The State of the Offshore Wind Market:

Opportunities for growth in the UK and beyond

Seb Rae
RenewableUK

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Investing in Your Future
European Regional Development Fund 2007-13
Southampton Solent University
National Oceanography Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL
SOREC
Solent Offshore Renewable Energy Consortium

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Seb Rae – Market Intelligence Manager, RenewableUK

DEVELOP IT

GROW : OFFSHORE WIND

Opportunities for manufacturers in the offshore wind market

mas
manufacturing advisory service

What is RenewableUK?

Formerly the British Wind Energy Association (BWEA) & has been representing the wind industry since 1978

- UK's leading not for profit renewable energy trade association
- Central point of information and a united representative voice for its members
- Conducts research, finds solutions, organises events, facilitates business development and networking, and promotes the benefits of wind and marine renewables to government, industry, the media and the public
- Has a large corporate membership ranging from small independent companies, to international corporations and manufacturers
- Members contribute to its activities through strategy & support groups
- To become part of the RenewableUK community visit the website at www.renewableuk.com, e-mail membership@RenewableUK.com or telephone +44 (0)20 7901 3001 - you will be in excellent company

Upcoming Networking & B2B opportunities

renewableUK 2015 ANNUAL CONFERENCE & EXHIBITION — Conference & Exhibition | ACC, Liverpool, UK | 6–8 October 2015

RenewableUK One Day Technical Events – Fundamentals — Two-day course | RenewableUK, London, UK | 21-22 July 2015

renewableUK TLT — Connect Event | TLT LLP, Bristol, UK | 10 September 2015

ICOE 2016 — Conference & Exhibition | EICC, Edinburgh, UK | 23–25 February 2016

renewableUK 2016 HEALTH & SAFETY — Conference & Exhibition | Edgbaston Stadium, Birmingham, UK | 28 January 2016

Sponsoring Members

ABB, AREVA, DONG energy, EDF ENERGY, e·on Climate & Renewables, MAINSTREAM RENEWABLE POWER, MITSUBISHI POWER SYSTEMS EUROPE, LTD., res power for good, RWE npower renewables, SCOTTISHPOWER RENEWABLES, SIEMENS, Statkraft, Statoil, Vestas

~500 corporate members across: Supply Chain, Services, O&M, Professional, Legal, Financial

What can RenewableUK do for you?

Grow Your Business
Enable Business Engagement

Protect Your Future
We Champion Your Industry

Meet the Right People
Connect Hundreds of Organisations

Achieve More
Return on Investment

Keep Up to Date
Receive Information to Make Informed Decisions

What is an offshore wind farm?

Offshore Processes in the Development, Installation & Operation of a Round 3 Wind Farm

- The Crown Estate own the rights to the seabed
- Offshore wind developers have secured leases for 60 years
- Profits from revenue earned by the Crown Estate from Offshore wind farms go to Her Majesty's Treasury (HMT)
- Before a wind farm can be built, it must be consented and a Financial Investment Decision (FID) will only be taken after a project has secured support from the government in the form of a Contract for Difference (Cfd)

Source: [BVG on behalf of the Crown Estate]

Look out for the new Haynes Manual

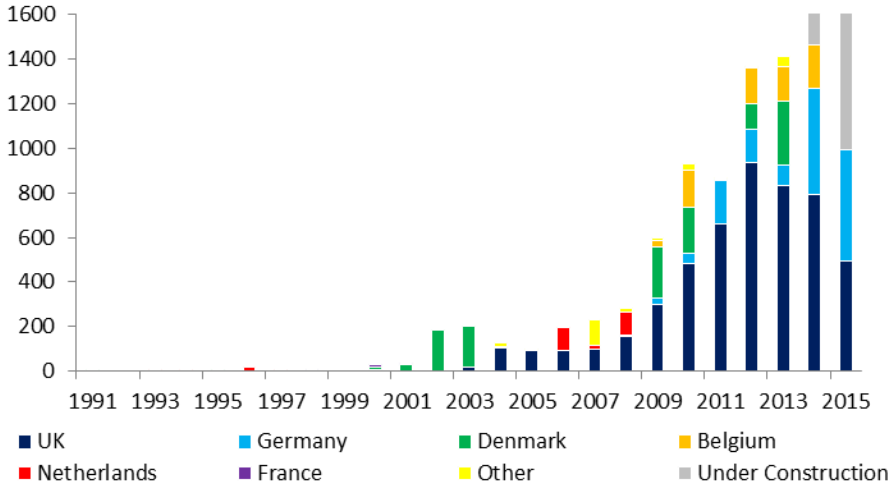
The UK: Building on experience in 2015

As an English company you are well positioned to take advantage of opportunities in the world's largest offshore wind market

