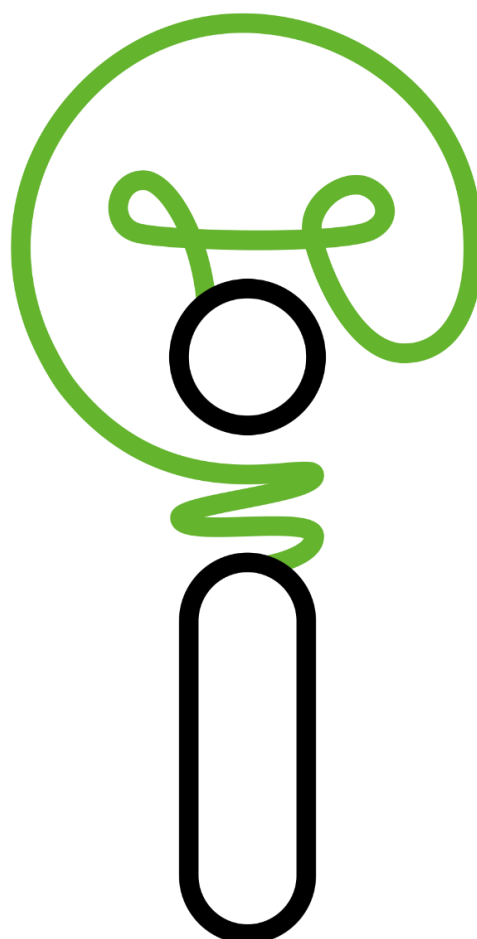


EV044

Triton Knoll Humber Skills Strategy

Not confidential





Humber Skills Strategy

April 2016

Objectives

Contribute to a Winning Supply Chain Plan

De-risk the Supply of Key Resources

Maximise Local Content

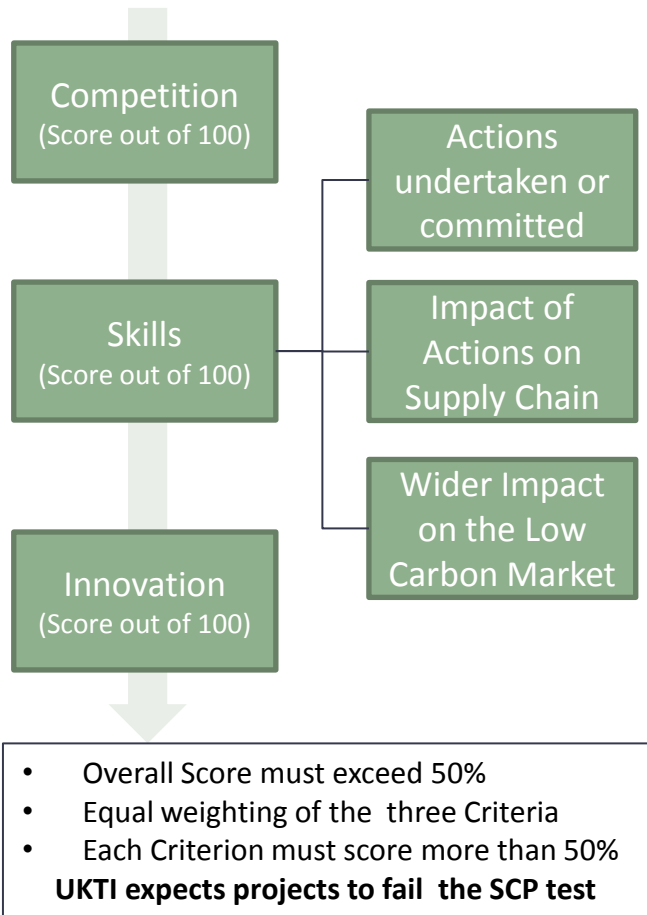
Build on Local Infrastructure

- Build a robust programme of actions and commitments that demonstrate a genuine and deep-rooted determination to maximise local and UK employment in the project.
- Ensure there are sufficient professional and vocational skills to support project delivery in an area where there will be significant competition between projects for the best people.
- Promote employment and re-skilling opportunities in the communities most closely associated with the development of the project to maximise the local content in the project.
- Optimise the use of existing local and national education and skills infrastructures and add value to these where possible.

Importance of Skills in the Supply Chain Plan



Supply Chain Plan Scoring



What DECC Expects to see....

- S1. An assessment of the future skills requirements at each stage of the project (design, construction- including the major supply components, and operation and maintenance of the life of the project)
- S2. An assessment of whether these skills are currently in place and what, if any, gaps there are
- S3. A set of actions that will provide investment in skills and training in order to meet the future needs of the project- as estimated at each stage
- S4. Plans that the project intends to put in place to maintain and develop the skills necessary for the lifetime of the project
- S5. Examples where the applicant had, or intends to, share best practice and lessons learned

What TK has to do....

- TK must complete a Skills Audit
- TK must develop a programme of Actions and Commitments

Humber Skills Landscape



	Schools	Colleges	Further Education and University	Re-Training and Re-Skilling
Training and Education	Humber UTC Top-class education. Engineering and renewables focus. 14/19 years.		National College for Wind Energy Aims to provide high level technical skills through national hub & spoke model infrastructure.	Tata Response Task Force Steering and Action Groups led by council to retrain steel workers and suppliers. Supports the community.
	School STEM Activity Support existing LEP and LA initiatives.	Humber Energy Campus Employers, University, colleges and training providers seeking become a centre of excellence for energy skills.		
	Employability Passport Developing the benchmark for employability skills		Humber Apprentice Support Service Brokerage service providing support to employers of Apprentices	
Careers Education, Information, Advice, Guidance	The Humber Gold Standard Developing benchmark for youth careers advice.		'Bridging the Gap' Online portal to raise aspirations/awareness of career pathways.	
	Festival of Skills & Opportunities - Month long series of skills initiatives in N Lincs (Oct)			
	Careers and Enterprise Company Nat. initiative developed on Humber. Aims to motivate and inform choices. Trial with 40 schools and education establishments.			Labour Market Intelligence Online resource to provide sector stats.
Recruitment	The Humber Skills Pledge Links employers, trainers, councils, Jobcentre to pledge one of six skills initiatives.			
	Skills Network Training providers, LAs, agencies and employers discuss skills issues.		Recruiters Forum HR professionals informing the LEP of real skills needs on hard-to-fill roles and to steer skills funding.	

Humber Skills Landscape



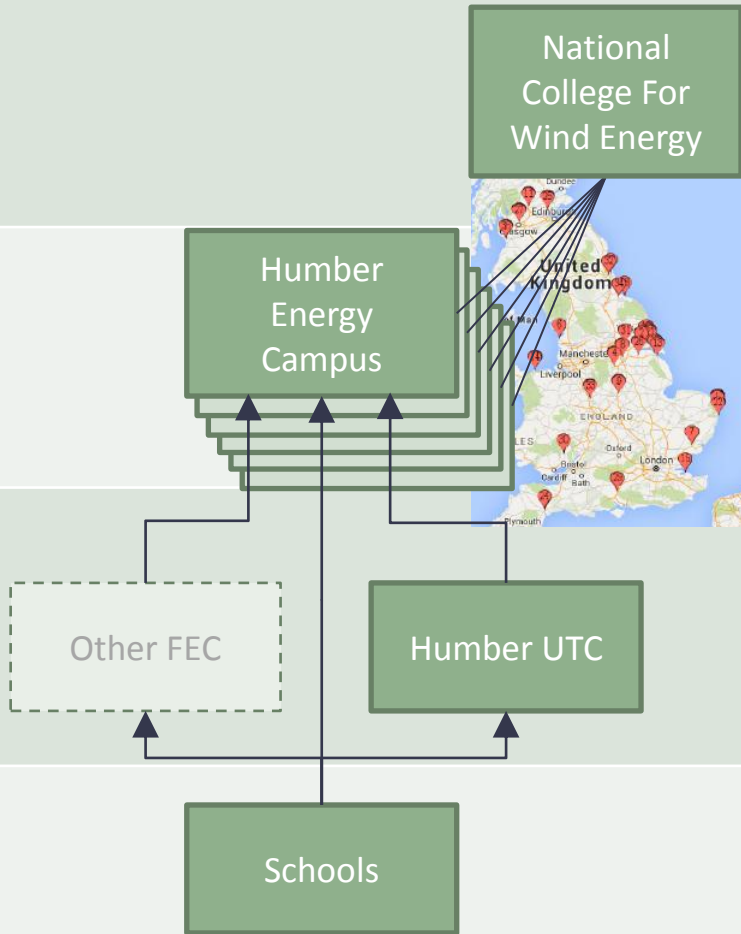
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Education Overview

Outline of Proposed Education System

Description

Opportunities for TK



- Proposed Hub & Spoke arrangement
- LEP developing bid to Govt in August
- Backing of local and nat. politicians
- Developers needed on the Board
- Operational in 2 years

- Board role
- Possible Chair
- Steer Bid process to ensure success
- Sponsorship

- LEP led collaboration of employers and training providers
- Aims to be centre of excellence on energy skills

- Support by providing breakdown of skills that the project needs
- Help shape the make up of courses to deliver skilled workforce for TK and the supply chain

- UTC similar to school for 14 – 19 year olds
- Launched in 2015
- Core skills plus engineering and renewables

- Board role
- Curriculum shaping
- Sponsorship

- Existing Schools

- STEM support to programmes that others are running.
- Outreach to support UTC goals
- Future: Careers and Enterprise Co

Proposed Immediate Engagement

A range of initiatives that will play well in the SCP, represent good value to the project and require limited project resources.

	Resources Required from Project	Importance to Project Delivery	SCP Scoring Impact	Proposed Actions
Humber UTC	Mgt time for Board Role Sponsorship [£TBC]	Med	High	Consider sponsorship, Board role?
National College for Wind Energy	Monthly Development Boards to Aug . Inc commitment for Chair. Sponsorship [£TBC]	Med	V High – Regional project, National impact, Political weight.	Identify best candidate and pitch for role as Chair Consider sponsorship
Tata Response	Low – Supply skills info . Present at seminar	High	V High for Competition, Innovation and Skills	Generate skills data and work with N Lincs Council ASAP
School Stem Activity	Low - Mgt Time working with existing schemes	Med – possible future staff and good local PR	Med - Expected Activity	Engage with LEP on options for STEM work
Humber Energy Campus	Low – Supply indicative profile of workforce	Med	Med	Generate workforce data and work with LEP
Bridging the Gap	Low – supply aspiration for project and branding	Low	Med - Can implement Immediately	Work with LEP on branded web material
The Humber skills Pledge	Almost nil - Sign Up!	Low	Med - Can implement Immediately	Review 6 pledges. Sign up.

Proposed Delayed Engagement

A group of initiatives where engagement will be required during construction / operation but SCP and PR benefits can be gained through an early MOU with the Humber LEP.

	Description	Project Resources	Recommendation
Humber Apprenticeship Support Service (HASS)	<ul style="list-style-type: none"> Roll out following successful pilot Brokerage providing support to employers of apprentices 	Quarterly meeting of LEP Apprenticeships Group	<p>Develop a single MOU with Humber LEP to demonstrate that we will engage in partnership across all these areas when we have a construction project.</p> <p>Plays well in the SCP.</p> <p>Provides great PR Opportunity.</p>
Employability Skills	<ul style="list-style-type: none"> Improving employability skills Employability Passport Framework 	Support the Working Group Support testing of Passport validation	
The Humber Gold Standard	<ul style="list-style-type: none"> Benchmark for advice developed National interest 	Engage & shape the standard. Provide info on skills needed. Or simply Sponsor it (c.£5k)	
Careers and Enterprise Company	<ul style="list-style-type: none"> National Initiative delivered in Humber Working with schools Motivate and inform choices 	6 hrs/month with 1 year commitment	
Labour Market Intel	<ul style="list-style-type: none"> Online sector stats 	Provide Employment details Qtrly	
Skills Network	<ul style="list-style-type: none"> Good Sounding Board 270 Organisations 	Quarterly Meeting (or can use LEP to sound out issues)	
Recruiters Forum	<ul style="list-style-type: none"> Good HR Sounding Board 28 HR Professionals 	Quarterly Meeting (or can use LEP to sound out issues)	

Festival of Skills and Opportunities (FOSO)

- North Lincolnshire Council initiative
- A one month programme of events in October each year
- Designed to help children and adults consider career, skills and training opportunities
- Potential to engage and steer individual events that are linked to offshore wind/energy/engineering
- **BUT the event is throughout October..... we may be busy and distracted this year.**
- Consider engagement for future years



Sector specific event for those interested in having or developing a career within the sector.

Event to be held at the Pods inviting schools to attend to gain career advice from companies and information stands. To provide attendees with the information needed to help make their decision in further education choices to move into their desired career.

Event aimed at those looking for a specific apprenticeship. All companies are invited to attending if have any current or up and coming apprenticeships.

Event	Date
Open Doors	29 Sept
Sector Saturday - Discover Health	01 Oct
Action station One Year On	03 Oct
Graduate Speed Networking	04 Oct
CIP Event	05 Oct
Discover Schools	07 Oct
Sector Saturday – Engineering, Construction and Renewables	08 Oct
Big Dinner	09 Oct
Business Support Breakfast	11 Oct
Armed Forces Eng Challenge	12 Oct
Careers Event	13 Oct
Armed Forces and Veterans Event	15 Oct
Code Breaker Yr 6	19 Oct
Code Breaker Yr 8	20 Oct
Sector Saturday – Teaching	22 Oct
Apprenticeship Event	27 Oct
Discover	29 Oct
Celebration Event	03 Nov

Resourcing and Recommendation

Resourcing

- Implementation
 - Responsible - Communications and Stakeholder Officer
 - Accountable – Consents Delivery Manager
 - Support – Communications Manager, Stakeholder Manager
 - Additional Support from Westbourne may be possible
- Humber UTC and Nat College Board membership
 - SMT Commitment needed

Recommendations

- SMT is requested to:
 - Support the objectives of the Skills Strategy
 - Approve the proposal for immediate actions to engage with the region's Skills and Education infrastructure
 - Commit SMT resources for National College for Wind Energy development board meetings
 - Approve the development of a Memorandum of Understanding on our future partnership with the Humber LEP.

Backup Slides

The Humber Skills Pledge

Select one of the pledges below to find out more:



Invest in increasing the skills of your workforce



Mentor a budding entrepreneur



Offer a work placement to a young person or adult



Employ a graduate



Offer an Apprenticeship / Traineeship



Support the development of employability skills

To get involved and support skills and training in the Humber, please fill in the online form and we will try and contact you within 48 hours to gain further details and take the next step.

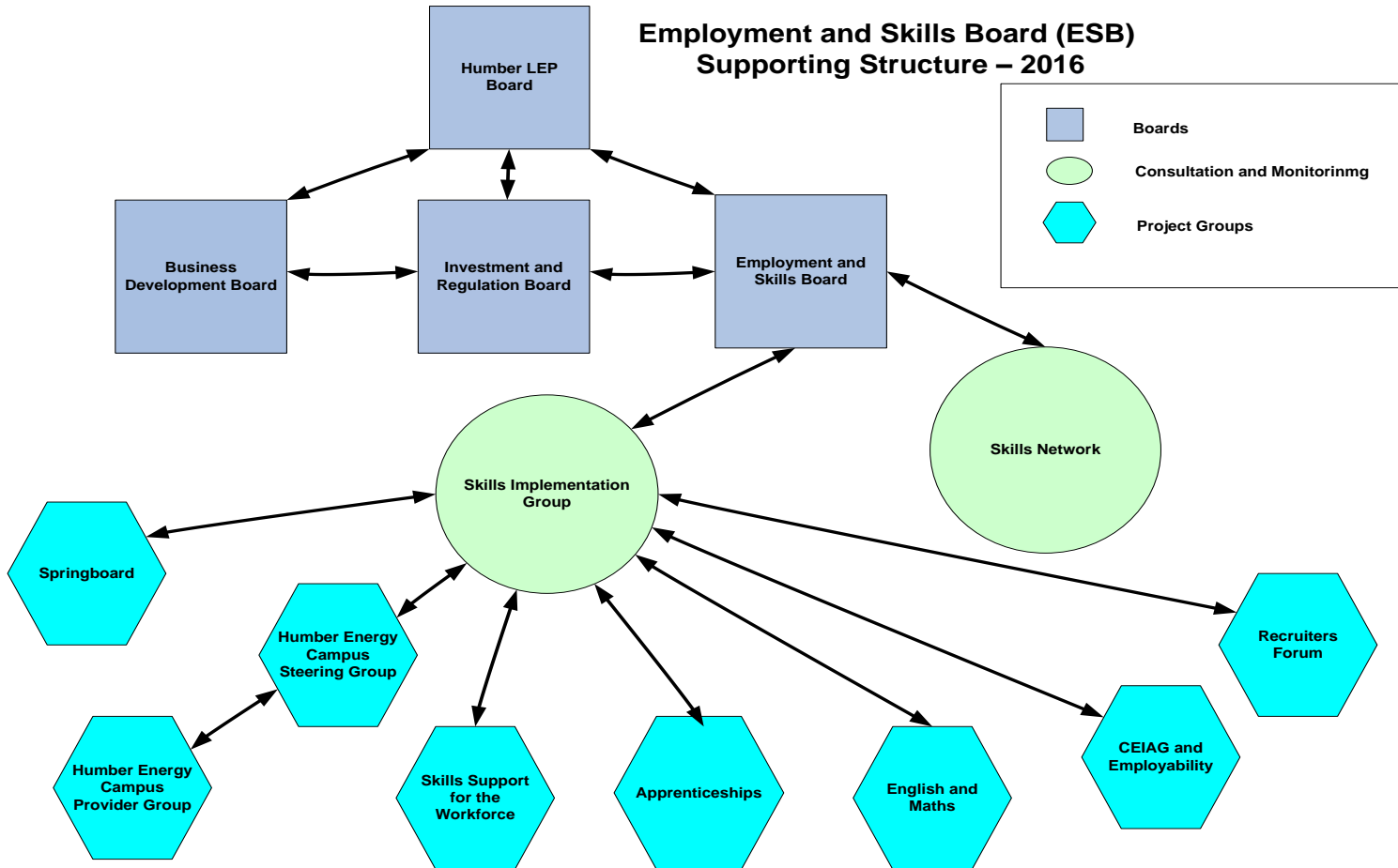


to the pledge



Pledge supporters

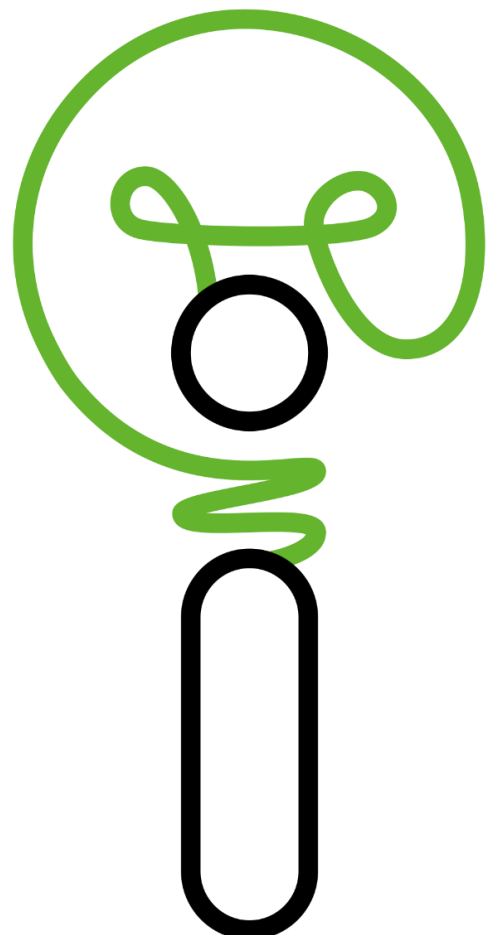
Humber ESB Infrastructure



EV045

Environmental Statement Chapter 22 Socio-economics

Not confidential





**DOGGER BANK
TEESSIDE A & B**

**March
2014**

Environmental Statement Chapter 22 Socio-economics

Application Reference: 6.22

Table 5.1 Full time equivalent jobs predicted for the construction of a single project

Scenario	Direct employment	Indirect employment	TOTAL	
	FTE jobs	FTE jobs	FTE jobs	FTE jobs per MW installed
Low – 13 GigaWatts by 2021	1,092	588	1,680	1.4
Medium – 23 GigaWatts by 2021	1,548	912	2,460	2.05
High – 31 GigaWatts by 2021	1,644	984	2,628	2.18

Workforce numbers (operation and maintenance)

5.2.10 Using the employment projections presented in **Table 4.9** the range of FTE jobs associated with the operation and maintenance of a single project are presented in **Table 5.2**. The table also shows estimated full time jobs per MW installed.

Table 5.2 Full time equivalent jobs predicted for the operation of a single project

Scenario	Direct employment	Indirect employment	TOTAL	
	FTE jobs	FTE jobs	FTE jobs	FTE jobs per MW installed
Low – 13 GigaWatts by 2021	216	180	396	0.33
Medium – 23 GigaWatts by 2021	240	192	432	0.35
High – 31 GigaWatts by 2021	300	216	516	0.42

5.2.11 The realistic worst case scenarios taken forward for assessment within this chapter are presented in **Table 5.3**. The identified worst case scenarios are also applied to the cumulative impact assessment.

12 Summary

12.1 Summary

- 12.1.1 This chapter of the ES has provided a characterisation of the existing environment for socio-economics.
- 12.1.2 The socio-economic impacts of Dogger Bank Teesside A & B are considered within the regional and national policy framework for energy and energy infrastructure. Government strategic assessments and policy statements have made the case that an increase in energy produced from renewable sources will not only increase the security of energy supplies, but will also provide opportunities for investment in new industries. The Government's Renewables Roadmap notes that nationally, renewable energy could employ half a million people by 2020 and that the creation of these new jobs in the renewable energy sector, with the accompanying investment in new manufacturing capability will support the nation's transition to a green economy. The NPSs recognise that the construction, operation and decommissioning of energy infrastructure may have socio-economic impacts and sets out some of the national level impacts.
- 12.1.3 This assessment has considered socio-economic impacts at the local and regional levels. It has considered the impacts of construction, operation and decommissioning of Dogger Bank Teesside A & B upon a range of socio-economic receptors. Available guidance notes that potential socio-economic impacts of new energy infrastructure should be considered with any other sources that the Planning Inspectorate considers to be both relevant and important to its decision, which includes the case already made in the NPSs and other Government assessments at the national level.
- 12.1.4 Forewind has not yet confirmed which port(s) will be used to support construction activities, and there may not be a single 'base' construction or workers' port. Therefore, an assessment of socio-economic impacts at a named port or ports has not been undertaken. Once a construction port has been confirmed, the future developers and operators of the development will work closely with the port authority and relevant local authority to ensure that all potential impacts are fully understood and measures are proposed where relevant.
- 12.1.5 For this assessment the north east region was identified as a realistic economy within which both the onshore and offshore projects could be based. Potential impacts at the local (Redcar & Cleveland Borough) level were also assessed.
- 12.1.6 Potential beneficial impacts have been identified for the construction, operational and decommissioning phases, relating to project expenditure and direct and indirect job creation. In addition, a number of other proposed offshore wind farms may be based in the north east region. These have been identified as

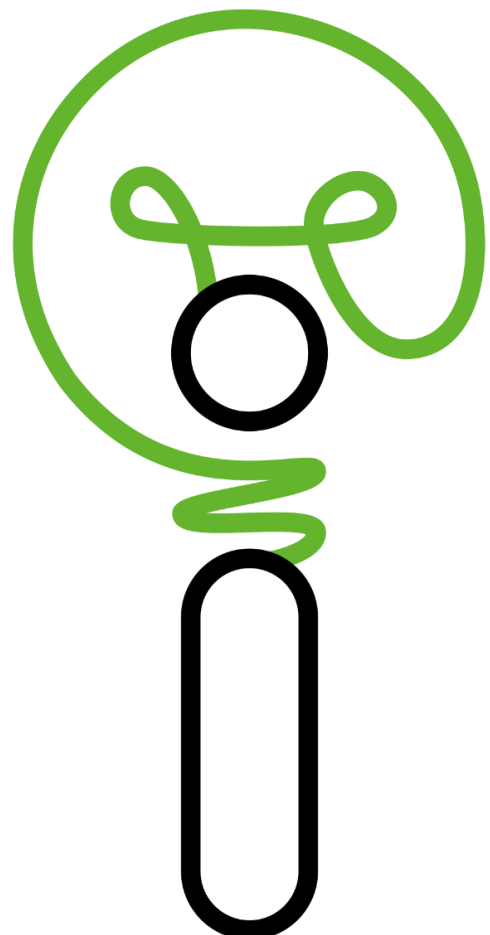
there is potential for cumulative beneficial impacts on the regional economy as well as job creation opportunities within the region.

- 12.1.7 Forewind supports the Government's ambition that UK firms should provide a significant proportion of the content of future offshore wind farms. Forewind and its shareholders will continue to proactively engage with the UK supply chain and regional suppliers in particular, to ensure that a high quality, sustainable supply base for the industry can be developed. Forewind has already supported initiatives in North East England to ensure businesses are well positioned to tender for the greatest possible share of future work.
- 12.1.8 Forewind is actively supporting initiatives such as the Champions for Wind careers education engagement programme, a scheme designed to raise awareness and provide inspiration to young people of the potential career opportunities in offshore wind energy.

EV048

NEPIC new members newsletter

Not confidential



[View in browser](#)



NEW MEMBERS

A warm welcome to our latest member companies



Innogy Renewables UK

Sofia Offshore Wind Farm is the largest project in innogy SE's current development portfolio, with a generating capacity of up to 1.2 gigawatt. It is being developed 165 km off the coast of the North East of England - on a 593km² site in the shallow central area of the North Sea known as the Dogger Bank. Its connection point is at the existing National Grid substation at Lackenby, Teesside. The consented project represents significant opportunities for investment in the UK's energy infrastructure with associated jobs and supply chain benefits. Potential suppliers can register for the Supply Chain Portal:

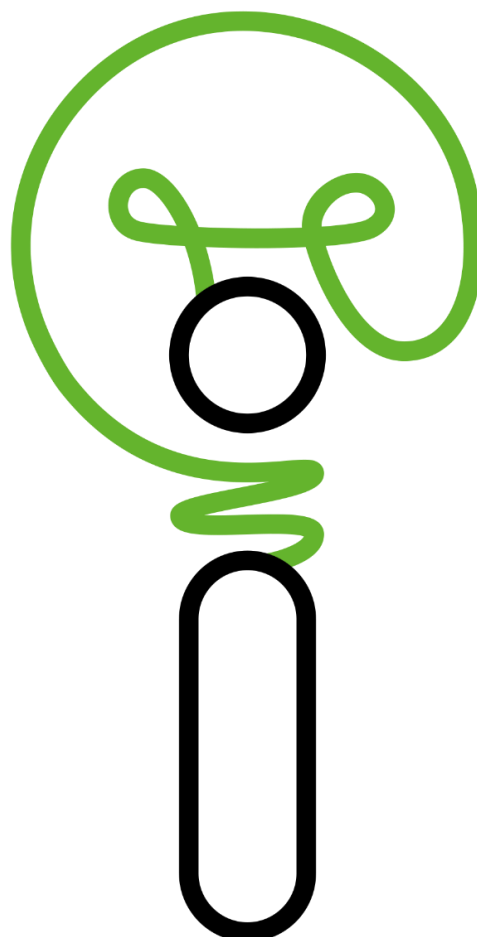
www.innogy.com/renewablesUK/sofia

www.innogy.com

EV051

Innogy NOF Energy supplier engagement

Not confidential



Overview of event

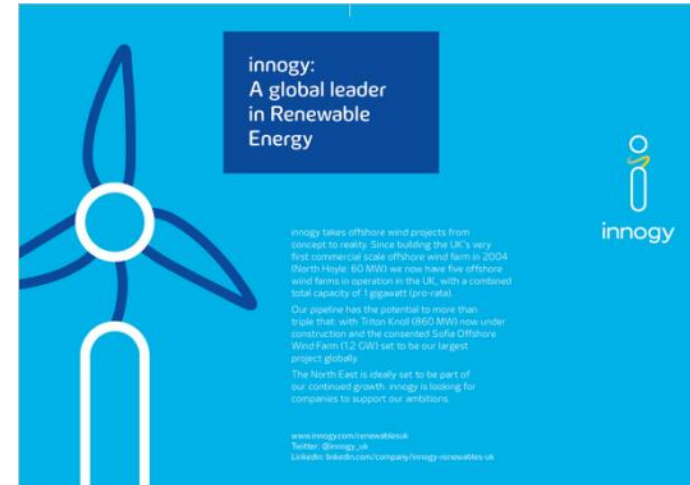


innogy

Date / activity	innogy involvement
Wednesday 7 November	
VIP site visits (various NE sites)	Al Gill, David Few, John Davies and Fruzsina Kemenes visited site in the North East (manufacturers, ports etc)
innogy Supply Chain Workshop (Xcel Centre, Newton Aycliffe)	More than 100 people attended a workshop given by Glyn Jones, Joel Hubbard and Alan Bailey on the opportunities with TK and Sofia
Pre-conference dinner (Redworth Hall, Newton Aycliffe)	innogy hosted three tables at the dinner and Richard Sandford give the key note address (approx 200 guests)
Thursday 8 November	
Platinum sponsor of Offshore Wind North East Conference and Exhibition (Xcel Centre, Newton Aycliffe)	Business lounge with VR kits, tea/coffee and seating. David Few welcomed all to event and gave presentation innogy was the main stand visible on entrance to the hall (more than 400 delegates and 50 exhibitor stands) Three young people from Redcar seeking work attended.
Friday 9 November	
VIP site visits (various NE sites)	John Davies at Port of Blythe and other industrial sites.

