

Sector Briefing - Wind

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Offshore:

Alastair Dutton – Crown Estate

Ray Thompson – Siemens Wind Power

Onshore:

Jonny Clark – WSP Future Energy

Muir Miller – Peel Energy

Sector Briefing - Wind

Alastair Dutton – Crown Estate

Offshore Wind Programme Progress and Delivery



Alastair Dutton
Programme Manager
18th January 2012

The Crown Estate

Is a landowner

Is not a regulator

Is a public body – The Crown Estate Act 1961

Is not part of Government – but works closely with Government, statutory bodies *etc.*

Annual surplus is passed to the UK Government



**Urban
Estate**



**Rural
Estate**



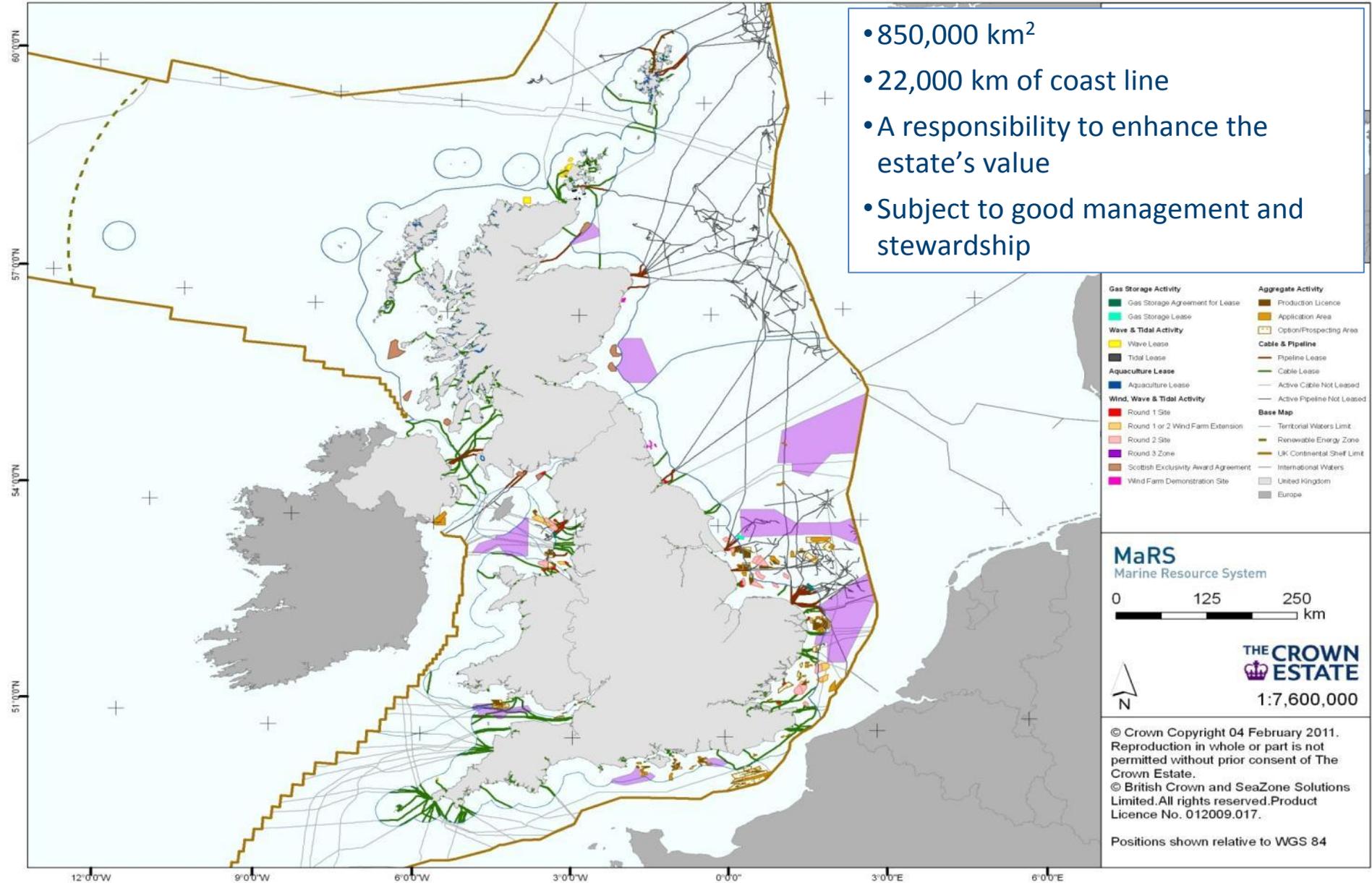
**Windsor
Estate**



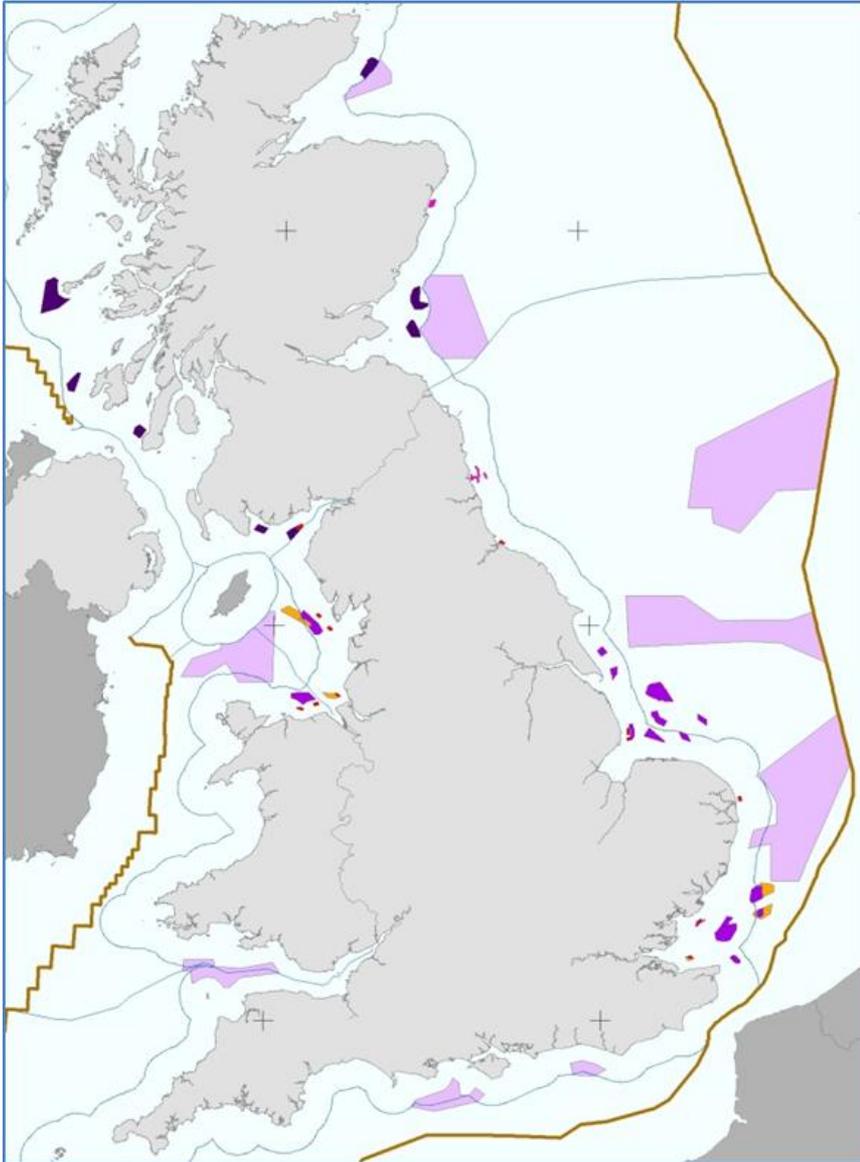
**Marine
Estate**

The Marine Estate

- 850,000 km²
- 22,000 km of coast line
- A responsibility to enhance the estate's value
- Subject to good management and stewardship