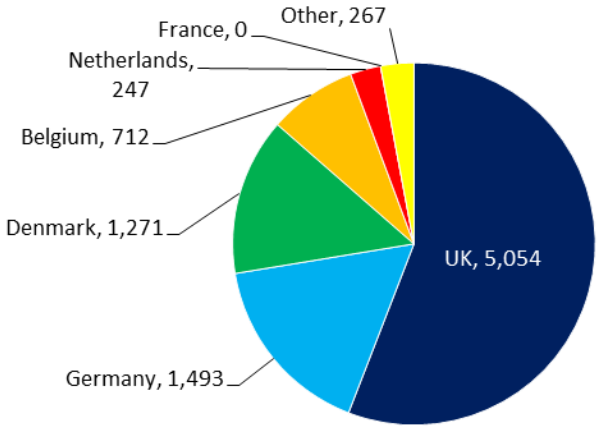
- Fully commissioned offshore wind capacity in the UK is now over 5GW
  - ❑ 1,452 turbines operating across 26 offshore wind farms – more than the rest of the world combined
  - ❑ 3,544,375 homes powered (annual equivalent)
  - ❑ 13,000 people employed (full time, direct & indirect)
  - ❑ Remaining portfolio is in excess of 30GW

- The experience of British companies who have delivered this portfolio is now highly sought after in emerging markets across Europe

European Commissioning Activity by Country (MWs p.a.)



European Fully Commissioned Capacity by Country (MWs)

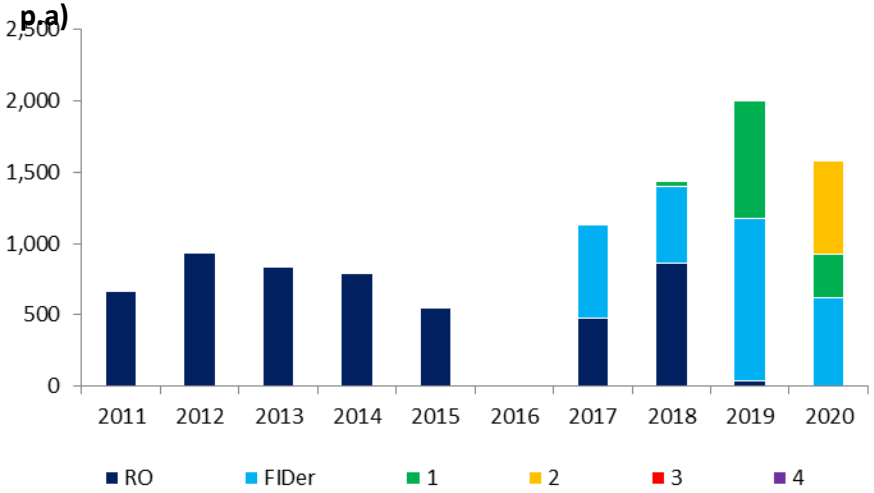


The UK: Key policy milestones in 2015

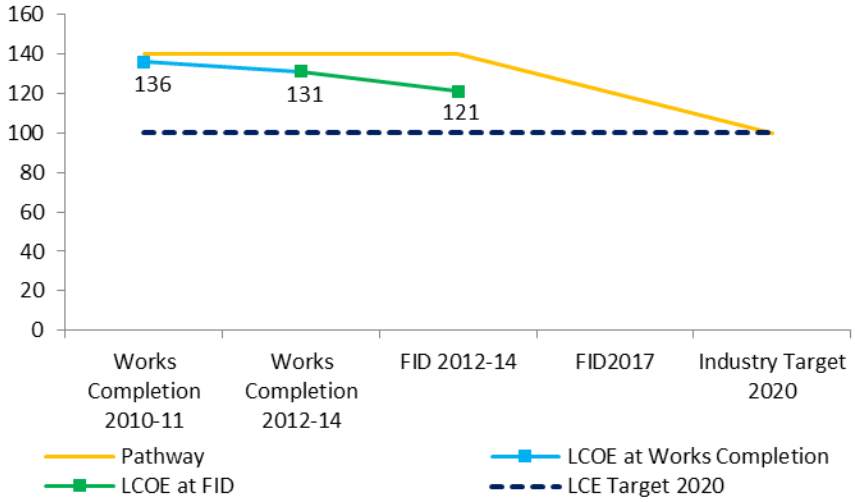
Pipeline Visibility & Cost Reduction

- On course to install over 10GW of operational capacity by 2020
- First successful Contracts for Difference (Cfd) auction delivered two projects with a strike price of less than £120 per megawatt hour
  - East Anglia One £119.89
  - Neart na Gaoithe £114.39
- Industry progressing towards cost reduction:
  - From 2010-2014, the cost of offshore wind has fallen by 11%
  - The UK is ahead of schedule on its path to delivering the LCOE target of £100 per megawatt hour for projects reaching FID in 2020

UK Commissioning Activity & Forecast by Allocation Round (MWs p.a)



Offshore Wind Levelised Costs compared to the Pathways Study



Policy Snapshot: FIDer

Financial Investment Decision Enabling for Renewables (FIDer)

- x5 projects received early Cfds from government in 2014 to help consolidate the pipeline up to 2020:
  - ❑ Beatrice (SSE)
  - ❑ Dudgeon (Statoil; Statkraft; Masdar)
  - ❑ Burbo Bank Extension (Dong)
  - ❑ Walney Extension 1&2 (Dong)
  - ❑ Hornsea 1 (Dong)

- Facilitated inward investment decisions from:
  - ❑ Siemens (Hull)
  - ❑ MHI Vestas (Isle of Wight)
  - ❑ OSB UK Ltd (Teesside)