Pre-event communications- innogy profiling

- innogy logo and branding on all pre-event and pre-dinner publicity – e-flyers, event invitations, hard copy flyers and brochures, advertising, social media, joining instructions and media coverage.
- innogy advert (see opposite) and editorial in OWNE brochure
- Pre-event promotion of Sofia/David Few as the speaker and of Richard Sandford as keynote speaker at the dinner.
- Invitations and emails - programme, joining instructions etc regarding workshops (innogy own event)
- Media announcement of innogy as Platinum sponsor
 - <https://www.businessupnorth.co.uk/innogy-announced-as-platinum-sponsor-of-offshore-wind-north-east-2018/>
 - <https://bdaily.co.uk/articles/2018/10/29/innogy-announced-as-platinum-sponsor-of-offshore-wind-north-east-2018>
 - <https://neconnected.co.uk/innogy-announced-as-platinum-sponsor-of-offshore-wind-north-east-2018/>
 - <http://www.northernengineer.co.uk/blog/innogy-announced-as-platinum-sponsor-of-offshore-wind-north-east-2018-415>



Supply Chain Workshop – Xcel Centre



innogy

- More than 100 supplier delegates arrived for the event at the Xcel Centre, Newton Aycliffe (1500 to 1630)
- innogy's own event, so all publicity around the event was innogy branded.
- Three speakers - Glyn Jones, Joel Hubbard and Alan Bailey from Sofia and Triton Knoll outlining to delegates their opportunities and how to engage with procurement. Tier 1 contactors from Triton Knoll (MVOW & A2Sea) attended and supported supplier discussions.
- All received an innogy booklet with contact details and blank pages for notes, pens and a feedback form. More than 55 responded to the feedback. Responses were all positive with some minor room for improvements (sound at the venue for example –practicalities rather than concept).
- Delegate lists and presentations were sent to all after the event.

“Good overview and understanding and also good to meet the team and know relevant individuals”

“Useful insight into how and when the project will go forward”

“Good information for future business planning”

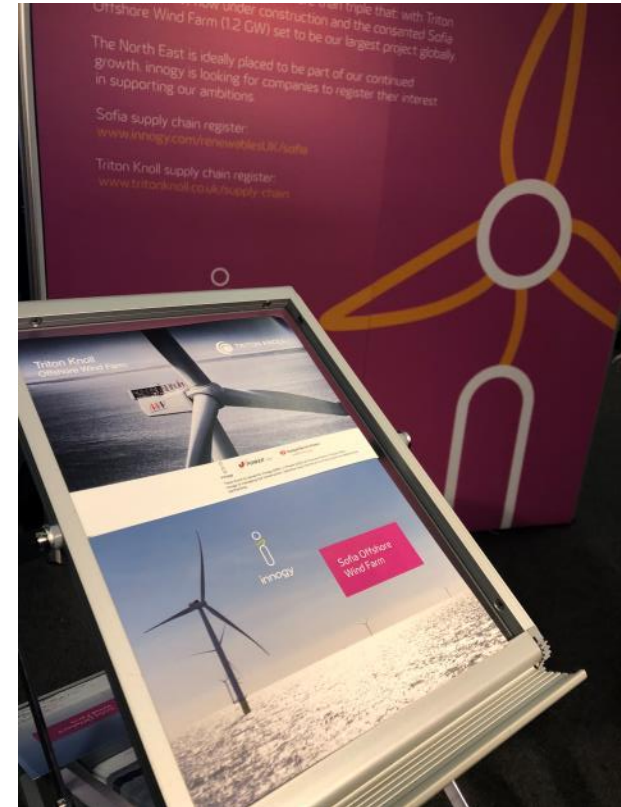
“Both projects require an element of ‘out of the box’ thinking and we will be able to engage with you much better in finding and creating a solution that exactly meets your needs”



OWNE 2018 - innogy profiling



- innogy logo and branding on all banners, signage, staging, event materials including insert in delegate bag, name tags, teardrop banners, floor decals.
- Eye-catching central display used as a meeting point and to direct people to the innogy business lounge. Giveaways: pens, postcards on both projects, bookmarks on both projects (promoting supply chain portal), coasters.
- David Few welcomed delegates, the main film featured innogy interviewee - <https://youtu.be/i0ixb2enB6g>, innogy own film played and David Few was the first developer to outline our plans to the more than 400 attendees.
- Business lounge with two fully innogy branded VR kit, plus Triton Knoll, Sofia and innogy specific branding (banners, promo items) – see photos over.



Slido – onsite immediate polling app

innogy was given the chance to ask some questions using the Slido app during the conference. Here are some of the results – useful information for our Supply Chain Plan.











Strategic benefits of Platinum sponsorship

- Direct exposure to top decision makers, for example:
 - ✓ Baroness Brown (*MP Julia King*) – (*r*) - is the Sector Deal champion for the industry and was a key speaker, and was seated with innogy/Triton Knoll/Sofia representatives during the pre event dinner
 - ✓ Ben Houchen, the influential Metro Mayor for Tees Valley and was a specific dinner guest of innogy
 - ✓ Introduced to all of the most influential supply chain and industrial bodies in the north east/east coast cluster - North East Local Enterprise Partnership, Invest North East England, Tees Valley Combined Authority (Tees Valley LEP).
- Opportunity to delivery innogy and project specific messages to influential regional audience
- Exposure of our two key east/north east coast projects to target audiences of stakeholders, suppliers, regional decision makers, business community leaders who can support supply chain engagement, regional decision making, etc, in support of Sofia and Triton Knoll, as well as in preparation for potential extensions work in future.



Triton Knoll Tier 1 Suppliers


Our seven top-tier suppliers are currently working under preferred supplier agreements that due to be confirmed soon. Below we have indicated their responsibilities.


	Wind Turbine Generators	Offshore Export Cable	Array Cables	WTG Foundations	OSP Foundation	OSP Topside Structure	OSP Electrical Equipment	Onshore SS & Electrical Equipment	Onshore Export Cable
Design / Engineering	MHI Vestas 	VBNK  		SiF / Smulders 	Seaway Heavy Lifting 	Siemens Transmission & Distribution 	J Murphy & Sons 		
Fabrication									
Transport & Installation	GeoSea 								


Supply Chain : Tier One Supplier Contact(s)

Please address e-mails by stating *Triton Knoll Project – Expression of Interest* in the Subject Title.

WTGs – Design, Supply and Commission		
Supplier	MHI Vestas Offshore Wind	
	Contact	Lars Norregaard Olsen
	Title	Procurement & Logistics
	e-mail	contact@mhivestasoffshore.com <i>please identify FAO : Lars Norregaard Olsen</i>
	Website	www.mhivestasoffshore.com


WTGs – Transport & Installation		
Supplier	Geosea NV	
	Contact	Ian Taylor
	Title	UK Area Representative
	e-mail	taylor.ian@newwaves-solutions.co.uk
	Website	www.deme-group.com/geosea


Foundations – Design and Supply		
Supplier	Smulders Sif Steel Foundations BV (3SF)	
	Contact	Bénédicte Zwijsen
	Title	Projects Purchasing & Logistics Manager
	e-mail	info@triples-f.com
	Website	www.triples-f.com



Foundations & OSPs – Transport & Installation		
Supplier	Seaway Heavy Lifting	
	Contact	Mr Richard den Hollander
	Title	Business Development director
	e-mail	rhollander@shl.nl
	Website	www.seawayheavylifting.com

Supply Chain : Tier One Supplier Contact(s)

Please address e-mails by stating *Triton Knoll Project – Expression of Interest* in the Subject Title.

Electrical System – Substations (incl OSP)		
Supplier	Siemens Transmission & Distribution Limited	
	Contact	Jane Duckworth
	Title	Senior Procurement Manager
	e-mail	jane.duckworth@siemens.com
	Website	www.siemens.co.uk

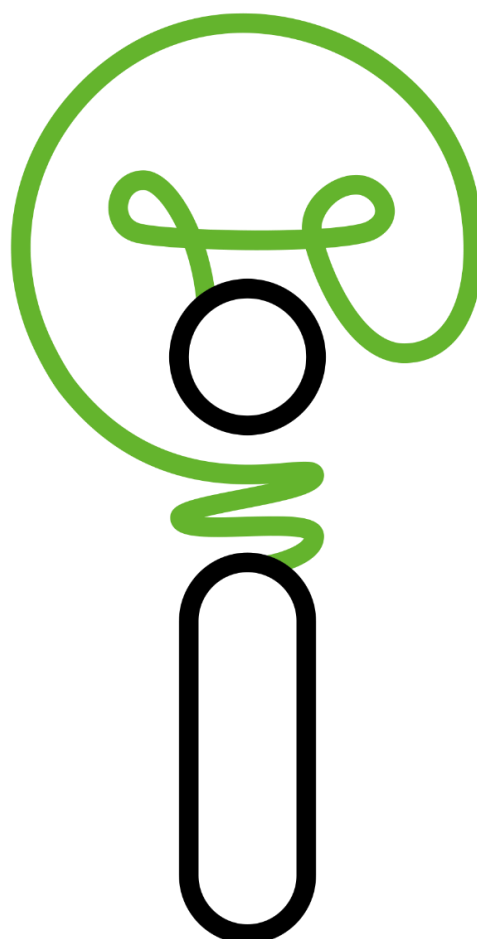
Electrical System – Onshore Export Cable		
Supplier	J Murphy & Sons Ltd	
	Contact	Lukasz Olszewski
	Title	Procurement Manager
	e-mail	lukaszolszewski@murphygroup.co.uk
	Website	www.murphygroup.co.uk

Electrical System – Offshore Cables : Supply		
Supplier	VBNK through NKT Cables GmbH	
	Contact	Iain Entwistle
	Title	Sales Manager - UK&I
	e-mail	iain.entwistle@nkt.com
	Website	www.nkt.com
Electrical System – Offshore Cables : Installation		
Supplier	VBNK through VBMS (UK) Limited	
	Contact	A.D. (Ad) Wielaard
	Title	Manager Procurement & Logistics
	e-mail	a.wielaard@vbms.com
	Website	www.vbms.com

EV054

Champions for Wind evaluation

Not confidential



**Overall evaluation of the project
July 2015**

Champions for Wind



Project Evaluation

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Summary

The final evaluation for the Champions for Wind project is based on 464 pupils (questionnaires and focus groups) aged 9 - 15 and 41 teachers (questionnaires and interviews) from 2012 - 2015.

The results indicate that pupils' knowledge of the offshore wind industry, Dogger Bank and related careers significantly increased after the programmes had been delivered in their schools. In addition, pupils' desire to work in the offshore wind industry also increased and pupils' interest to learn more about the offshore wind industry, Dogger Bank and related careers also statistically significantly increased. Few sex differences in knowledge and interest were found and those that were revealed were mostly in favour of boys but with some unexpected sex differences in favour of girls in relation to an interest in working in the offshore wind industry.

Teachers reported that they had very much enjoyed working with the pupils on this project and commented that it had increased their knowledge of the offshore wind industry. They reflected on their professional development and reported that their confidence to deliver new material in their curriculum area had increased as a result of designing teaching materials for this project. Indeed, the increase in knowledge and interest reported by the pupils is evidence that teachers' knowledge and confidence to deliver in this subject area did increase. Teachers also reflected on the effect that taking part in this project had had on their professional development.

The results suggest that the educational programmes delivered in schools resulted in the increases in knowledge and confidence in teachers in addition to increases in knowledge of, and interest in, the offshore wind farm industry for pupils.

Acknowledgements

Many thanks to the schools, Teacher Champions and all pupils for their involvement in the evaluation.

Schools involved (in alphabetical order):

Ashwell PRU

Bydales School

Caedmon School

Cleveland and Redcar College

Cottingham High School

Driffield School

Dyke House School

Eskdale School

Graham School

Hessle Federation

Kelvin Hall School

Kirkleatham Hall

Lawrence Jackson School

Malet Lambert

Oases School

Redcar Academy

Ryehills School

Scalby School

St Anne's CE Primary

St Hilds School

St Peters School

The Boulevard Academy

The Snaith School

Withernsea High School

Evaluation carried out by:

Dr Myfanwy Bugler, University of Hull

The evaluation of the Champions for Wind education programme received ethical consent from the Department of Psychology Ethics Committee, University of Hull.

Rationale for the project

The aim of the Forewind 'Champions for Wind' project was to raise awareness amongst primary and secondary pupils of the potential career opportunities in offshore wind energy and to inculcate an understanding of the qualifications and experience required to gain employment in the industry. A total of 24 Secondary, Primary and Special Educational schools in Teesside, Hull and the East Riding of Yorkshire have been involved in the project over the last four years with 41 'teaching champions' and 464 pupils. These schools were chosen due to their proximity to Forewind's development of the offshore wind farm at Dogger Bank.

Each teacher "champion" worked with careers advisors and wind industry representatives, to design and develop a curriculum-based resource relevant to their local area and appropriate to their school and focused on the opportunities offered by the offshore wind industry. The teachers delivered their resources within their own school in the first year of the project in 2012, they then disseminated these resources over the following school year to colleagues both within their school and in neighbouring schools. This continued as new schools engaged in the project so that resources were shared both within and across schools throughout the area. These resources were designed to be used both by the teaching champions and other teachers and to be future-proofed by being continually developed and updated and eventually embedded in the curriculum in some subject areas.

By facilitating careers education for young people in the area around the Dogger Bank projects' onshore infrastructure, Forewind aimed to meet the needs of the local community whilst also supporting the wind industry by boosting the number of motivated young people entering into it. The objectives of the programme included: promoting gender balance in science subjects such as technology, engineering and mathematics as well as in future careers; roundedness of the industry; pride, a sense of ownership and skills development in the local area; innovation; providing a vision for the future; building on any existing programmes fostering teacher development, and having a robust evaluation methodology.

In order to assess the affect of this educational programme on the pupils it was necessary to gain some understanding of their knowledge and interest in the industry prior to start of the project. To this end pupils were asked to complete two questionnaires one pre-programme and one post-programme to assess the extent of their knowledge and interest in the offshore wind industry.

Professional development of the teachers involved in the project was also an area of interest. The aim was to encourage and support teachers to develop new resources to deliver information about careers and the required qualifications needed to seek employment in this industry. The aim was to assess whether there was a measurable

increase in their confidence in their ability to create and deliver new teaching resources, which would promote both career development and personal development, and whether there was an increase in their knowledge of careers within the offshore wind industry. To assess the change in teachers' knowledge and confidence they were also asked to complete two questionnaires, one pre-programme and one post-programme.

The aim of this report is to give an overview of the whole project and its effect on pupils' knowledge and interest in the industry, and the available career paths in offshore wind farms. In addition, this report aims to assess the effect of this project on teachers' confidence in producing teaching materials, knowledge of careers within the industry and on their professional development.

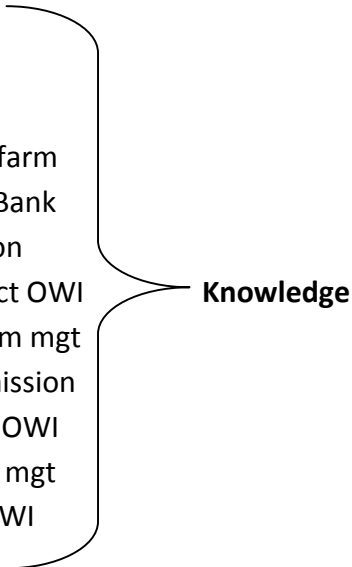
Summary of evaluation for 2012, 2013 and 2014

Pupil questionnaire (this was used for all three cohorts and results were reported in the evaluation documents for 2012, 2013 and 2014)

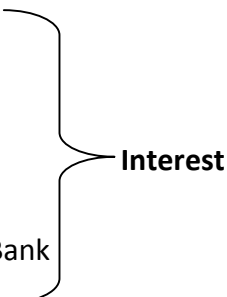
The pre and post programme pupil questionnaire examined three areas of interest. The first related to pupil's knowledge about the offshore wind industry, Dogger Bank, and related careers. Pupils were questioned on their knowledge of more familiar concepts (i.e., renewable energy and wind farms) before being asked more specific questions assessing their knowledge of the offshore wind industry and Dogger Bank.

Please see the Appendices for copies of these questionnaires.

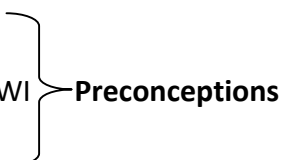
Pupil questionnaire

- Q1. I know what renewable energy is
 - Q2. I know how wind farms work
 - Q3a. I know about careers in the OWI
 - Q3b. I know about the Dogger Bank offshore wind farm
 - Q3c. I know about the careers available at Dogger Bank
 - Q4a. I what a company needs to do: Gain Permission
 - Q4b. I know what a company needs to do: Construct OWI
 - Q4c. I know what a company needs to do: Long term mgt
 - Q5a. I know about career opportunities: Gain Permission
 - Q5b. I know about career opportunities: Construct OWI
 - Q5c. I know about career opportunities: Long term mgt
 - Q7. I know about qualifications and experiences: OWI
- 
- Knowledge**

The second area related to pupils' interest to learn more about the offshore wind industry, Dogger Bank, and related careers. In addition, pupil's desire to pursue a career in this area.

- Q8. I would like to work in the OWI
 - Q10. I am interested to learn more about wind farms
 - Q11. I am interested to learn more about the OWI
 - Q12. I am interested to learn more about careers in the OWI
 - Q13. I am interested to learn more about Dogger Bank
 - Q14. I am interested to learn more about careers at Dogger Bank
- 
- Interest**

The third area related to pupil's perceptions of the offshore wind industry, specifically examining whether only a narrow range of careers would be identified as relevant for this industry. In addition, preconceptions about the traits necessary to work in the area (e.g., more masculine than feminine traits) was also examined

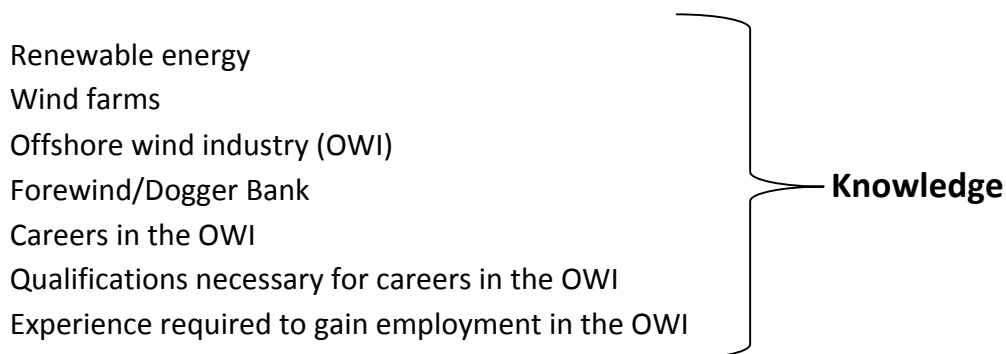
- Q6. Careers related to the OWI
 - Q9. Important personal qualities to work in the OWI
- 
- Preconceptions**

Teacher questionnaire

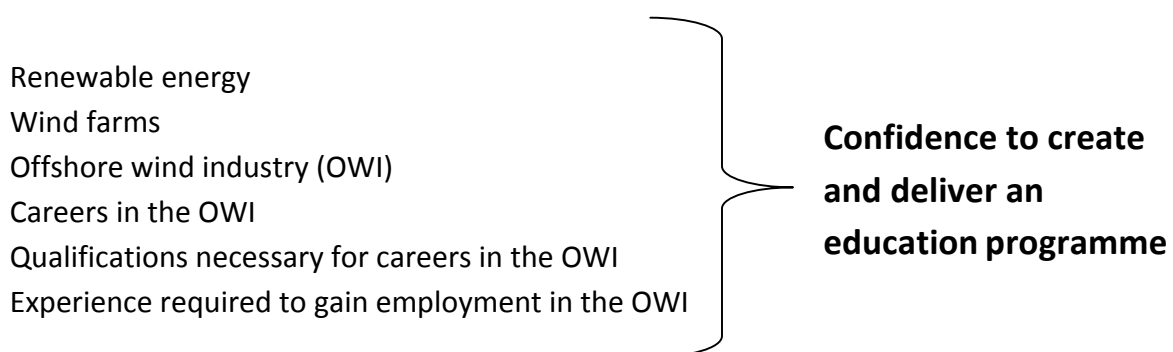
The same Teachers' questionnaire was used for all three cohorts and results were reported in the evaluation documents for 2012, 2013 and 2014.

It was predicted that teachers' knowledge and confidence as educators would increase in the following areas:

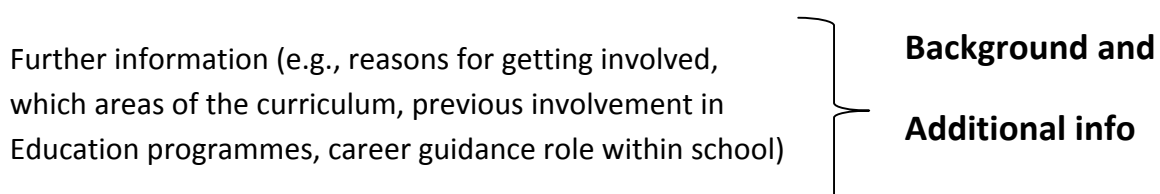
The first area related to teacher's knowledge about more familiar topics (i.e., renewable energy and wind farms), before extending to the offshore wind industry and careers in the industry.



The second area related to teacher's confidence to create and deliver an education programme relating to these topics. In other words, teachers would probably feel more confident that they could effectively communicate this information to their pupils.



The third area related to background information from the teacher, for example, involvement in previous education programmes etc.



Forewind champions for Wind Project 2012

The Champions for Wind 2012 evaluation was based on one hundred and ninety eight pupils (aged 12 – 15) and nine teachers within nine secondary schools. Pre and post programme questionnaires were completed by pupils and their teachers and focus groups were carried out with a sub-sample of pupils (n = 35) and teachers (n = 3) after the programmes had been completed.

Pupil's knowledge about the offshore wind industry and related careers significantly increased after the programmes had been delivered in their schools. Increases in pupil's interest to learn more about the offshore wind industry, related careers or pursue a career in the industry also increased, although these differences were less consistent. Sex differences in knowledge were wider prior to the programme than after the programme, with boys consistently reporting greater knowledge. Sex differences in interest were similar before and after the programme, with boys reporting greater interest. Teacher's also reported a significant increase in knowledge and confidence to deliver an education programme relating to the offshore wind industry and related careers after the programme.

Focus groups and additional comments by pupils and teachers revealed insight into how to proceed with this in the future. To maximise impact, it was suggested that pupils learn about career opportunities in offshore wind industry through a variety of learning methods; this is likely to be most popular among pupils and lead to increased interest. Indeed, increasing interest and reducing sex differences in interest are likely to be the greatest challenges in the future. It was also suggested that future Teacher Champions are carefully selected (given the passion and commitment necessary to be involved this project) and well supported (via professional dialogues among Teacher Champions and sharing of resources).

This evaluation suggests that successful offshore wind educational programmes were delivered in all schools which resulted in the development of knowledge and confidence for all teachers and increased knowledge for all pupils. Generating interest among pupils appeared to be more difficult than developing knowledge and this was likely to be a challenge to future projects.

Forewind champions for Wind Project 2013

The Champions for Wind evaluation 2013 was based on 137 pupils (questionnaires = 117, mind maps = 20) aged 12 – 15 and 15 teachers (questionnaires/interviews).

Pupil's knowledge of the offshore wind industry, Dogger Bank and related careers significantly increased after the programmes had been delivered in their schools. In addition, pupil's desire to work in the offshore wind industry increased. However, pupil's interest to

learn more about the offshore wind industry, Dogger Bank and related careers did not increase statistically. Few sex differences in knowledge and interest were found; however sex differences that were present were in favour of boys.

Teacher's reported a significant increase in knowledge and confidence to deliver an education programme relating to the offshore wind industry and related careers after the programme had been completed. Indeed, the professional development of the teachers involved is crucial, as these teachers will be responsible for teaching future cohorts of pupils. Most teachers also made very positive comments about what they had learnt and gained personally from being involved in the programme and provided advice to future Teacher Champions.

This evaluation suggests that the educational programmes resulted in the development of knowledge and confidence for all teachers and increased in knowledge for pupils; generating interest among pupils was more difficult.

Forewind champions for Wind Project 2014

The Champions for Wind evaluation 2014 is based on 129 pupils (questionnaires = 258) aged 9 - 15 and 17 teachers (questionnaires).

Pupil's knowledge of the offshore wind industry, Dogger Bank and related careers significantly increased after the programmes had been delivered in their schools. In addition, pupil's desire to work in the offshore wind industry also increased and pupil's interest to learn more about the offshore wind industry, Dogger Bank and related careers also statistically significantly increased. Few sex differences in knowledge and interest were found and those that were revealed were mostly in favour of boys but with some unexpected sex differences in favour of girls in relation to an interest in working in the offshore wind Industry.

Teachers reported that were very much looking forward to engaging in the programme to increase their knowledge of the Offshore Wind Industry. They reflected on their professional development and hoped that the programme would increase their confidence to deliver new material in their curriculum area. Indeed, the increase in knowledge and interest reported by the pupils is evidence that teachers' knowledge and confidence to deliver in this subject area did increase. Professional development is important for these teachers as they will be responsible for teaching future cohorts of pupils.

This evaluation suggests that the educational programmes resulted in the development of knowledge and confidence for all teachers in addition to increases in knowledge and interest among pupils. The increase in interest in working within the offshore industry evidenced in this evaluation may be a reflection of the increase in teachers' increased knowledge of the careers available in this industry.

Changes in pupils' knowledge and interest post programme reported in 2014

Initially, analysis was carried out to measure changes in knowledge and interest from pre to post programme for all pupils included in the evaluation. Interestingly these results indicated an increase in motivation as the pupils' interest has increased significantly towards the offshore wind industry both in terms of possible future employment and in finding out more about the industry and how it functions.