UK Offshore Wind Programme

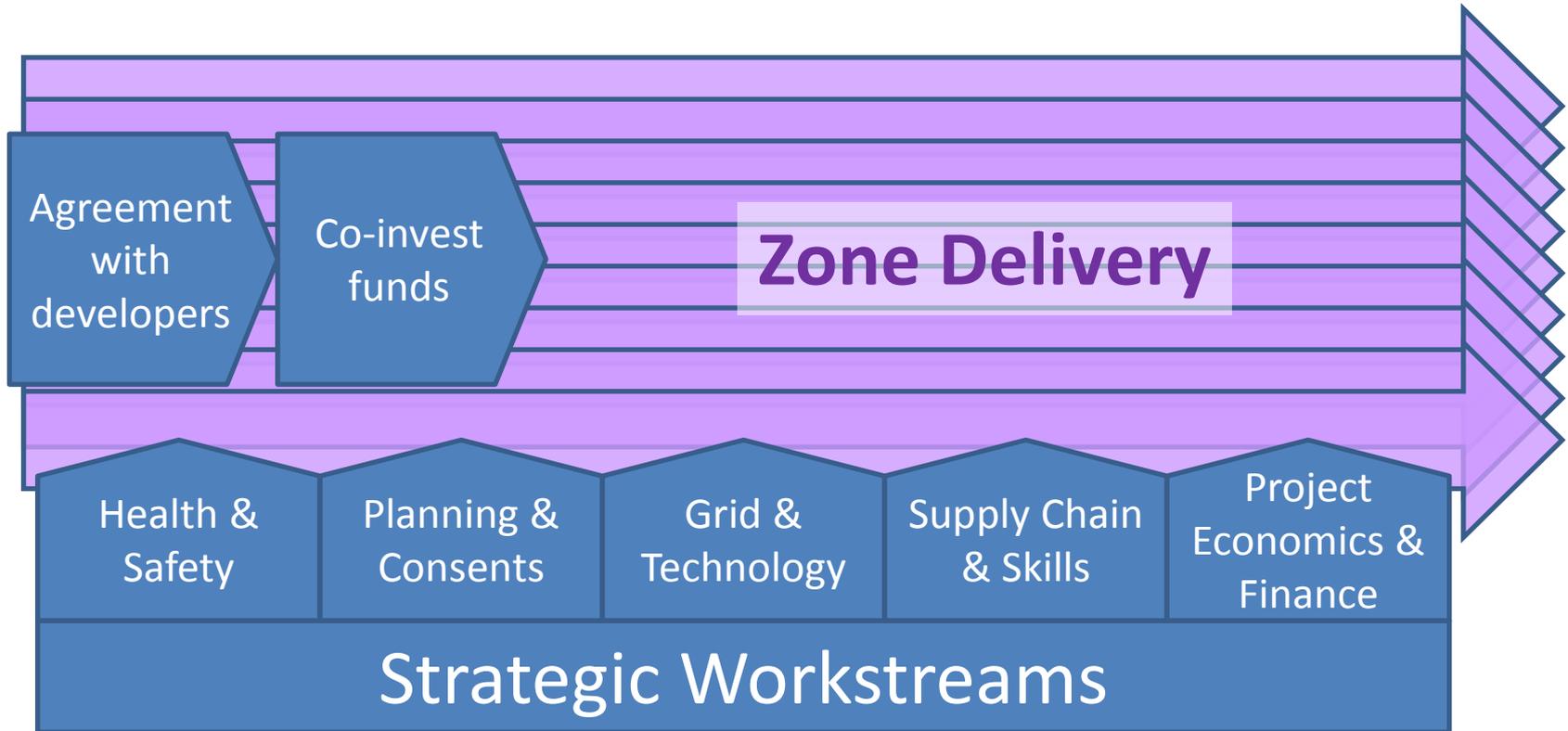


EU mandatory target is for the UK to achieve 15% of its energy consumption from renewable sources by 2020

Offshore Wind Leasing Rounds:

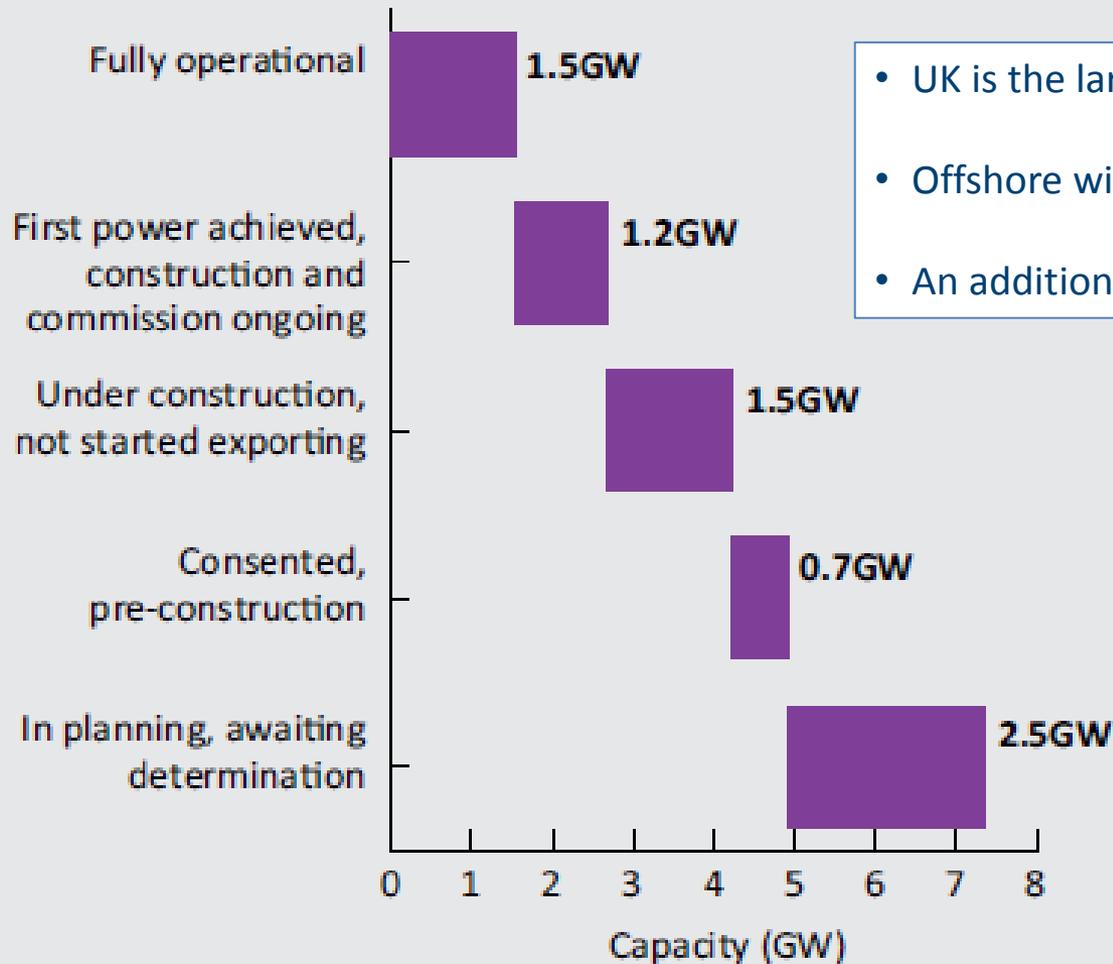
Round 1	1 GW
Round 2	8 GW
STW	5 GW
Round 3	32 GW

Round 3 Programme



Programme to de-risk and accelerate development

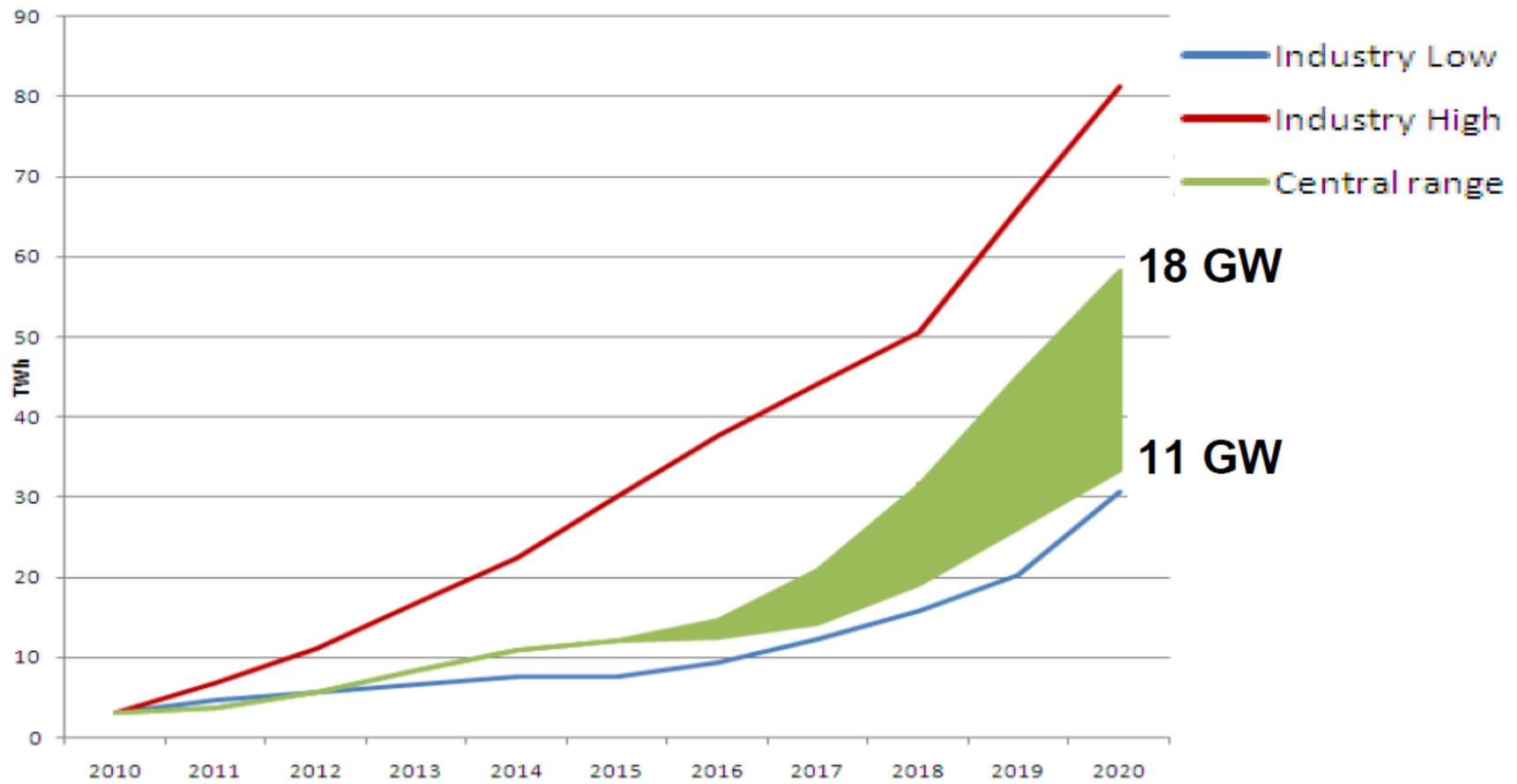
Offshore Wind Project Status



- UK is the largest market for offshore wind
- Offshore wind continues to deliver at scale
- An additional 40GW is in pre-planning