- Major contract wins:
  - ❑ JDR (framework agreement with Dong)
  - ❑ Briggs group (framework agreement with Dong)
  - ❑ Sembmarine (substation for Dudgeon)
  - ❑ OSB (transition pieces for Burbo Bank Extension)
  - ❑ MHI Vestas (turbines for Burbo Bank Ext., Walney Ext.1 & Navitus Bay*)
  - ❑ Siemens (turbines for Dudgen, Hornsea 1 & Walney Ext. 2)

Inward Investment

SIEMENS
Siemens Wind Power

MHI VESTAS OFFSHORE WIND

OSB
OFFSHORE STRUCTURES BRITAIN

UK winners

JDR

sembmarine SLP
A Subsidiary of SMOE

Briggs

RXPE
RONGXIN POWER ENGINEERING

LONGITUDE Engineering

Policy Snapshot: Cfd

A policy framework that has been built to last

- Projects compete on price for a for the available budget in that year

- Clear & transparent milestones
  - ❑ Milestone Delivery Date (10% of total project spend must be allocated 1 year after Cfd award)
  - ❑ Target Commissioning Date (project must deliver within 1 year of this date)

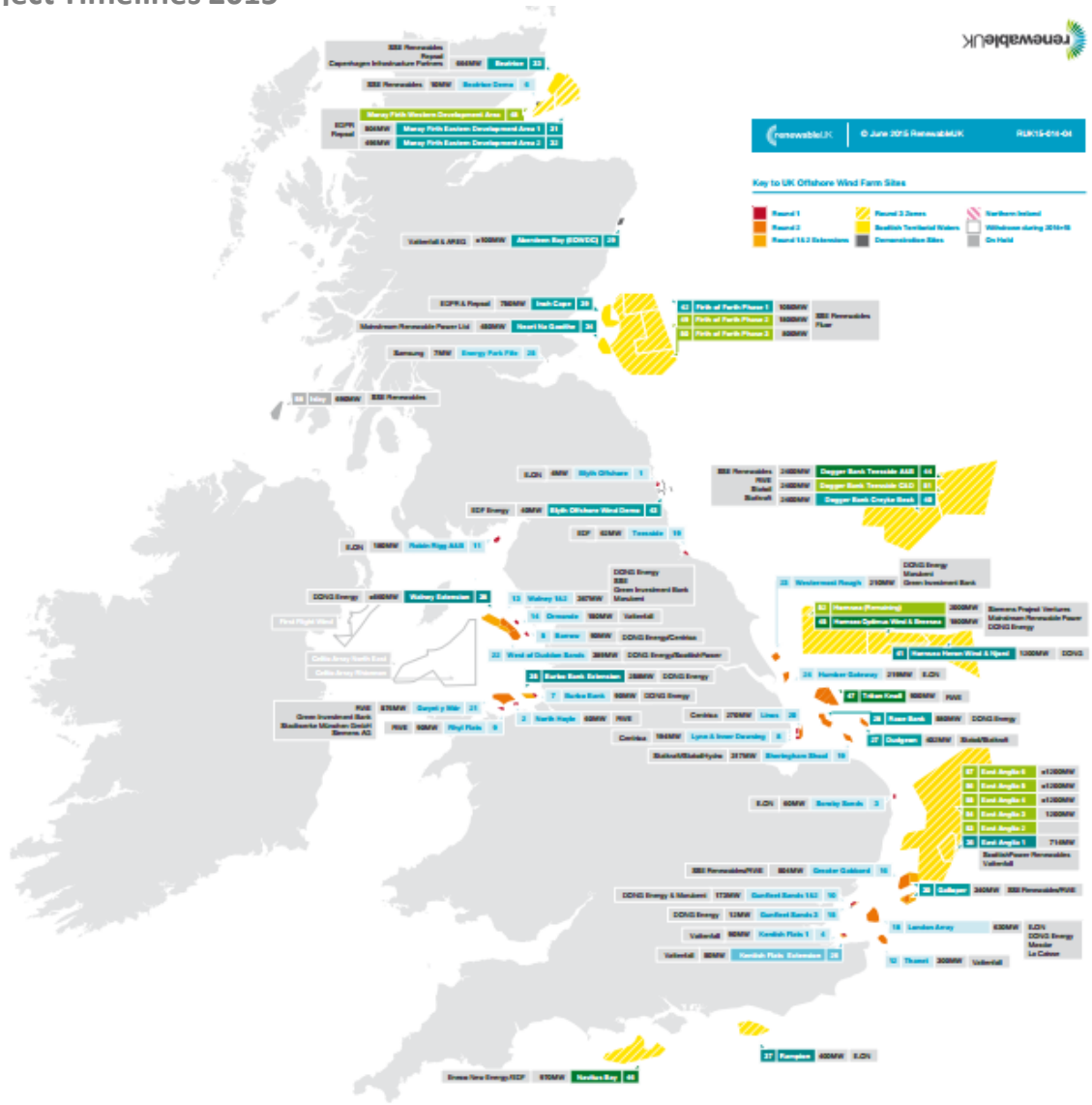
- In order to participate in an auctions, developers are required to submit supply chain plans that address:
  - ❑ Competition
  - ❑ Innovation
  - ❑ Skills

- East Anglia 1:
  - ❑ Committed to 50% UK content

- Neart na Gaoithe:
  - ❑ First commercial deployment of the new Offshore Transformer Module from Siemens T&D

Where are the UK projects?