Sex differences

Analysis was carried out to examine sex differences in the pre and post programme responses. In addition, changes in boys and girls knowledge from pre to post programme are also reported.

Sex differences prior to the programme

In the pre programme questionnaire, some sex differences were found; statistically significant sex differences were found in 5 out of 14 questions pre programme.

Sex differences after the programme

Boys: Changes from pre to post-programme

Boys' knowledge about and interest in the offshore wind industry increased for all questions. Boys also stated that they would be more likely to want to work in the offshore wind industry after the programmes had been completed.

Girls: Changes from pre to post-programme

Girls' knowledge about and interest in the offshore wind industry increased for all questions. Girls stated that they would be more likely to want to work in the offshore wind industry after the programmes were completed.

Correlations between pre and post-test responses

The results illustrated that there was not a linear increase in pupil's knowledge and interest, but individual differences; some pupil's knowledge and interest developed to a greater extent than others. There were no associations between pre and post-test. These results suggest that pupils' knowledge and interest are flexible and open to educational change. Therefore education may play a major role in increasing pupil knowledge and interest in new industries.

Change in pupils' knowledge and interest between cohort 2 and cohort 3 (2013 and 2014)

It was of interest to ascertain whether there had been an effect on pupil knowledge and interest in the offshore wind industry as a result of taking part in the project. To that end

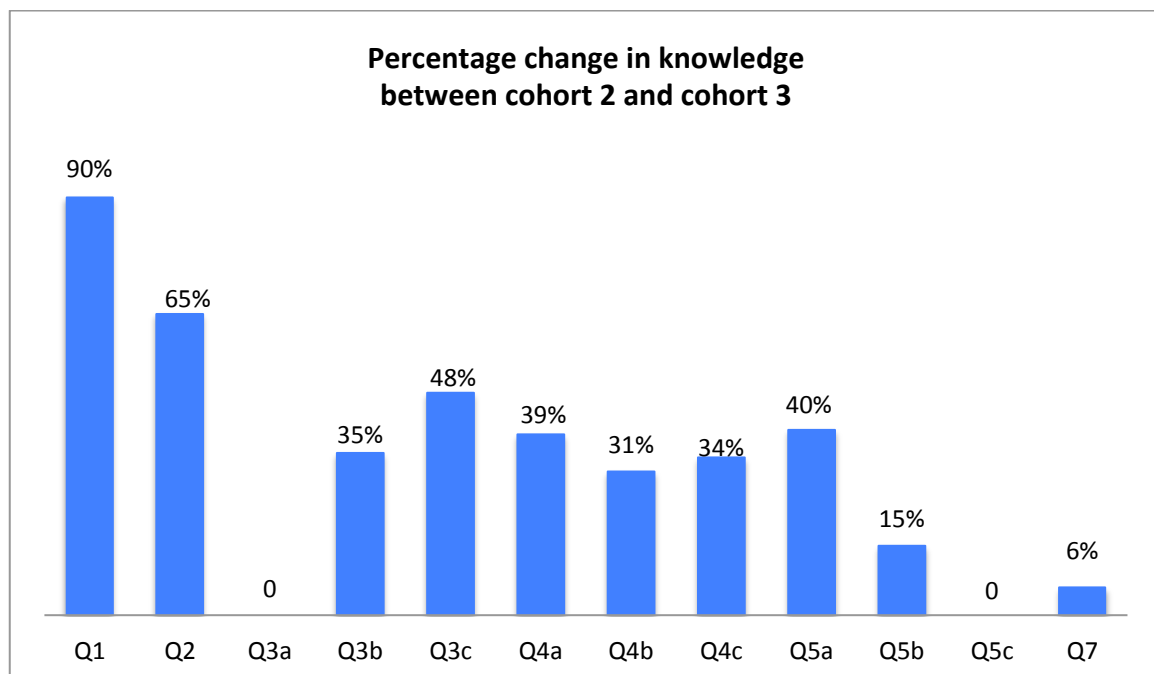
analysis was carried out to investigate whether knowledge of, and interest in, the offshore wind industry had increased in participating pupils due to the dissemination of teaching materials created by partner schools. In addition, analysis was carried out to investigate whether knowledge in the offshore wind industry and confidence to create teaching materials, and to deliver a programme based on this industry, had increased in participating teachers.

Data used to determine the percentage change in knowledge, interest and confidence were the t-test size of increase reported in cohort 2013 and 2014 (2012 used different questionnaires so this data was not used to establish percentage change between 2012 and 2013).

For pupils there was a significant percentage change in knowledge (see Graph 1) and interest (see Graph 2) between cohort 2 (2013) and cohort 3 (2014).

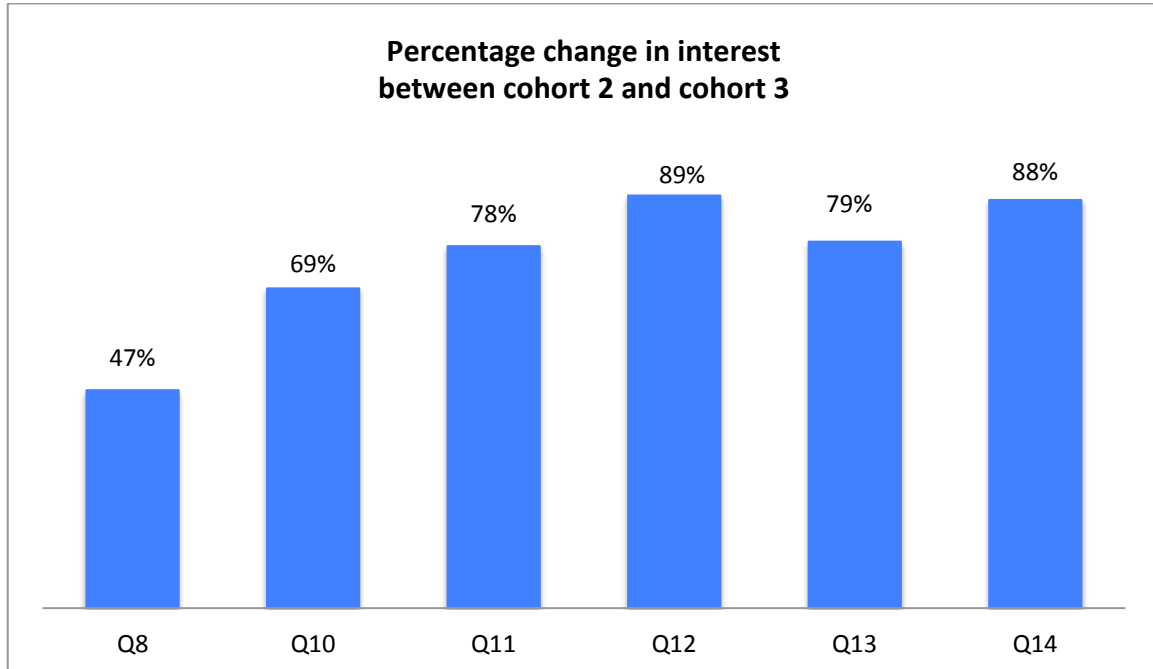
Percentage change in knowledge and interest between cohort 2 (2013) and cohort 3 (2014)

Graph 1. Percentage change in knowledge between cohort 2 (2013) and cohort 3 (2014)



There was a significant percentage increase in knowledge for pupils from 2013 to 2014 for most questions apart from Q3a and Q5c. Both these questions refer to knowledge of careers within the offshore wind industry. It would appear that the pupils had a sound knowledge of this area so no increase in knowledge was evident between both cohorts.

Graph 2. Percentage change in interest between cohort 2 (2013) and cohort 3 (2014)



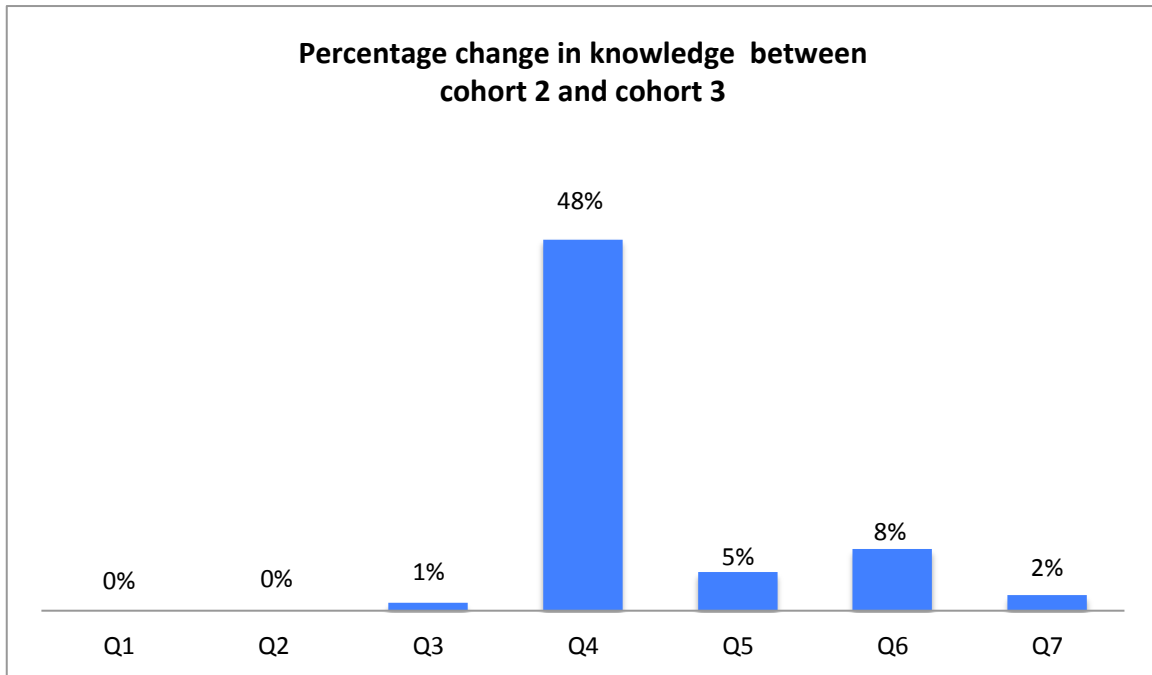
There was a significant percentage increase in interest in the offshore wind industry for pupils between cohort 2 and cohort 3. This could be due to better teaching materials, an increase in teacher knowledge of careers within the offshore wind industry or general publicity within the schools and media about renewable energy.

Change in teachers' knowledge and confidence between cohort 2 and cohort 3 (2013 and 2014)

It was interesting to note that the teachers' knowledge about the offshore wind industry, and their confidence to create teaching resources, and deliver programmes in this field, increased. These increases were statistically significant except for two questions (questions 1 & 2), which showed an increase in knowledge and confidence but this increase was not significant. Overall the trend was definitely positive in favour of increase in knowledge and confidence.

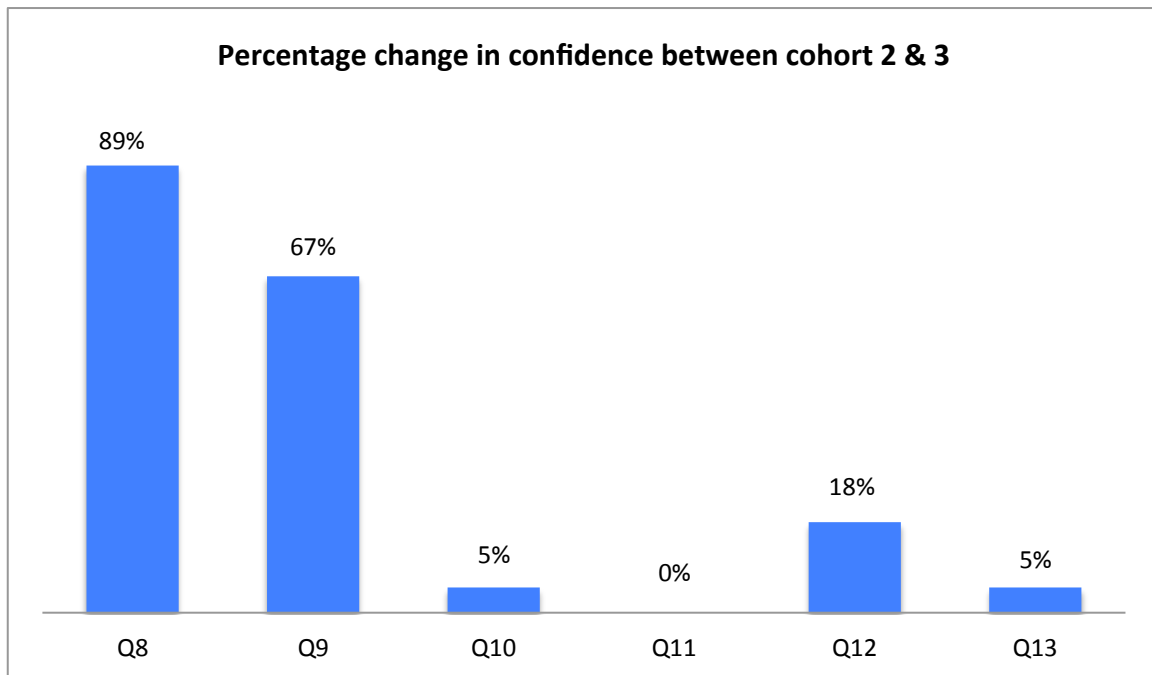
For teachers there was a significant percentage change in knowledge (see Graph 3) and confidence (see Graph 4) to create teaching materials and deliver a programme about the offshore wind industry between cohort 2 (2013) and cohort 3 (2014).

Graph 3. Percentage change in knowledge between cohort 2 (2013) and cohort 3 (2014)



There was a significant percentage increase in teachers' knowledge between cohort 2 and cohort 3 for most of the questions with the exception of Q1 and Q2. Question 1 and Question 2 relate to knowledge of renewable energy and wind farms which teachers probably had a very good knowledge of already so would therefore show no increase in knowledge.

Graph 4. Percentage change in confidence to create materials and to deliver a programme based on the offshore wind industry between cohort 2 (2013) and cohort 3 (2014)



There was a significant percentage change in teachers' confidence to create teaching materials and to deliver a programme about the offshore wind industry with the exception of Question 11. Again teachers would probably have a reasonable idea of the careers available in the offshore wind industry so change was evident for this question.

Analysis of effectiveness of the whole project (2012-2015)

Pupil focus group interviews June 2015 after the Forewind project had finished.

A focus group of pupils in Year 10 (15yr olds) were asked to reflect on their experience of the project. These pupils were in the first cohort (2012) and it was of interest to ascertain whether their career aspirations have been influenced as a result of taking part in the project. Their reflections are cited below:

What five personality qualities do you think might be important to work in the offshore wind industry?

These were the most common answers:

Leadership, trust, intelligence, resourcefulness, responsibility, strength, teamwork, communication, creative, independent, an environmental conscious, hard working, perseverance, resilient, reflective, patience, good with hands, motivated.

Overall, the qualities suggested by pupils were positive traits, not necessarily related specifically to the offshore wind industry. In addition, pupils did not necessarily focus on academic skills (although there was reference to this by some).

Write a list of all the careers you think might be needed to work in the offshore wind industry.

These were some of the more common answers:

Engineer, builder, technician, manager, welder, pilot, crane technician, crane driver, health and safety officer, accountant, painter, planner, ethologist, scientist, designer, marine biologist, caterer, diver, drill operator, medic.

Interestingly, more careers were listed by pupils in this questionnaire than in the previous evaluations conducted in 2012, 2013, and 2014. In addition, these questionnaire responses generally reflected a much better understanding of the potential careers available in this industry.

How did the project impact on you?

It helped me to understand how the offshore wind turbines worked and showed me career options that I wasn't aware of (girl).

Previously I was only aware of the negative impacts of wind farms so after the project I was surprised to find that in my opinion that the positive points out-weighed the negative (girl).

It had a good impact on me because it made me think whether I would rather have lights on or lights off. Wind turbines are not very nice to look at but they will make a difference by generating electricity for us. It makes you think what would you do without energy? The wind farms create lots of jobs (boy).

It had a good impact on me because it opened my eyes to the massive opportunities there are involved with the offshore wind industry and how lucky we were to know that there will be jobs available for us when we have finished our education (boy).

It helped me to understand that there are jobs out there that are related to the project for both boys and girls. There's 1200 jobs available related to the offshore wind farm (girl).

The initial setting up of the offshore wind farm didn't impact me a lot however, learning about it in school opened my eyes to the amount of jobs that will be available in the offshore wind farm (girl).

The project made me realise that there are a lot of opportunities to have the career that I want. I want to be an engineer or a welder. This made me realise that I could have that career if I wanted and if I worked hard enough to get it (boy).

Did the project extend your knowledge of future career aspirations?

Yes because it showed and helped me get an understanding of alternate job options that I didn't know about or had not thought of doing (girl).

Yes I feel it did because I've never realised how many other jobs there are that are exciting and connected to this project (girl).

It extended my career aspirations a lot because you wouldn't have thought that there would be so many engineering jobs out there (boy).

Yes it did because it made me realise how much money and effort is involved with wind turbines (boy).

It helped by showing me career options that I hadn't heard about or been told about (girl).

It didn't make me want to change my future career aspirations but it did show me that there is a lot of opportunities for jobs around here now (girl).

It made me think about what I wanted to do as a career and about any opportunities that may arise (boy).

Did the project enable you to learn new skills?

I learned skills that are important in future careers. More writing skills involved in these other job options (girl).

It helped me to debate, to do graphs, built my confidence and developed my ability to understand and listen to the opinions of other people (girl).

Yes because it made me knowledgeable about the offshore wind turbines. Also I learnt about marine biologists and the job that they do (boy).

Yes because it made me much more knowledgeable about the industry and the skills I needed to be able to work in that industry (boy).

Taught me graphing skills (girl).

It helped me adapt the skills that I already have. It also helped me realise that things can be just as good closer to home (girl).

Yes because it informed me about what the offshore wind industry is looking for in terms of employees and what I need to learn and achieve in order to obtain a position there (boy).

Did the project enable you to consolidate learning of existing skills through the way that the project was developed and delivered in your school?

It enabled me to build on my communication skills, both speaking and written and to adopt team-working skills. It also helped me to develop graphic skills (girl).

It opened my mind to be able to consider other people's opinions but also built my confidence to learn how to debate. Also knowing that you have to be aware of all impacts before making a final decision about something. Overall these skills can build on my life decision and being able to understand others which has made me feel more mature (girl).

Yes because the skills we learnt in the geography lessons helped us in other subject areas such as maths and English (boy).

Yes because the skills were easy to apply to the lessons when we were working in a group and answering questions. My graph skills increased as did my communication skills. Also this helped me with maths and English (boy).

Helped me develop team-working skills (girl).

It helped me learn about debates and helped me adapt my learning skills such as drawing graphs and collecting data in questionnaires (girl).

It helped me with gathering public opinion and how to take that into consideration when thinking about a career, especially a career that would have a big impact on the community (boy).

Summary of pupils' reflections

Pupils, boys and girls, reported that as a result of being involved in the FOREWIND project they had a greater understanding of the careers available in the OWI and the qualifications required to work in the various jobs that are available. They also reflected on the teaching resources that were created to deliver the programme in schools and stated that these resources had allowed them to develop new skills e.g. communication (written and oral), graphing skills, team-working skills, and data gathering. Pupils also felt that these skills transferred to other areas of the curriculum such as maths and English. They viewed the project as a very positive contribution to their overall educational experience.

Teacher interviews June 2015 after the Forewind project had finished

Teacher interviews were carried out with some of the Teacher Champions. The interview questions were designed to find out about the teachers own professional development after being involved in this project, their feelings about the project and their advice for potential future.

Did you attend the initial conference? If so, can you tell me your thoughts about the initial conference?

Yes- very positive in meshing the interests of education and the offshore wind industry. First contact with people in the offshore wind industry. – very positive sense of engagement.

Yes. Excellent. The Conference was really informative both in terms of the renewables industry, and also company information in relation to Forewind & OSW Energy. The initial conference was informative and contained lots of relevant content. It was also great to have access to industry specialists.

Yes. It was very informative and an excellent opportunity for networking. I really felt like it set the tone for the project and allowed us the ability to begin with initial thoughts to do the project.

What, if anything, do you think you have learned from being involved in this project?

Wide range of curriculum backgrounds of people involved in the industry. Interesting to see the 'project' nature of the work that industry people sign up to for 3-5 years with no guaranteed idea of what follows. Worthwhile chance to meet professionals from private industry to see their ethical attitude towards environmental stewardship and community participation.

I have learnt a lot of things about the offshore wind industry and I'm sure I have only scratched the surface of what there is to know. It was interesting to find out about some of the careers available, the planning that goes in to a wind farm and the technicalities of the turbines.

The renewables sector, and in particular the wind industry, is more than just the building of the actual wind turbines. The "off-shoot" industries, including hospitality and environmental protection also create numerous job opportunities for the wider community.

The politics in the UK are far more "restrictive" than our German / Dutch counterparts and unless "we" are careful our European colleagues will capitalise on the wind industry at the UK's expense.

I have learned more about STEM, the wind industry and opportunities for employment in the renewables sector. I have also learned the important of incorporating real life learning into my teaching practice. Enabling pupils to work on projects linked to careers and employability.

I now have a greater understanding of the employment opportunities within the industry and how best to communicate these across to the pupils. This has also been fed back into our careers department and integrated within the future planning process.

What, if anything, do you think you have gained from being involved in this project?

Networking with other teachers in the area/other subject areas/cross phase. Getting involved with HETA and seeing how this is a very valid route forward for many pupils. Continuing to work with HETA and Wind Champions in subsequent initiatives in education.

I found it very useful to be able to access information that I might otherwise have not known about. The financial support from the project meant that we could buy in resources that were suitable to the level of pupils that were part of the project.

A clearer understanding of the science, job opportunities and politics of the renewables sector.

A better understanding of STEM etc. I have also gained a network of teachers, leaders and experts in this field.

One of the biggest challenges for me was creating a whole project and managing the staff both internal and external volunteers etc and the budget. I now know how to create a large scale project and manage it appropriately.

Which aspect has been the most satisfying?

Working with the department to develop the scheme of work and resources. Sharing with other colleagues at Wind Champion conferences. Seeing pupils (Y8) perspectives change on offshore engineering and the types of roles, capacities and subject routes that may contribute – and be gender neutral.

The knowledge that the pupils gained and the fact that they could access practical equipment as a direct result of the funding.

Gaining a clearer understanding of the science and the wide variety of job opportunities.

The opportunity to work with industry experts as well as great teachers. Another area that was most satisfying was being able to collaborate and share practice, this has improved my teaching and learning.

Being involved in the final project and reading through the evaluations of the pupil and staff impressions.

Which aspect has been the least satisfying?

Becoming increasingly frustrated with civil servants and the “politics” of making this happen!

Which aspect has been the most challenging?

Creating the time to produce the resources and scheme of work.

Deciding which resources would best suit the needs of our learners and trying to be forward thinking enough to make sure that they were relevant for pupils accessing them in successive years that the programme would be delivered.

Generating whole school interest in the project – many have pre-conceived opinions on the wind industry.

The area that was most challenging included embedding the lesson with other teachers. Sometimes it was also difficult to get out of lessons for the training due to in School demands and pressures.

Can you reflect on the impact that the project had on your professional development?

Kept me professionally sharp and active in the later stages of a Head of Department career. Opened up significant areas for my subsequent work in retirement. Created contacts for subsequent professional work.

Personally I gained a lot of confidence from developing the programme within school and having the opportunity to feed back to the senior management team. I found the STEM Centre conference great for exploring other ways that schools had developed their programmes.

Very positive – incredibly worthwhile and inspiring project.

This project has enabled me to grow both as a teacher and leader. This project gave me confidence to deliver training, share good practice and think about how I deliver aspects of the IT curriculum. I attribute my current role as an Assistant Headteacher down to the key principles of this project. Real life learning, links to academic research and industry links. I am still in contact with teachers who worked on projects and am very grateful of the opportunity.

Can you reflect on the impact that the project had on your teaching ability?

Made me far more gender conscious of messages we give to pupils. More appreciative of engineering and the need for engineers and also of the subjects that lead to a career in engineering. Collaborative planning of teaching materials is far more effective in engaging the rest of the department to committed teaching of the material.

Having appropriate resources meant that I could teach what I felt was necessary rather than having to adapt lessons to what resources were available.

Good. Made me think more creatively and enhanced my technological skills.

This project links to the book I read recently by Ron Berger entitled 'An Ethic of Excellence'. By giving pupils the opportunity to learn about 'real life' projects, this enables excellent learning opportunities. The project made me think about how I deliver the curriculum and also look at opportunities to develop links to STEM, CEIAG in practice.

I feel I now try to incorporate more career related elements into my planning where possible.

Can you reflect on the impact that the project had on your ability to create teaching resources?

Good. I also had to work within a tight budget.

All of the information available meant that making resources took less research than usual. The funding helped a lot because it meant that we could afford to be more creative without the worry of the cost.

The main impact was access to industry resources and ideas that I could incorporate into my teaching and learning.

Creating new teaching resources has generally been an aspect of my role all the time, however creating resources that are able to disseminate directly to others is not. Producing the planning documentation that would allow someone else to deliver is mostly what has impacted on my abilities here.

Have other colleagues benefitted through the dissemination of teaching resources?

Yes – the Head of Department is using the resources to develop specific dedicated one day local fieldwork for future Year 7 pupils.

Yes, my colleagues in our secondary department have benefitted from the dissemination of the teaching resources.

Yes, at my previous school – Hessle High School & 6th Form College.

Yes, this was included in our key stage 3 scheme of work for all pupils in ICT.

I am aware that other schools within our cluster have looked towards delivering the event or something similar.

Summary of teachers' reflections

Teachers reported that they had found the experience very positive as it gave them the opportunity to network with teachers in other schools, share learning resources and share good practice. Some commented that they were more gender conscious when teaching and ensured that all pupils were expected to take an interest in STEM subjects by creating gender-neutral teaching resources. In addition, one teacher stated that although planning and producing teaching resources is a routine part of their teaching role producing the

planning documentation that would allow someone else to deliver is not and this positively impacted on this teacher's abilities. The links with real life learning and to academic research increased teacher motivation and interest and this was reflected in their teaching resources.

Many teachers commented on the impact that participating in this project had had on their professional development. It enabled them to develop both as teachers and leaders. One teacher reflected that they attributed their current role as Assistant Head teacher to having taken part in the Forewind project as they had learned both leadership and organizational skills. Others reflected that the skills and contacts that they had acquired during the project has enabled them to continue to develop into retirement and they are now working independently with industry.

Final conclusions of Champions for Wind Project

This project ran over three years with 24 schools, 464 pupils and 41 teachers in total taking part. Analysis was carried out to investigate whether knowledge of, and interest in, the offshore wind industry had increased in participating pupils due to the dissemination of teaching materials created by participating schools. In addition, analysis was carried out to investigate whether knowledge in the offshore wind industry and confidence to create teaching materials, and to deliver a programme based on this industry, had increased in participating teachers. Teachers were also asked to reflect on their professional development as a result of taking part in this project

Data used to determine the percentage change in knowledge, interest and confidence were the t-test size of increase reported in cohort 2013 and 2014 (2012 used different questionnaires so this data was not used to establish percentage change).

For pupils there was a significant percentage change in knowledge and interest between cohort 2 (2013) and cohort 3 (2014). See Graphs 1 & 2. In addition, for teachers there was significant percentage change in knowledge and confidence between cohort 2 (2013) and cohort 3 (2014). See graphs 3 & 4.

This has been a very successful project for pupils and teachers. Both pupil's knowledge of, and interest in, the offshore wind industry, Dogger Bank, and career opportunities in this area had increased after their involvement in the Champions for Wind programme. Pupils (both boys and girls) reported a statistically significant desire to learn more about the industry and also to work in the offshore wind industry after being involved in the programme.

