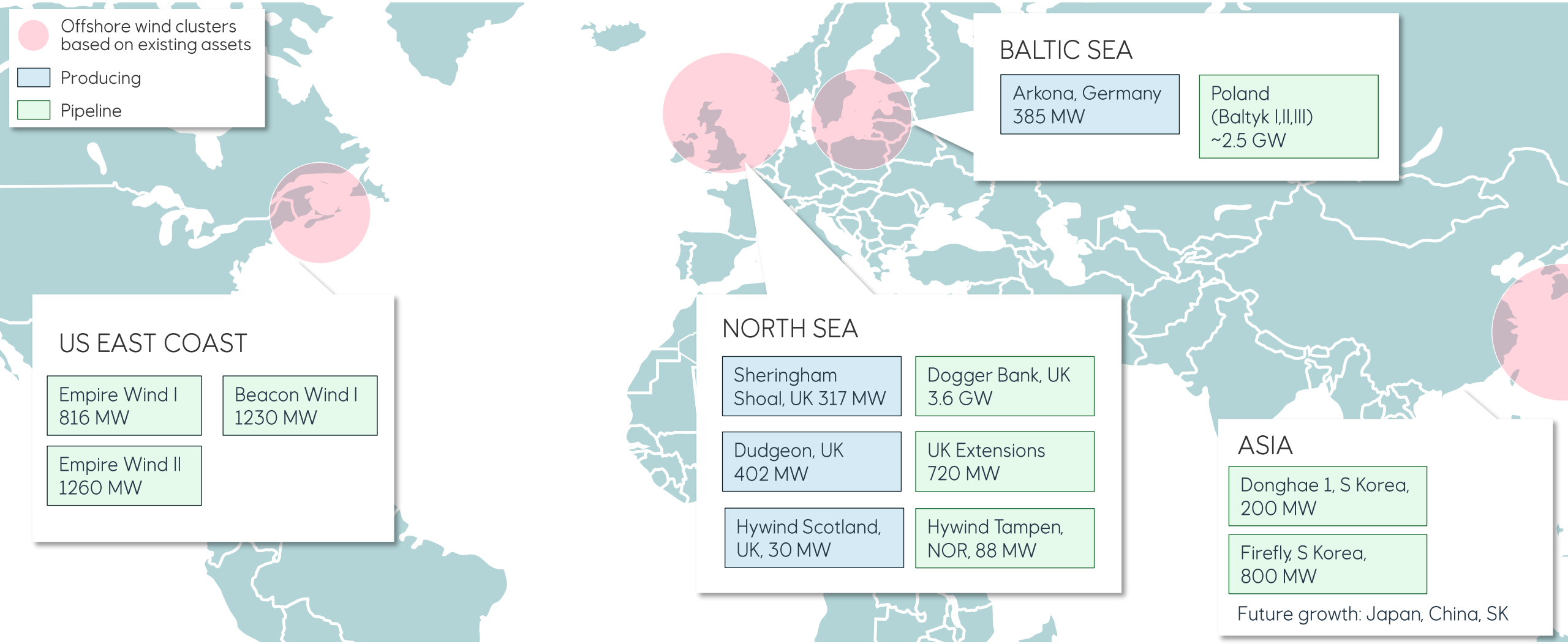
Lessons learned from Hywind Scotland and developing a floating offshore wind supply chain