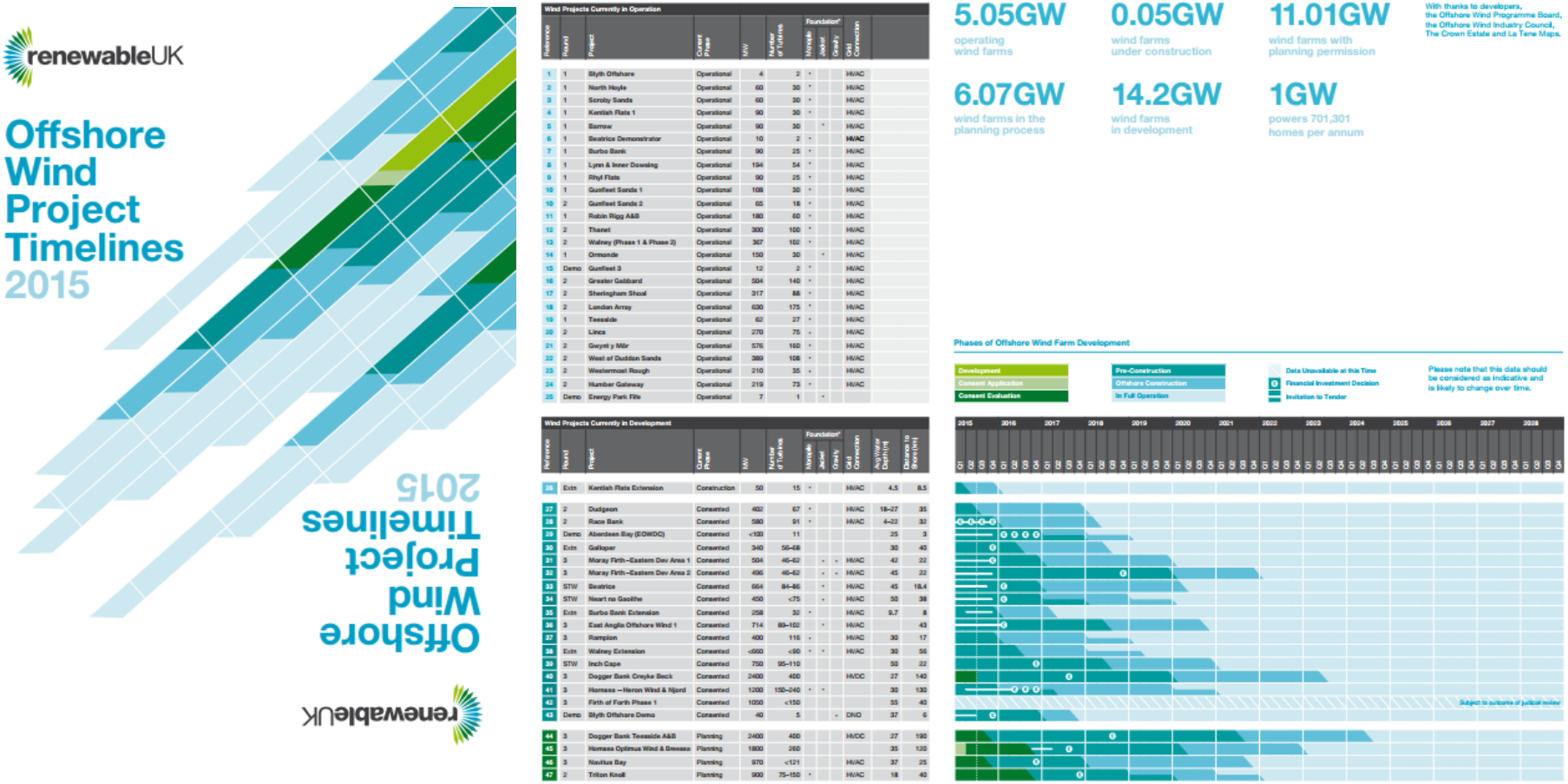
RUK Offshore Wind Project Timelines 2015



Source: RenewableUK

When are the UK projects delivering?