In addition, the increase in knowledge and interest reported by the pupils is evidence that during the programme teachers developed their knowledge of the offshore wind industry

and their confidence to create teaching materials aimed at teaching pupils about the offshore wind industry. The professional development of teachers involved in the programme is crucial, as they will be responsible for teaching future cohorts of pupils. Champions for Wind will only be sustainable if teachers develop their confidence, knowledge and teaching materials to share with future Teaching Champions.

The Champions for Wind project has been a very successful project with a minimum of 464 pupils benefitting from 41 schools across the region. It is reasonable to assume from the percentage change data in pupil knowledge and interest that teachers are more confident in creating teaching resources and more knowledgeable about the offshore wind farm industry and in particular Dogger Bank. This is supported by the percentage change data in teacher confidence and knowledge reported between cohort 2 and 3. These percentage increases should increase again over the coming years as the teachers continue to improve their resources and disseminate these resources to additional teachers both in their own schools and schools within their locality.

Appendices

Appendix 1 –
Pre-programme teacher questionnaire

Appendix 2 –
Pre-programme pupil questionnaire

Appendix 3 –
Post-programme teacher questionnaire

Appendix 4 –
Post-programme pupil questionnaire

Appendix 5-
Questionnaire for teachers to reflect on participation in project

Appendix 6 –
Questionnaire for pupils to reflect on participation in project

Appendix 7 -
Pupil consent form and debrief information

“Champions for Wind” Teacher Questionnaire



Pre Programme

As part of the Forewind education programme “Champions for Wind” we are evaluating pupils’ prior knowledge and understanding about the offshore wind industry and career opportunities in this area. Following implementation of the education programme we plan to evaluate how successful this programme has been.

Pupils are being asked to complete a 15 minute questionnaire to measure their prior knowledge and perceptions, please ensure that they work on this alone without assistance. However, help can be given if the pupil has difficulty reading the content of the questionnaire.

In addition, could you please complete the questions below based on your current knowledge and experience:

Name: _____

School: _____

Which subjects within the curriculum do you teach: _____

Number of years teaching: _____

Please answer the following questions:

Q1. On a scale of 1 (nothing) to 5 (a lot), please rate how much you feel you currently know about each of the following areas:

Renewable energy

1 2 3 4 5

Wind farms

1 2 3 4 5

Offshore wind industry

1 2 3 4 5

Forewind / Dogger Bank

1 2 3 4 5

Careers in the offshore wind industry

1 2 3 4 5

Qualifications necessary for careers in the offshore wind industry

1 2 3 4 5

Experience required to gain employment in the offshore wind industry

1 2 3 4 5

Q2. On a scale of 1 (not at all) to 5 (a lot), please rate how confident you would currently feel to create and deliver an education programme to pupils on each of the following areas:

Renewable energy

1 2 3 4 5

Wind farms

1 2 3 4 5

Offshore wind industry

1 2 3 4 5

Careers in the offshore wind industry

1 2 3 4 5

Qualifications necessary for careers in the offshore wind industry

1 2 3 4 5

Experience required to gain employment in the offshore wind industry

1 2 3 4 5

Q3a. Have you been involved in delivering a careers education programme before?

Yes

No

Q3b. If yes, do you believe it was successful?

Q3c. What, if anything, could have made it more successful (e.g., additional resources)

Q4a. On a scale on 1 (not at all) to 5 (very much), to what extent do you feel the “Champions for Wind” programme will benefit your pupils?

1 2 3 4 5

Q4b. Do you feel that all pupils will similarly benefit from this programme?

Yes No

Q4c. If no, what type of pupils in particular do you feel might benefit?

Q5. Please state which areas of the curriculum you believe the Forewind education programme will link well with and why:

Q6. Do you have any other comments regarding your involvement in the Forewind education programme?

Q7. What made you apply to become a teacher champion?

Thank you for taking the time to complete these questions

Pupil Questionnaire 1



Name: _____

School: _____

Age: _____ Circle: Boy / Girl

Please answer the questions below and be honest when answering, no one else will see the answers you give.

On a scale of 1 (nothing) to 5 (a lot), rate how much you know about each of these topics:

Q1. I know what renewable energy is:

1 2 3 4 5

Q2. I know how wind farms work:

1 2 3 4 5

Q3. If you work in the **offshore wind industry**, you help to design, build and manage wind farms at **sea**. There are lots of different careers in this area.



On a scale of 1 (nothing) to 5 (a lot), rate how much you know about:

Q3a. The different **careers** in the offshore wind industry:

1 2 3 4 5

Q3b. The **Dogger Bank** offshore wind farm:

1 2 3 4 5

Q3c. The **careers** available at the **Dogger Bank** offshore wind farm:

1 2 3 4 5

Q4. Please indicate how much you know (1 = nothing, 5 = a lot) about **what a company needs to do to:**

a) Gain permission from the authorities to build an offshore wind farm

1 2 3 4 5

b) Construct an offshore wind farm (including putting together the wind turbines, foundations and substations and making the cables)

1 2 3 4 5

c) Ensure the long-term management, operation and maintenance of an offshore wind farm to keep it working efficiently.

1 2 3 4 5

Q5. Please indicate how much you know (1 = nothing, 5 = a lot) of the **career opportunities** available during each of these stages:

a) Gaining permission from the authorities' to build an offshore wind farm

1 2 3 4 5

b) Constructing an offshore wind farm (including putting together the wind turbines, foundations and substations and making the cables)

1 2 3 4 5

c) The long-term management, operation and maintenance of an offshore wind farm to keep it working efficiently.

1 2 3 4 5

Q6. Please write a **list** of **all the careers** you think might be needed to work in the offshore wind industry:

Q7. On a scale of 1 (nothing) to 5 (a lot), rate how much you know about the **qualifications and experience** needed to work in the offshore wind industry:

1 2 3 4 5

Q8. On a scale of 1 (not at all) to 5 (a lot), rate how much you think **you would like to work** in the offshore wind industry:

1 2 3 4 5

The offshore wind industry employs people with different types of abilities and different qualities

Q9. Write five **personal qualities** that you think might be important to work in the offshore wind industry

-
-
-
-
-

On a scale of 1 (not at all) to 5 (a lot), rate how interested you would be to:

Q10. Learn more about wind farms

1 2 3 4 5

Q11. Learn more about the offshore wind industry

1 2 3 4 5

Q12. Learn more about careers in the offshore wind industry

1 2 3 4 5

Q13. Learn more about the Dogger Bank offshore wind farm

1 2 3 4 5

Q14. Learn more about careers at the Dogger Bank offshore wind farm

1 2 3 4 5

Thank you for completing these questions

“Champions for Wind” Teacher Questionnaire



Post Programme

As part of the Forewind education programme “Champions for Wind” we have evaluated pupils’ prior knowledge and understanding about the offshore wind industry and career opportunities in this area. Following implementation of the education programme we now plan to evaluate how successful these programmes have been.

As before, pupils should be asked to complete a 15 minute questionnaire to measure their current knowledge and perceptions, please ensure that they work on this alone without assistance. However, help can be given if the pupil has difficulty reading the content of the questionnaire.

In addition, could you please complete the questions below based on your current knowledge and experience:

Name: _____

Please answer the following questions:

Q1. On a scale of 1 (nothing) to 5 (a lot), please rate how much you feel you currently know about each of the following areas:

Renewable energy

1 2 3 4 5

Wind farms

1 2 3 4 5

Offshore wind industry

1 2 3 4 5

Forewind / Dogger Bank

1 2 3 4 5

Careers in the offshore wind industry

1 2 3 4 5

Qualifications necessary for careers in the offshore wind industry

1 2 3 4 5

Experience required to gain employment in the offshore wind industry

1 2 3 4 5

Q2. On a scale of 1 (not at all) to 5 (a lot), please rate how confident you currently feel to create and deliver an education programme to pupils on each of the following areas:

Renewable energy

1 2 3 4 5

Wind farms

1 2 3 4 5

Offshore wind industry

1 2 3 4 5

Careers in the offshore wind industry

1 2 3 4 5

Qualifications necessary for careers in the offshore wind industry

1 2 3 4 5

Experience required to gain employment in the offshore wind industry

1 2 3 4 5

Q3a. Do you believe the 'Champions for Wind' project in your school was successful?

Please circle: Yes No

Q3b. Please state the reason for your answer to Q3a:

Q3c. What, if anything, could have made it more successful (e.g., additional resources)

Q4a. On a scale on 1 (not at all) to 5 (very much), to what extent do you feel the “Champions for Wind” programme has benefitted your pupils?

1 2 3 4 5

Q4b. Did you feel that all pupils similarly benefited from this programme?

Yes No

Q4c. If no, which type of pupils in particular benefitted?

Q5. Please state which area of the curriculum you included the Forewind education programme within:

Q6a. Could you please provide some detail about how you implemented the “Champions for Wind” project into your classroom.

Q6b. Which aspects of your Champions for Wind project do you feel your pupils were

Most engaged with:

Least engaged with:

Q7. After the programme has ended, do you have any other comments regarding your involvement in the Forewind education programme?

Thank you for taking the time to complete these questions

Pupil Questionnaire 2



Name: _____

School: _____

Age: _____ Circle: Boy / Girl

This questionnaire is very similar to one that you completed earlier this year. However, please complete this again based on your current thoughts and knowledge. Please answer the questions below and be honest when answering, no one else will see the answers you give.

Q1. On a scale of 1 (nothing) to 5 (a lot), rate how much you know about each of these topics:

I know what renewable energy is:

1 2 3 4 5

Q2. I know how wind farms work:

1 2 3 4 5

Q3. If you work in the **offshore wind industry**, you help to design, build and manage wind farms at **sea**. There are lots of different careers in this area.



On a scale of 1 (nothing) to 5 (a lot), rate how much you know about:

Q3a. The different **careers** in the offshore wind industry:

1 2 3 4 5

Q3b. The **Dogger Bank** offshore wind farm:

1 2 3 4 5

Q3c. The **careers** available at the **Dogger Bank** offshore wind farm:

1 2 3 4 5

Q4. Please indicate how much you know (1 = nothing, 5 = a lot) about **what a company needs to do to:**

a) Gain permission from the authorities to build an offshore wind farm

1 2 3 4 5

b) Construct an offshore wind farm (including putting together the wind turbines, foundations and substations and making the cables)

1 2 3 4 5

c) Ensure the long-term management, operation and maintenance of an offshore wind farm to keep it working efficiently

1 2 3 4 5

Q5. Please indicate how much you know (1 = nothing, 5 = a lot) of the **career opportunities** available during each of these stages:

a) Gaining permission from the authorities' to build an offshore wind farm

1 2 3 4 5

b) Constructing an offshore wind farm (including putting together the wind turbines, foundations and substations and making the cables)

1 2 3 4 5

c) The long-term management, operation and maintenance of an offshore wind farm to keep it working efficiently

1 2 3 4 5

Q6. Please write a **list of all the careers** you think might be needed to work in the offshore wind industry:

Q7. On a scale of 1 (nothing) to 5 (a lot), rate how much you now know about the **qualifications and experience** needed to work in the offshore wind industry:

1 2 3 4 5

Q8. On a scale of 1 (not at all) to 5 (a lot), rate how much you think **you would like to work** in the offshore wind industry:

1 2 3 4 5

The offshore wind industry employs people with different types of abilities and different qualities

Q9. Write five **personal qualities** that you think might be important to work in the offshore wind industry

-
-
-
-
-

On a scale of 1 (not at all) to 5 (a lot), rate how interested you would be to:

Q10. Learn more about wind farms

1 2 3 4 5

Q11. Learn more about the offshore wind industry

1 2 3 4 5

Q12. Learn more about careers in the offshore wind industry

1 2 3 4 5

Q13. Learn more about the Dogger Bank offshore wind farm

1 2 3 4 5

Q14. Learn more about careers at the Dogger Bank offshore wind farm

1 2 3 4 5

Q15. What part of the offshore wind project have you **enjoyed the most?**

Q16. What part of the offshore wind project have you **enjoyed the least?**

Thank you for completing these questions.

Teacher Interview Questions

This evaluation is simply aimed at trying to identify the impact that the Champions for Wind programme has had on the teachers who were involved. The information that you give me will be made anonymous. This is not an evaluation of you, your pupils, or your school, the questionnaires are simply aimed at identifying the impact the CFW programme has had across the four years.

Questions:

Did you attend the initial conference? If so, can you tell me your thoughts about the initial conference?

What, if anything, do you think you have *learned* from being involved in this project?

What, if anything, do you think you have *gained* from being involved in this project?

Which aspect was the most satisfying?

Which aspect was the least satisfying?

Which aspect was the most challenging?

Can you reflect on the impact that the project had on your professional development?

Can you reflect on the impact that the project had on your teaching ability?

Can you reflect on the impact that the project had on your ability to create teaching resources?

Have other colleagues benefitted through the dissemination of teaching resources?

Pupil Consent Form

Title of project: **Champions for Wind Project.**

Researcher: Dr Myfanwy Bugler, Department of Psychology, University of Hull

This project is going to be delivered by your teacher within the school day and focuses on developing your knowledge of the wind farm industry (particularly the offshore wind industry). You will learn how offshore wind farms can generate electricity for our homes and industries and provide careers for local school leavers.

If you agree to take part in this project you must complete the following questions. Please cross out as necessary:

- Do you understand what the project is about YES/NO
- Have you had the opportunity to ask questions YES/NO
- Have all your questions been answered YES/NO
- Have you been given enough information about the project YES/NO
- Do you understand that you do not have to complete the questionnaire if you don't want to YES/NO
- Do you agree to take part in the study YES/NO

This project has been explained to me and I agree to take part. I know that I don't have to answer the questionnaires if I choose not to.

Signature of Pupil.....

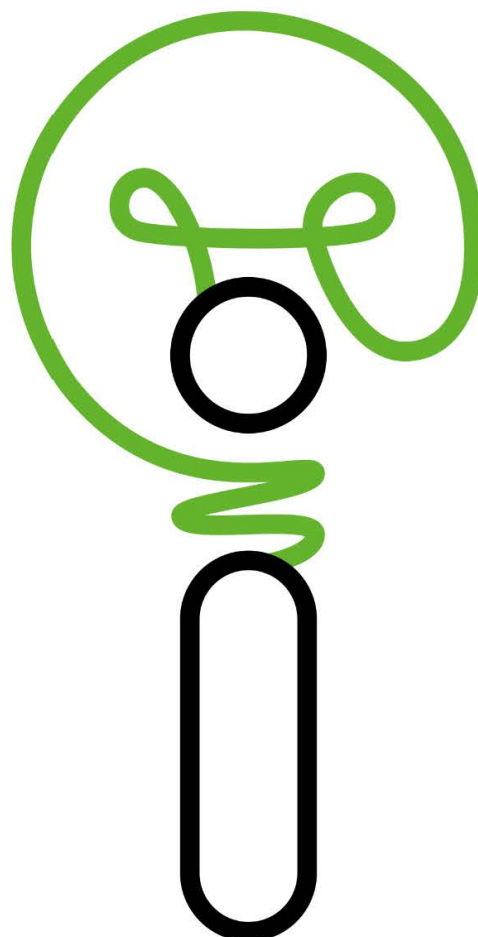
Date.....

Name (in block capitals).....

EV056

Engagement with ORE Catapult

Not confidential



Clare, Ian,

Thank you very much for our conversation today, I hope it cleared your understanding of Hub activities. Please find attached a short summary of Hub's purpose and introduction to roadmaps.

Electrical Infrastructure Research Hub is a partnership between ORE Catapult and the Universities of Strathclyde and Manchester so there is no direct involvement of industry partners. The Hub's goal is to accelerate research and development activities. You can find more information on the [website here](#). I'd be happy to introduce you to Paul McKeever if you would like to know more.

We'd be glad to hear what do you think about Electrical Infrastructure innovation priorities and hope to stay in touch,

Kind regards,
Kacper

Kacper Stefaniak
Strategy Analyst

From: Offshore Wind Innovation Hub
Sent: 03 September 2018 11:07
To: Davies, Clare; Offshore Wind Innovation Hub
Cc: Claire Canning; Andrew Stormonth-Darling; Timbrell, Ian
Subject: RE: Offshore Wind Innovation Roadmaps

Hi Claire,

Thank you for your message.

I'm Kacper Stefaniak and I'm taking care of roadmapping activities in OWIH. I'd be more than happy to discuss our processes behind them and outcomes. Both Claire and Andrew are on annual leave but Andrew is back on Tuesday. If you don't mind having a conversation without Claire we could have it Thursday 6th Sep 13:00. Otherwise we could schedule it some day during the week commencing 10th Sep.

Kind regards,
Kacper

From: clare.davies
Sent: 31 August 2018 12:13

[REDACTED]

Subject: RE: Offshore Wind Innovation Roadmaps

Hi Andrew and Claire

I was previously in touch with Jonny about the Offshore Wind Innovations Hub and Roadmap (see emails below). Ian (Engineering manager for Sofia Offshore Wind Farm) and myself would like to have a call to understand a bit more about the set-up and co-ordination of them.

Would you be free for a 30 minute call to introduce ourselves and discuss this? I have suggested some dates and times below that are currently convenient for us:

Monday 3rd September – 11.00-15.00

Tuesday 4th September – 15.00 to 17.00

Thursday 6th September – 13.00-17.00

Let me know if any of these suit. I will then send a calendar invite.

Kind regards
Clare

From: Offshore Wind Innovation Hub

Sent: 12 July 2018 16:51

To: Davies, Clare

Cc: Offshore Wind Innovation Hub; Claire Canning; Andrew Stormonth-Darling

Subject: RE: Offshore Wind Innovation Roadmaps

Hi Clare,

Apologies, I had indeed missed your previous e-mail. Once you have completed the exercise we would be delighted to follow up with you.

Just so you are aware, I will be leaving Catapult on the 3rd August and Andrew Stormonth-Darling (CCed here) will be taking over from me as the Project Manager for the Hub, so please include Andrew and Claire on any follow up e-mail.

Kind Regards,
Jonny

From: Offshore Wind Innovation Hub

Sent: 03 July 2018 13:17

To: [REDACTED]

[REDACTED]

Subject: RE: Offshore Wind Innovation Roadmaps

Hi Claire,

Thanks for getting in touch. As you'll be aware, the four innovation roadmaps are available [online](#) and you can expand them to show all the elements. Clicking on any of the grey bars to show the detail on that particular area for innovation, and there is the function to filter innovation areas based on their scoring. We don't have any more detailed material published however we would be delighted to speak to you about some of the background to the roadmaps and to provide more detail on any areas that may be particularly relevant to Sofia.

Is this something you would be amenable to and, if so, would you be available for a one hour call sometime this week? I would also invite my colleague Claire Canning (CC'ed here) to join the call. Claire leads on the stakeholder engagement elements of the Innovation Hub.

Would you have any availability for a one hour call at any of the following times?

- Thursday 5th July – Anytime between 09:30 – 16:00
- Friday 6th July – Anytime between 10:00 – 16:00

If none of these suit then just let me know and I can propose some dates for the week after, or later this month.

Kind Regards,
Jonny

From: clare.davies

Sent: 03 July 2018 11:22

To: Offshore Wind Innovation Hub <[REDACTED]>

Subject: Offshore Wind Innovation Roadmaps

Hi Jonny

Innogy have been interested to read the Offshore Wind Innovation Roadmaps, and are particularly interested to see where our Sofia project could look to support some of the innovations that have been highlighted as high priority for the industry.

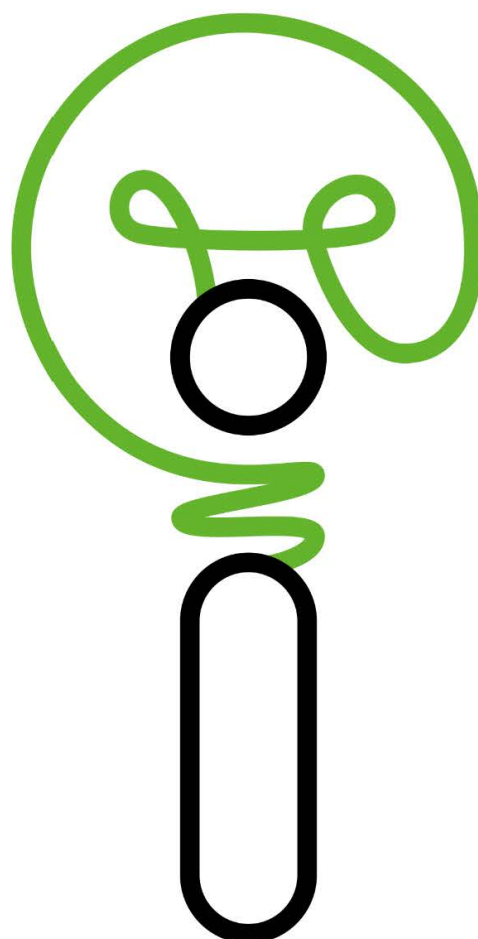
Your reports go into detail on a number of the innovations but not all of them. Do you have more detail on them all that you can share with us?

Kind regards
Clare

EV058

Engagement with Green Port Growth

Not confidential



From: Dawn Hall
Sent: 24 September 2018 15:43
To: Davies, Clare
Cc: Nolan, Michael; Lianne Emery
Subject: Re: Sofia offshore wind farm

Hi Clare

Good to hear from you and hope that the job is going well.

Many thanks for the contact with Mike and we would be delighted to do both a link through our newsletter as well as a direct email. As you are aware the more we can do to showcase opportunities to businesses the better.

Mike - Over the last 5 years we have successfully engaged and assisted local companies in their development to access opportunities within the renewable sector supply chain. It's because of this strong link to businesses that the team have been instrumental in supporting global renewables companies to establish productive supplier connections. In addition we have over 600 companies on our Green Port Directory, enabling the team to identify and suggest suitable companies for your supply chain needs.

For this reason more than happy to support yourself or your tier one suppliers by:

- Making personal introductions and arranging 1-2-1 meetings
- Supporting and/or arranging business events with targeted invites.
-

If we can be of any further assistance please do not hesitate to contact us.

Regards

Dawn



Dawn Hall
Project Manager
Green Port Business Support
Business Investment & Tourism Services East Riding of Yorkshire Council

From: [REDACTED]
Date: 24/09/2018 13:19
Subject: Sofia offshore wind farm

Hi Dawn and Mike

Dawn- How are you and things going in the business support team? I'd like to put you in touch with my colleague Mike Nolan, who is the senior procurement manager on the Sofia project. We are currently completing an exercise to promote the Sofia project and encourage potential suppliers to register their details so we can share information with our top tier contractors once they are appointed. I know that you provide your companies with information on UK offshore wind projects, but I was wondering if you would also consider sending a direct email or placing an article in your newsletter with an overview of the Sofia project and a link to our procurement portal?

You may also be aware that we recently published a guide to procurement opportunities at Sofia and other innogy wind farms:

<https://www.innogy.com/web/cms/mediablob/en/3913284/data/3864760/1/innogy-renewables-uk/sites/wind-offshore/sofia-offshore-wind-farm/Supply-Chain-Brochure.pdf>

Mike- Dawn is the head of the business support team at Green Port Growth and has an excellent understanding of companies in Hull and East Riding of Yorkshire, both already active in offshore wind and those capable to enter the market.

Kind regards
Clare

Clare Davies
Consent Manager

www.innogy.com/renewablesUK/sofia

Innogy Renewables UK Limited
Offshore Wind
Project Services
M:
W: www.innogy.com
E:

Date: Mon 15/Oct/2018 04:32:38	
Subject: Green Port Business Support - innogy and Sofia offshore wind farm	
Attachments: Green Port Growth News RU issue 66 September 18.pdf	
Good Afternoon Paul	
Following our latest news round-up (please see attached) we would like to highlight that our latest project updates and customer listings guides include an update from innogy regarding Sofia offshore wind farm - previously known as Dogger Bank Teesside B.	
Innogy are encouraging potential suppliers to register their details so they can be shared with the top tier contractors once they are appointed.	
Please see the following link to read more about procurement opportunities at Sofia and other innogy wind farms:	
https://www.innogy.com/web/cms/mediablob/en/3913284/data/3864760/1/innogy-renewables-uk/sites/wind-offshore/sofia-offshore-wind-farm/Supply-Chain-Brochure.pdf	
Best wishes	
Lianne	



Green Port Growth Business Support News Round Up

Issue no 68
December 2018

Supply Chain Opportunity

Supply chain portal for Sofia Offshore Wind Farm

Sofia Offshore Wind Farm is one of the four Dogger Bank projects that were awarded consent in 2015. Formerly known as Dogger Bank Teesside B, the project was taken over 100% by Innogy in August 2017 and subsequently renamed Sofia Offshore Wind Farm.

The wind farm's Project Director David Few is responsible for leading the project through the upcoming Contracts for Difference (CfD) auction, which the government has announced will take place around May 2019, and then on to associated financial decisions.

Innogy has launched a Sofia Offshore Wind Farm registration portal for companies interested in supply chain opportunities. David Few said of the registration portal: "This will enable us, and potentially our Tier 1 contractors once they are appointed, to contact companies that may have the right skills and experience required to support the project at the right time."

To register for suitable procurement opportunities, please click 'find out more'

[Find Out More](#) 

The News Round-up is designed for information purposes only. All the articles above have been collated from various sources and in no way reflect the views of East Riding of Yorkshire Council. Whilst the information provided is as accurate and up-to-date as possible, there may be updates on individual websites. Before you rely on the information in this News Round-up, you must verify with the appropriate sources.

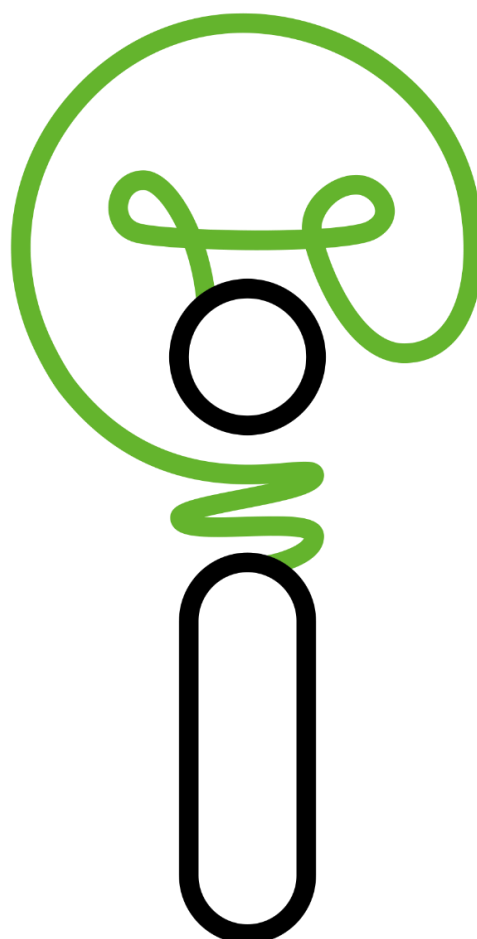


[Click here](#) to unsubscribe.

EV063

Forewind spotlight on Teesside report

Not confidential





Spotlight on Teesside



Research Document
November 2011

prepared by **mhw**
PR & MARKETING

CONTENTS - SPOTLIGHT ON TEESSIDE

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2. INTRODUCTION

This document aims to throw a spotlight on Teesside, also known as Tees Valley by the business and public sectors. This area, sitting in the southern part of North East England is made up of 5 local authority districts:

- Hartlepool
- Stockton on Tees
- Middlesbrough
- Redcar & Cleveland
- Darlington

For the purpose of this document we have largely ignored the Darlington borough as this is quite a different profile and constituency to the widely accepted area known by the public as Teesside which shares many common issues and history.