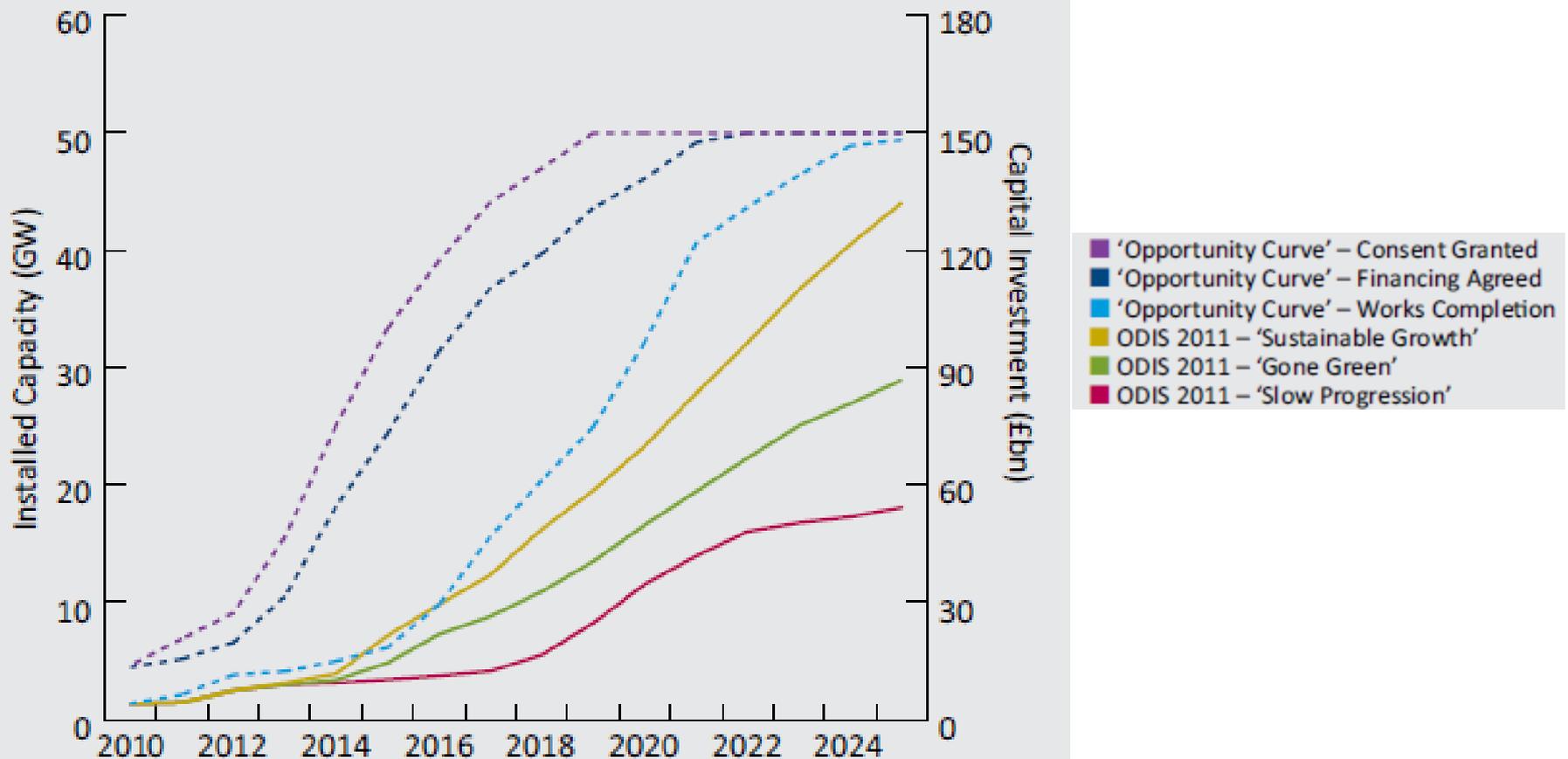
DECC Roadmap 2011

Figure 14: Deployment potential to 2020 for offshore wind



Source: UK Renewable Energy Roadmap, DECC, July 2011

Opportunity and Scenarios



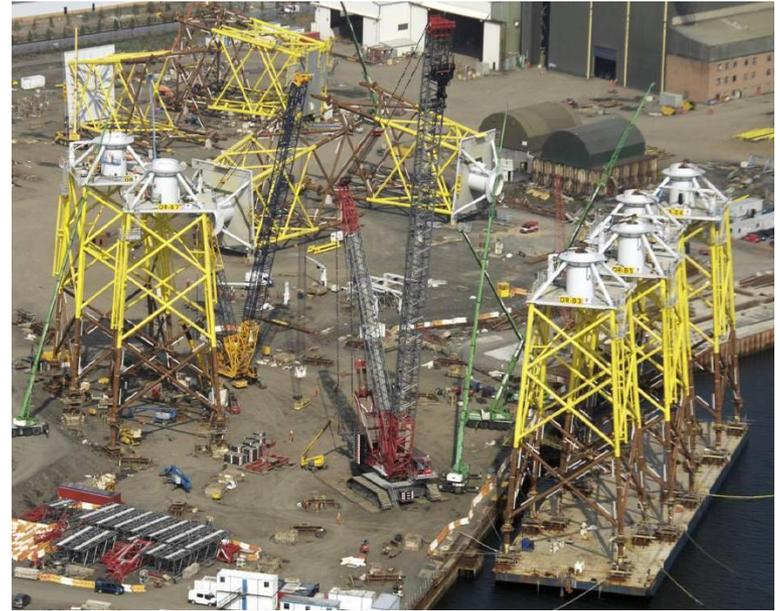
SOURCE: THE CROWN ESTATE, NATIONAL GRID OFFSHORE DEVELOPMENT INFORMATION STATEMENT (ODIS) 2011

Olympic ideals: "higher, longer and faster"



Higher

Turbines are increasing in height and weight, putting increased challenges on the supply and installation vessels and construction methods



Longer

Construction and operation will be at greater distances from land and in harsh access conditions



Faster

Construction time is of the essence to bring down costs, requiring careful construction and operations planning



European and Global Market



Courtesy:4COffshore

Thank you



<http://www.thecrownstate.co.uk/energy/offshore-wind-energy/>

Sector Briefing - Wind

Ray Thompson – Siemens Energy



Offshore Wind
Opportunities & Challenges

Built Environment
Leeds
January 2012

Ray Thompson
Business Development Manager
Siemens Wind Power

Content

➤ Siemens Wind Power Offshore: Our Experience

➤ Offshore size and scale

➤ Supply Chain Challenges

➤ Siemens Solutions

SIEMENS is Market leader in offshore with 2.0 GW installed

SIEMENS

Burbo Banks, UK

→ 25 x SWT-3.6-107 (2007)

Lynn / Inner Dowsing, UK

→ 54 x SWT-3.6-107 (2008)

Gunfleet Sands, UK

→ 48 x SWT-3.6-107 (2009)

Rhyl Flats, UK

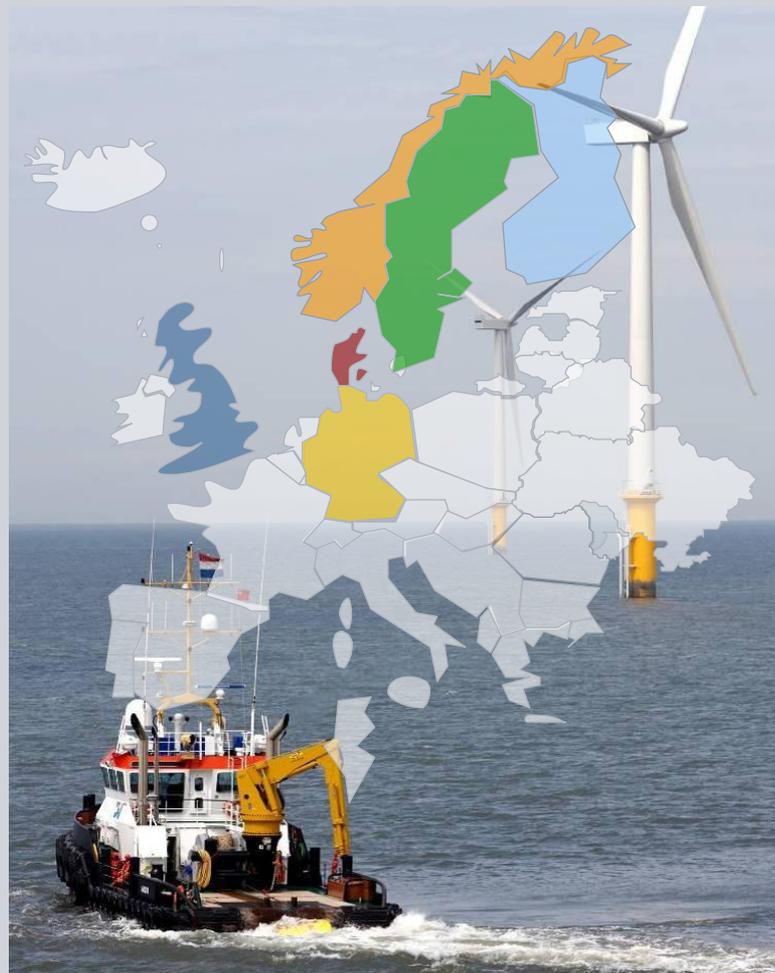
→ 25 x SWT-3.6-107 (2009)

Pori, FIN

→ 1 x SWT-2.3-101 (2010)

Baltic I, DE

→ 21 x SWT-2.3-93 (2010)



Vindeby, DK

→ 11 x 0.45 MW (1991)

Middelgrunden, DK

→ 20 x SWT-2.0-76 (2000)

Samsø, DK

→ 10 x SWT-2.3-82 (2002)

Rønland, DK

→ 4 x SWT-2.3-93 (2002)

Rødsand/Nysted, DK

→ 72 x SWT-2.3-82 (2003)

Frederikshavn, DK

→ 1 x SWT-2.3-82 (2003)

Horns Rev II, DK

→ 91 x SWT-2.3-92 (2009)

Rødsand II, DK

→ 90 x SWT-2.3-93 (2010)

Lillgrund, SE

→ 48 x SWT-2.3-93 (2007)

Hywind, NO

→ 1 x SWT-2.3-82 (2009)

Many projects to come, also outside Europe...