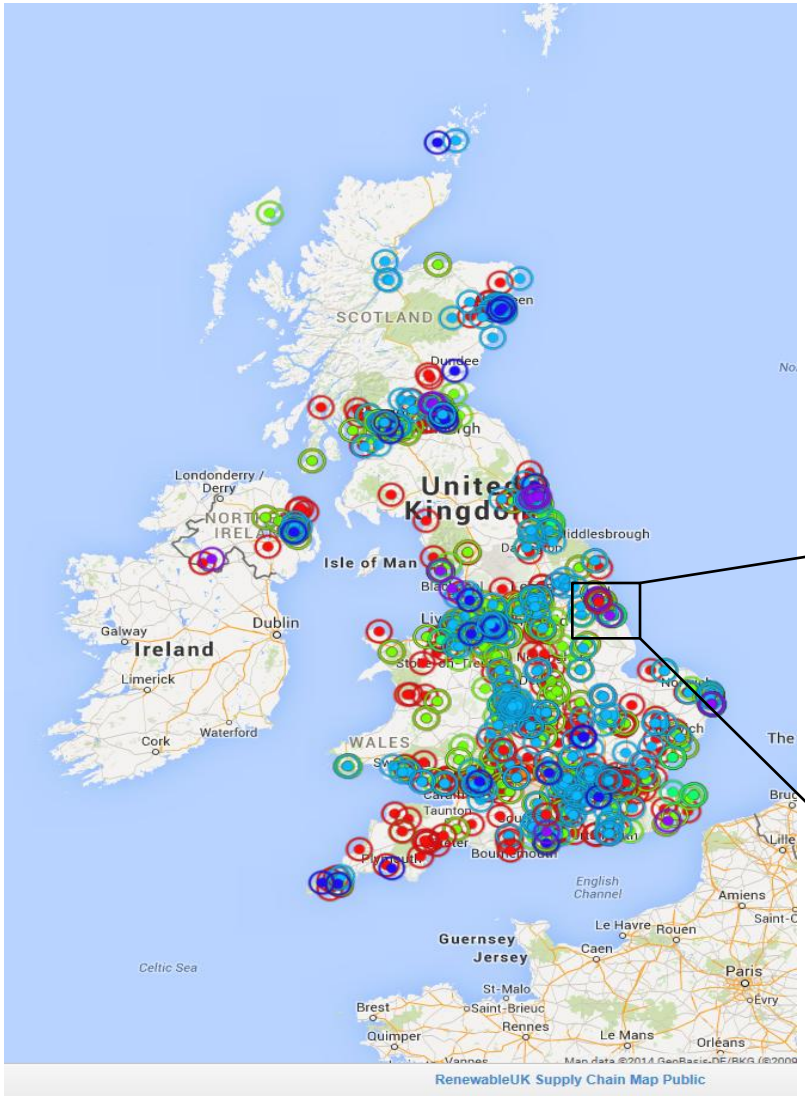
RUK Offshore Wind Project Timelines 2015

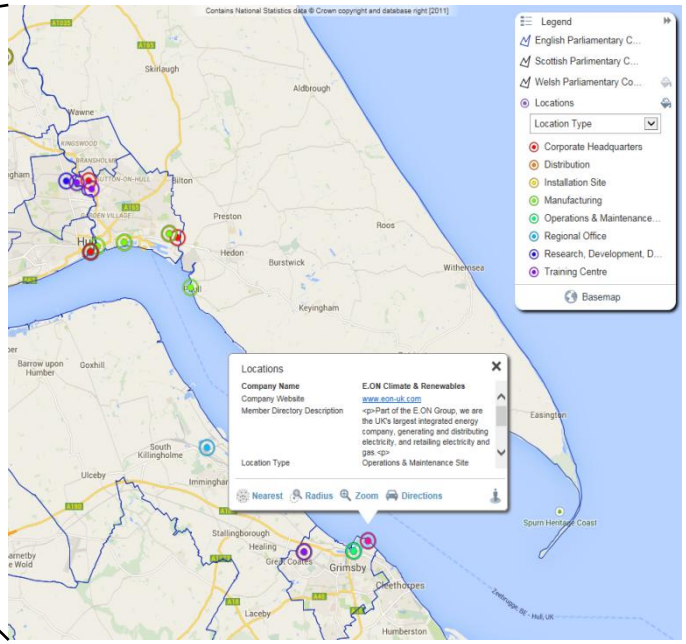


Source: [RenewableUK]

What does the UK supply chain look like?

RUK Supply Chain Map





Source: RenewableUK

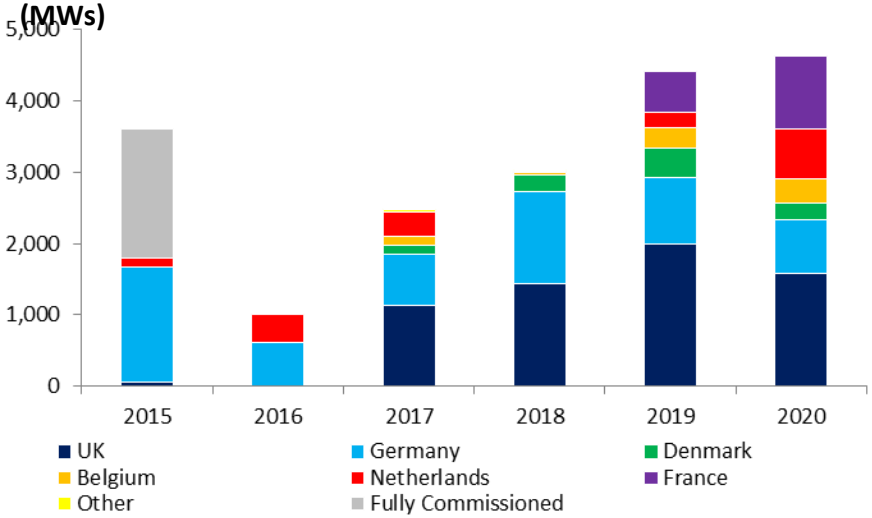
Europe: A £50bn CAPEX market to 2020 across Europe

From a UK base you are well placed to win domestic business & to export into the largest commercial opportunity in the world

