OFFSHORE WIND ACCELERATOR PROJECT
WEBINAR SERIES

Offshore Wind: Lessons From Europe

Hosted by Lew Milford, President of Clean Energy Group
Founder of CEG and CESA

December 19, 2013

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Innovation in Finance, Technology & Policy

CleanEnergy States Alliance

Housekeeping

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- You are encouraged to type in questions regarding today's presentations at any time during the webinar by entering your question in the **Question Box** on the webinar console. Questions will be answered as time allows following all of today's presentations.

- This webinar is being recorded and will be made available after the call at **www.cleanenergystates.org/webinars**. Previous webinar recordings are also posted.

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Offshore Wind Accelerator Project

- OWAP Objective: Address key challenges facing offshore wind in five focus areas

- Work with individual States to assist with the development of strategic, long-term policies to advance offshore wind and develop a serious process to get to OSW scale in the U.S.
- Work on regional strategies with multiple states to increase opportunities for joint funding, networking and information sharing, joint procurement, supply chain and siting cooperation.
- Work on developing new finance tools and mechanisms, including buyers' networks and joint aggregated purchases, to provide the needed capital to scale up the offshore wind industry.
- Continue to communicate of ideas and policy developments between states and other stakeholders through OWAP.
- Work with leading European and UK policy makers to learn about the more established experience with offshore wind in those countries, and import that knowledge to US energy policy makers.

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Guest Speakers

- Mike Hay, Xodus Group
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- Cathryn Hooper, Source Low Carbon
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Please Submit Questions

Questions submitted from webinar participants will be addressed following the presentations.

Please type your questions in the webinar console's question box and hit "send" at any time during the broadcast.

Stay connected to OWAP!

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Find us online:

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Visit our website to read more about OWAP and sign up for our e-newsletter:
http://www.cleanenergystates.org/projects/accelerating-offshore-wind-owap/

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Independent,
integrated
thinking

Offshore Wind: The start of the learning curve

Mike Hay, Senior Consultant

Two Business Streams – Oil & Gas and Low Carbon

Supported by Four Service Lines

Total Field Development

- Concept integration and selection
- Site selection
- Integrated multi discipline engineering teams for studies
- Environmental and consenting support

Integrated Projects

- Integrated multidisciplinary teams for FEED onwards
- Post consent and environmental support
- Project delivery support
- H&S support