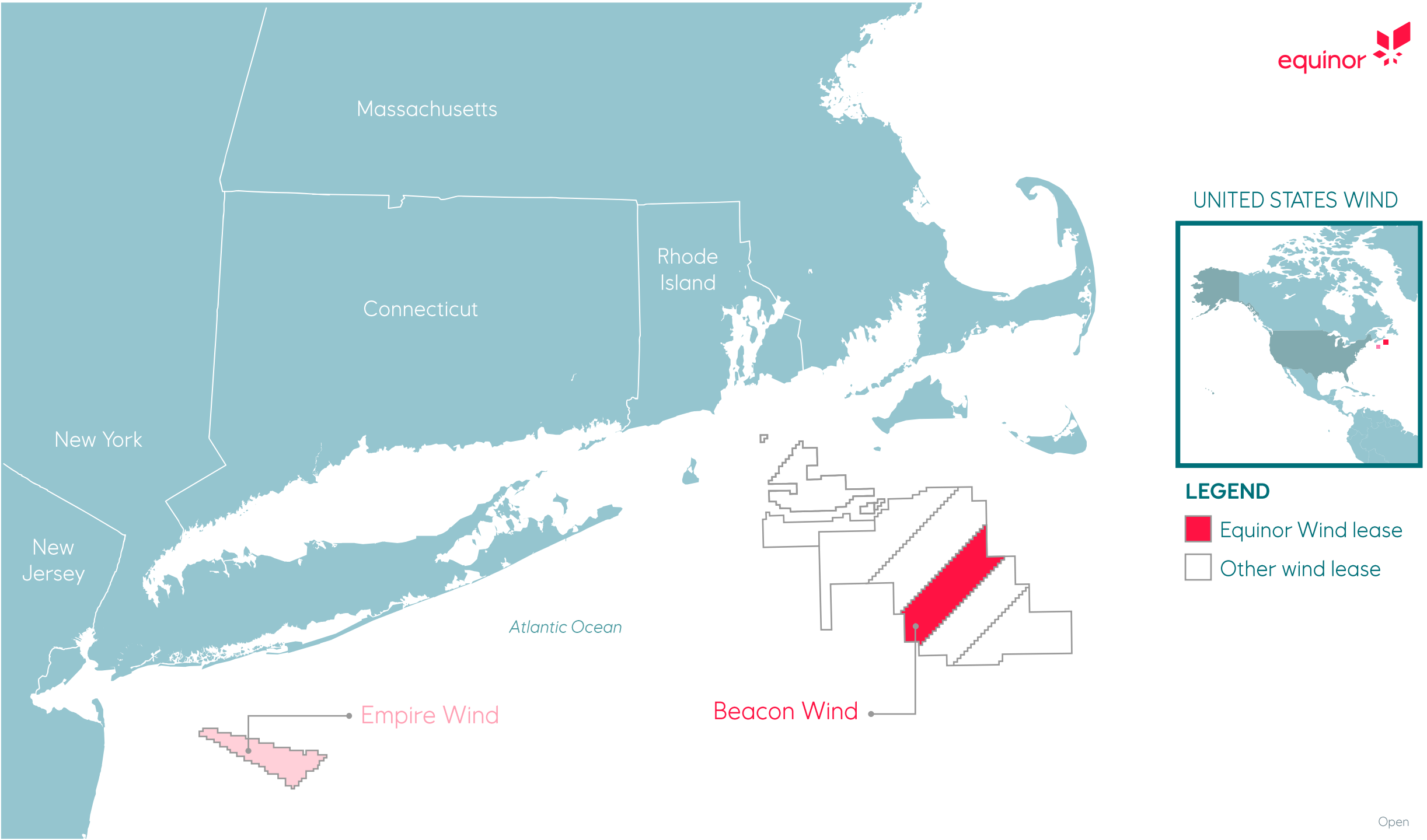
UK-ME OSW Supply Chain webinar

Rhodri James, Lead Business Developer

30 March 2021

Equinor's Global Presence: Offshore Wind

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Massachusetts
Rhode Island
Connecticut
New York
New Jersey
Atlantic Ocean
Empire Wind
Beacon Wind
UNITED STATES WIND
LEGEND
Equinor Wind lease
Other wind lease

Economic development & Supply chain

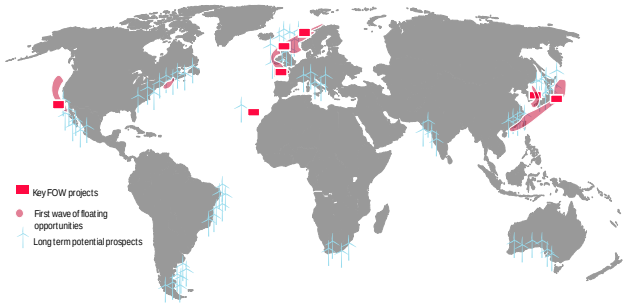
- **South Brooklyn Marine Terminal (SBMT):**
  - Turbine staging
  - O&M hub
- **Port of Albany**
  - Turbine tower factory
  - Partnership with Marmin and Welcon
- **GBS (Empire 1)**
  - Concrete foundations
  - Fabricated with high local content in New York State
- **Skills & research:**
  - Workforce development & training
  - Research partnerships

Our floating wind roadmap:
Stepping up floating wind to become a competitive source of energy

Hywind demo
2.3 MW

Hywind Scotland
30 MW

Hywind Tampen
88 MW



Next floating wind project
200-500MW

Utility scale project
~500-1000MW

Fully commercial technology
40-60 EUR/MWh

Long-term vision

- Utility generation
- Power export
- Island states
- O&G integration
- Power-to-Gas (H_2)