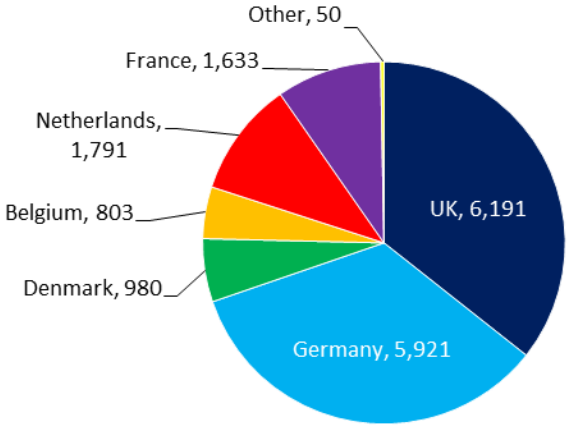
Significant commercial opportunity for English based businesses over the next 5 years:

- Up to £12bn worth of component supply and construction contracts in the UK
- O&M estimated to be worth £850m per annum by 2020 in the UK – will require companies experienced in managing and delivering offshore O&M activities
- £40bn worth of component supply and construction contracts expected across the rest of Europe
- x7 key UK projects contracting over the next 9 months:
  - ❑ Race Bank (580MW)
  - ❑ Walney Extension (660MW)
  - ❑ Galloper (336MW)
  - ❑ Beatrice (664MW)
  - ❑ East Anglia 1 (714MW)
  - ❑ Neart na Gaoithe (448MW)
  - ❑ Hornsea 1 (1200MW)

European Cum. & Annual Commissioning Forecast by Country (MWs)



European New-build Forecast by Country (MWs)



When are the European projects delivering?

Germany: The projects

By 2020 6.5 GW of projects are expected to be operational

Wind Farm	Owner(s)	Capacity (MWs)	Turbine	2014	2015	2016	2017
Hooksiel	BARD	5	BARD 5MW				
Alpha Ventus 1	EWE; E.On; Vattenfall	30	Senvion 5MW				
Alpha Ventus 2	EWE; E.On; Vattenfall	30	Adwen 5MW		5 year service agreement		
Baltic 1	EnBW; Consortium of Municipalities	48	Siemens 2.3MW				
BARD Offshore 1	BARD; Ocean Breeze	400	Bard 5MW				
Riffgat	EWE; Enova	108	Siemens 3.6MW	5 year service agreement			
Meerwind	Blackstone; WindMW	288	Siemens 3.6MW		5 year service agreement		
DanTysk	Vattenfall; SWM	288	Siemens 3.6MW			5 year service agreement	
Nordsee Ost	RWE	295	Senvion 6MW			5 year service agreement	
Borkum West 2.1	Trianel	200	Adwen 5MW			5 year service agreement	
Global Tech 1	SWM; HSE; Axpo; Esportes Offshore; FC Wind; Windreich; GTU; Norderland	400	Adwen 5MW			5 year service agreement	
Baltic 2	EnBW Macquarie	288	Siemens 3.6MW			5 year service agreement	
Borkum Riffgrund 1	Dong; Kirkbi; Oticon	312	Siemens 4MW			5 year service agreement	
Amrumbank West	E.On	288	Siemens 3.6MW			5 year service agreement	
Butendiek	Marguerite; Siemens; PKA A/S; Industriens Pension; WPD	288	Siemens 3.6MW			10 year service agreement	
Gode Wind 1&2	Dong	582	Siemens 6MW				5 year service agreement
Sandbank	Vattenfall; SWM	288	Siemens 4MW	FID			5 year service agreement
Nordergrunde	WPD	111	Senvion 6MW		FID		5 year service agreement
Wikinger	Iberdrola	350	Adwen 5MW	FID			5 year service agreement
Nordsee 1	Northland; RWE	332	Senvion 6MW		FID		5 year service agreement
Veja Mate	Laidlaw Capital	402	Siemens 6MW		FID		5 year service agreement
Arkona-Becken Sudost	E.On	385	Tbc	Grid Agreed		FID	
Borkum West 2.2	Trianel	200	Adwen 5MW	Grid Agreed		FID	
Borkum Riffgrund 2	Dong	450	MHI Vestas 8MW	Grid Agreed		FID	
Hohe See	EnBW	450	Tbc	Grid Agreed		FID	
Deutsche Bucht	Laidlaw Capital	210	Adwen 5MW			FID	
MEG 1	DEME; Windreich	400	Adwen 5MW		Data is unavailable at this time		14 year service agreement

Total	7,428
Fully Operational June '15	1,493
Under Construction '15	2,358
By 2020	*7,428

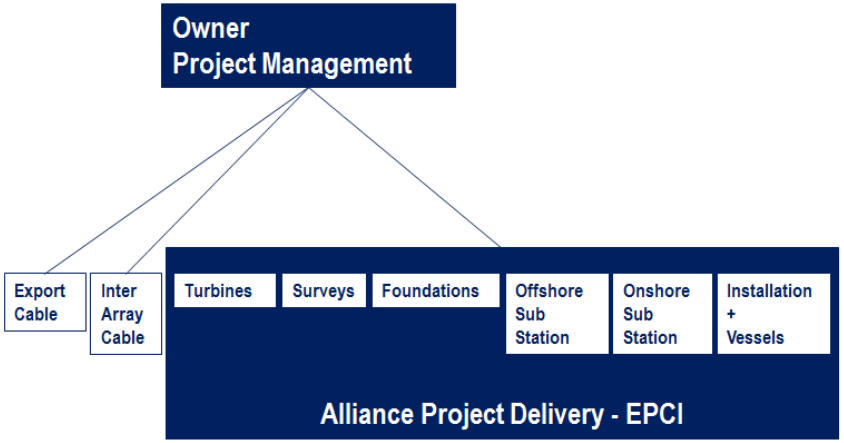
*This figure represents all projects with grid connections to 2020. This is more than is required to deliver the Federal Government's cap of 6.5GW by 2020. For this reason the German Federal Network Agency may look to manage capacity in order to work within this cap.