Integrated Asset Support

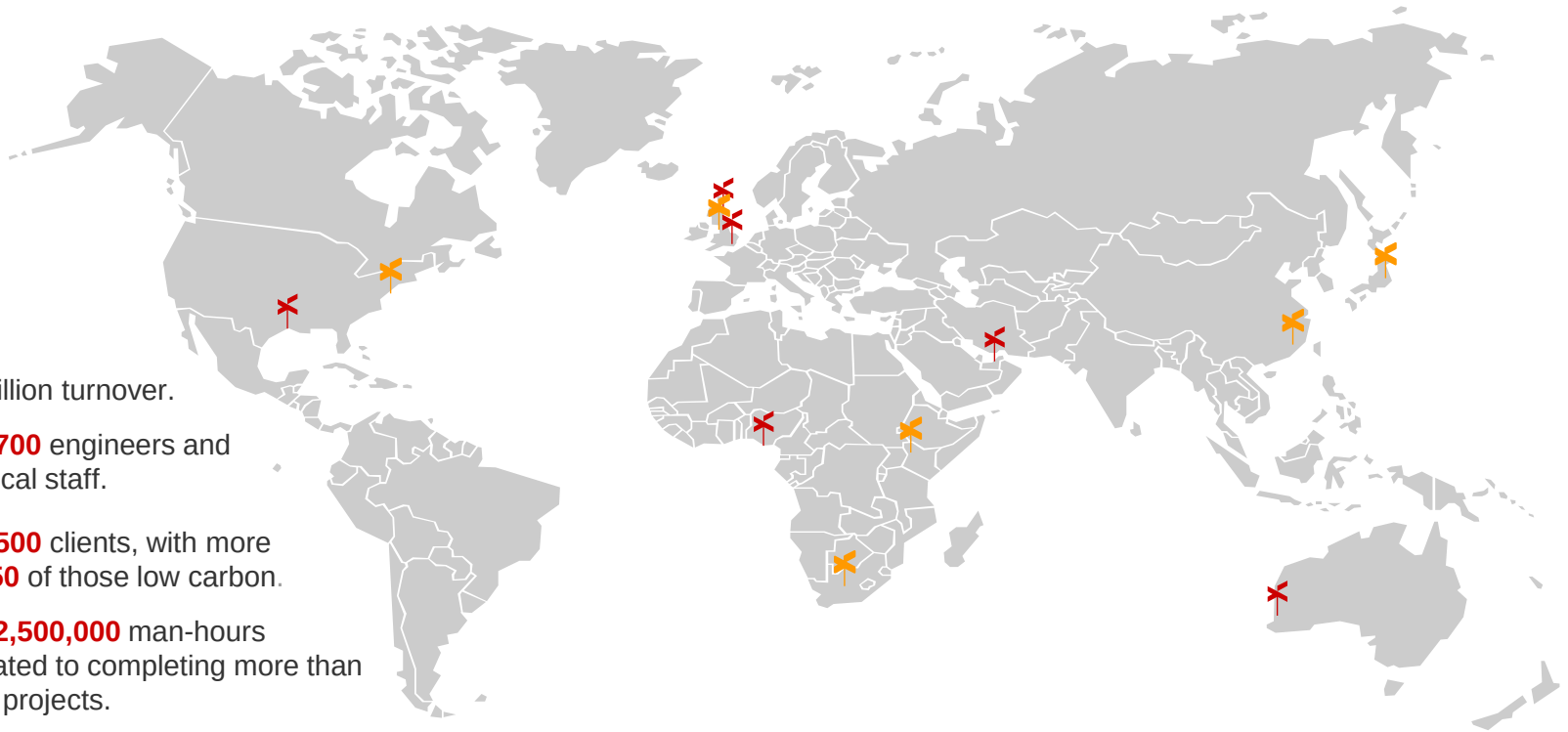
- Technical Integrity assurance
- Reliability and maintainability
- Risk Based Inspection
- Operations and maintenance optimisation

Advisory

- Strategic studies and Feasibility assessments
- Due diligence
- LCoE modelling
- Training
- Audits

Global Presence

Offices, projects and key statistics



£**62**million turnover.

Over **700** engineers and technical staff.

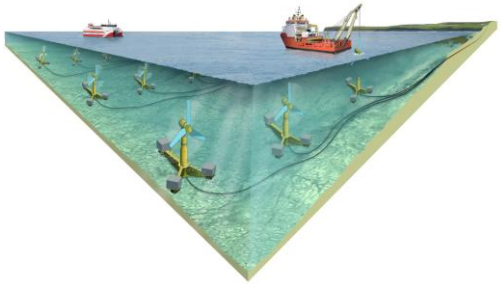
Over **500** clients, with more than **50** of those low carbon.

Over **2,500,000** man-hours dedicated to completing more than **5,500** projects.