Greater Gabbard, UK

→ 140 x SWT-3.6-107

Sheringham Shoal, UK

→ 88 x SWT-3.6-107

London Array, UK

→ 175 SWT-3.6-120

Walney, UK

→ 51 x SWT-3.6-107
→ 51 x SWT-3.6-120

Lincs, UK

→ 69 x SWT-3.6-120

Gwynt Y Mor, UK

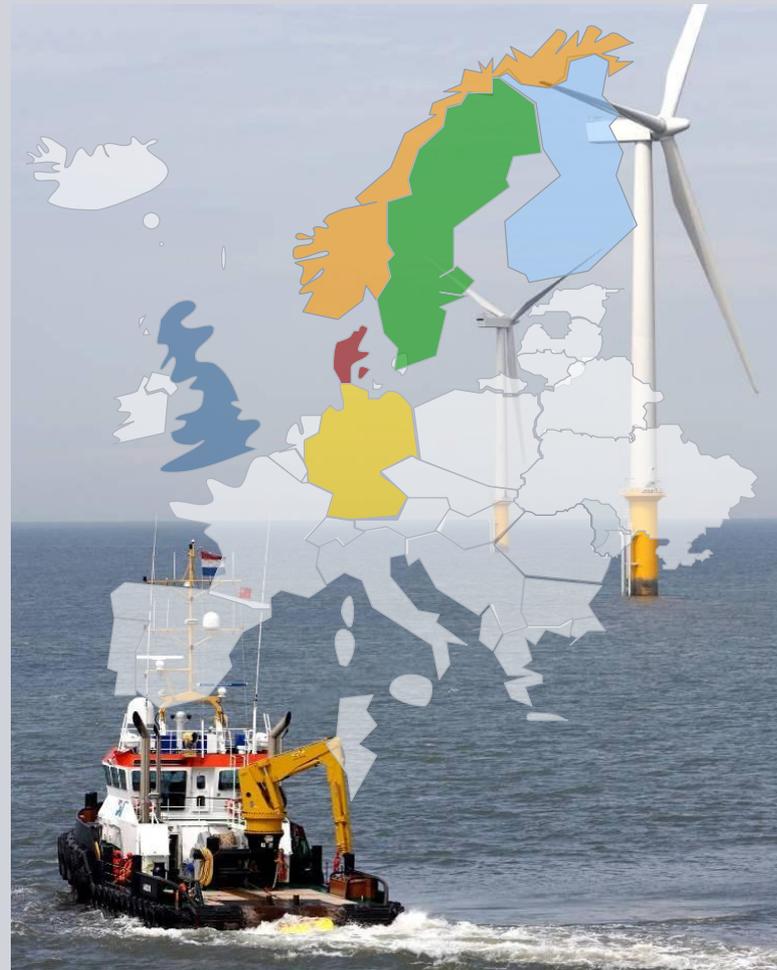
→ 160 x SWT-3.6-107

West of Duddon Sands, UK

→ 108 x SWT-3.6-120

Teesside, UK

→ 27 x SWT-2.3-93



Anholt, DK

→ 111 x SWT-3.6-120

Baltic 2, DE

→ 80 x SWT-3.6-120

Borkum Riffgat, DE

→ 30 x SWT-3.6-107

Dan-Tysk, DE

→ 80 x SWT-3.6-107

Borkum Riffgrund 1, DE

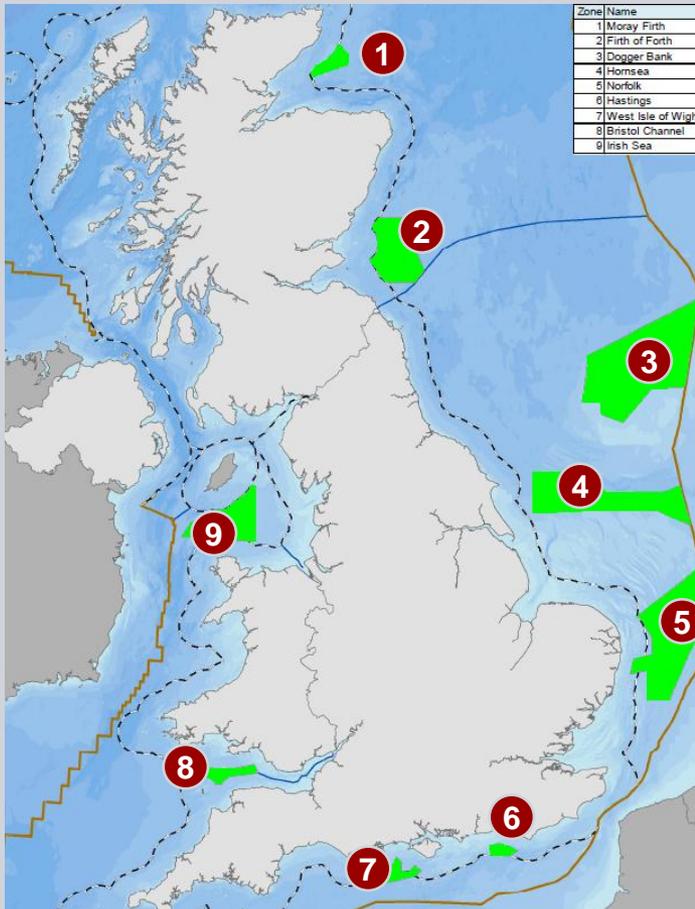
→ 77 x SWT-3.6-120

Rudong Intertidal, CHN

→ 21 x SWT-2.3-101

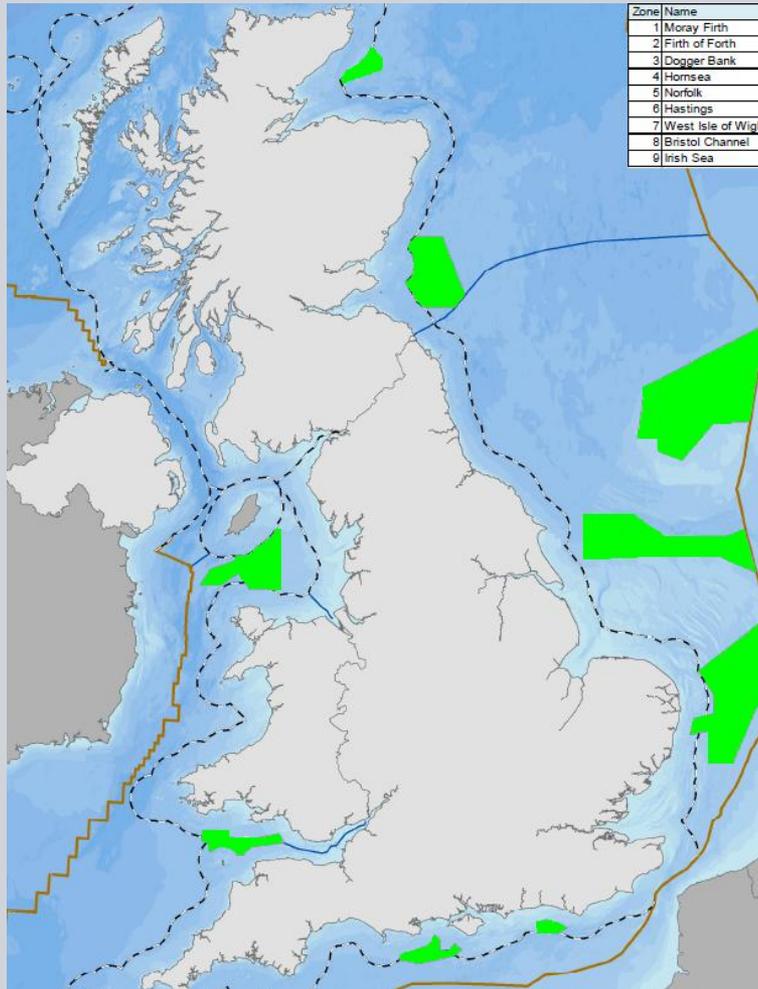
The Crown Estate has awarded development rights for 32 GW in UK Round 3

UK Round 3 zones



Zone	GW	Consortium members	
1 Moray Firth	1.3	EDP Repsol	75% 25%
2 Firth of Forth	3.5	SSE Fluor	50% 50%
3 Dogger Bank	9.0	RWE Statoil SSE Statkraft	25% 25% 25% 25%
4 Hornsea	4.0	SPV Mainstream	50% 50%
5 East Anglia	7.2	Scottish Power Vattenfall	50% 50%
6 Rampion	0.6	E.ON	
7 Navitus Bay	0.9	Eneco	
8 Atlantic Array	1.5	RWE	
9 Irish Sea	4.2	Centrica	

UK Round Three Programme



UK Round Three Program

9 zones awarded in 2009

32GW of generation capacity

Around 1/3 of UK capacity

Capital spend >£100bn

Through life O&M cost c£60bn

Potential for up to 70,000 UK jobs

UK's largest economic development opportunity

Content

▶ Siemens Wind Power Offshore: Our Experience

▶ **Offshore size and scale**

▶ Supply Chain Challenges

▶ Siemens Solutions

Machines easily weighing over 1000te each

- Tip height to 200m
- Rotor diameter 160m

Foundations alone major structures

- Multiple Designs;
 - Monopiles
 - Jackets
 - Suction buckets
 - Tripods
 - Tri-piles
 - Concrete gravity based
 - Floaters