Also, the key local, daily evening newspaper for the area – the Evening Gazette - has, within the last 12 months, made an editorial decision to refer to the area as Teesside rather than Tees Valley (SEE 'executive summary'.)

In addition, we have placed a bias on Redcar & Cleveland district as this is the likely immediate area of capital investment and interest for Forewind.

Task and methodology

MHW was tasked with undertaking a situation analysis of the Teesside area for Forewind. Essentially, this took the form of desk top research and a handful of qualitative one-to-one interviews with senior representative individuals based in the area.

The purpose of the document was to throw a light on Teesside, providing objective information while also offering some subjective but informed perspectives of the area. We went to various sources for our information and where possible we have tried to give attribution to the source.

We have tried to find the most up-to-date statistical information but in some cases this data is several years old but is the most current available.

We undertook the research and interviews over a three week period during October 2011.

We interviewed / liaised with the following people organisations:

Evening Gazette	Jez Davison	Snr business writer
Tees Valley Business Club	Jane Reynolds	Chair
Redcar MP, Ian Swales constituency office	Becky Selmer	Agent / office manager
NEPIC	Stan Higgins	CEO
Barclays Bank	Trevor Jenkins	Corporate manager Teesside
N-East Chamber of Commerce	Anon / various	Anon

Their observations are scattered within the document and more subjective comments are recorded in an appendix at the end of this report.

Wayne Halton
Director
MHW PR

2. EXECUTIVE SUMMARY

Teesside is a proud area of North East England. Largely built and established in the industrial revolution, the region has - like many former heavy industrial areas – gone through a period of pain, transition and change. This transformation has been quite dramatic and acute during the last couple of decades.

Teesside was built on heavy manufacturing industry. The decline of this industry has left the area with more than 1,000 hectares of under-utilised and derelict land, much of it along the River Tees.

Teesside is often regarded as the ‘Cinderella’ within the North East – certainly by the more confident and assertive regional capital Newcastle and the wider Tyne & Wear area of the region. Teesside does not necessarily acknowledge the north’s more dominant role and often reveals ‘chips on its shoulder’ when it comes to talk of ‘region’. It’s fair to say Teesside is influenced directly by County Durham in the north and North Yorkshire in the south.

Teesside area within the North East of England



Anecdotally, there is strong evidence to suggest that business and decision makers look as much to the south to Leeds as they do to the North East's regional capital of Newcastle. The two are perceived as a similar distance ... and some in Middlesbrough are old enough to remember that the town – which is bidding to be given 'city' status - was once in Yorkshire.

In terms of deprivation, the local authority areas of Teesside are among the most deprived nationally taking the district as a whole.

However, the area still has industrial strength and skills that are unique in the North East and valuable to the UK. Teesside is the largest petrochemicals/energy/biofuels and advanced engineering complex in the UK. Some 60% of the UK chemical exports are from Teesside. The area's overall contribution to Gross Value Add is £10bn a year.

Teesside contains plants of a world scale. Examples are SABIC's polyethylene plant which is the world's largest; Ensus' bioethanol plant is one of Europe's largest; and the Teesside Power Station is the world's largest combined cycle gas turbine heat and power plant producing 1870 megawatts of electricity.

The area's port is a major catalyst and driver of growth and prosperity. Teesport is the fourth largest port in the UK.

A snapshot SWOT of Teesside would reveal the following:

Strengths

Manufacturing industry (particularly chemicals); land availability; workforce; Teesport; university

Weaknesses

Lack of economic diversity; no significant financial or professional services sector; branch plant economy; skills; youth unemployment; health and deprivation

Opportunities

Development of Local and Enterprise Partnership (LEP); growth of renewables and energy sectors; educational institutions

Threats

Wider economy; continued public sector cuts (big employer in area); uncertainty following demise of the RDA (One North East); government policy

Identity – Teesside or Tees Valley ?

‘We are Teesside’ was the verdict of a widespread identity survey undertaken by Middlesbrough’s daily newspaper, the Evening Gazette in July 2010.

The name Tees Valley got a resounding thumbs down from readers and even the local branch of the Institute of Directors. Readers and business leaders recognised the need for a strong ‘sub-regional’ brand and Teesside was the favoured identity.

The study showed the Tees Valley brand was a term largely used by the public sector and a clumsy device to unify the 5 local authority areas (including Darlington, which most people did not regard as Teesside).

The Gazette now only refers to the area as Teesside.

The study also revealed the widespread desire to change the name of the local airport – currently marketed as Durham Tees Valley Airport. The public and most recently Stockton South MP James Wharton want the owners (Vancouver Airport Services) to change the name back to Teesside International Airport (which is what it was called until 2004).

Teesside Offshore Wind Farm

EDF Energy Renewables has, since 2001, been planning to develop a large offshore wind farm off Redcar. Construction of the 27 turbines, located 1.5km from the coast, is due to begin in Feb 2012 and be complete end of June. An onshore substation is currently being built at Warrenby, near Tod Point, Redcar. Cables will come ashore at Coatham Sands. The electricity will feed into the regional and national grids via the NEDL Lackenby substation.

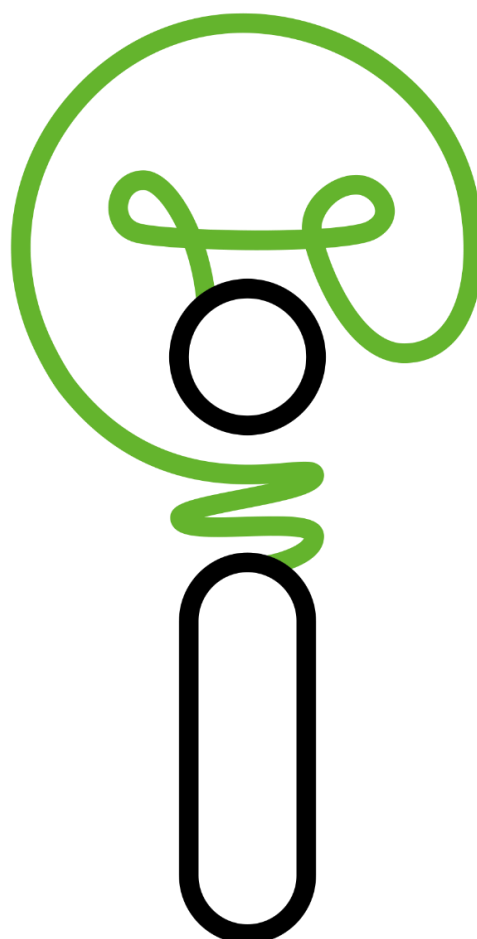
Be aware and sensitive to the following

- Unusually scenic coastline (even with a land-based industrial backdrop) – featuring areas of Special Scientific Interest and a ‘Heritage Coast’ south of Redcar
- A modest and declining but active sea fishing community
- Windfarms are an emerging feature of the area – offshore and onshore
- Political tensions within Redcar & Cleveland area – between Lib Dem MP and Labour controlled council
- Transition and change within the wider Teesside political landscape and infrastructure (LEPs, etc)

EV064

G+ Innogy presentation

Not confidential



G+ 2018 Stakeholder Forum



Darren Tape and Thomas Johann

How G+ Membership helps innogy to Improve H&S Performance

www.gplusoffshorewind.com

In partnership with the



- innogy Renewables develops, builds and operates electricity generating plants from renewable energy sources
- Innogy operates in a variety of sectors including; solar, hydro, biomass, biogas, onshore and offshore wind
- As one of the leading Offshore Developers, innogy has been operating Offshore Wind Farms since 2004
- With Partners, we operate Wind Farms off the UK, German and Belgium coasts up to 60km from the mainland shore



Offshore Portfolio



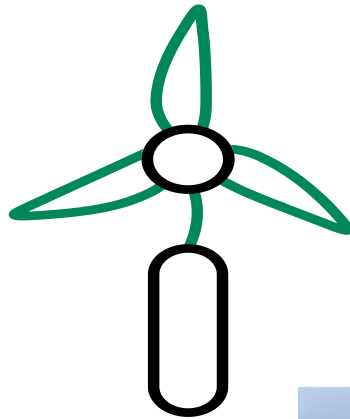
Rhyl Flats, UK, 90 MW:
Completely commissioned 2009



North Hoyle¹⁾, UK, 60 MW:
Completely commissioned 2004



Thornton Bank I-III²⁾, BE, 325 MW:
Completely commissioned 2013



**Nordsee Ost,
GER, 295 MW**



Greater Gabbard³⁾, UK, 504 MW:
Completely commissioned 2012



**Gwynt y Môr⁴⁾,
UK, 576 MW**



New 2018

- Nordsee One (GER) -

Construction
Europa

- Galloper - UK

Development
Europa

- Triton Knoll - UK

- As one of the founder members of the original G9, innogy is fully committed to raising standards and improving health and safety standards in the offshore wind sector
- We work closely with a number of organisations including the Global Wind Organisation, European Wind Energy Association, VGB and Regulatory Bodies such as the UK Health & Safety Executive
- Membership of the G+ extends this even further to other Global Organisations such as the International Marine Contractors Association
- Next few slides will highlight



Information sharing amongst peers

- Forum to share **H&S ideas / innovation / new campaigns**
- **Safety alerts** frequently circulated amongst the Focal Group
- Incident from **lessons learned** shared at each Focal Group meeting
- Access to papers / presentations / **safety information** through a dedicated web portal
- Recognised **sharing / learning** amongst peer companies



Common / agreed ways of working across the industry

Leitlinien für bewährte Praktiken/
Qualitätsstandards

Höhenarbeiten in der Offshore-Windindustrie



In einer Beziehung mit



Leitlinien für bewährte Praktiken/
Qualitätsstandards

Der sichere Betrieb von kleineren, in der Offshore-
Windindustrie eingesetzten Service- und
Arbeitschiffen



In einer Beziehung mit



G+ BOARD MEMO

Subject: Quick Wins – Site induction checklist

To	G+ Board		
Document type	<input checked="" type="checkbox"/> Decision	<input type="checkbox"/> Information	
From	Developed by	Kate Harvey	
	Reviewed by	G+ Focal Group	
Date	23/11/16		

Before visiting an offshore wind farm of a G+ member, for the first time, all workers must undertake a site induction. This is obviously in addition to any technical training that might be required for specific tasks that are to be undertaken.

The intention of this note is to provide a checklist for items that G+ members view as being good practice for inclusion in a site induction. The aim is for consistency amongst the offshore wind farm community and to guide new entrants who are looking at creating a site induction for the first time. It is appreciated that most G+ members undertake modular site inductions depending on the individual and the activities that they will be completing. This checklist looks at a general site induction that is required.



c/o Energy Institute
61 New Cavendish Street
London
W1G 7AR
United Kingdom

31 March 2015

Re: HEALTH & SAFETY AT WORK ETC. ACT 1974 TRANSFER PROCEDURES

Dear Trevor,

Thank you for your letter dated 09 February 2015 outlining the HSE's position on the transfer of personnel from vessel to offshore fixed assets on UK offshore windfarms. This letter and the expectations contained within it have been discussed by the G9 Board of Directors and the Focal Group.

Within the G9, there is a strong desire to improve Health & Safety performance not only in the UK but at all member sites in Northern Europe. To support this objective, we can confirm that G9 members support the HSE position of ensuring permanent attachment to the fall arrest system during transfer operations where a traditional push on process via Crew Transfer Vessel (CTV) is used, until other relevant mitigating measures and new technologies, which can bring the risks associated with the transfer operation to an acceptable level, are introduced.

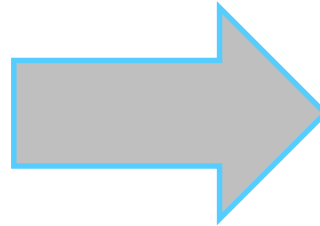
Within the G9, where member sites are not currently adopting this approach we will work collectively to support a transition to this arrangement and will notify the wider industry via the G9 website and other appropriate channels once this is in place.

Yours sincerely,

Benj Sykes
Head of Asset Management, DONG Energy
Chairman, G9 Board of Directors

Stephen Rose
Head of Offshore Wind Generation, SSE
Leader, G9 Focal Group

Participating in industry leadership



Board
of Directors


The primary aim of the G+ Board of Directors is to actively lead the industry in finding solutions to the safety challenges that offshore wind projects face

Improving safety performance – delivery of good practice




Good practice guideline

Working at height in the offshore wind industry



**G9 Offshore Wind
Health & Safety
Association**

In partnership with 

G9 Good Practice Guidelines – Working at Height – Implementation Checklist.			
Reference number	GWO Audit 01	Version	1.00
Business Unit	Rhyl Flats (RF) & North Hoyle (NH)	Location	Mostyn
Head of Business	Chris Griffiths	Manager	Mike Bradley & John Davies
Auditor	Sye Channer	Audit date(s)	29/07/2015

Checklist Process

Auditor to use checklist to record evidence to verify the requirements of the Risk Standard.

For each requirement of the guideline, based on the evidence or observations from the audit, findings are classified using the Audit Categories and recorded on this form.

Record the overall status against the Good Practice Guidelines in the Audit Summary table.

Findings that require corrective action should be discussed with the Auditee and achievable close-out dates agreed.

Audit Summary

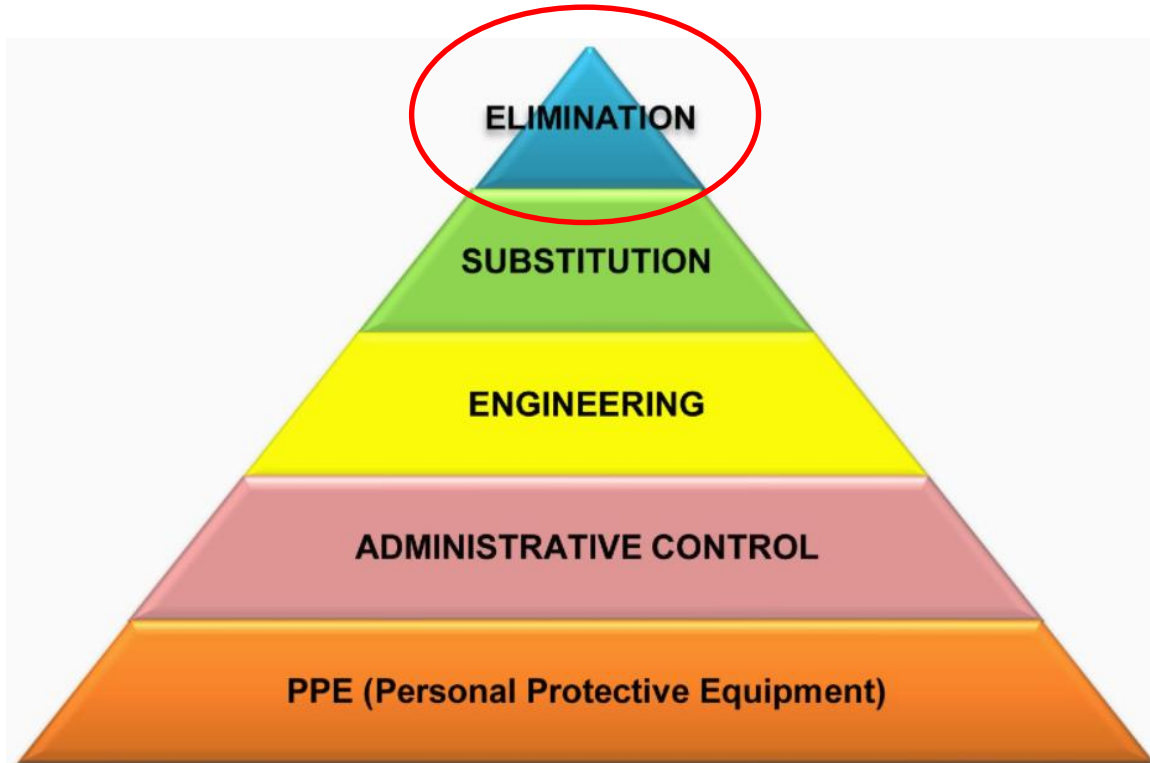
Number of Corrective Actions	Major Non-Conformance	
	Non-Conformance	
	Requires Correction	
	Observation	4

Audit Report

Agreed corrective actions from this audit should be entered into an Audit Report database (MNC, NC and RC Actions only).

This completed checklist should be embedded in the Audit Report as audit evidence.

Inherent safety / Safe by Design



G+ Safe by design

Workshop report: WTG service lifts



Collective industry engagement on key H&S issues



“one industry
one voice”

Overview of G+ member sites



- **Collective engagement** through G+ with:
 - Regulators
 - Government bodies
 - Trade associations
 - Academic institutions
- **Reducing duplication and increasing harmonisation** of operating practices (across Innogy and wider industry sites)
- **More efficient** regulation – regulator to speak to **whole industry** at same time

Innogy philosophy – good safety is good business



Money talks!



- Health and Safety can be seen as an expense that can be done without
- Can be seen as bureaucracy and burden
- Reality health and safety makes good business sense
- Improvements in costs, productivity and reputation
- Can increase moral and productivity and reduce absences and staff turnover

04/09/2017

Work-related accidents and injuries cost EU €476 billion a year according to new global estimates



The economic case for safety and health at work has never been clearer. New estimates from the [project on the costs and benefits of OSH](#) indicate that work-related injuries and illnesses cost the EU around €476 billion each year. The cost of work-related cancer alone amounts to €119,5 billion.

Through the project, in collaboration with the [International Labour Organization](#) and other partners, EU-OSHA is developing an approximate economic costing model for ineffective or non-existent OSH measures. The model allows for comprehensive measurement of the resulting societal burden, and the results will enable policy-makers to better understand the economic impact of poor workplace safety and health.

European Agency for Safety and Health at Work

ISSN: 1831-0343

Estimating the costs of work-related accidents and ill-health: An analysis of European data sources

European Risk Observatory



Safety and health at work is everyone's concern. It's good for you. It's good for business.

A more productive relationship with supply chain / OEMs



Become a G+ Associate member

The G+ Global Offshore Wind Health and Safety Organisation (G+) comprises the **biggest offshore wind farm operators globally**.

The primary aim of the G+ is to **create and deliver world class health and safety performance** across all activities in the offshore wind industry.

As the leading global authority on health and safety issues in the offshore wind industry, the G+ is committed to engaging with all key stakeholders in order to **find solutions to the safety challenges** that offshore wind projects face.



Membership Fee

- The annual membership fee for G+ Associate Membership is GBP15K.
- It includes EI Technical Company Membership (see overleaf).

Contact details

G+ General Manager
Kate Harvey e: kharvey@energyinst.org
EI Technical Manager:
Andrew Sykes e: asykes@energyinst.org
gplusglobalofw
www.gplusoffshorewind.com
www.energyinst.org

Become a G+ Associate member



In partnership with
energy institute

The Energy Institute (EI) offers secretarial support to the G+. It is a not-for-profit registered charity, which exists to **promote and advance knowledge, skills and good practice in energy for society's benefit**.

EI TECHNICAL COMPANY MEMBERSHIP

Industry leadership

- Benefit from the EI technical programme outside of the G+ offshore wind programme, in the areas of human and organisational factors, process safety, health and environment.
- Opportunity to sponsor **high profile industry events**, such as the EI Awards, IP Dinner or numerous conferences throughout the year.
- Enhance your reputation in industry and raise your profile.



Access to specific technical committees

- Valuable means of networking and sharing knowledge informally with peers.

Access to knowledge and industry information

- A global licence to access **EI publications** within the areas of offshore wind, human and organisational factors, process safety, health and environment. EI good practice guidance is used internationally – in 2016 there were over 25,000 downloads of EI guidance across all global regions where the industry is active.
- Easily transfer to the **EI Knowledge Service** to access 90,000+ wider industry resources, including news, abstracts, data sheets, contacts, events, periodicals, and more. All digital content available through the Energy Matrix and EI Collections is available to download.
- Access to monthly **Energy World** magazine free of charge.

Professional development of staff

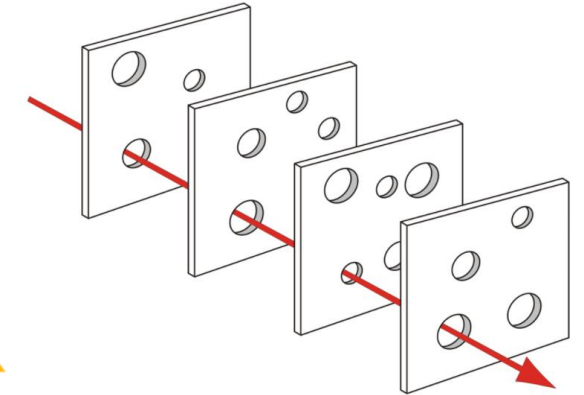
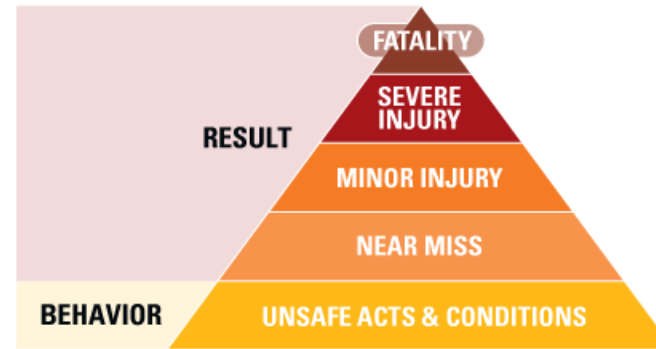
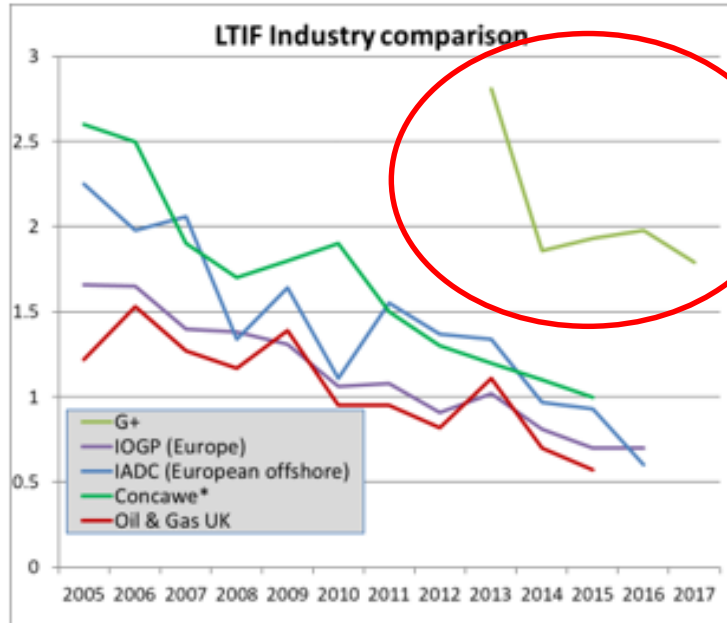
- Support for individual staff on application for **professional recognition** as Chartered engineers, energy managers, scientists or environmentalists is available from the EI.
- Access to technical workshops, **conferences** and **training** as speakers and delegates significant discounts on listed prices.

G+ ASSOCIATE MEMBERSHIP

- Become part of an open network of health and safety experts, professionals and stakeholders and help to provide health and safety leadership and direction to the industry
- Attend the G+ Annual General Meeting with members of the G+ Board of Directors
- Attend G+ Focal Group meetings on a rotational basis and propose agenda items for discussion
- Contribute to G+ work programme
- Actively participate in G+ working groups to deliver health and safety products for the industry
- Contribute suggestions for topics and presentations to be included in the G+ "Safe by Design" workshop programme
- Gain industry recognition as an Associate Member on the G+ website
- Includes Technical Company Membership of the EI (see overleaf for benefits)
- Discounted access to the EI's good practice resources



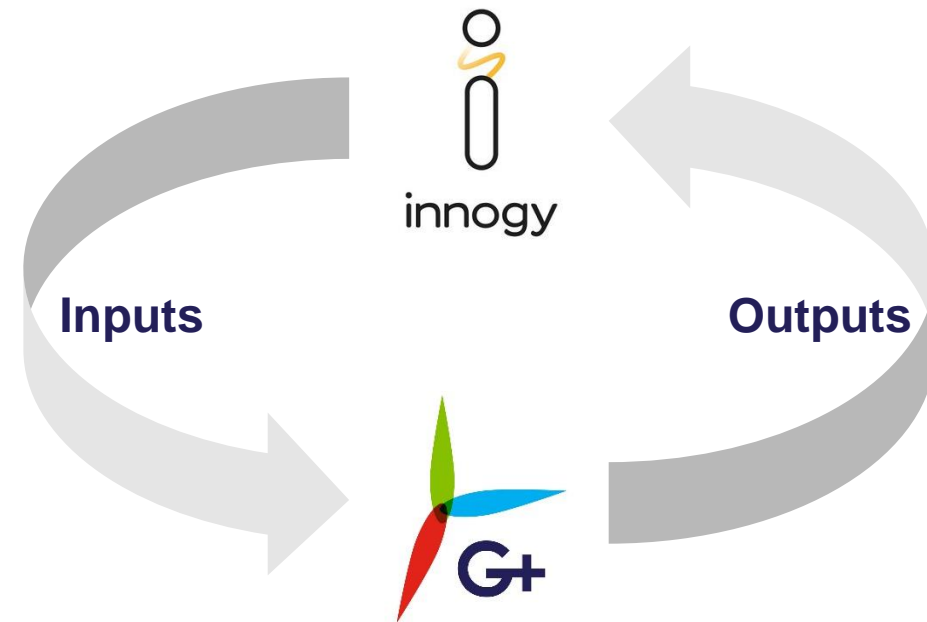
A demonstrable improvement in H&S performance



- Industry H&S improvement has improved since the formation of the G9 (now G+)
- The journey is not yet complete – further improvement can and must be made
- Through the G+, Innogy are committed to this journey and will support it as necessary

Summary and concluding remarks

- Innogy will continue to work with other Operators, Contractors, OEMs, Suppliers and the entire Supply Chain
- The G+ has facilitated an open and transparent approach where there is a willingness to share information without prejudice
- Demonstrable improvements in the industry can be observed and innogy will continue to input and work alongside like minded organisations and individuals



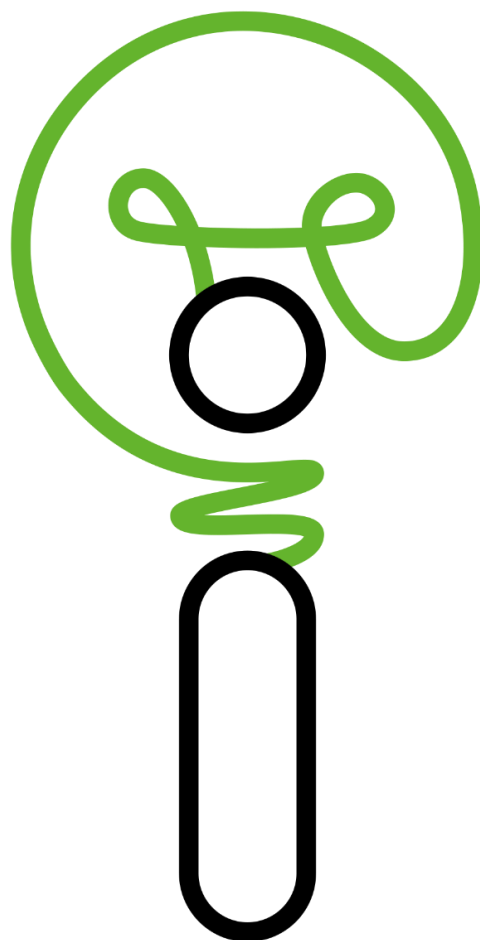
Thank you



EV066

Case study Hereema

Not confidential



Gallopier Wind Farm Supply Chain Case Study:

Hereema

Heerema secured a £20 million contract to manufacture and build the topside and jacket for the offshore sub-station of the Gallopier Offshore Wind Farm. In delivering this contract, Heerema will be working from its yard in Hartlepool, and will also seek to use supply-chain facilities from within the Teesside and North East Region.