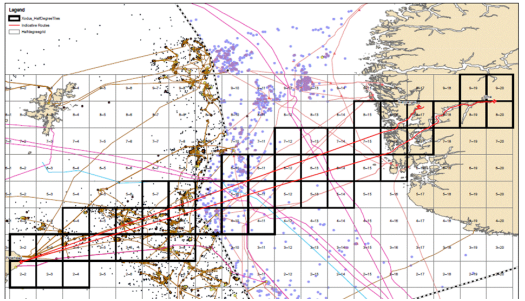
Xodus Low Carbon Sectors

Our main sectors

Offshore Wind



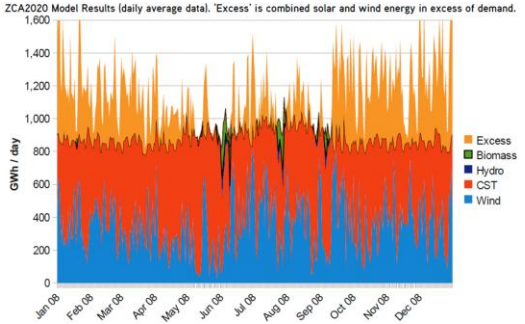
Marine Energy



Interconnectors

Floating wind

CCS



Carbon Consultancy

Project Due Diligence Experience

Offshore Wind

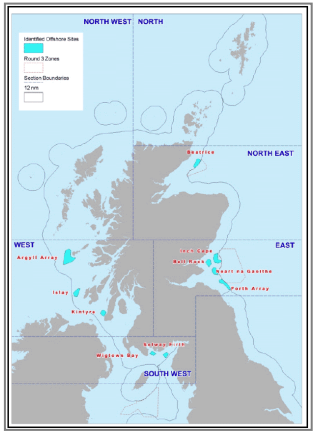
- Offshore engineer on more than 10 offshore wind projects in UK, France, Germany, Holland and Belgium
  - Q7/ Prinses Amalia (world's 1st non-recourse pre-construction project finance of an offshore windfarm)
  - Thanet
  - Bligh Bank
  - Thornton Bank (Phases 1 & 2)
  - Baltic 1 & 2
  - Greater Gabbard
  - Cote d'Albatre
  - Plus significant experience in oil & gas sector which is directly transferrable

Offshore Wind in the UK

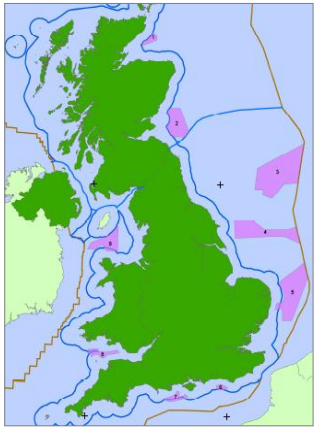
Scaling up to bring costs down

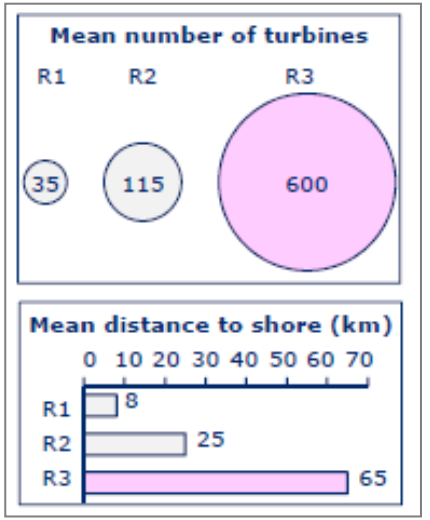
2000 and 2003

2009



2010





> Round 1 and 2:

- > Demonstration and up-scaling
- > 60-1,200MW's
- > Up to 30m water depth
- > Up to 20km from shore

> Scottish Territorial Waters:

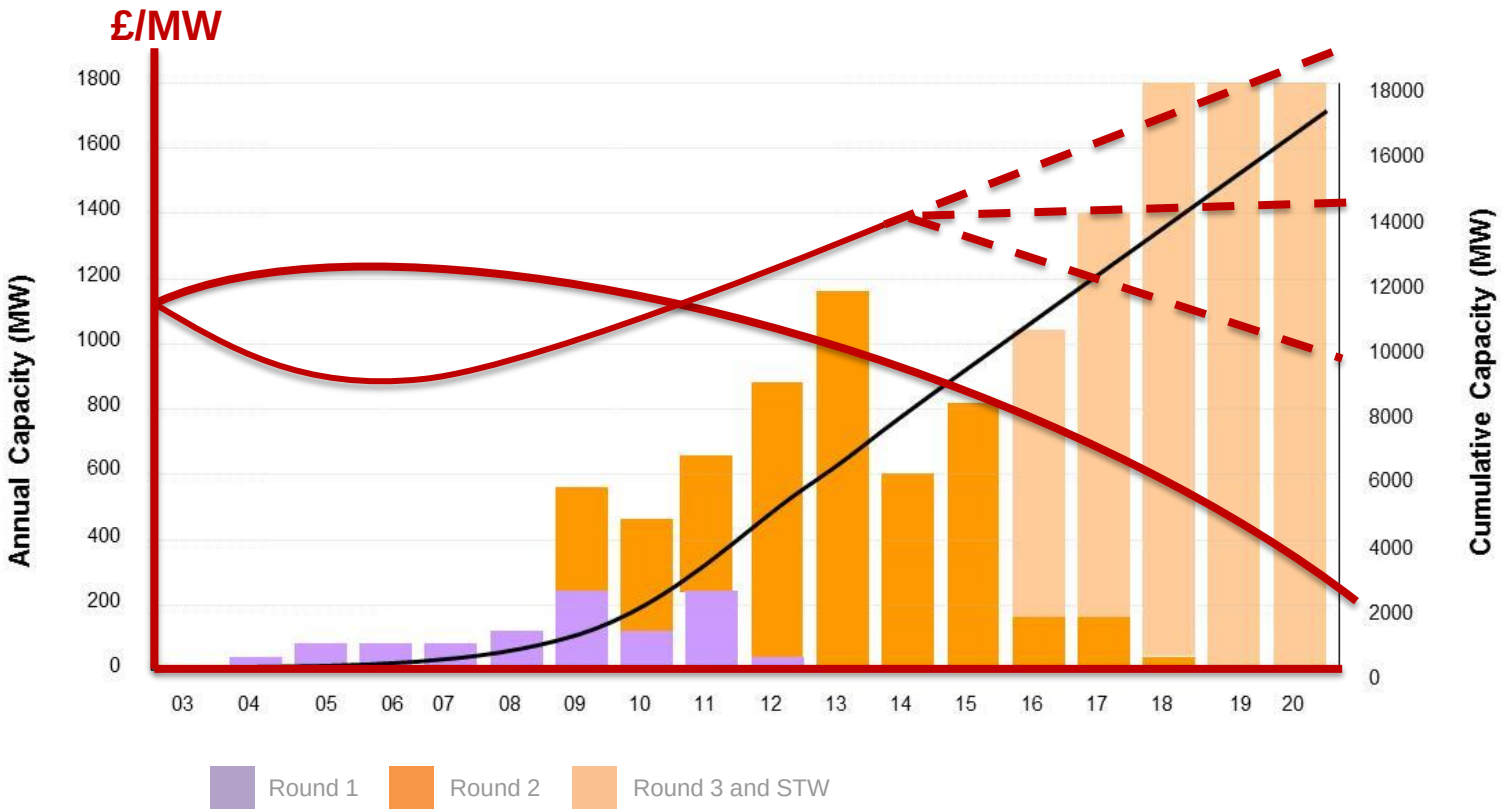
- > Regional Opportunity
- > 450-1,000MW's
- > Up to 50m water depth
- > Up to 20km from shore

> Round 3:

- > Industrialisation
- > 600-9,000MW's
- > Up to 70m water depth
- > Up to 140km from shore