(www.weserwind.de)



Land and portside facilities - Vital



(Scout Moor Wind farm – Nordex N80 - 39m blades)

Monopile foundation



Road Transport issues



Road transport



Grid substations



Scale & Scope – 32GW

With the largest machines today around 5MW

- 32 GW is 6000 turbines
- 6,000 sets of jackets or piles

Scale

- 300-400t of rotating machinery
 - 120m in the air
 - In 50-60m of water
 - Up to 200km from the shore
-
- Quite a challenge
 - **Estimated capital Expenditure program of £100bn**



Content

▶ Siemens Wind Power Offshore: Our Experience

▶ Offshore size and scale

▶ **Supply Chain Challenges**

▶ Siemens Solutions

Many factors to consider when building offshore

Manufacturing

- Nacelles
- Towers
- Blades
- Castings
- Generators

O&M / Service

- Personnel
- Tools

Transmission

- Sub-station
- Cabling
- Planning & permitting
- Transmission lines
- Shoreside interconnections



Environmental impact

- Birds
- Marine life
- Coastal morphology & transport of sedimentation
- Visual consequences
- Risk of collision in ship traffic

Site conditions

- Water depths
- Climatic conditions
- Waves

Transportation

- Permitting ports
- Rail

Installation

- Planning & Permitting
- Foundations
- Engineering
- Vessels

SCM Offshore Challenges

Key Questions for the Offshore Supply Chain Manager

SIEMENS

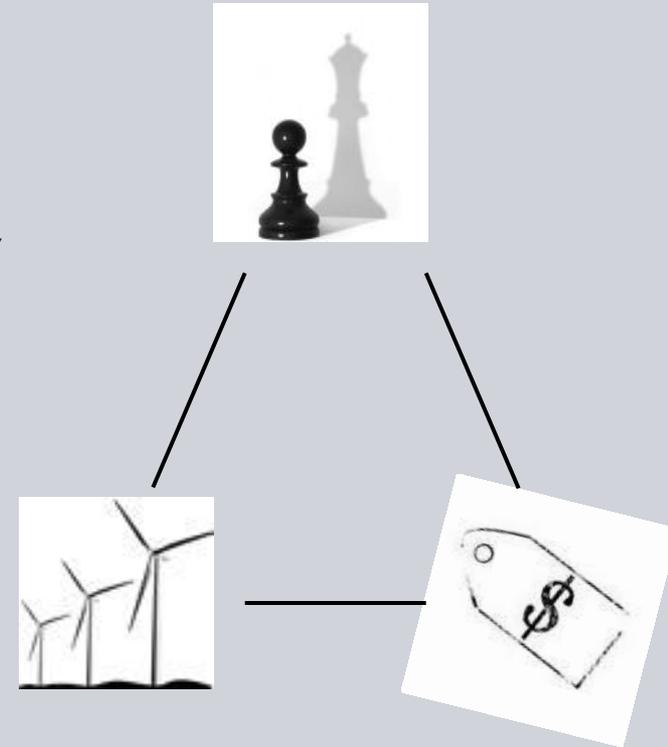
Offshore turbines and their components continue to grow in size and weight.

Some of the components are facing severe supply bottlenecks. Few capable suppliers. Insufficient capacities.

Customer demand is always changing. And so are turbine designs.

The pressure to reduce costs is immense.

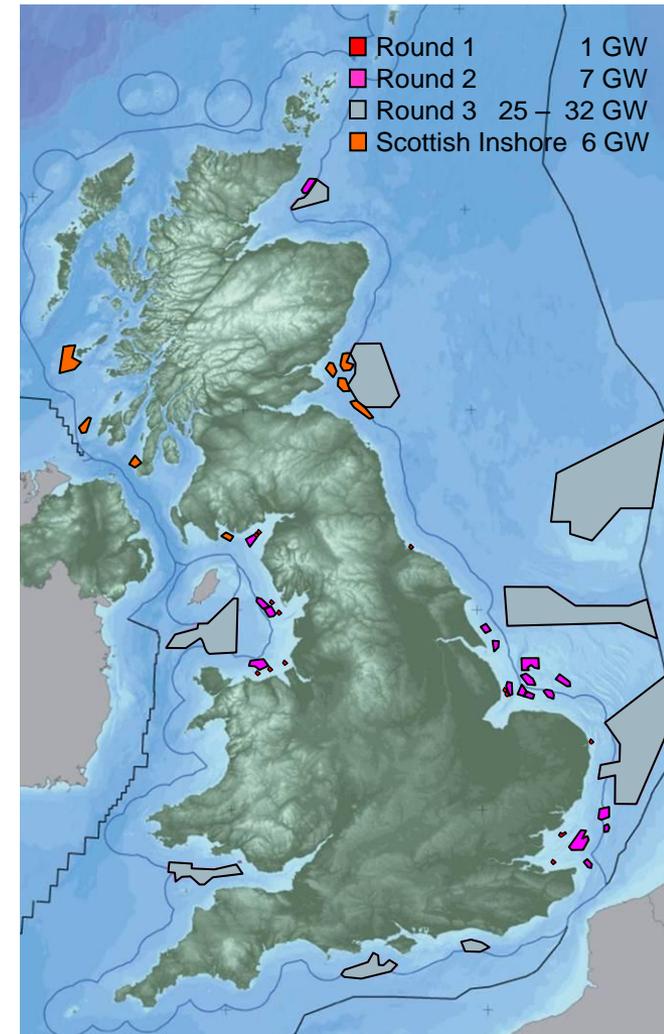
Reliability of our offshore turbines is one of SIEMENS' major success factors.



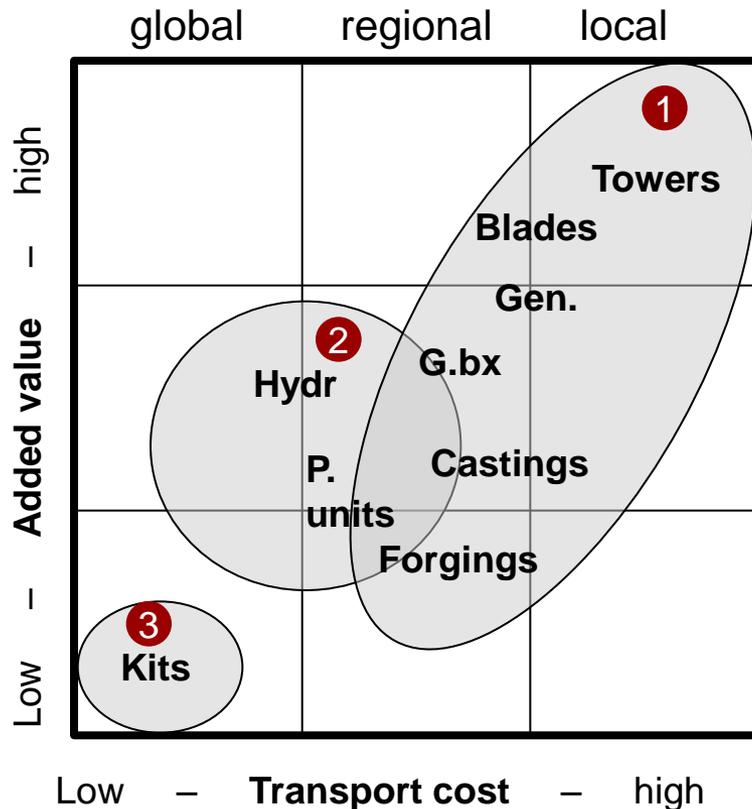
Opportunities and Success Factors

Harbour location

- deep sea harbour, direct quay access
 - sufficient size of land, expansion potential
 - ability to reach different wind farm (also future locations)
- Infrastructure
 - good inland transport connections
 - existing technical infrastructure at site
 - Long-term commitment to location
 - skilled work force, permanent jobs = consistent performance
 - Flexible set-up at harbour site, easy to adjust to changing demand
 - Simple, basic set-up, relatively low investments
 - one location as main hub for UK
 - possibly additional satellites at other sites with reduced scope



Opportunities and Success Factors from the SCM point of view



- Optimal split between Make & Buy
 - large components sourced from suppliers nearby
 - basic components from existing *global* suppliers
- Sourcing decisions based on landed costs (incl. transport) and strategic fit
 - components produced in low cost countries...
 - vs. locally produced components
 - dual or multiple sourcing to avoid bottlenecks
- Improved flow of material to reduce logistics costs

Content

▶ Siemens Wind Power Offshore: Our Experience

▶ Offshore size and scale

▶ Supply Chain Challenges

▶ **Siemens Solutions**

Opportunities and Success Factors - Logistics

- Process oriented set-up, optimal flow of material
- Improved onshore processes
 - effective use of installation vessel by optimizing on-land pre-assembly
 - accurately defined, checked and tested components from all internal and external suppliers
- Sophisticated vessel loading
 - optimized loading process
 - minimal distance from nacelle assembly factory to pre-assembly to vessel
- Integration of supply chain partners
 - collaboration & best practice sharing with other offshore industries (oil & gas)
 - establish “supplier cluster” at main hub



Opportunities and Success Factors

The new SWT-6.0 wind turbine; a combination of innovative Direct Drive and proven rotor technology

SIEMENS

SWT-6.0-120/154

Optimized offshore turbine design

- Direct Drive wind turbine with 6 MW rated power and a 120 m or 154m rotor diameter designed specifically for the harsh offshore environment
- Simple and straightforward design based on and benefiting from experience with smaller Siemens Direct Drive turbines
- Low Tower-head mass – a new low-weight standard for offshore turbines. This will contribute significantly to reduced cost of offshore wind energy, including Balance of Plant
- Low-risk approach by reusing well-proven key technologies such as the B58 blade from SWT-3.6-120 and standard NetConverter



Prototype installation Høvsøre, Denmark

Siemens visible commitment to UK

£7m 340 jobs Manchester
European hub for HVDC



£80m 700 jobs Hull



£7.6m Energy Training Centre Newcastle
380 New starters and >1,000 refresher
courses planned for 2012



6MW offshore wind turbine June 2011

Thank You for Your Attention!

ray.thompson@siemens.com

Sector Briefing - Wind

Jonny Clark – WSP Future Energy

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Onshore Wind — The UK Market

Jonny Clark,
UK Director, WSP Future Energy

Agenda

- Brief background to WSP Future Energy
- The UK Market Drivers & Key Facts
- Onshore Wind Developers & Service Providers
- Opportunities & Challenges facing Onshore Wind

WE ARE WSP

Operating across 60 countries, we provide global expertise through local relationships, and our diverse people united by a shared passion for delivering work to be proud of.