Source: UKTI

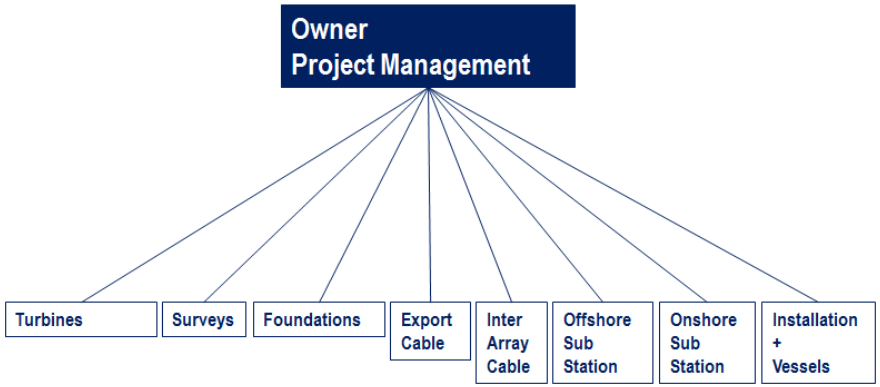
Contracting structures

Contracting structures vary from project to project – make sure you understand who your end customer is

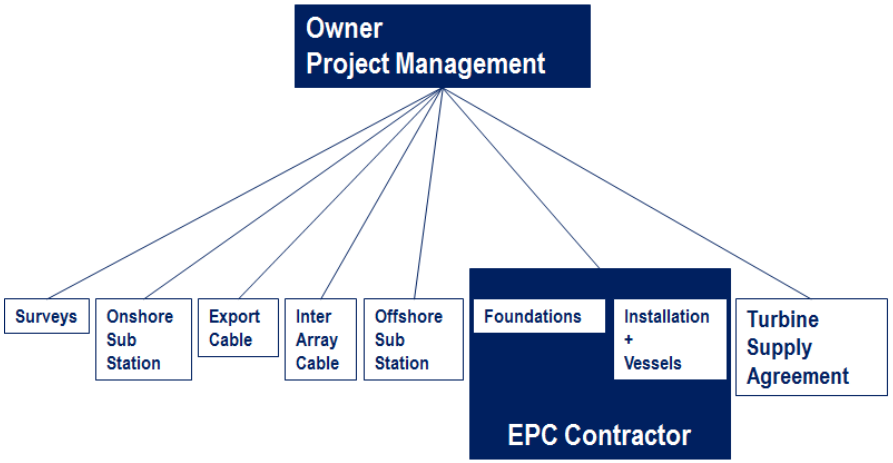
Alliance Project Delivery



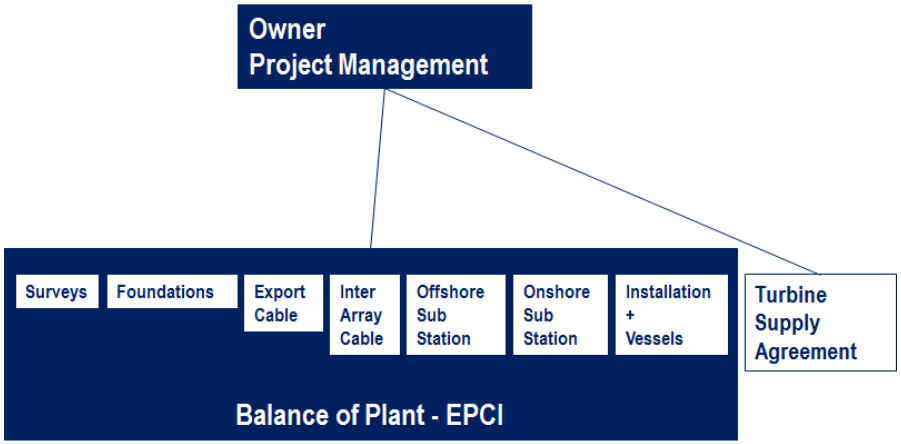
Multi-Contract Approach



Foundation EPC



Balance of Plant EPCI



Procurement Portals

Company or project specific procurement portals are widespread & are usually the a good place to start

Method Used*

Developer or Tier1 Supplier	Sellihca	UVDB	F-PAL	OJEU –	Company Website	Meet the Buyer events	Advertise in Trade Publications	Other	Notes
E.On Climate & Renewables		Yes			Yes	Yes		Yes	Procurement Information page
Mainstream Renewable Power					Yes			Yes	http://www.smartwind.co.uk/register.aspx
DONG Energy	Yes	Yes		Yes	Yes			Yes (Connexi o- Achilles hosted)	How to become a supplier to DONG Ener gy Wind Power
EDF Energy Renewables		Yes		Yes	Yes			Yes	Supply Chain Opportunities Supplier Portal
SSE Renewables		Yes		Yes	Yes – Supplier register			Yes	SSE Supplier Registration System
Forewind	Yes	Yes	Yes		Yes			Yes	http://www.forewind.co.uk/suppliers/ http://www.forewind.co.uk/zone-development/suppliers.html
Vattenfall				Yes	Yes-Supplier bank			Yes	Supplier relations Vattenfall Supplier Bank
RWE npower renewables		Yes			Yes	Yes		Yes	RWE Supplier Portal
Scottish Power				Yes	Yes			Auction tool	Becoming a ScottishPower Supplier ScottishPower Supplier Registration
EDPR					Yes- Supplier register			Yes	EDPR Supplier Registration