Technology development → Cost reduction → Industrialization

2009 — 2017 — 2022 — 2025-26 — 2027-30 — 2030+

Open

Elements in the Supply Chain for a Floating Offshore Wind project

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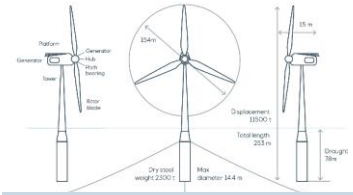
LCOE (%):	~2-4%	~25-35%	~25-35%	~5-10%	~25-35%
	Project development	Turbine	Balance of Plant	Installation & Logistics	Operation & Maintenance

Project development

Design and Engineering
- Feasibility studies
- Concept studies
- FEED
- Detail engineering



Permitting
- Planning
- Consent

Site investigation
- Wind resource
- Met-ocean assessment
- Geotechnical
- Geophysical
- Environmental surveys

Turbine

Turbine
- Nacelle
- Blades
- Tower
- Small components (e.g. landing base)
- Other (e.g. internals)

Balance of Plant

Foundation
- Substructure
- Connection pieces
- Boat landing

Mooring system
- Mooring lines (chain/rope)
- Connection system
- Tensioner
- Anchors

Electrical infrastructure
- In-field array cables
- Floating elements
- Offshore substation
- Export cable
- Land Fall
- Onshore substation