Permanent offices in
35
countries

9,000
Global WSP employees

What is WSP Future Energy?

- WSP Future Energy is a global business within WSP Group plc
- WSP Future Energy **provides whole project life cycle engineering and environmental services to the energy supply and transmission sectors**
- Our primary focus is on renewable energy power generation, transmission and distribution
- We deliver complete solutions on future energy projects (feasibility through to operation & maintenance and decommissioning) for utilities, renewable energy developers and funders



Future Energy sectors

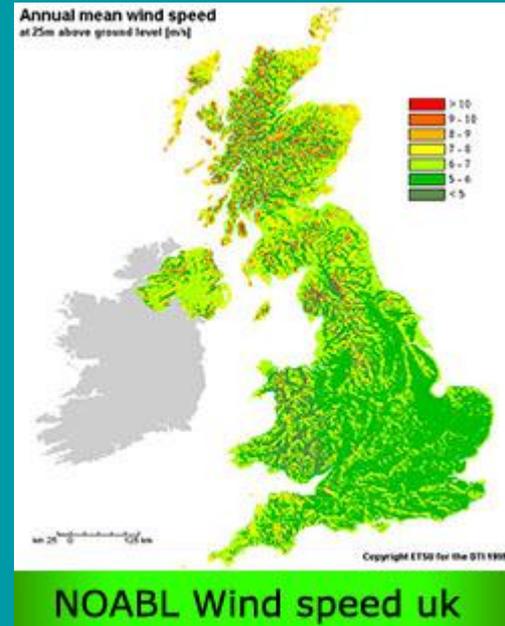
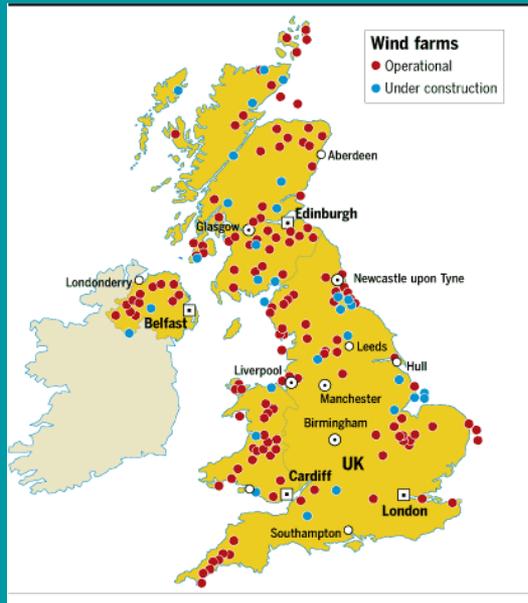


- Onshore wind
- Offshore renewables
- Solar
- Electricity transmission & distribution
- Biomass/waste-to-energy
- Biogas/AD/biofuels
- Hydropower
- Geoenery
- District heating & cooling

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Onshore Wind: Market Drivers & Key Facts



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UK Drivers

Climate Change, Energy Security, Demand

Global/EU Policy/Legislation

UK Renewables Roadmap

UK Legislation

UK Renewable Strategy

15% energy from renewables 2020:
30% electricity
12% heat
10% transport

£110 billion invested in Renewables by 2020

ROCs, FiTs, RHI, Capital grants, planning etc

Some UK Onshore Wind Statistics

Wind farm Status: (Dec 2011)

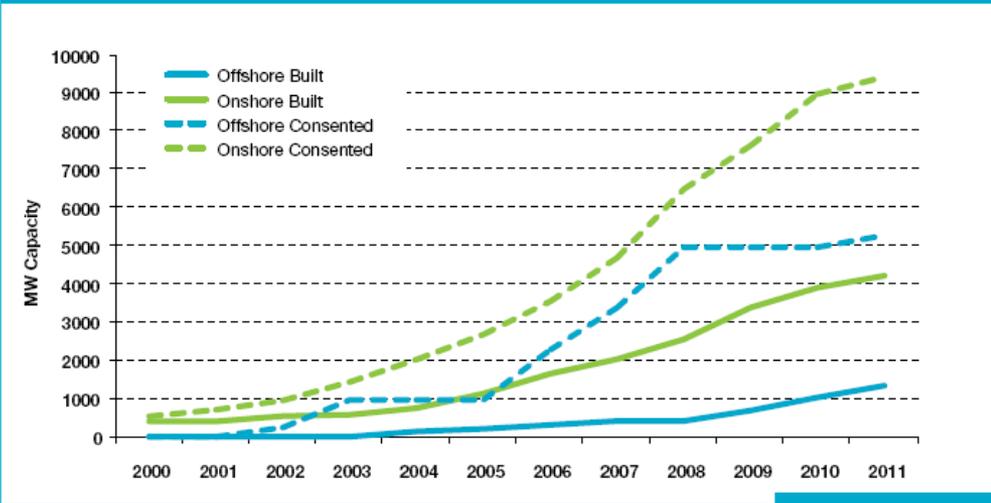
- Operational: 4,247MW (301 schemes)
- Consented (but not in construction): 3,725MW (235 schemes)
- In planning: 7,660MW (325 schemes)
- In construction: 1,635MW (37 schemes)

Market Trends:

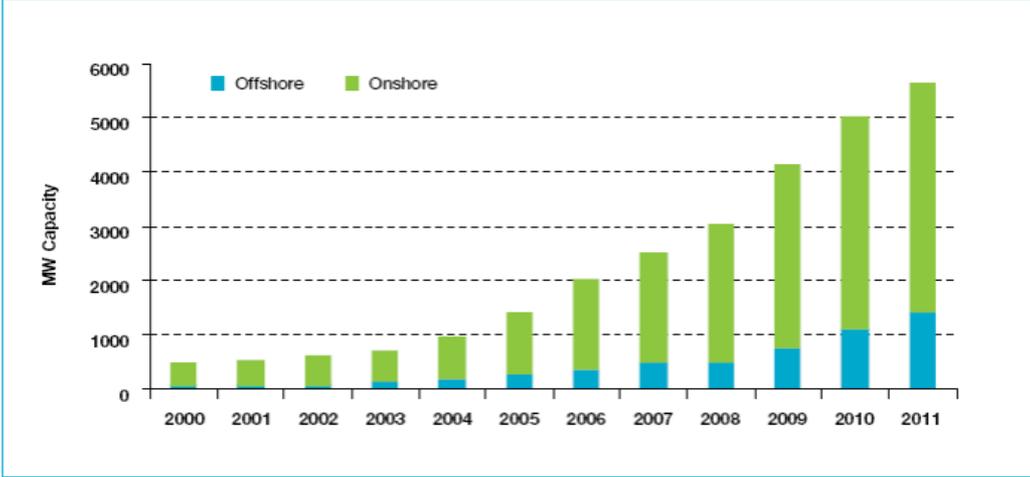
- Increase in smaller scale of applications <2MW
- Decrease in larger scale applications >50MW
- Planning decisions and timescales

Some UK Onshore Wind Statistics

Graph 1: UK Wind energy capacity consented and commissioned mid-2000 to mid-2011

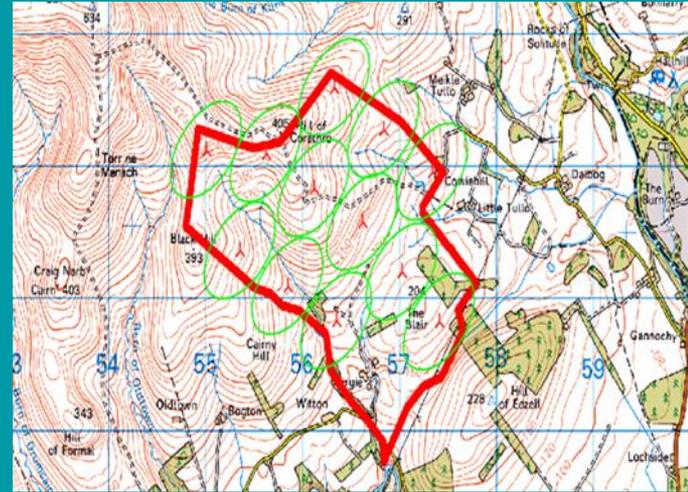


Graph 3: UK operating capacity mid-2000 to mid-2011



Source: RenewableUK, SOI 2011

Onshore Wind Developers & Providers



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Onshore Wind Project Developers & Operators

- Utilities
- Onshore wind developers
- Corporates
- Industrials
- Property / Land Owners



Onshore Wind Service Providers

- Engineers, transport planners & environmental consultants
- Funders & Investors
- Health & Safety advisor
- Insurers
- Land Agents
- Lawyers
- Public Relations
- Tax & Financial advisor
- Town & Country Planners
- Civils contractors
- Electrical contractors
- Equipment Suppliers
- Hauliers/Transport logistics
- Operation & maintenance contractors
- Wind turbine suppliers

Sector Opportunities

- UK renewables targets
- UK wind resource
- Bankable technology
- UK project pipeline
- Re-powering existing assets
- Skills export
- On-site generation



Sector Challenges



- Grid connection
- Planning system
- Landscape capacity
- Funding/Investor confidence
- Incentives scheme - RO re-banding /Contracts for Difference
- Turbine supply
- Technical issues eg access, radar

Thank you for your time.