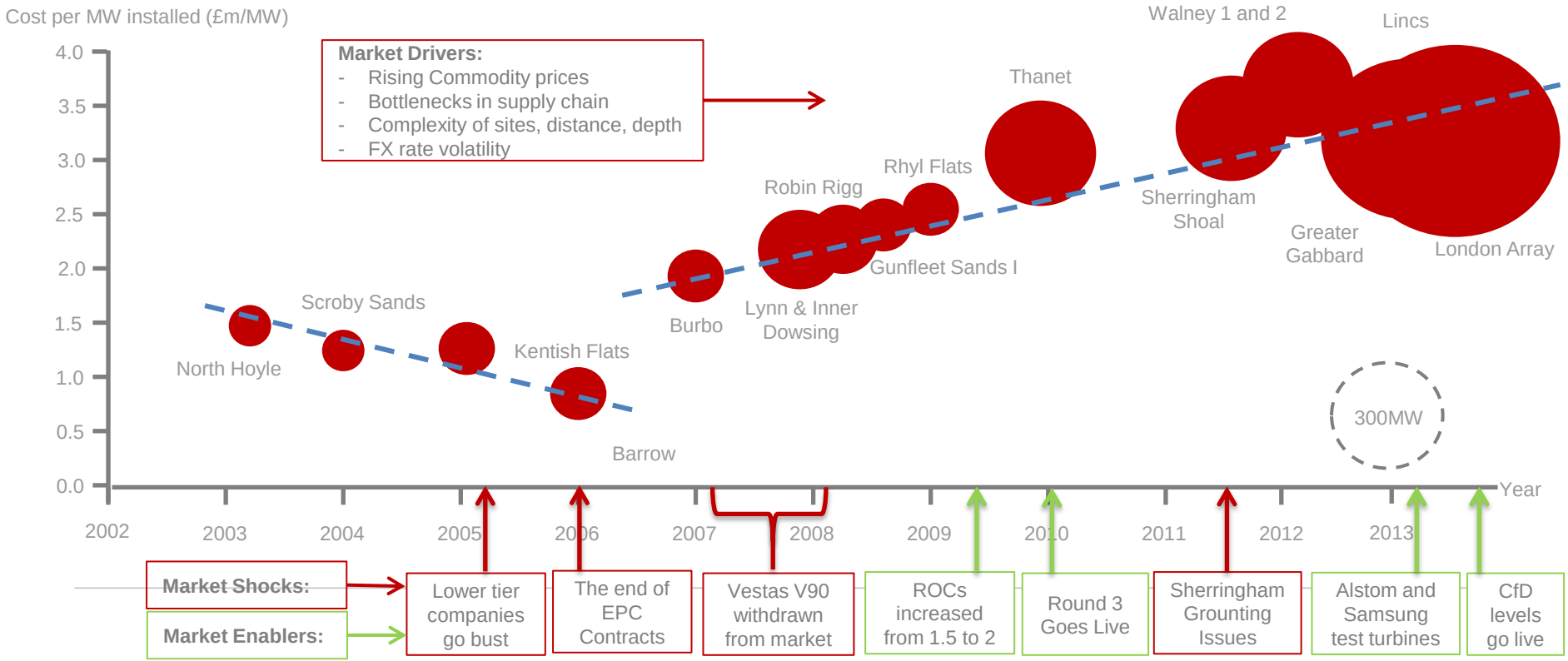
Offshore Wind in the UK

Scaling up to bring costs down



A life less ordinary

A promising childhood but turbulent teenage years



Cost Reduction: Technical Innovation

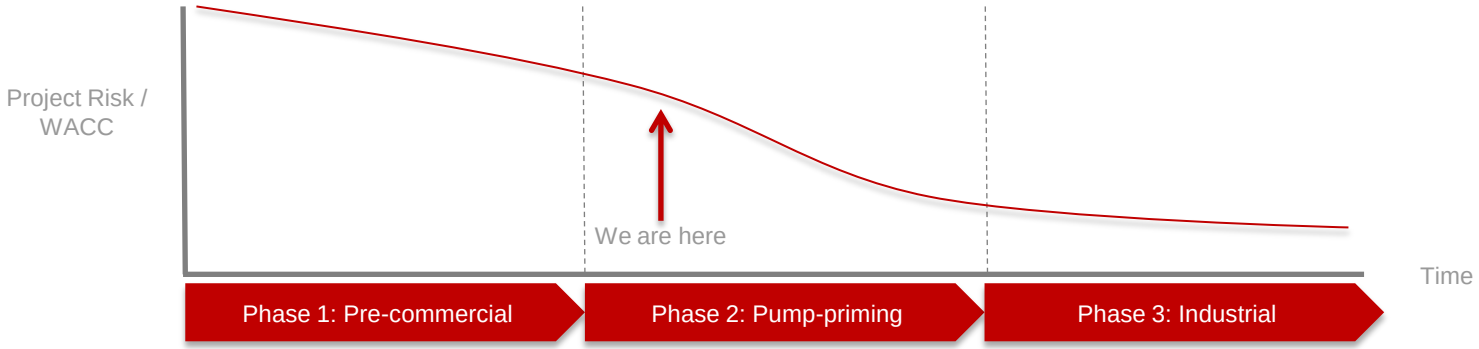
Emerging markets could leap-frog those ‘stuck in the past’

Development	Electrical	Foundations	Installation	Turbine	O&M
New layouts	AC vs HVDC links	Monopiles	Jack-up barges + shuttles	Larger turbines	Port based vs mother ship
	Higher voltage arrays	Gravity bases	Floating installation vessels	Blades	New vessels, transfer systems
	Radial vs loops	Jackets		Drivetrain	
		Buckets	Float out and sink		Condition monitoring
		Floating			

Cost Reduction: Financial Innovation

Offshore Wind is still an education for banks and equity providers

- To date almost all construction financed on utility balance sheets, often supported by capital grants
- More recently alternative equity investors have been coming in both pre and post construction
- Since 2006 across Europe seven projects have raised pre-construction debt finance, six post-construction and one during construction
- Lender appetite is now strengthening, leveraged by risk transfer to the tax payer
- Projects need to understand their target investors and package their risks appropriately