Employment Impacts: The Gallopier Offshore Wind Farm project is expected to support up to 250 direct jobs at Heerema over a 15 to 18-month manufacturing period. In addition, this contract is expected to support up to a further 100 jobs within Heerema's supply chain, with many of these jobs expected to be located in Teesside and the North East. This contract will help to provide long-term sustainability to energy-related employment in the region, in addition to increasing overall confidence in the offshore sector.

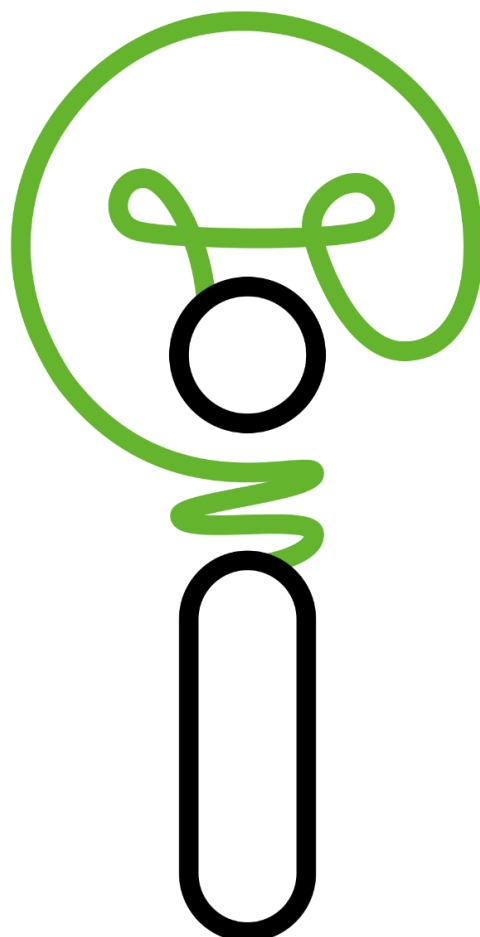


Source: © Petrofac

EV067

Case study JDR

Not confidential



Galloper Wind Farm Supply Chain Case Study:

JDR Cables

JDR Cables was sub-contracted by VBMS to manufacture the array cables of the Galloper offshore wind farm. This contract is substantial for JDR Cables and will contribute towards filling up its order books and strengthen its position within the UK renewables' supply chain.

Employment impacts: The contract will help to sustain current employment levels at JDR and, as a result of the increased workload (due to Galloper and other ongoing energy projects), JDR Cables expects to have to increase its workforce over the longer term.

Investment: JDR Cables has recently undertaken a significant investment of around £10 million for a new machine that will allow it to almost double its capacity throughput. Although this investment was needed regardless of the work for Galloper offshore wind farm, this contract alongside wider overall growth of the renewables sector, encouraged JDR Cables to consider speeding up the process of acquiring the new machinery. Galloper will be one of the first projects on which the new machine will be used, and Galloper's will be the first power cables produced using this machine.



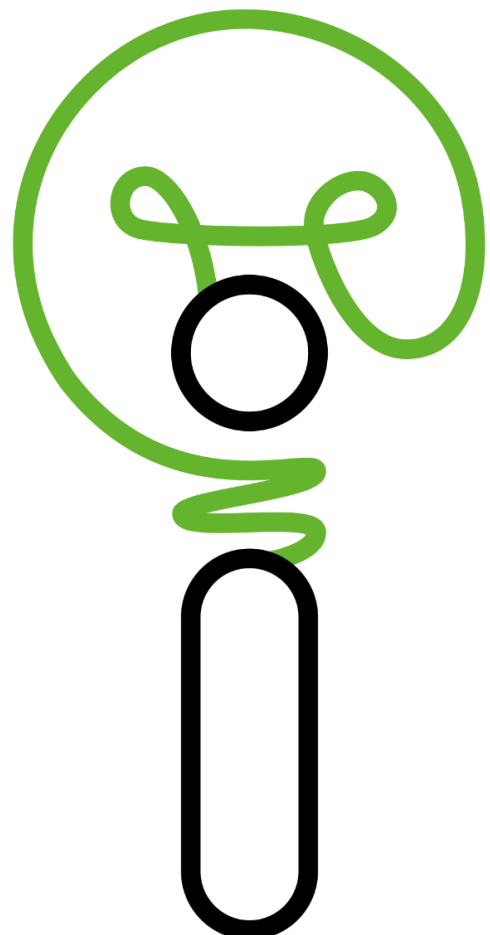
Source: © JDR Cables

Long term view: Around 10 years ago, JDR Cables was involved in the delivery of the Greater Gabbard offshore wind farm project (the wind farm which Galloper is extending onto). Since then, JDR Cables has grown and is now a key player in the North East's renewables supply chain. This initial project has helped JDR Cables make its decision to build its factory in Hartlepool and ensure the creation of long-term employment in the renewables sector in the North East region.

EV076


TKOWFL Skills audit scope of work


Not confidential




History of the windmill

No one knows who invented the windmill, but we do know that the Chinese were using wind power to pump water for their crops 4,000 years ago, and people were using wind power to drive boats at least 5,000 years ago on the River Nile in Egypt.

 Two hundred years ago there were over 10,000 windmills in use in Britain, mainly used to grind corn, which is where the word 'windmill' comes from.

 Windmills began to be used to make electricity about 100 years ago and modern modules are generally called wind turbines.

 Windmills were up to 23 metres high. By comparison, the world's biggest wind turbine, has a total height of 220 metres!



About Me

Hi, my name is Evie Read and I'm the author of this booklet. I am in year 12 and I am studying Maths, Further Maths, Chemistry and Physics at A-level. Over my Summer holidays I completed an internship with innogy for the Galloper project.


As an intern, my job is to help research and develop new ideas into helping you learn about Galloper offshore wind farm. I did this by writing blog posts, visiting people from the local area and making this booklet.

This internship has helped by showing me what it's like to work in the renewable industry.

Working on such an amazing project has been a great opportunity for me and one that I will never forget!

Evie
Summer 2017



 @galloperwindfarm
www.galloperwindfarm.com

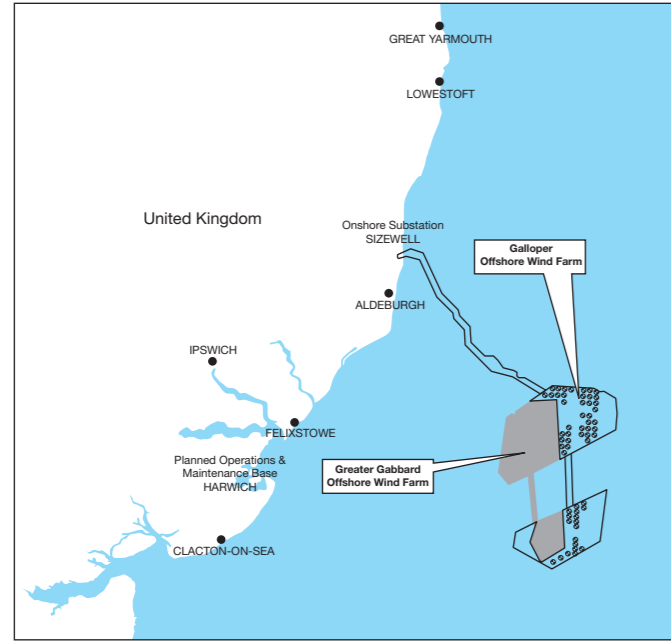


Turning wind into power



What is Galloper?

Galloper is a wind farm which means it uses wind energy and technology to turn turbines to generate electricity. Construction of the project, which is 27,000 meters off the Suffolk coast, began in 2015.



There will be 56 turbines when it's completed and each turbine will be 108.5 meters tall.

The project will be operational in 2018 and will be able to make enough energy for up to 336,000 houses!

Footnote: Energy predicted to be generated by the proposal is derived using wind speeds monitored in the local area and correlating to suitable reanalysis weather data providing longer term data. The calculations are based on an installed capacity of up to 336MW. The energy capture predicted and hence derived homes equivalent or emissions savings figures may change as further data are gathered. Equivalent homes supplied is based on an annual electricity consumption per home of 4500 kWh. This figure is supported by recent domestic electricity consumption data available from The Digest of UK Energy Statistics and household figures from the UK Statistics Authority.

Can you breeze through our word search?

N Z U X T Y D D V A B V
 F W D M S T T A L L Z U
 D T U A I I D G L M O T
 A G N G E C E P Y R Y K
 E A Q Q M I D T E A G L
 P C R Q E R C U N F O O
 U C E K N T O R E D N F
 C H N I S C V B R N N R
 F N E B F E P I G I I O
 J G W Z L L J N Y W Z N
 B C A B O E A E A B U E
 W Q B J P T F S L B R Y
 B C L G A L L O P E R L
 X F E T Q N O Z W N T Z

ELECTRICITY INNOGY SIEMENS ENERGY NORFOLK TURBINES GALLOPER RENEWABLE WINDFARM

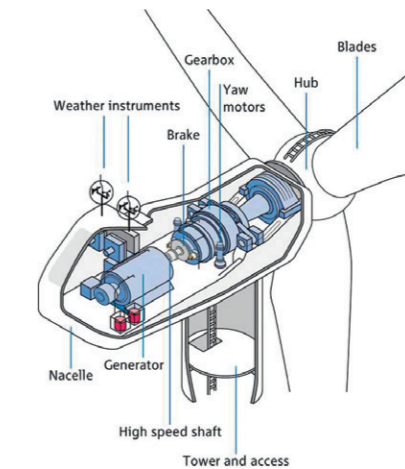
Blow us away!

Can you help us by drawing Galloper a mascot? Her name is **Gail Force** what do you think she would look like?



How wind turbines work

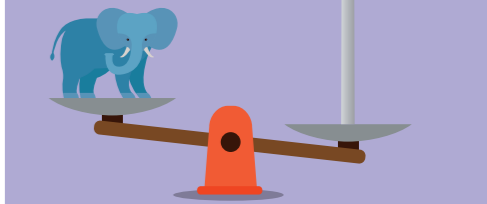
Wind turbines usually have three blades. The wind turns the blades, which drive an electrical generator. A generator is a machine that contains coils of wire and strong magnets. When the wire coils are spun quickly inside the magnets, they produce electricity. The Galloper turbine towers are 90m high and is made up of three parts each weighing up to 200 tonnes!



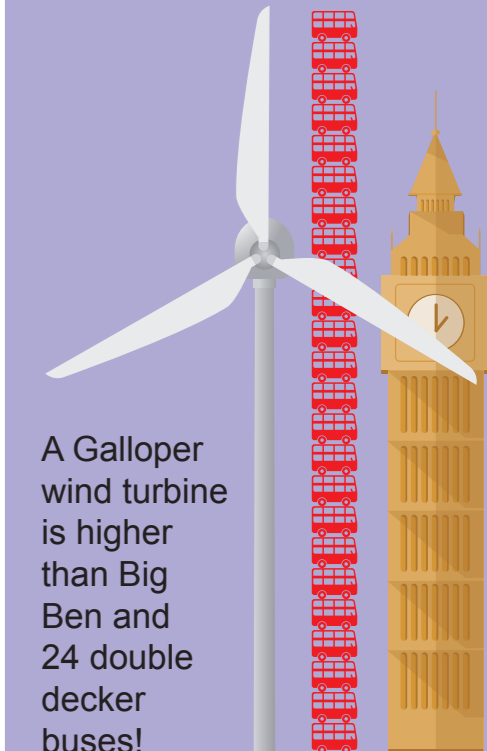
One rotation of one of these wind turbines generates enough energy to power a home for 29 hours!



Fun Facts!



Did you know one turbine weighs about as much as 150 elephants!

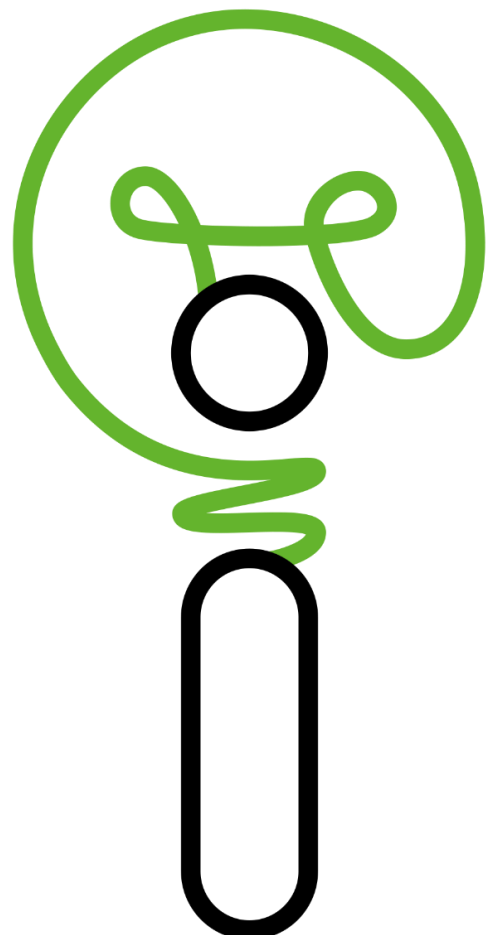


A Galloper wind turbine is higher than Big Ben and 24 double decker buses!

EV079

Innogy innovation case studies

Not confidential



RWE Innogy research and development projects

Joint Industry R&D Programmes

Offshore Wind Accelerator

- Aim: Carbon Trust brings together nine offshore wind developers in a joint industry project to work towards reducing the cost of offshore wind by at least 10% by 2015.
- <http://www.carbontrust.com/our-clients/o/offshore-wind-accelerator>
- Country: UK
- Enabling Body: DECC
- RWE is participating in the following projects within the OWA:
 - **All OWA common R&D projects Year 1 –Year 6 inc. Stage I OWA.**
 - **Floating LiDAR demonstration at Gwynt y Môr (Lead partner)**
 - Up to three floating LiDAR systems are to be installed in the vicinity of the Gwynt y Môr meteorological mast in the Bay of Liverpool, Irish Sea in order to collect meteorological data (primarily wind speed and turbulence) at comparable heights to the mast over a six month demonstration period.
 - As the floating LiDAR units will be installed on an RWEI site, RWEI have an obligation through the CDM Regulations as well as professional and self interest to ensure that the floating LiDAR installation, operation and decommissioning is undertaken safely, the equipment and vessels are fit for purpose and the demonstration is a success.
 - RWEI's has two funding agreements
 - 1) The Grant Offer Letter with the Carbon Trust which provides funding for up to three LiDAR contractors who will be directly employed and managed by RWE, but through which RWEI receives no direct funding.
 - 2) The Management Services Contract which provides funding for RWEI to cover their internal costs for managing the floating LiDAR project.
 - **ØRJIP bird monitoring at Thanet offshore wind farm (Partner)**
 - The project will require the deployment, at operating offshore wind farms, of a proven, practical and cost effective offshore monitoring system, comprising of more than one piece of monitoring equipment on a suitable number of turbines, which is capable of measuring both bird avoidance behaviour and collision impacts.
 - The aims of the project are to:
 - Select suitable equipment that can be deployed in order to measure both micro and macro avoidance behaviour and, if appropriate, collision impacts.
 - Measure the level of bird avoidance and collision at one or more offshore wind farms and provide robust evidence on the rates of avoidance and collision for a number of key species identified as being most at risk from collision with offshore wind turbines.
 - Determine how data from this study can be applied to support consenting applications for other sites.
 - The objective of the project is to obtain data on avoidance behaviour and collision impacts at operating offshore wind farms using proven, practical and cost-effective monitoring systems that can be used to inform the estimation of potential impacts of other offshore wind farms. The aim is to reduce the uncertainty over the prediction of the impact of new offshore wind projects on key bird species, and the degree of precaution necessary in assessments in the light of that reduction in uncertainty.
 - **Rødsands measurement campaign (Partner)**

*Project receives joint funding from OWA and FLOW

- A measurement campaign is proposed to provide the data required. It will be hosted at E.ON's Rødsand II wind farm in the Baltic Sea just off southern Denmark. Technical and logistical details of the trial are described in detail in the Method Statement. The result of a scoping desktop study has defined the measurement campaign. It will consist of:
 - 4x Nacelle-mounted LiDAR - fore and aft facing units on two turbines
 - 2x Long range scanning LiDAR - installed on the substation and met mast
 - Upgrade of met mast instrumentation to provide high frequency data
 - Upgrade of turbine SCADA data to provide high frequency data
- The project will cover all aspects of the procurement, deployment, operation and decommission of the campaign as well as data processing and analysis of the results.
 - **Universal Foundation demonstration at Dogger Bank (Lead partner through Forewind)**
- The aim of the programme is to show that the UF system, a large bucket foundation, can be used as a foundation for offshore wind structures in severe UK locations. Two Met Mast structures have been constructed and installed by F Olsen group companies including Belfast based Harland and Wolfe. Project cost largely borne by Forewind development partners (SSE, RWE, Statoil, Statkraft).

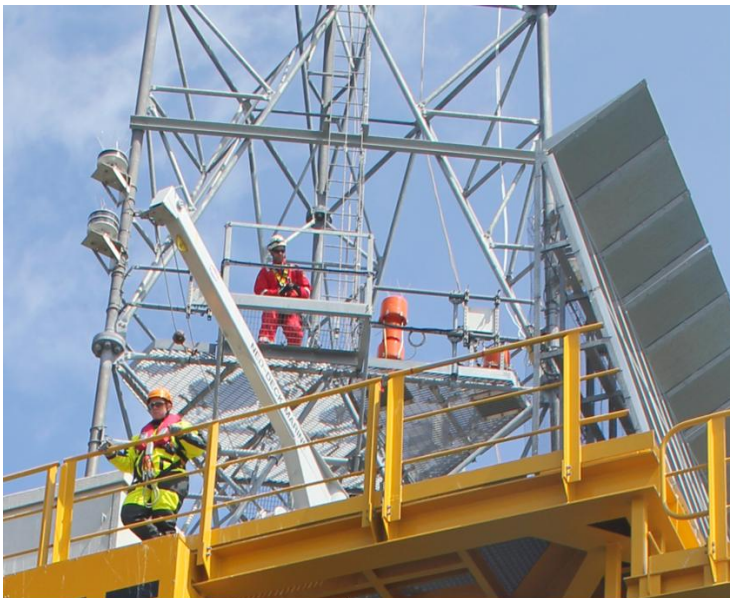


Figure 1 One of the two Installed Met-Masts on Dogger Bank, summer of 2014

- **PISA pile soil interaction (Partner)**
- How can the pile - soil interaction for offshore structures under wind turbine loading be better understood in order to reduce the design uncertainty, through lift foundation maintenance, built in design contingency and cost of offshore mono- and multipile offshore wind turbine support structures.
- Traditional design of monopole foundations is based on standards developed for the offshore oil and gas industry, which adopts the P-y curve method. The P-y curve method is a semi-empirical method based on a series of field tests conducted in the 1960s and subsequently supported by a database and calibration study in the 1980s. The original field tests which underpin this method were lateral pile load tests conducted on instrumented piles less than 1m in diameter with an aspect ratio (length/diameter) greater than 30. Typical aspect ratios (length/diameter) for the support of wind turbine generators (WTGs) have been 4-6 to date and are expected to reduce further in the future. A large aspect ratio leads to a fundamentally different failure mechanism than with the lower aspect ratio piles used for wind turbine generators.
- The aim of the programme is to gain specialist knowledge on the pile-soil interaction of laterally loaded piles.

- To have access to a body of test evidence on pile-soil interaction, deformation and failure of typical structural steels used in the offshore wind turbine industry to support design decisions, structural certification and reduce insurance premiums.
 - To improve the current wind industry standard pile design procedure of using P-y curves. [Knowledge to be assembled into design guidance akin to a CIRIA guide.
 - Ability to extend the fatigue life of the support structure beyond its envisaged design life (20/25 years), [2-5 years potentially, dependent on maintenance and project specific factors]
 - Potential slenderer design of monopiles due a to higher soil stiffness than envisaged. [Potential cost saving of £100K per monopile in steel alone]
 - Potential reduced penetration depth of monopiles from an increased understanding of the long term effects of cyclic loading on soil stiffness. [Potential to reduce penetration depth by 0-5m, estimated saving up to £50K per monopile in steel alone]
 - Possibility to consider the use of monopiles for projects in deeper water where monopiles were previously considered unfeasible. Benefit of existing supply chain and long experience with the foundation type reducing foundation risk in future projects. [Water depths up to 40m with 6MW WTGs may be possible which would result in savings of up to £1million per foundation by avoiding the use of jackets]
 - Ability to design jacket leg piles to resist significantly larger lateral loads. Jacket piles can then have an increased upstand from the seabed before connection to the jacket. This would permit jackets for a wider range of water depths to be manufactured identically with savings to be realised in mass production and fewer different jacket designs per wind farm.
 - Benefit: Improvement in the accuracy and reliability of calculations using the P-y design method leading to leaner future pile design and the use of monopile structures for WTGs in water depths, soil conditions or supporting larger WTGs which were previously not considered feasible.

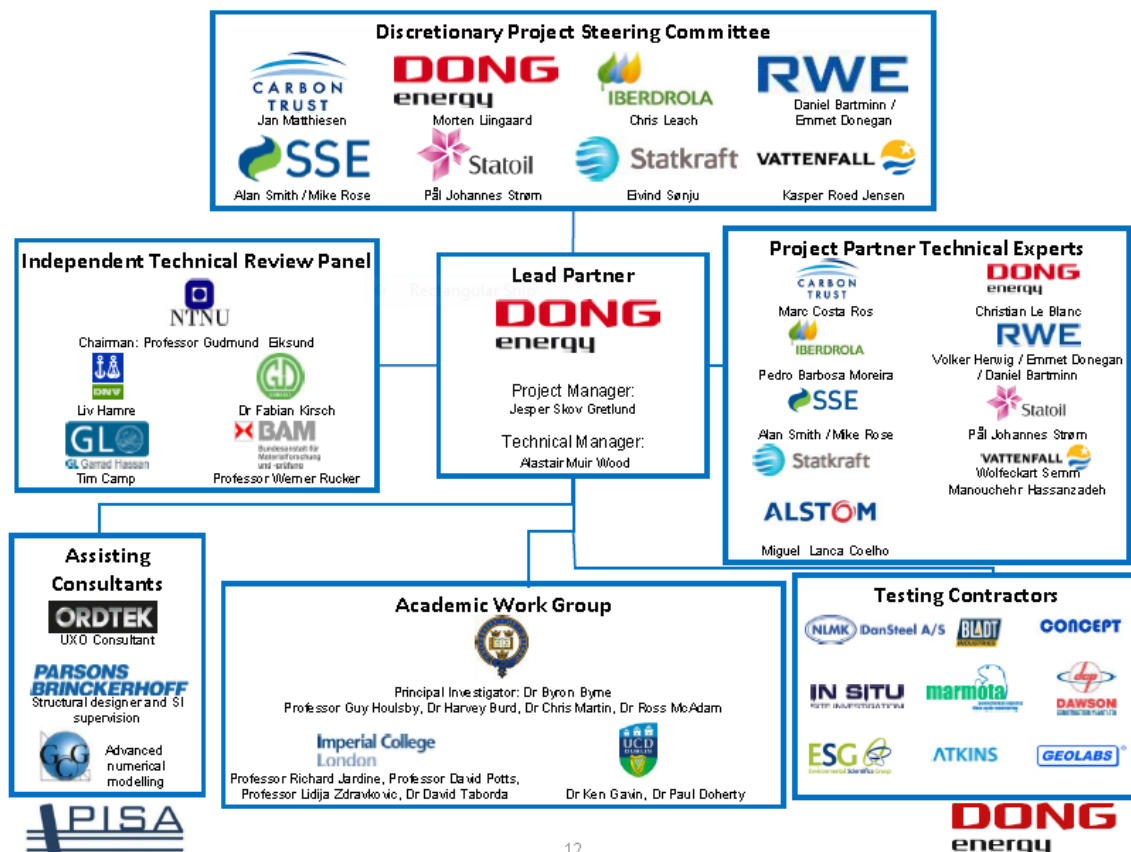


Figure 2 PISA Sponsors and Organisation

*Project receives joint funding from OWA and FLOW

- **GOAL Grouted connection (Lead partner)**
- The wind offshore industry has experienced in the past serial defects on grouted connections for monopiles, due to deficient design guidelines. These defects have resulted in multi million euro rehabilitation works, which to date are not completed. Grouted connections of pre-piled jackets for offshore wind turbines also fall outside the existing design guideline, which primarily have been derived for oil and gas platform jackets. Pre-piled grouted connection differ in the degree of cyclic loading and are further distinguished by a larger grout annulus. Therefore there is a risk that current design guidelines might not be safe.
 - To perform a series of cyclic load box tests on scale model samples and a one near full scale test of a typical pre-piled grouted connection in the following phases:
 - PHASE 1: Full scale cylindrical calibration test and box test series
 - PHASE 2: Investigation of early age cycling and effect of annulus width
 - PHASE 3: Bending tests to establish significance of bending loads
 - PHASE 4: Possible combined loading tests at a reduced scale
 - To develop design guidance for the safe and cost effective design of pre-piled large annulus grouted connections.



Figure 3 One of the proposed 20MN test rigs for GOAL Grout tests.

- **SEAT Sea vessel service trials (Lead partner)**
- The access limit for crew transfer vessels is currently subjective and the general industry accepted limit is 1.5m Hs regardless of actual vessel type and capability. To use the vessel to their full capability the actual safe transit and access limits for personnel need to be defined for all sea states.
- To provide a body of data to define the actual vessel operating limits.
- To allow crew transfer vessels to be used to their full capability.

*Project receives joint funding from OWA and FLOW

- The data collected will be fed into a further Offshore Wind Accelerator project to validate tank testing and numerical computer models of vessel performance allowing cheaper and faster vessel performance evaluation.
- Instrumentation to be fitted to three different crew transfer vessels - Discovery (19m CAT) ICENE Victory (24m CAT) Cymyran Bay (24m Semi-SWATH) during their normal operations activities to measure vessel motion in a range of sea states. A wave buoy will also be deployed near to vessel during landing operations to collect the actual wave condition data. The data will be analysed and a monthly report produced to determine the capability of the vessels.
 - **Farshore Floating LiDAR demonstration at Ijmuiden met mast (Lead partner)***
- Inexpensive floating LiDAR units offer the potential to be used instead of expensive fixed met masts in the collection of metocean data. In order for floating LiDAR units to become accepted by banks as sufficiently reliable data sources for wind resource assessment and project financing their operational performance in terms of data accuracy and availability needs to be validated. In addition, the design aspects of the floating LiDAR buoys which relate to deployment, operations, maintenance and recovery, particularly those aspects pertaining to personnel safety, require scrutiny from the operating utility.
- Aims are to:
 - To test the accuracy of floating LiDAR collected wind speed, directional and turbulence data in comparison with a fixed metmast.
 - To test the complete system availability of the floating LiDAR units including LiDAR availability, weather downtime from excessive motion, spray or fog, auxiliary system availability (incl. Power systems, washers etc.) and communication availability.
 - To test the robustness of the floating LiDAR units under farshore metocean conditions to demonstrate robustness, redundancy and survivability.
 - To gain experience of the safety aspects of the floating LiDAR units in terms of deployment, gaining access offshore, carrying out maintenance and recovery.
 - To evaluate the marine safety of the floating LiDAR units in terms of markings and identification, collision avoidance protection, compliance with MCA requirements and aids to navigation.
 - Test additional data collection instrumentation measuring parameters such as wave heights, wave periods, wave steepness, water and air temperature.
- Until now such testing and validation campaigns for floating LiDAR buoys have only been conducted for a limited number of floating LiDAR devices and only under mild wind and wave conditions (eg. Gwynt y Môr) which are not representative of farshore offshore wind farm sites where they will be required in the near future.
- The FFLIDAR project is a discretionary project of the OWA II.
- RWE will make its Ijmuiden met mast available for up to two designers of floating LiDAR units for testing and validation of measurement data each over a 6 month period. RWE will manage the project consisting of applications for permits (for installation, maintenance visits and retrieval), data collection, data evaluation and reporting. RWE will facilitate the campaign but will not take any responsibility for the floating LiDAR units themselves. No funding is proposed to be provided to the floating LiDAR suppliers, but they will receive the site location, data from the Ijmuiden metmast and analysis and validation of the floating LiDAR captured data in comparison to the metmast by an independent third party at no cost to themselves. An independent data analyst will be contracted by RWE in order to perform the data analysis and validation of the floating LiDAR measurement data against the measurements of the fixed met mast according to the GLGH floating LiDAR Roadmap to Bankability.
 - **VIBRO vibration and impact driven pile installation demonstration (Lead Partner)**
- Piles for offshore constructions are traditionally installed by heavy impact hammers. This technique creates high sound pressure levels, which are required to be mitigated to protect the marine environment. The vibration of offshore piles is an alternative installation technique that could reduce noise emissions at the source. This technique is already significantly developed and shows benefits in installation time, logistics, pile fatigue & noise reduction.
- The effect of vibropiling on the soil bearing capacity is insufficiently understood (stiffening or softening in non cohesive soils). This is particularly relevant for the lateral load bearing capacity of new generation of monopiles. Due to this lack of knowledge, the technique of vibropiling is not considered as state-of-the-art. The proposed test programme intends to fill this knowledge gap through a full-scale onshore test

*Project receives joint funding from OWA and FLOW

programme. A methodology for determining the stability of axially and laterally loaded piles installed through vibropiling shall be developed and verified. This would allow the relevant standards to be developed to allow for the installation of offshore piles solely through vibropiling.