Any Questions?



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Sector Briefing - Wind

Muir Miller – Peel Energy

Muir Miller
Managing Director
Peel Energy



January 2012

Built Environment Networking – The Wind Sector

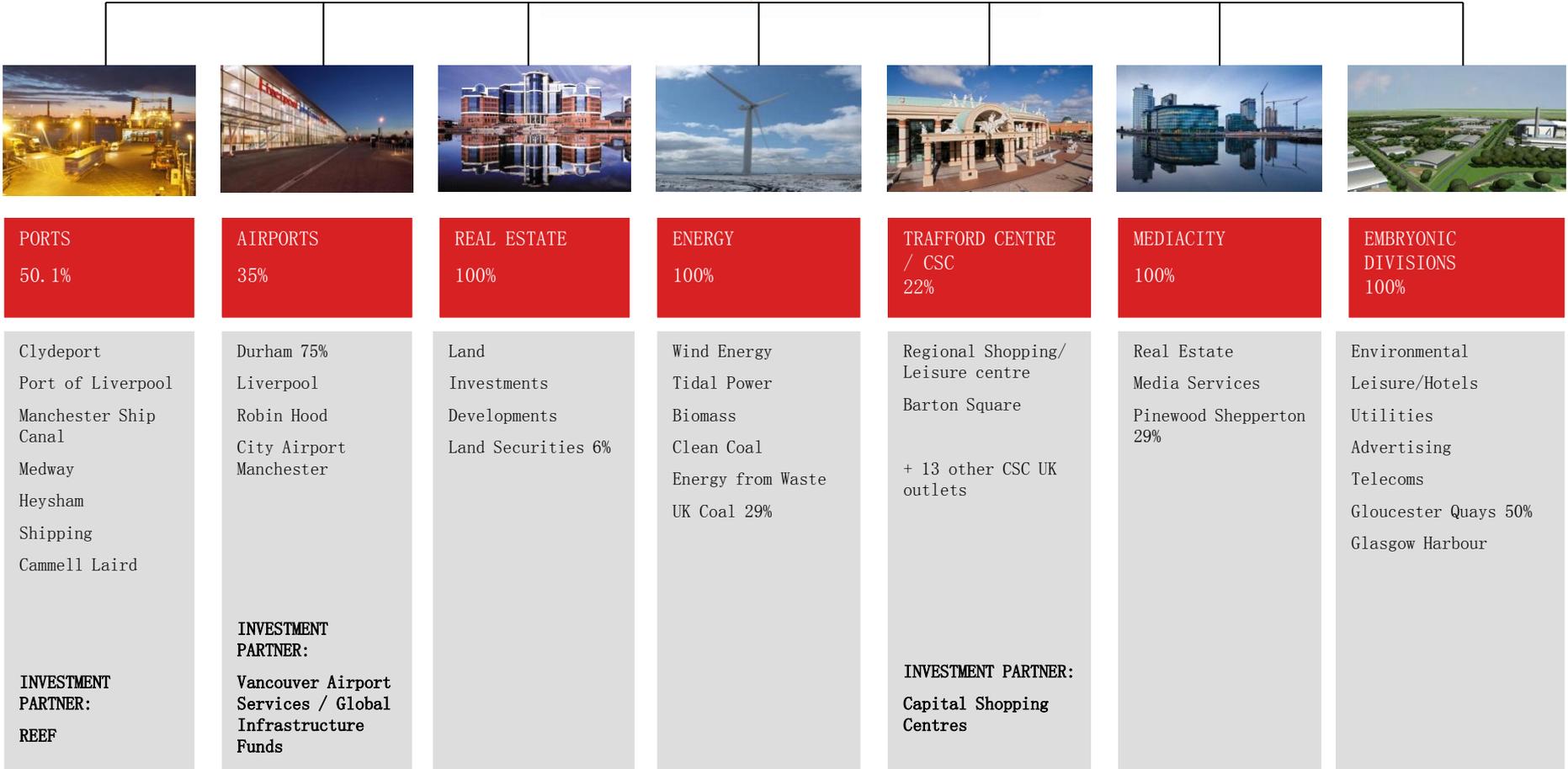
Structure of the Presentation

- The Peel Group and Peel Energy
- Peel Developments
- Targets for Wind Generation
- Project Timeline
- Case Studies – Challenges and Opportunities
- Summary





THE PEEL GROUP





Onshore Wind

3 operational
2 consented
3 in planning
6 pre-planning
358 MW by 2016



Biomass

2No. 20MW in planning
1No. 20MW pre-planning
2No. 100-299MW
pre-planning



Mersey Tidal

Feasibility Study completed
in partnership with NWDA
700MW preferred scheme
on-hold



Multi-fuel With CCS

Ayrshire Power 1852MW
Section 36 application
submitted June 2010
NER300 CCS funding
bid submitted
Feb 2011

Peel Energy – Operational

Royal Seaforth Dock, Liverpool, 3.6 MW : 6 x 600 kW Vestas V44



Port of Liverpool, 10 MW : 4 x 2.5 MW Nordex N90

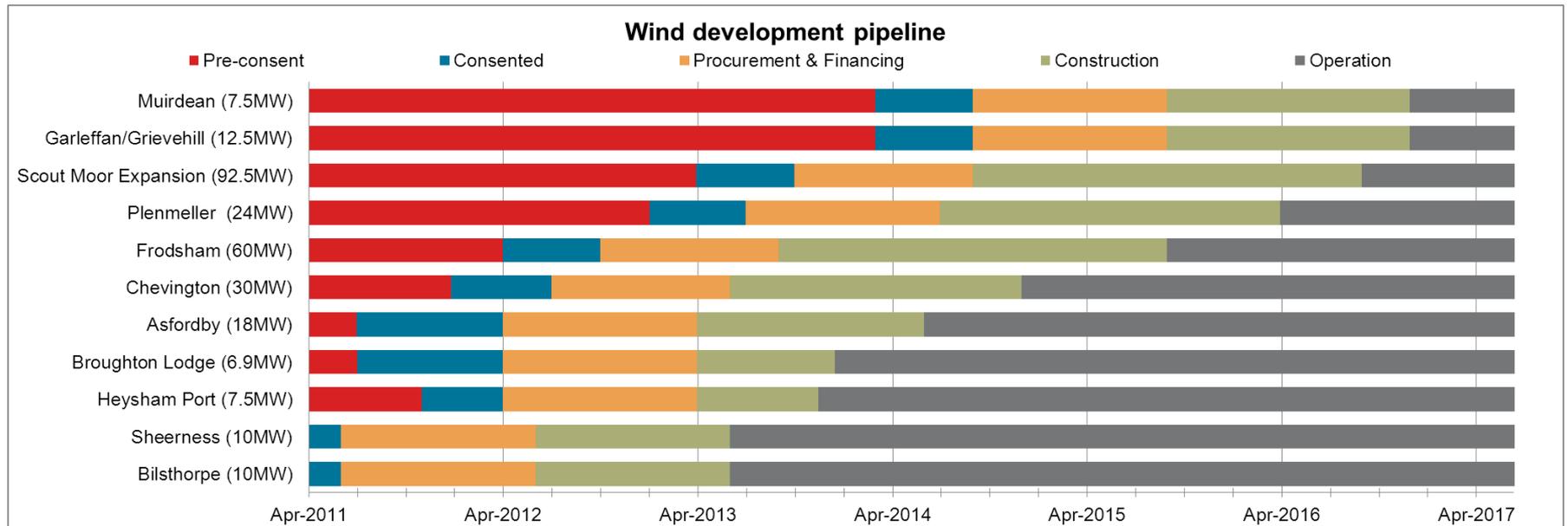


Scout Moor, Lancashire, 65 MW : 26 x 2.5 MW Nordex N80



Peel Energy – The Development Pipeline

- Consented – Bilsthorpe and Sheerness
- Appeals – Broughton and Frodsham
- Live Applications – Heysham and Asfordby
- Imminent Application – Chevington
- Public Consultation – Scout Moor Expansion
- Scoping – Garleffan, Muirdean, Plenmeller and others.