Reducing the project risk profile is the key to attracting cheaper capital

This must happen across industry and markets, particularly in emerging markets

Key Project Risks		Current Profile Management	Future Opportunities for US
Technology	Turbine	Contract manufacturer with large balance sheet, strong track record and solid warrantee	Reallocate some construction risk from OEM to EPC contractors. Encourage major US companies to develop and test next generation machines for home market and export.
	Balance of Plant	Attract competent suppliers and drive standardised designs	Pick winners: Mass manufacture standardised designs. Develop, test and deploy floating plant to enable risks to be understood and managed appropriately.
Commercial	Contract Structure	Based on standard construction contracts but developed project by project	Standardise contracts and ensure clear allocation of risk, particularly for cables and cable installation.
	Operating Costs	Put technology risk on OEM.	Negotiate with OEM and seek flexibility to see what wider market can offer, ensuring more competitive pricing
Construction	Weather	Without availability of EPC wrap in current market, and with contractors cautious, some developers are willing to accept exposure to these risks for higher returns.	When EPC becomes more competitive in Europe the US market should move in this direction with experienced players. The more risk EPC contractors can take the better for investors.
	Ground		
	Programme		
	Contractor / Vessel Experience	Contract experienced teams and seek performance guarantees.	A US EPC contractor could manage delivery in Europe and bring experience across Atlantic. Or a US project could partner with experienced European player.

Conclusion

This is really just the beginning

- Scale will only deliver positive economies if the market fundamentals are in place
- Increased competition in the European turbine market will take pressure of costs internationally
- Targeted technical risk taking is just business-as-usual, provided it’s well managed
- It is likely to be the same banks investing in US projects, so project risks must be packaged and presented in way that is recognisable and acceptable to them
- Experience is important to investors, particularly during construction, so if US companies do not play in European projects then European companies must be allowed into US projects
- The UK and Germany has shouldered the cost of marinising onshore wind, but there are huge opportunities for countries looking to drive forward a truly offshore industry

Independent,
integrated
thinking

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Offshore Wind – Lessons from Europe: Role of Policy

Cathryn Hooper, Source Low Carbon LLP

December 2013

Overview

- About Source Low Carbon LLP
- Role of Policy and Politics in Offshore Wind
- UK Policy and Lessons Learned
  - Site Award
  - Environment and Permitting
  - Support Mechanism
- Summary of Key Lessons

Introduction to Source Low Carbon

- Source Low Carbon LLP ('Source') is an offshore renewables development and advisory partnership.
- Formed in Q1 2013 by individuals who each have over a decade of experience in offshore wind.
- Two parts to our business:
  - Advisory Services
    - Development Services: supporting those developing projects
    - Project Assessment : working in collaboration to assess opportunities
    - Policy and Regulatory
  - Project Development

About Us

- Members of the original Mainstream team
- Offshore Strategy: bidding, development opportunities throughout Europe, North America
- Permits and Environment: managing and advising on issues across offshore portfolio
- Board member of OWDC.

- Senior Permits & Environment Manager: Walney extension, Burbo extension, Hornsea, Westermost Rough and Gunfleet demonstrator projects

- Management of Bidding Process, Strategy, Partnership to secure the Round 3 Hornsea zone
- Ongoing advice and support to the JV: strategy, planning, environment
- Advice in relation to the Project 1 acquisition and development (Dong Energy)

- Consent Manager for the 500MW Greater Gabbard Offshore Wind Farm

- Project Manager for the 7.2GW Round 2 tender process

Importance of Policy: Lessons Learned from UK

Introduction

- Policy creates the conditions that attracts capital into offshore wind.
- A positive policy environment has been the foundation of European offshore wind

- Policy risk (actual and perceived) and the influence of politics are the biggest issues facing UK offshore wind investors. Arguably the biggest stumbling blocks for the US too.

- Additional sources of debt and equity are needed in both markets – UK and US face many of the same challenges, seeking to attract many of the same investors.

- Policy: driven by the 'local' agenda
- Investors: similar requirements across jurisdictions

Introduction

- Policy drivers
  - 'Supply' perspective – easy to point to lots of reasons why both UK and US could have large offshore wind industries. Long coastline, shallow water, population density etc
  - 'Demand' perspective – Why is offshore wind needed?
    - UK – Energy security, decarbonisation (mandatory RE targets).
    - US – More difficult to articulate 'hard' motives; many ways in which US won't/can't go the same way as Europe. All the more important to provide policy clarity to investors.
- Key Policy Areas for comparison:
  - Site Award;
  - Environment, Permitting ("Consenting");
  - Support Mechanisms.