- Potential gains:
 - noise reduction and potential cost reduction due eliminating other noise mitigation measures
 - reduced installation time
 - reduction of fatigue damage from driving

Far and Large Offshore Wind (FLOW): Phase 1 (2009-ongoing)

- Aim: reduce cost of energy, accelerate development and reduce risk in far and large offshore wind farms
- <http://flow-offshore.nl/>
- Country: NL
- Enabling body: Ministry of Economic Affairs
- RWE is participating in the following projects within FLOW:
 - Metocean buoy with LiDAR at IJmuiden (Lead partner)*
 - Operations and maintenance cost estimator (Partner)
 - Electrical system stability impacts – grid trade off analysis (Partner)
 - Dynamic power management (Partner)
 - Smart regulation of far and large offshore wind farms (Partner)
 - Electrical system design and optimisation (Partner)
 - Optimized blade installation (Partner)
 - Wind farm wake modelling fatigue loads and control (Partner)
 - Meteo Dashboard weather forecasting (Lead partner)
 - Cost reduction evaluation (Partner)
 - Noise mitigation (Partner)

*Project receives joint funding from OWA and FLOW

Joint Industry R&D Projects

RWE is participating in the following joint industry R&D projects:

▪ SLIC - Structural Lifecycle Industry Collaboration

- <https://www.gov.uk/government/publications/offshore-wind-structural-lifecycle-industry-collaboration>
- Aim: Demonstrate and develop a contemporary set of Fatigue S-N curves to enable recent advances in welding technology to be realised in offshore structural design. Targets mainly monopile design, considers thickness effects and weld improvement, corrosion in seawater. Many UK and European partners, £2,464M budget managed by Centrica with University of Cranfield, local workshops in Northamptonshire and Berkshire, plus AMEC test houses benefitting from the program. A total of 120 large welded samples each weighing one tonne have been made by EEW, SIF and Bladt industries. The program is recognised and supported by DNV and Lloyds Wind Industry Divisions.
- Country: UK
- Enabling body: DECC with The Crown Estate

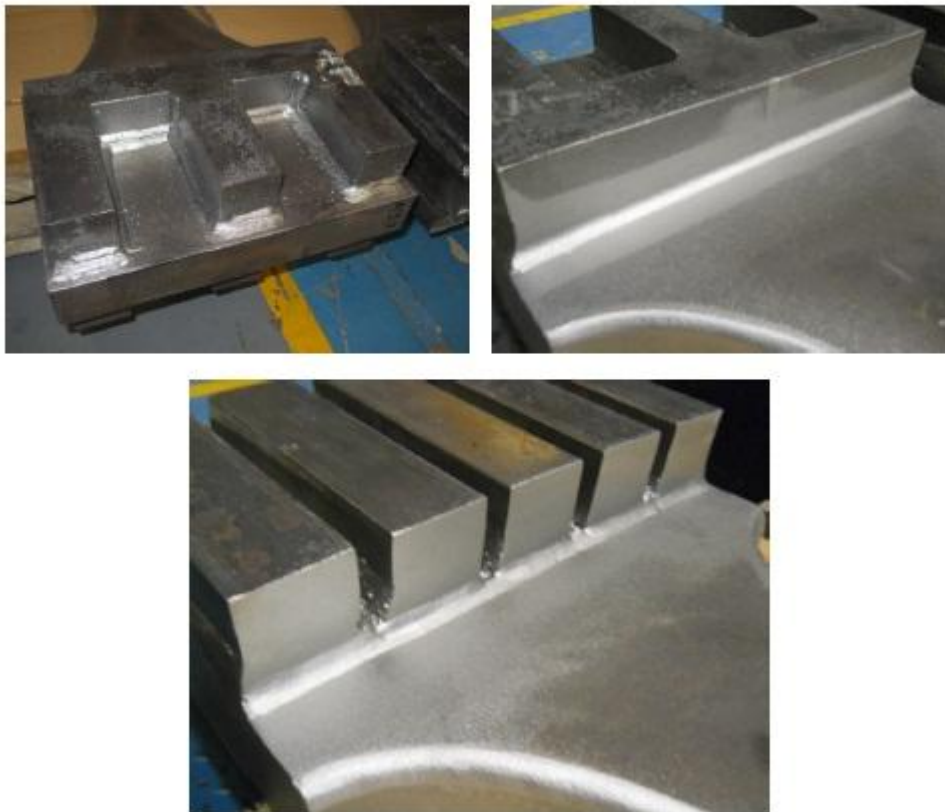


Figure 1: Type 1 specimen (new and initial lugs' configuration)

Figure 4 SLIC Large Samples

▪ Cluster Design - multivariable optimised design of clusters of offshore wind farms (2011-2016)

- <https://www.cluster-design.eu/>
- Aim: develop toolbox for an integrated offshore wind farm clusters design
- Development and test of a toolbox for wind farm cluster design, including novel improved control concepts which enable the wind farm to provide improved grid services and decrease loads on single turbines at constant overall output. Models for wake effects, loads as well as improved controls concepts will be tested in an offshore wind farm.

*Project receives joint funding from OWA and FLOW

- Partners: 3E, Repower, ECN, ForWind Oldenburg, Imperial College.
- Country: Europe
- Enabling body: European Commission

- **KiZO - Concept for intelligent condition monitoring of offshore wind farms**

- <http://www.kizo-offshore.de/web/guest/ebcot-gmbh;jsessionid=A7A9CBA08A5F9541314802B007BDA187>
- Offshore Windparks benötigen intensives Monitoring und Fernüberwachung. Dies ist die Basis für die Betriebsführung und angepasste Wartungsstrategien.

Die hier vorgestellte Forschungsidee greift aktuelle Herausforderungen im Bereich der Betriebsführung auf. Der Fokus des Forschungsvorhabens liegt in der Entwicklung strukturierter Auswertung und Interpretation der gemessenen Daten und eine weitergehende Analyse und Umsetzung in Handlungsanweisungen für den Betreiber. Ein wesentlicher Bestandteil der Analyse ist die konzentrierte Darstellung von KPIs (key performance indicators). Nicht zuletzt muss eine zusammenfassende Dokumentation in Form eines Reporting Systems erstellt werden, das einen schnellen Überblick über den aktuellen Zustand, so-wie eine Sicht auf die historischen Daten erlaubt.

Eine Grundlage für die Datenauswertung sind die Zusammenführung und Integration verschiedener Monitoring Systeme (Condition Monitoring Systems, meteorologische Daten, Betriebsdaten usw. Dies ist wichtig, um den Zustand der einzelnen Anlagen zu jedem Zeitpunkt bewerten zu können und stellt einen wesentlichen Punkt in einem ganzheitlichen Betriebsführungssystem dar. Zudem wird das Ergebnis des Projektes Hinweise einer Remote-Betriebsführung liefern, so dass Offshore-Windparks landgestützt überwacht werden können.

Die entwickelten Algorithmen und Darstellungen werden in eine Software implementiert, die zukünftig ein Bestandteil der Betriebsführungssysteme von Offshore Windparks bilden wird.

- **Offshore WMEP - performance monitoring and data evaluation of offshore wind farms**

- **Sparta - performance monitoring and data evaluation of offshore wind farms**

- <http://offshorewmeep.iwes.fraunhofer.de/index.html>
- <http://www.thecrownestate.co.uk/news-and-media/news/2014/sparta-project-to-drive-offshore-wind-cost-reduction/>
- Aim: creation of a database of failure rates for offshore wind farms to be made available to academic and research institutions
- Extension of the WMEP database. Aims:
 - Draw general conclusions related to use of wind energy offshore
 - Monitoring of farms, high level
 - Optimise operation and maintenance effort, improve availability
 - analyse operational experience of a number of wind farms in the North Sea (anonymised)
- Country: DK
- Enabling body: BMU

- **SWINE - Study into the impacts of offshore wind farm construction on harbour porpoise**

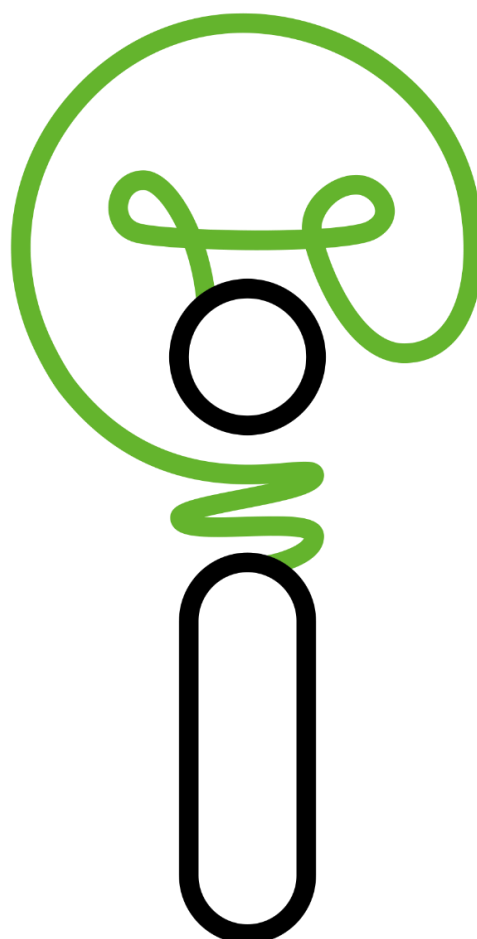
German environmental protection agencies and authorities (BSH) lack studies about the impact of offshore wind park construction on harbour porpoise. The result of this lack of data is over-precautious guidelines for acceptable noise levels and requirements for the use of noise mitigation equipment during construction. OWP developers have collected a huge amount of relevant data in the course of permit applications, during construction and operation - in line with the guidelines for the environmental impact assessments and the general permit requirements. To date nobody has compiled the data from all developers and conducted a rigorous assessment of the impact of noise emissions on the harbour porpoise population.

*Project receives joint funding from OWA and FLOW

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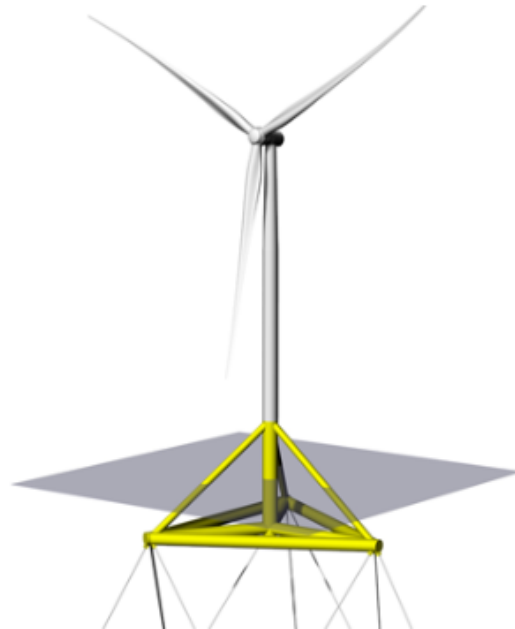
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Floating wind

'TetraSpar' concept in Norway

October 05, 2018



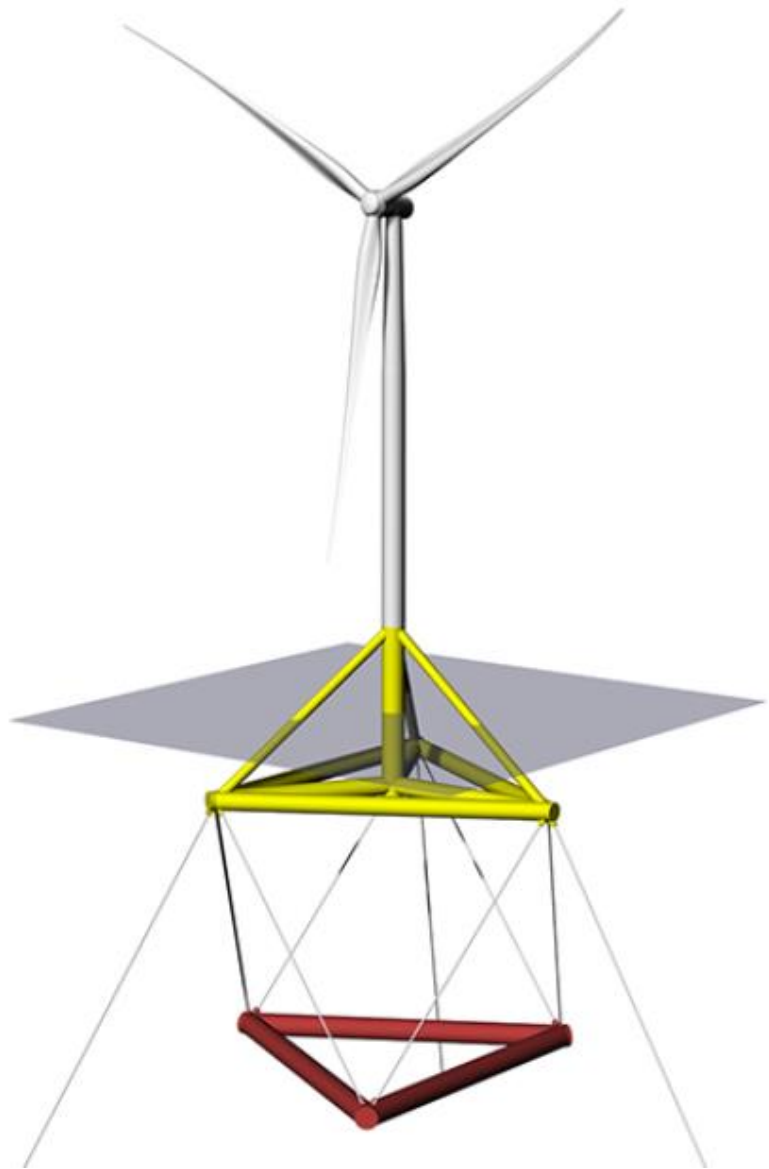
innogy SE, Shell and Stiesdal Offshore Technologies A/S (SOT) have signed an investment and cooperation agreement today committing the partners to build a demonstration project using SOT's 'TetraSpar' floating foundation concept. Its modular layout consists of a tubular steel main structure with a suspended keel. It is expected to offer important competitive advantages over existing floating wind concepts, with the potential for leaner manufacturing, assembly and installation processes with lower material costs. The project has a budget of approximately €18 million.

Hans Bunting, COO Renewables of innogy SE, said: "These are exciting times. The floating offshore wind market is evolving but until now, floating foundations have been stubbornly expensive.

This demonstration project will give us a better understanding of how the cost can be driven down.

The industrialised approach of the TetraSpar design, combined with innogy's experience in delivering offshore wind projects, will enable large-scale, cost-effective deployment of floating wind projects around

Dorine Bosman, VP Shell Wind Development, added: "This initiative could help to lower the cost of offshore wind energy while providing more options for development locations, giving access to higher wind speeds and deeper water depths. Building our offshore wind business is a key part of the Shell



New Energies
strategy. Investing
in innovative
projects such as

TetraSpar gives us early access to a new technology that could help us become a leading player in this field.”

The demonstration project will use a 3.6MW Siemens Gamesa Renewable Energy (SGRE) direct drive offshore wind turbine and is due to be deployed in 2019. It will be located approximately 10km from shore in water depths of 200m at the test site of the Marine Energy Test Centre (Metcentre) near Stavanger in Norway. The foundation will be manufactured and assembled in Denmark and the turbine will be installed in the port of Grenaa, from where it will be towed to site. At site the floating structure will be moored to the seabed with three anchor lines and connected to the electrical grid.

Henrik Stiesdal, CEO of Stiesdal Offshore Technologies A/S, stated:
“We are very excited about the prospects of carrying out the

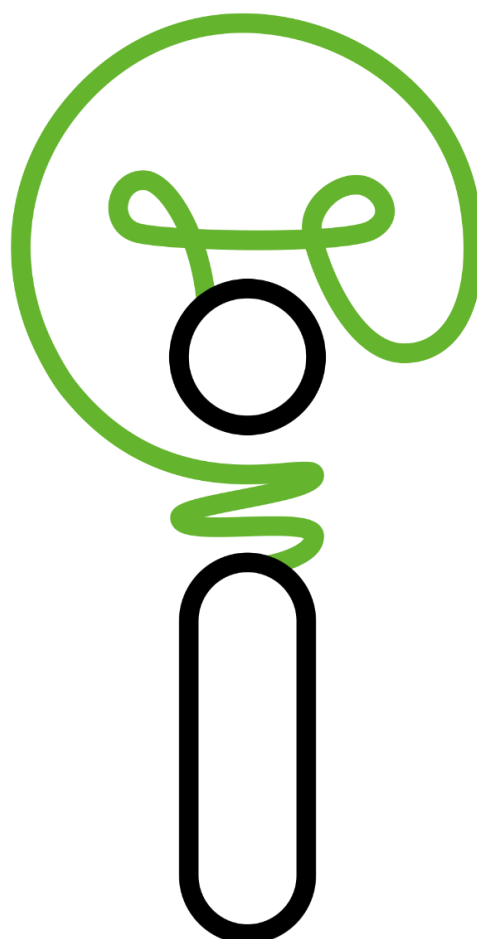
deployment and test of our full-scale demonstration project in collaboration with leading industry players. We have already benefited greatly from the dialogue with innogy, Shell and Siemens Gamesa Renewable Energy during the project planning. Their experience combined with the competences of our manufacturing and installation partners, Welcon A/S and Blue Power Partners A/S, will put us on the fast-track for rapid commercialisation.”

The partners will set up a company with a 33 percent share each for innogy and Shell, with the rest held by SOT and its parent company. SGRE is contributing to the project as a technology partner and will provide the wind turbine and required services. The partners will be part of a project team that will gain detailed, practical insights into the construction, installation and operation of the TetraSpar concept as well as detailed performance data.

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Unconference 2018

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UnConference 2018

Collaboration and co-creation

October 05, 2018



Leading figures in the energy industry, technology startups and entrepreneurs, and investors converge in Berlin to shape the future of energy

Let's make it clear: the technologies and dynamics that will shape future energy systems are already here. There is no turning back; disruption through digitalisation and the convergence of industries, technologies and people lies ahead of us. This became especially evident today at our fourth annual UnConference in Berlin. Around 400 guests from our global innovation network joined us to hear thought-provoking insights on unlocking innovation from top industry business leaders and experts. We were also joined by participants of the Free Electrons program - the first global energy start-up accelerator. Taking place at Café Moskau, our audience of business leaders, entrepreneurs, investors, and startups from various industries had the opportunity to engage with our investment portfolio of over 80 global start-ups and explore how their innovative solutions can grow and transform their own businesses.

The UnConference starts with the innogy Innovation Hub vision; that the energy industry will be



fundamentally redefined as new technologies, business models and consumption patterns begin to replace the existing system. In the future world of decentralisation, digitalisation and democratization, we have identified four focus areas which we believe to be the main drivers of disruption. For this year's UnConference we posed a question or thesis to industry experts in each of these four areas. These verticals present exciting opportunities to develop game-changing acceleration platforms that transform our businesses and our world. Before we become too visionary, let's take a look at these four topics and what happened at the UnConference 'Disruption Platforms':

'Digital Disruption and Artificial Intelligence': Will the digital revolution and artificial intelligence make utilities redundant?

Moderated by Thomas Birr, SVP Innovation & Business Transformation innogy SE and CEO of the innogy Innovation Hub, Tim Kock, Co-Founder of the US based start-up Jungle AI and Nicolai Wadstrom, Founder and CEO of BootstrapLabs and applied AI investor, the panel discussed the challenges and opportunities presented by emerging technologies and their potential impact on the centralised energy system of the future. The panellists agreed that, despite popular belief, the largest issue in AI is not about collecting massive amounts of data, but the quality of data. The organisations that can solve this are well positioned to drive innovation: "Utilities that don't figure out AI simply

won't survive, and they won't be allowed to operate by governments either", Nicolai Wadstrom said.

'Smart and Connected': At what point will our living and working environment begin to govern our lives?

Coen van Oostrom, Founder and CEO at EDGE Technologies and CEO of OVG Real Estate, in a conversation with Alina Prawdzik, Head of 'Smart & Connected' at the innogy Innovation Hub, discussed the latest innovations in the property technology industry. According to Mr. van Oostrom, the industry is "at a tipping point", where developers will soon be able to create innovative buildings that are more sustainable, safe and secure, that can create healthier lifestyles, and empower and inspire tenants to do their best work. All of this is done, of course, with the use of new technology.

"There's a new generation; it's not just 25-year olds but older generations as well that want to feel empowered in their space", Coen Van Oostrom said. "Leveraging new technology and data, we can create a positive feedback loop where we can learn from our own buildings to achieve this."



**'Human-Machine Interaction':
Machines become more human than humans.**

Trent McConaghy, founder of

Ocean Protocol & BigchainDB and Marco Richardson, CEO and founder of Inclusify, joined Kerstin Eichmann, Head of Machine Economy at the

Ocean Protocol & BigchainDB and Marco Richardson, CEO and founder of Inclusify, joined Kerstin Eichmann, Head of Machine Economy at the innogy Innovation Hub, to examine the current state of human-machine interaction, including the "internet of things" (IOT), artificial intelligence, and blockchain. In the future, the energy industry will be completely automated and decentralised with little human interruption, they argued.

"We can think of autonomous machines as nature 2.0. We are used to autonomous trees. We will get used to autonomous machines, too", said Trent McConaghy

'Cyber Security': Is tech advancement making it easier to bring down the energy system?

Moderated by Christof Kortz, Head of Strategic Cyber Security Venturing at the innogy Innovation Hub, Thomas Krauhausen, Head of Cyber Security at innogy SE and Liran Tancman, primary investor and board member of Aperio Systems, considered the implications of new

'Cyber Security': Is tech advancement making it easier to bring down the energy system?

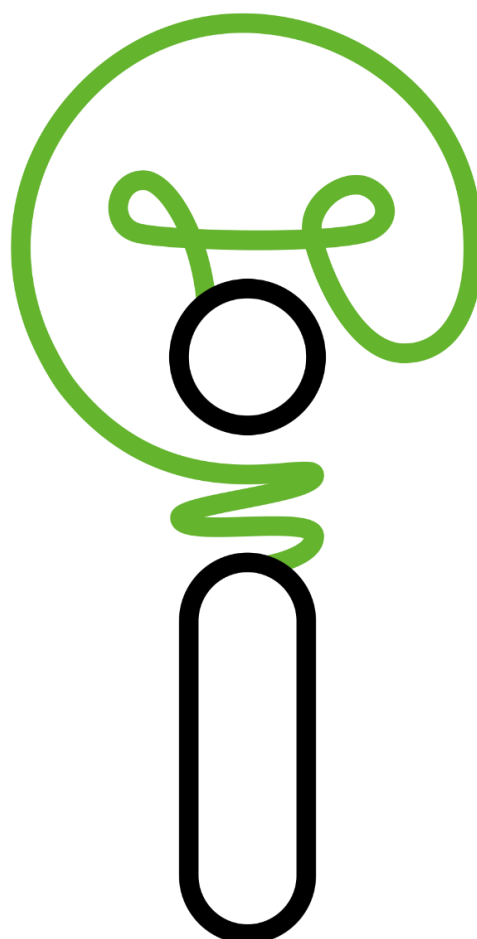
Moderated by Christof Kortz, Head of Strategic Cyber Security Venturing at the innogy Innovation Hub, Thomas Krauhausen, Head of Cyber Security at innogy SE and Liran Tancman, primary investor and board member of Aperio Systems, considered the implications of new technology on energy security systems. In order to ensure protection of future energy networks, start-ups and large corporations need to work together. While this is easier said than done both Mr. Tancman and Mr. Krauhausen noted that partnerships will be the only way forward and establishing clear lines of communication will be critical.

"The most important thing it to set expectations and agreed upon KPIs," said Christof Kortz to the audience on improving start-up and corporate communication processes.

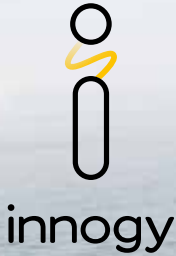
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Supply chain brochure

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Offshore Wind Supply Chain Opportunities with Innogy Renewables UK Ltd



Help us continue
to shape the future
of offshore wind

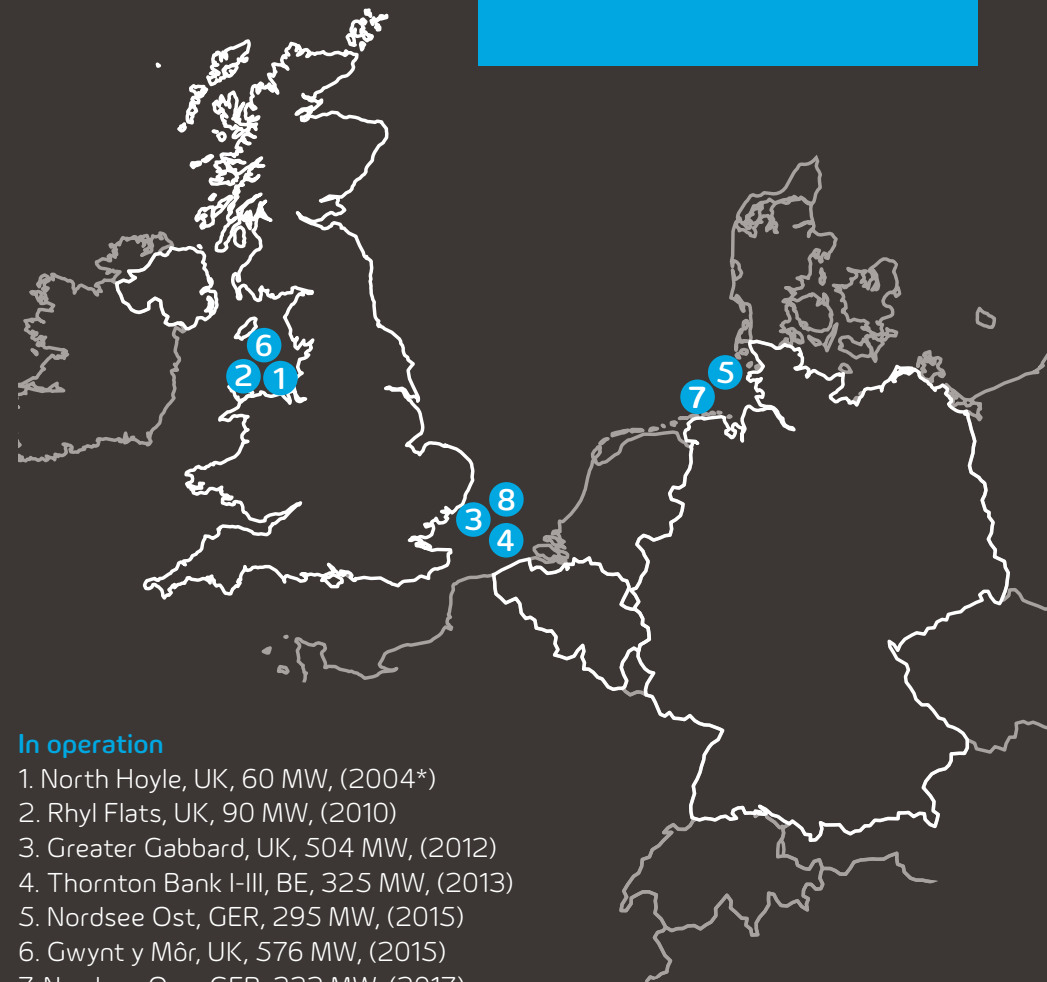
innogy - shaping the future of offshore wind

innogy SE is a leading European energy company. With its three business divisions Grid and Infrastructure, Retail and Renewables, innogy addresses the requirements of a modern, decarbonised, decentralised and digital energy world. We develop, build and operate plants to generate power and heat, and extract energy from renewable sources. Our portfolio includes wind and hydro power plants as well as solar and biomass plants. Our aim is to expand our renewables business further, both on our own and working with partners.