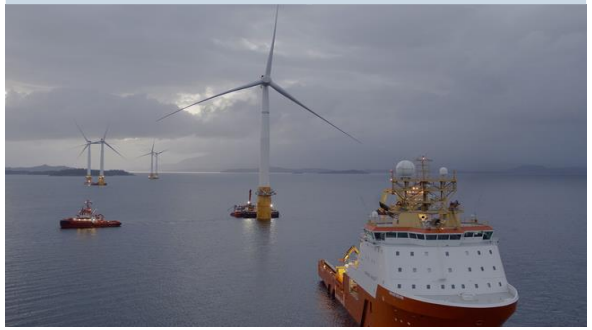
Installation & Logistics

Transportation
- Vessels
- Marine operations
- Logistics

Staging & Assembly
- Marshalling port(s)
- Heavy lift crane

Offshore installation
- Mooring system
- Offshore substation
- Cable laying

Tow and hook-up
- Vessels
- Marine operations
- Logistics
- Commissioning



Operation & Maintenance

O&M base
- Port
- Facility / office

Vessels
- CTV
- SOV
- Heavy lift crane vessel

Subsea inspection
- Vessels (CTV, SOV)
- ROVs

Decommissioning

Hywind Scotland: Construction

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Fabrication

Transportation

Staging & Assembly

Mating

Towing

Hook-up and commissioning

Open

Procurement and supply chain of Hywind Scotland

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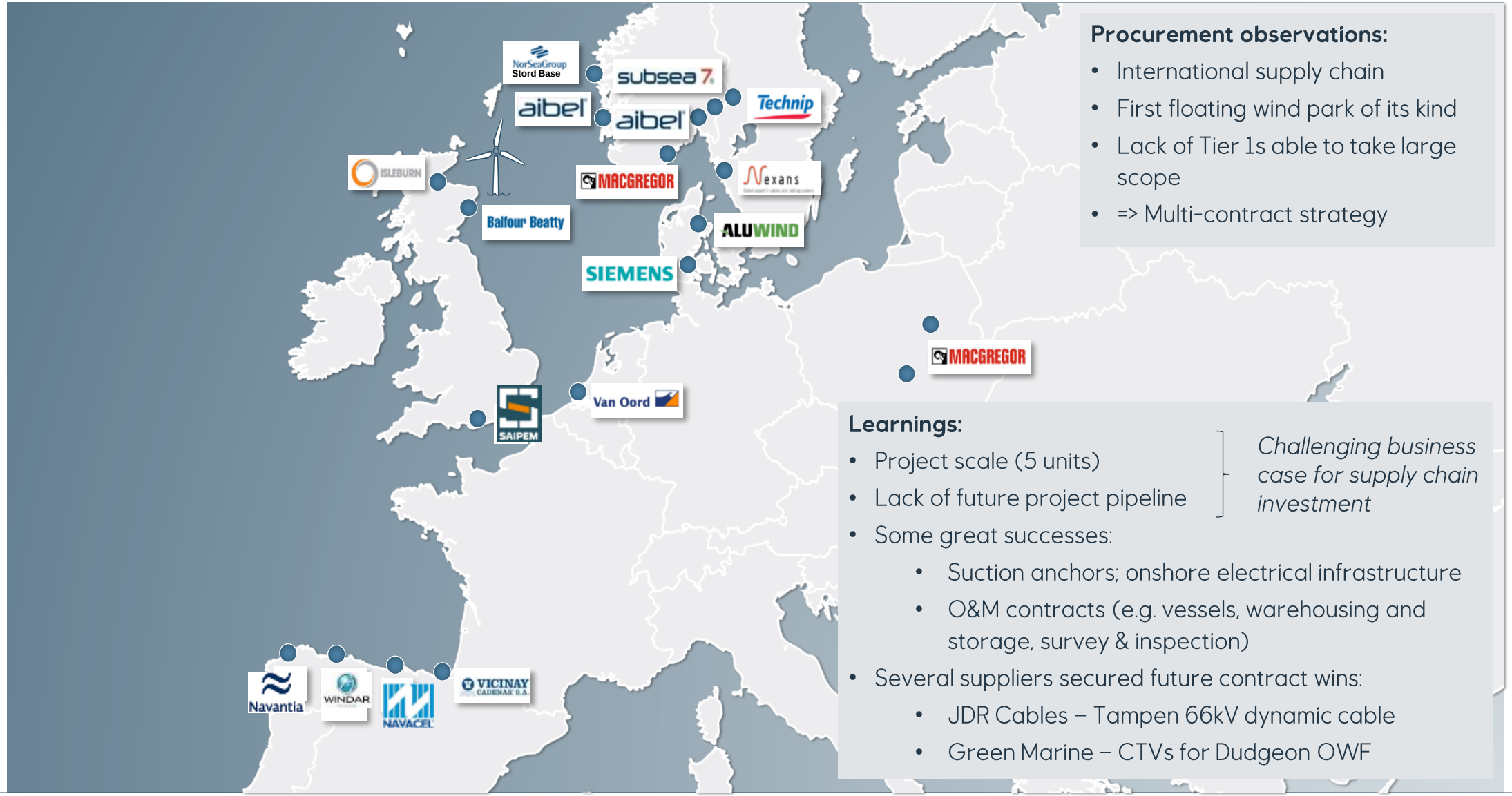

Procurement observations:

- International supply chain
- First floating wind park of its kind
- Lack of Tier 1s able to take large scope
- => Multi-contract strategy

Learnings:

- Project scale (5 units)
- Lack of future project pipeline

Challenging business case for supply chain investment

- Some great successes:
  - Suction anchors; onshore electrical infrastructure
  - O&M contracts (e.g. vessels, warehousing and storage, survey & inspection)
- Several suppliers secured future contract wins:
  - JDR Cables – Tampen 66kV dynamic cable
  - Green Marine – CTVs for Dudgeon OWF

UK: Positioned for future success

- **Long-term market demand**
  - 40 GW by 2030; ~100 GW by 2050
  - 1 GW floating offshore wind by 2030
- **Enabling environment**
  - Port infrastructure upgrades
  - Support from central to local government
- **Attracting inward investment**
  - GE blade facility
  - Monopile and tower facilities (TBC)
- **Strengthening and growing the domestic supply chain**
  - Offshore Wind Growth Partnership (SME support)
  - Innovation / R&D

KEY MESSAGES

POLICY MAKERS & PUBLIC SECTOR:

- **Market demand:** Investment needs order books and visibility/certainty of demand, at scale
- **Collaborate:** Work with neighbouring states to deliver mutual benefits
- **Specialise:** Identify strengths and focus on creating world-class capabilities
- **Attract:** Be an advocate for offshore wind in Maine to attract investment
- **Enable:** Creating an enabling environment for inward investment

SUPPLIERS & BUSINESSES:

- **Understand the market:** Do your research, utilise the services available, build a network
- **Know your customer:** Identify where you fit into the supply chain and target your engagement accordingly
- **Collaborate:** Seek to build partnerships/alliances to improve your value offering
- **Innovate:** Develop solutions that set you apart – cost reduction, risk reduction, HSE

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Shaping the future of energy

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Q&A

- Fisheries – create a forum for discussion between developers and the fishing industry. It is important to keep clear lines of communication and transparency. There will be opportunities for co-existence e.g. Equinor are trialling different fishing methods at a testbed to aid understanding.
- Port facilities – Roadmap in Maine will look to identify short and long-term opportunities.
- Floating substations will be required in some markets (e.g. California) and Japan is currently operating one. Further development is required and fixed substations will be used in the short-medium term.
- O&M – floating will use CTVs and SOVs (similar to fixed) and don't expect to see greater levels of seasickness.
- Turbines are designed to worst-case scenarios with curtailment and there are lots of learnings from O&G on the mooring systems.