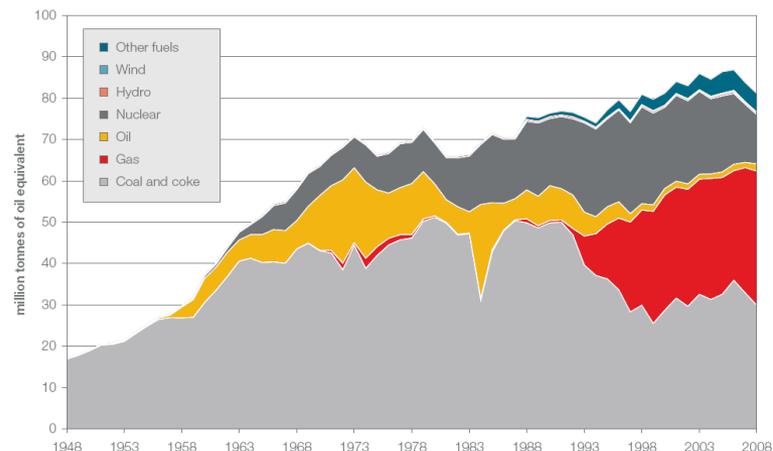


The Targets for Onshore Wind Generation

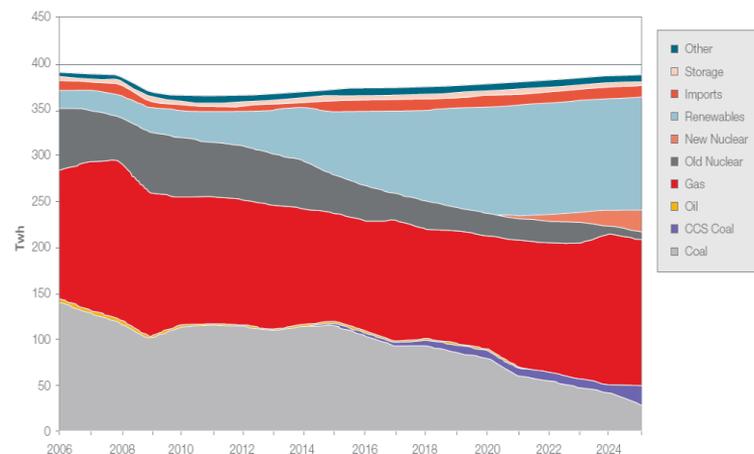
- The UK has committed to 15% of its energy from Renewables Sources by 2020 and to legally binding targets to reduce greenhouse gas emissions.
- The way we generate our energy is dramatically changing from coal, oil and nuclear to renewables and gas.
- Significant existing generation capacity will close in the next 5-10 years.
- UK demand for electricity is expected to more than double by 2050.

Against this:

- Only 33% of wind projects gain consent at local level.
- Public objection is vocal.
- Promotional costs are high and studies are lengthy.
- Against a UK target to generate 35% of electricity from renewable sources by 2020 only 9.0% was achieved by the end of Q3 2011.



Fuels used to generate electricity in UK 1948–2008. Source: DECC 60th Anniversary: Digest of United Kingdom Energy Statistics, July 2009.



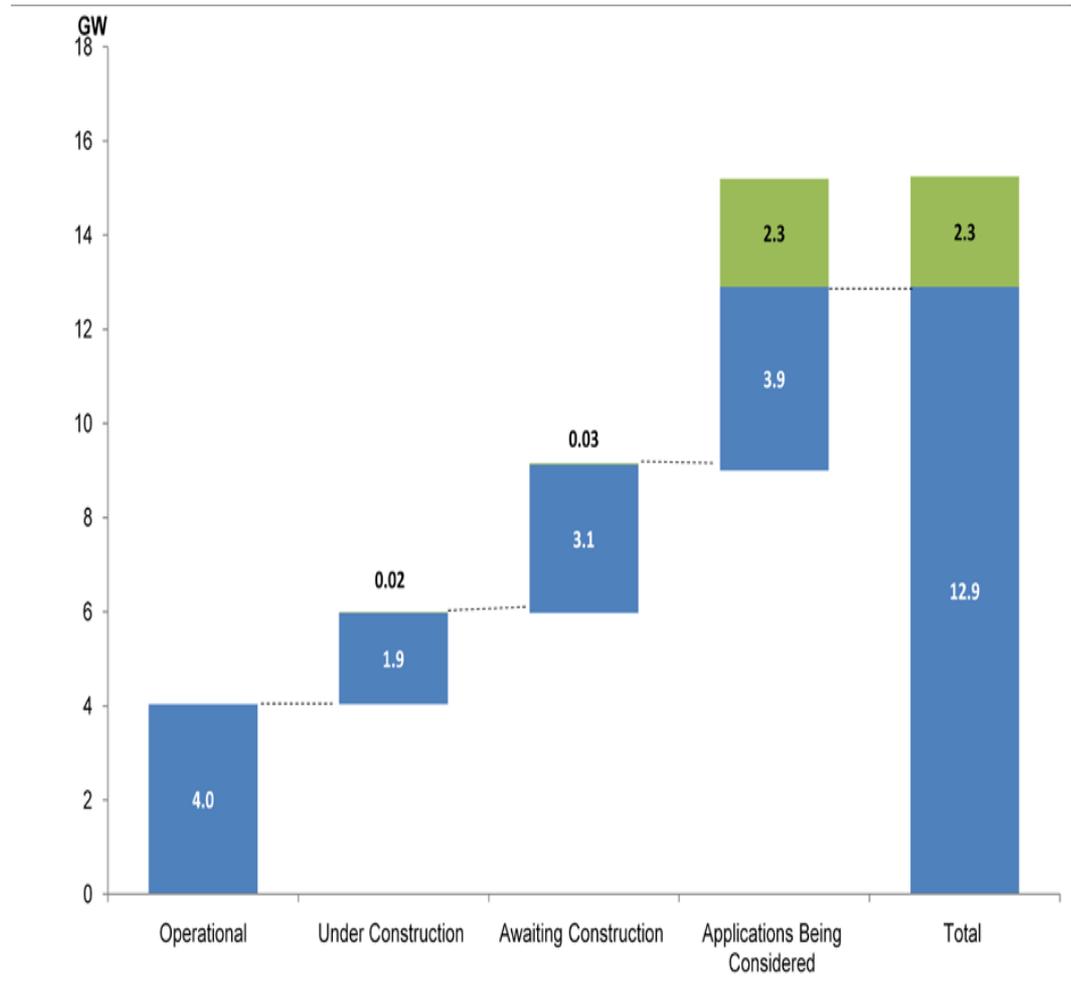
Projection of potential UK electricity supply by fuel 2006–2025. Source: DECC Energy and Emissions Projections, June 2010.

DECC Renewable Energy Roadmap - July 2011.

Developer Risks.

- Investment risk: –
 - RO banding + EMR.
 - Aviation – Radar interference, NATS, MOD, airports.
- Planning system –
 - Set out need through National Policy Statements.
 - Give communities a greater say.
- Grid –
 - Infrastructure re-enforcement .
 - Cost effective connection

- Capacity of onshore wind in the planning system .



Development Timeline



Case Study – Frodsham Wind Farm

- Twenty 3MW turbines on deposit ground next to Manchester Ship Canal.
- Industrial setting between Ineos Chloride and Growhow/Shell, etc
- Significant consultation programme
- Cheshire's first significant wind farm
- LPA objection on: - Green belt – visual impact – cultural heritage - noise – ornithology + (aviation and health & safety).
- Planning Inquiry: - Narrowed issues down to green belt and visual impact.
- Inquiry completed December 2011 – Inspectors report to Secretary of State March 2012.
- Developer costs & risks significant.



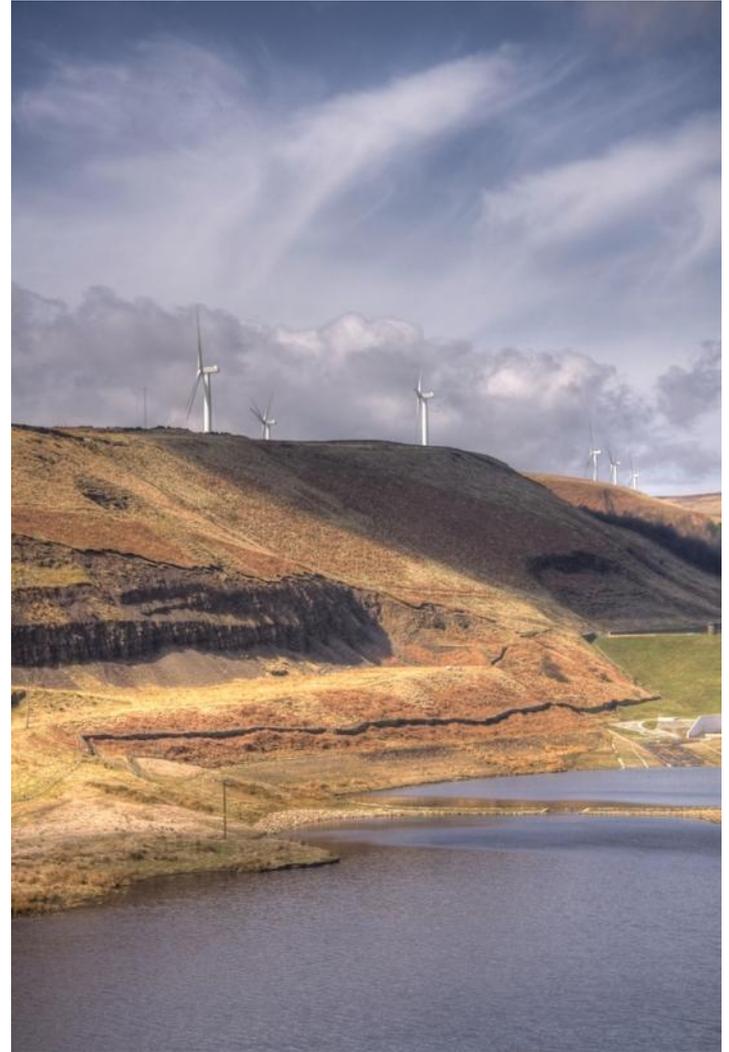
Summary

- Onshore wind could contribute 13GW by 2020, a 13% growth rate.
- With ROC banding for onshore wind at 0.9 ROCs/MWhr only the better sites will make financial sense.
- Long term debt funding from banks will not be easy for the next 12 months.
- The planning risk for developers is increasing due to localism despite National Policy Statements.
- Despite this, interest from experienced developers is still strong & this brings on-going opportunities for consultants, advisors and contractors.

Contact : Muir Miller

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Telephone : 0161 629 8200



Sector Briefing - Wind

QUESTIONS