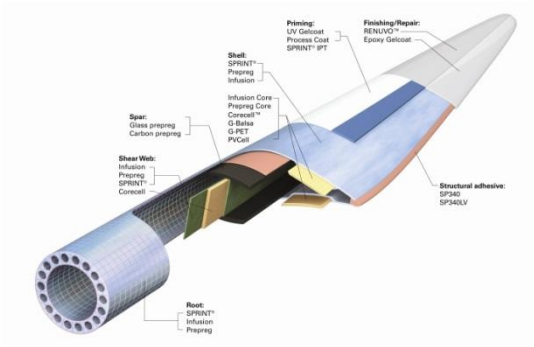
*further details on method used:

Sellicha- Nordic Utility Qualification System and Vendor Database http://www.achilles.com/en/Norway/
UVDB- Utility Vendor Database (UVDB) http://www.achilles.com/en/uk/UVDBsupplier/
F-PAL- First Point Assessment http://www.achilles.com/en/FPAL/
OJEU- Official Journal of EU http://www.ojeu.eu/
Other- This may include direct contact at networking & trade events, internet searches, review of experience on projects

What components are required?

Do you know when your components & services are required & where they end up on a wind farm?

- Blade Rack
- Blades (Surface materials)
- Bolted Joints
- Cabinets (Electrical Panels)
- Corrosion Protection Systems (Active)
- Corrosion Protection Systems (Passive)
- Pitch System & Drive(s)
- Primary Steelwork (Foundations)
- Secondary Steelwork (Transition Piece)
- Tower
- Yaw Drive(s)



What is required – Capability

Do you know whether you have the capability to supply quality products & services to a an increasingly competitive sector?

Technical Description (Coatings)

Any method used to provide an in-built defence (e.g. coatings) against the corrosive nature of the natural elements. Note: the following info only covers the provision of coating materials themselves, and not the preparation and application which is usually carried out under subcontract at fabricators' yards

Materials

Oxides, phosphates, electrolytic coatings, epoxy resin, polyurethane, ethyl silicate, silicons, zinc, cement

Etc…

Standards

DIN EN ISO 804
DIN EN ISO 150 12944

Etc…

Dimensions

Greatest volume market for coating systems will be for the **Towers** & **Transition Pieces**

- A 3.6MW tower has total area 3,000 – 4,000m2

Etc…

Potential Customers & Suppliers

OSB Ltd, Sif & Smulders
MHI Vestas, Siemens
MTL Group, Barrier Group
Mabey Bridge & Wind Towers Scot.
Etc…

Barrier to Entry

Fabricators and WTG OEM's usually have preferred suppliers for coatings, and a level of industry conservatism exists against new products

Etc…

Approval Lead-time

1-2yrs if existing supplier of field proven coatings to offshore industry

Etc…

Support: GROW:Offshore Wind

GROW:Offshore Wind can help companies based in England open doors within the offshore wind sector

Supported by the Department of Business, Innovation & Skills (BIS), GROW:Offshore Wind has supported over 1000 companies over the last 18 months across a wide range of projects including business development, progressing innovation and assisting with capital investments. We have matched funding available to support a wide range of business projects that can help your company develop in the offshore wind sector from your products, processes and people to supply chains and the markets you operate in. Typical projects include:

Projects that are in scope include:

- Business Development
- Patents and intellectual property
- Product design and development
- Prototyping, testing & trials
- Supply chain assessment, design and development
- Specialised training
- Bid writing, support with pre-qualification
- Market development to identify new sales channels and opportunities
- Bespoke/product specific tooling (made in the UK)
- Specialised software development

For more information and to arrange a free business capability review register your interest at www.growoffshorewind.com , email growoffshorewind@mymas.org or telephone +44 (0) 207 728 2738

* Projects and size of grants are subject to eligibility and scope criteria that we will discuss and review with you to make sure you meet the necessary conditions

Case Study - Funding Support H&Askham's Growth

- 2014 saw a number of major electrical engineering projects – worth several £millions – successfully completed in renewable energy, including the Global Tech 1 offshore wind farm, Dan Tysk offshore wind farm (both located in Germany), Whitland solar farm (UK) and the London Array offshore wind farm in Kent

- H&Askham is a Kent-based electrical installation specialist, offering a full range of electrical installation services for customers involved in civil engineering, rail and renewable energy

David Pierce, General Manager, continued:

- "The generous funding and support from GROW:OffshoreWind is allowing the business to pursue a number of opportunities that will not only help us develop as a business, but will also create jobs as we further expand our team."

Programme Partners

Grant Thornton – An instinct for growth™

renewableUK – The voice of wind & marine energy

BUSINESS GROWTH SERVICE

The University Of Sheffield. AMRC

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