Site Award

- UK: competitive tender process, assessment of capability, commitment to deliver.
  - Development, financial, health and safety, organizational and other plans.
  - Little money changes hands upfront – recognizes the capital intensity of the development phase, avoid taking money out of projects early on.
  - Milestone obligations.
  - Relatively successful, open.

- US:
  - Extent to which auctions can use multiple criteria, be milestone backed?
  - Money off the table? Willingness of new investors to pay? Favoring incumbents?
  - Excluding innovative, small developers?

Environment and Permitting

- UK: Pace and scale of industry ambition/growth has driven regulatory requirements
  - Learning by doing – importance of collaboration.
  - Expensive, time consuming for developers. Bottleneck.
  - Relative certainty, transparency – new planning system in England and Wales.

- US:
  - The US system looks very promising: good planning, well resourced, transparent, applying lessons learned.
  - Not seen as so much of a bottleneck as for early stage UK - but yet to be fully tested.

Support Mechanisms

- US offshore wind competing for investment with other markets, technologies
- Attractive features for a supporting mechanism:
  - Clear Objectives: what is to be achieved, by when, for how much.
  - Coherent: with other policy areas – eg environment, planning, industrial policy.
  - Consistent: stable across economic and political cycle.
  - Simple, open for new entrants, investors.
  - Predictable, transparent: clear process to securing route to market.
  - Affordable – public acceptance.
  - Risk is allocated to those best able to manage it.
- Most, though not all, have been features of UK support policies for offshore wind and have helped nurture the industry.
- In addition:
  - Importance of targets.
  - Role of public investment.

UK Support Mechanism: The RO

- **Renewables Obligation:**
  - Driven by desire to establish the industry, reach MW targets.
  - Mandated suppliers to source a growing percentage of electricity from renewables (15.4% in 2015/16).
  - Largely fulfilled previous criteria and has been relatively successful - BUT
    - UK is still well short of its 2020 target - £110bn investment needed.
    - Cost to consumer has risen up the agenda.
    - Utility-dominated offshore wind sector.
  - RO being phased out – Electricity Market Reform.

UK Support Mechanism: Electricity Market Reform

- Electricity Market Reform (EMR) introduced 3 years ago. Became law this week.
- Multiple, potentially conflicting objectives:
  - *"At the heart of our strategy is **affordable** **energy security** that meets our **climate change** responsibilities"*
  - *"We need to attract the £110bn of private **capital investment** required in this decade.."*
  - *"The investment that these reforms will unlock will help support up to **250,000 jobs**…, and strengthen **economic growth**"*
  - *"Investment will also lead to **innovation** and the development of **competitive supply chains**"*
- (from the October 2013 DECC consultation):

UK Electricity Market Reform

- EMR process has demonstrated the importance of policy certainty. Introduced fundamental, widespread questions over
  - Government's long term commitment,
  - Exposure to political uncertainty, squabbling
  - Consultation and legislative process – many details still unresolved, stakeholder fatigue

- Not all projects in the development pipeline will get Contracts for Difference (CfDs).
- Changes risks and incentives associated with allocation, eligibility for CfDs
- Proposed projects being withdrawn, changing hands. Utilities publicly delaying investment decisions

- However, rationalisation is needed.
- EMR does set out to reduce investor risk and could create the conditions needed for new investment and cost reduction.

Lessons for US

- Policy process is vital for confidence
- Be realistic from the outset– scale, timelines, benefits of the industry to the economy/jobs. Inspires confidence.
  - Attrition hurts – high risk, high cost, front loaded expenditure.
- Go back to key policy principles -clear, consistent, coherent, appropriate risk allocation
  - Stop-start/indecision is our industry's worst enemy.
  - EMR looks and feels very complex – much still to be resolved
- Importance of Co-operation:
  - Between States
  - Between industry and government
- Recognize that local conditions and policy drivers may be different, but pool of investors likely to be very similar.
- Focus on:
  - Avoiding mistakes of others, repeating successes where appropriate
  - Articulating objectives, setting and realizing positive but credible expectations

For further information:

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Thank you!

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