In the last five years, innogy Renewables has delivered, either on its own or with partners, new renewables energy projects in the UK with a total investment of around £4 billion. Projects in the pipeline, totalling around 3 gigawatts (GW), have potential for around a further £4 billion of investment. While offshore wind represents innogy Renewables' largest investment, in the UK we also operate 17 onshore wind farms and 24 hydroelectric power stations.

In terms of offshore wind, innogy is one of the world's leading operators of offshore wind farms, with more than 1,000 megawatts (MW) of installed capacity; a trailblazer in the industry since 2004. Together with investment partners, the company owns seven operational offshore wind farms off the UK, German and Belgian coastlines.

World leading operator of offshore wind farms



In operation

1. North Hoyle, UK, 60 MW, (2004*)
2. Rhyl Flats, UK, 90 MW, (2010)
3. Greater Gabbard, UK, 504 MW, (2012)
4. Thornton Bank I-III, BE, 325 MW, (2013)
5. Nordsee Ost, GER, 295 MW, (2015)
6. Gwynt y Môr, UK, 576 MW, (2015)
7. Nordsee One, GER, 332 MW, (2017)
8. Galloper, UK, 353 MW, (2018)

MW represent total installed capacity. Dates highlight when projects became completely commissioned. Projects are a mix of partnership and wholly innogy owned - please go to www.innogy.com for further information.
*In July 2016, innogy SE sold its stakes in the Zephyr portfolio. innogy SE provides O&M services to North Hoyle offshore wind farm.



“At innogy we aim to be one of the most cost-competitive offshore wind developers globally, seeking best value in all aspects of delivery. The UK supply chain has an integral role to play in shaping the future of our offshore wind industry both here and globally as we seek to share our expertise.”

Paul Cowling, innogy Renewables’ Managing Director in the UK and Director of Offshore Wind, innogy SE

A photograph of an offshore wind farm. The foreground shows the dark, choppy sea. In the middle ground, several wind turbines are visible, with one prominent one in the distance. The sky is a pale, hazy blue. The image is partially obscured by a large orange rectangular box in the upper right quadrant.

Offshore wind represents innogy Renewables’ largest investment



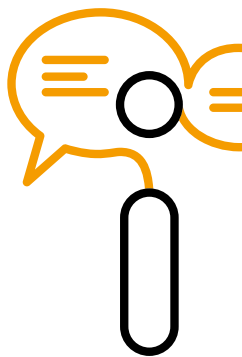
innogy procurement - fast, efficient, innovative

Our UK offshore wind farms can act as a catalyst for the UK supply chain. Skills, economic growth and the development, construction and maintenance of our offshore wind farms represent important opportunities for the supply chain across the entire project lifecycle.

We're already working hard to make sure those opportunities are visible to the UK supply chain supply chain, working closely with Local Enterprise Partnerships, industry bodies, membership organisations and local authorities. We also work closely with establishments including schools, colleges, Universities, STEM providers and Job Centre Plus.

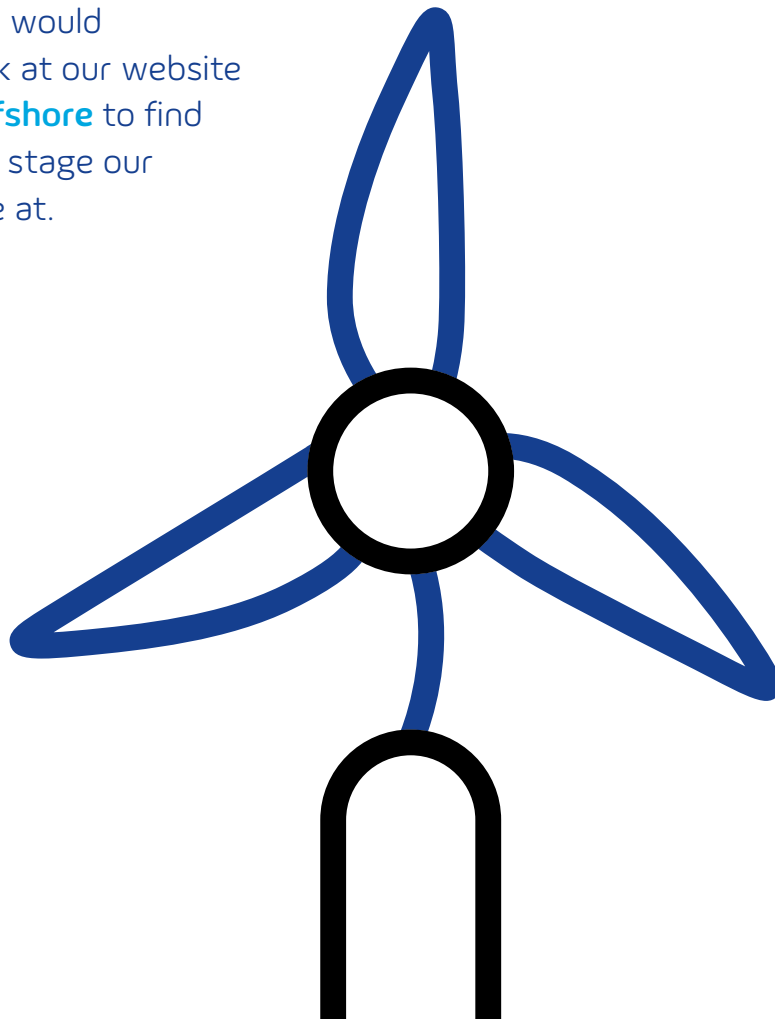
This brochure offers an overview of some of the supply chain activity which can be anticipated during the lifetime of an offshore wind farm and therefore some of the potential opportunities the sector offers. It also highlights some of the expertise and skills innogy Renewables expect to require to help us deliver our ambitious offshore wind vision.

Regardless of your company's size or experience, we hope you find the information in this brochure useful. There are details at the end of the brochure that explain how you can register your interest in our supply chain opportunities and we hope to see you at one of our future supply chain events. Come and talk to us about your ideas and aspirations. We can't do it alone and we expect some of the best innovations will come from you, the experts in your field!



Current offshore opportunities in the UK

We currently have three UK projects at different stages of development and construction. We would encourage you to look at our website www.innogy.com/offshore to find out more about what stage our individual projects are at.



Galloper Offshore Wind Farm

The construction phase of the 353MW Galloper Offshore Wind Farm, 30km off the coast of East Anglia was completed in early 2018 and the 23 years operational phase of the wind farm has now commenced. During the operations phase of the wind farm there will be ongoing supply chain opportunities. During construction of the £1.5billion wind farm around 700 full time equivalent jobs were created.

Triton Knoll Offshore Wind Farm

Our 860MW Triton Knoll Offshore Wind Farm is a consented project located 32km off the coast of Lincolnshire and 45km from the coast of north Norfolk. Construction of the onshore Triton Knoll Electrical System is underway, with offshore work due to start in 2019. The project has appointed its Tier 1 contractors, which will be responsible for the majority of contracting opportunities, while some of the longer term opportunities during the operation and maintenance phase will be directly with innogy and Triton Knoll. Triton Knoll is committed to maximising its investment for the benefit of local businesses. It is working closely with its Tier 1 contractors to ensure that local and regional businesses are fully aware of, and have the opportunity to bid for contract opportunities directly with Triton Knoll or the key suppliers on the project.

The project has established a database of Interested Suppliers which it shares regularly with all of its top tier contractors, and is a first point of call when seeking suppliers. Local companies are invited to register their details online at www.tritonknoll.co.uk/supply-chain

Sofia Offshore Wind Farm

In August 2017 innogy, which was previously one of four Forewind partners, secured 100% ownership of Teesside B. The project has since been renamed Sofia Offshore Wind Farm. The Sofia Offshore Wind Farm site is 165km off the coast of the North East of England and is expected to have a generating capacity of up to 1.2GW, making it innogy's largest renewable project to date. It is located on the shallow central area of the North Sea known as the Dogger Bank. It has a National Grid connection agreement with the connection point at the existing National Grid Lackenby substation located in Teesside.

Projects such as Sofia and Triton Knoll can offer many supply chain opportunities either directly or via Tier 1 suppliers. On Triton Knoll there were several Tier 1 suppliers. As the Sofia project progresses we will be engaging with business networks and bodies to raise awareness of potential opportunities for Teesside and UK businesses, either directly with us or our top tier contractors. We encourage potential suppliers to register their details so we can share information with our top tier contractors once they are appointed.

To find out more about the project; register on the Sofia Offshore Wind Farm supply chain portal; or to access a link to the planning documents on the Planning Inspectorate website go to www.innogy.com/renewablesUK/sofia



Sofia Wind Farm is innogy's largest renewable project to date with an expected generating capacity of up to 1.2GW

Finding your opportunity

Offshore wind farms go through development, preconstruction, construction, and operations and maintenance phases.

Opportunities in development and pre-construction

The development of a project can continue throughout all phases of a wind farm lifecycle. Pre-construction is the period following on from consent award, up to start of construction.

Opportunities at pre-construction stage can include:

- Further environmental survey work offshore and onshore, including ecology, archaeology and environmental monitoring
- Engineering design and feasibility studies for all aspects, onshore and offshore, of the wind farm
- Site investigation works offshore and onshore;
- Port studies
- Topographic surveys, and
- Environmental auditing and inspection.



Opportunities in construction

Our offshore projects can bring a multitude of opportunities - associated with the onshore and offshore cable routes, onshore and offshore substations, grid connection and associated infrastructure. In addition, there are of course significant opportunities offshore. Construction opportunities include the procurement of components and their installation and commissioning.

Normally, when building an offshore wind farm, we will appoint one or two very large contracts to companies known as Tier One suppliers – for example the turbine supplier and electrical package supplier. Therefore many supply chain opportunities during the construction phase will be subcontracted directly by these suppliers. Where appropriate we encourage them to work with local firms. We also encourage businesses to register with top tier suppliers who may be looking to sub contract aspects of work or services.

Onshore enabling works

- Road and track works, including metalling, bridging and upgrading
- Full site and compound works, from building, brick-laying, fencing, signage and security
- Extensive landscaping works, including land clearance, excavations, ditching, drainage and landscaping
- Habitat works, including hedgerow management and habitat restoration
- Transportation of materials and staff
- Environmental monitoring and survey works, and
- Cabling works, including excavation, jointing pits, concreting, and reinstatement works.

Grid connection work

- Subcontracts to National Grid or the relevant grid organisation
- Transport of components and equipment.

Turbine and balance of plant supply

For some of our offshore projects there is the potential for the supply chain to engage with the project or Tier One supplier within the area of turbine supply and balance of plant. Balance of plant includes the transition pieces, foundations, array cables, export cables and offshore and onshore substations. It covers both civil works and electrical works.

We encourage our main contractors to appoint local companies to these roles wherever possible, and where skills are appropriate:

- Supply of materials, including concrete, general materials, sand, paints
- Detailed civil and electrical design and studies
- Secondary steel supply, including beams, railings, ladders
- Cable storage, cable route systems and ancillaries
- Hire services, including equipment, plant, vehicles, fuel
- Office and site accommodation, security, welfare and support.
- Offshore and onshore substation, across the full spectrum of the electrical system
- Onshore and offshore cabling, including trenching, installation and protection, and
- Transformers.

Offshore installation and commissioning

Major component installation is often contracted to Tier 1 suppliers, which would then typically look to establish their supply chain, both locally and further afield, and often expect to use highly-skilled and experienced teams. Many potential opportunities remain to support the following offshore installation activities:

- Installation support vessels
- Crewing services
- Remotely operated vehicles
- Vessel mobilisation and vessel maintenance
- Construction port and full service provision
- Sea-based support, including crew transfer vessels
- Diving services
- Plant and equipment supply, and
- Commissioning services.

Opportunities in operations and maintenance

Operations and maintenance will generally be ongoing for the operational life-cycle of an offshore project which is typically between 20 to 25 years. It includes regular planned maintenance and servicing of components, and responding to unplanned maintenance.

Onshore

- Onshore habitat management works, including managing ecology, tree regrowth and maintenance
- Building maintenance works
- Fencing
- Landscaping
- Ecological surveys
- Land management consultancy
- Civil works maintenance
- Security
- Statutory inspection, such as fire, security, electrical, mechanical plant inspections, and
- General supplies, such as hardware, IT and materials.

Offshore

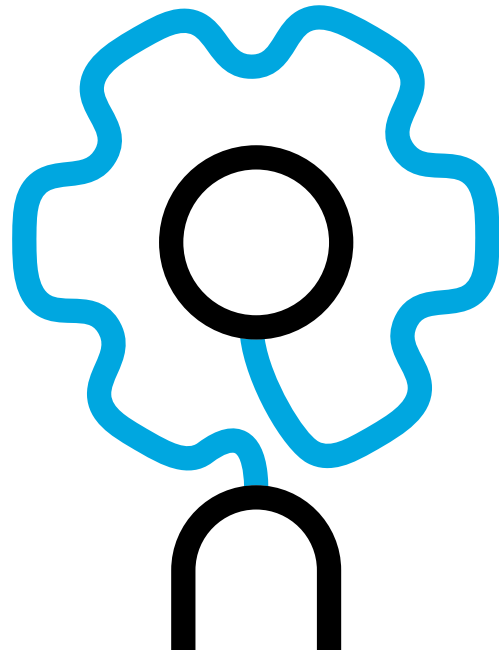
- Operations and maintenance port, including administration facilities and operations room
- Lifting equipment, including forklifts, cranes, clamping equipment, workbench areas and tool storage, provision of wet and dry rooms, fuel bunker
- Communications providers
- Statutory inspection
- Marine coordination of technician and equipment transfer, and
- Electrical and mechanical component maintenance and repair.



Opportunities in support services

While many opportunities are related to a wind farm phase, there are also significant opportunities providing support services to the project across all phases, you just need to find where you fit in.

- Resident engineers
- Ecological Clerk of Works
- Environmentalists
- Archaeologists
- Ornithologists
- Technical specialists
- Snagging and reinstatement works
- Hotels and other local accommodation
- Restaurants
- Vessels
- Catering services
- Hardware suppliers, including fuels and lubes, paints and bespoke fabrication
- Health and safety equipment providers
- Specialist coatings providers
- Training services
- Building merchants
- Vehicle hire and taxi services
- Public relations, design and marketing services



What do we look for in a supplier?

- Best in class health and safety management
- Competitive cost model
- Balanced risk
- Industry knowledge and insight
- Reliability
- Prompt service
- Local benefits
- Location specific to services required
- Innovative ideas
- Mutual co-operation
- Commitment to quality

Our approach to contracting

- Assessment of the market
- Determine contract terms and length
- Develop technical or functional specification
- Invite tenders
- Negotiate and select
- Monitor, manage and reflect

Register with us

General innogy registration

You can register your interest in opportunities to work with innogy across all projects and technologies, via the innogy procurement portal at: www.innogy.com/suppliers
Please also register on this portal if specifically interested in Galloper Offshore Wind Farm supply chain opportunities.

Triton Knoll Offshore Wind Farm registration and supply chain opportunities

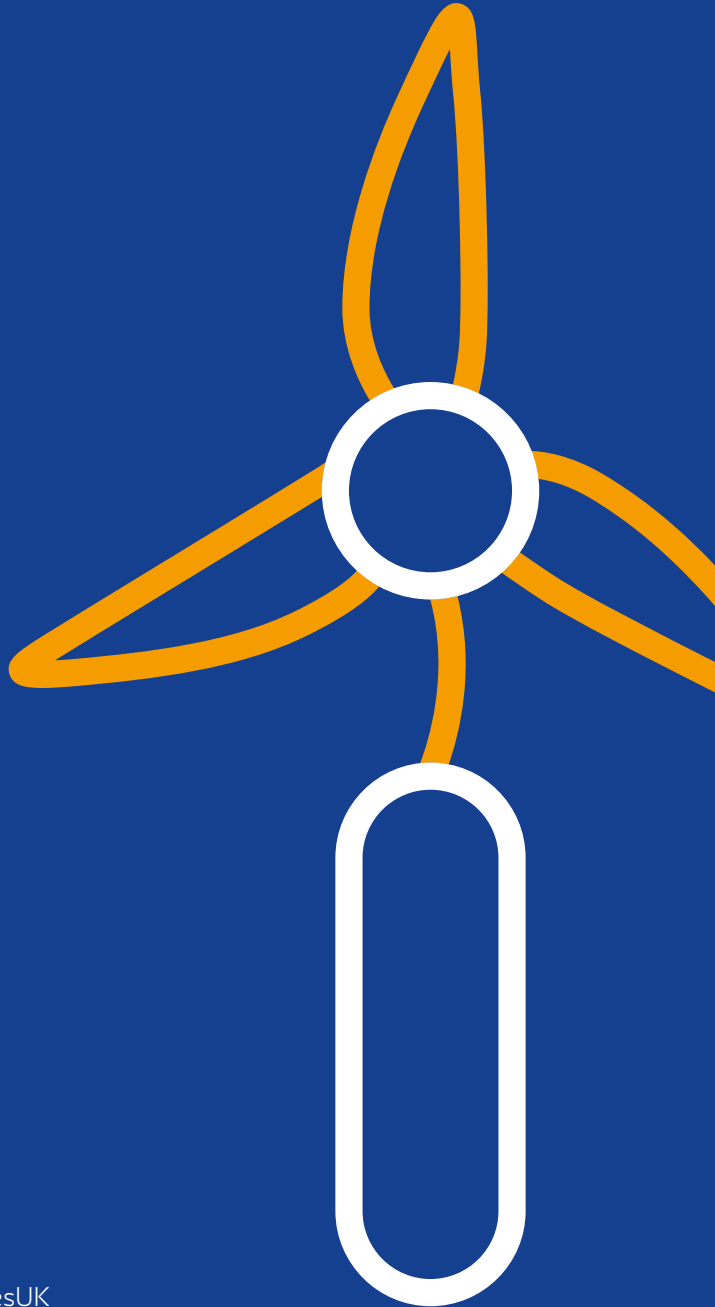
To register your interest in supply chain opportunities specifically related to Triton Knoll Offshore Wind Farm please complete the supply chain online form at:
www.tritonknoll.co.uk/supply-chain

Sofia Offshore Wind Farm registration and supply chain enquiries

To register your interest in supply chain opportunities specifically related to Sofia Offshore Wind Farm, please complete the supply chain online form at:
www.innogy.com/sofia

You can also contact the Sofia Offshore Wind Farm procurement team by emailing: procurement_sofia@innogy.com. Whether you are a highly experienced or a new entrant to the offshore wind sector, we'd like to hear from you and about what you can offer.





**Innogy Renewables
UK Limited**

Windmill Hill Business Park,
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Wiltshire, SN5 6PB

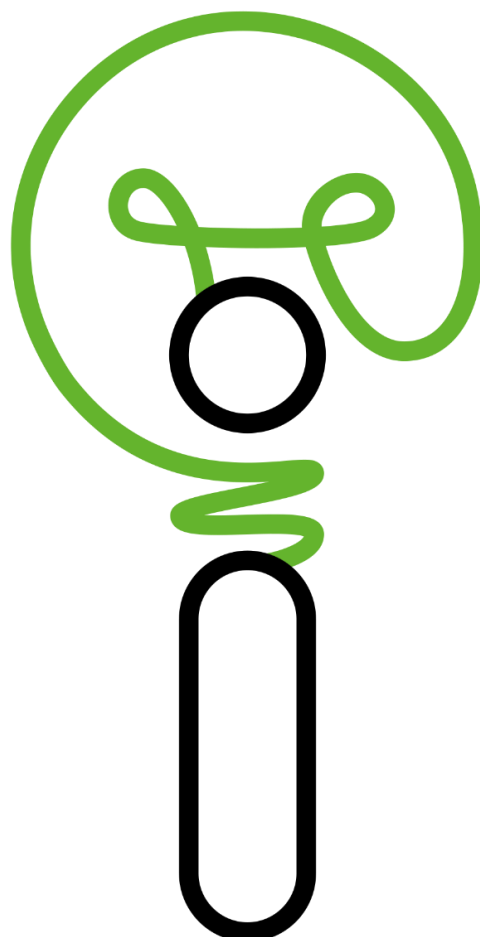
www.innogy.com
www.innogy.com/renewablesUK

Registered in England & Wales, Company Number 02550622.

EV094

Easter Daily Press Greater Gabbard 19th May 2018

Not confidential



(Re Greater Gabbard 50/50 SSE and innogy project)

Wind farm giants to support training academy for industry

BETHANY WHYMARK

BethanyWhymark@archant.co.uk

Employer-led training to ensure a pipeline of workers for multibillion pound offshore wind farms around the East Anglian coast is set to get under way.

The new East of England Offshore Wind Skills Centre is being led by 3sun Group with Greater Gabbard offshore wind farm and East Coast College, at whose Great Yarmouth campus the centre will be based.

Developers, operators and supply chain companies will support the cost of training places, including developer of the East Anglia One wind farm ScottishPower Renewables, which has invested £55,000 to sponsor up to 13 places.

Businesses have also committed up to £500,000 worth of equipment including wind turbine generators and blades.

It was officially launched at the East of England Energy Group's (EEEGR) SNS2018 event near Norwich, where offshore wind featured heavily in the second day's the conference programme.

Starting with 60 places, the centre will offer a three-week course for people with engineering backgrounds and a 12-week course for recent education leavers and jobseekers.

Training will be delivered by Petans, East Coast College, 3sun Academy and National Wind Farm Training Centres.

The centre's creation has been supported by a £1.1m grant from the New Anglia Skills Deal Programme, provided by Norfolk County Council, Suffolk local authorities and the Education and Skills Funding Agency.

Other companies supporting the initiative include Vattenfall and James Fisher Marine Services.

Graham Hacon, chief executive of 3sun Group, said: "The big barrier for people in this area to get into offshore wind is the enormous cost of the technical wind-related training. This provides the funding to remove this barrier.

"We are looking for more companies to be involved. The more that join, the greater benefit to the company when it is looking for skilled technicians."

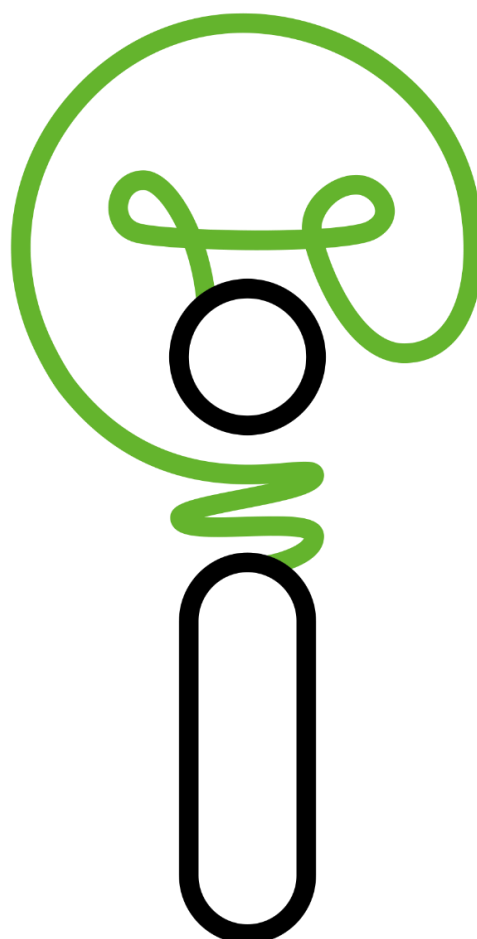
Victoria Sinclair, supply chain strategy manager at Scottish Power Renewables, said: "East Anglia is one of the most relevant areas in the global offshore wind sector and this investment reaffirms the longevity of our commitment to the region and to addressing the skills gap."

The 18-month programme is a precursor to next year's launch of the £11.3m Energy and Engineering Skills Centre at East Coast College's Lowestoft campus, funded by the New Anglia LEP.

EV095

NOF Strategic partner confirmation

Not confidential



From: Rebecca McGhin []
Sent: 01 June 2018 09:43
To: Neal, Rebecca
Cc: Joanne Leng; Paul Livingstone
Subject: Strategic Partner Confirmation



Welcome

Dear Rebecca,

I am pleased to confirm that Innogy Renewables UK LTD is now a Strategic Partner of NOF Energy. Please find attached the NOF Energy Strategic Partner logo which you are welcome to use on your website, literature, email signature etc.

Point of Contact

Your point of contact is Joanne Leng MBE, Deputy Chief Executive. Joanne can be contacted by telephone [REDACTED] [REDACTED]

Please feel free to contact Joanne at any time to discuss the relationship and ideas to work together going forward.

Gateway to the Supply Chain

The Strategic Partnership is your gateway to the NOF Energy supply chain, we will be more than happy to put you in touch with our network to provide you with specific products, services and technologies. In the meantime if you have any business opportunities that may be of interest to our network please send them to us.

Should companies in our network wish to start a dialogue we will introduce them to you as the gateway contact for onward referral to the most relevant contact within your business.

Access to Networking

We organise around 30 to 40 industry focused events each year covering the UK and overseas markets. They are an opportunity for members and partners to meet and network on a regular basis, for more information visit <https://www.nofenergy.co.uk/events1/>. If you would like to be involved in any of our upcoming events please contact Joanne Leng in the first instance.

Partnership Outlook

We are confident that you will find us an open and proactive partner, please circulate NOF Energy communications to your colleagues (should you wish to send communications external to your organisation please contact Joanne Leng as some communications are for use only within our network).

We would be more than happy to add your colleagues to our communication list, please send their details through to Rebecca McGhin, Business Development Coordinator, email rmcghin@nofenergy.co.uk

On behalf of our network we look forward to developing a long-term working relationship with Innogy Renewables UK LTD.

Kind regards,

Rebecca McGhin
Business Development Coordinator

NOF Energy
Helping members **win business**



NOF Energy Limited registered in England 5933450

2018 Energy: A Balanced Future Conference & Exhibition



Date: 13th - 14th June 2018

Venue: Hardwick Hall Hotel, Sedgfield, TS21 2EH

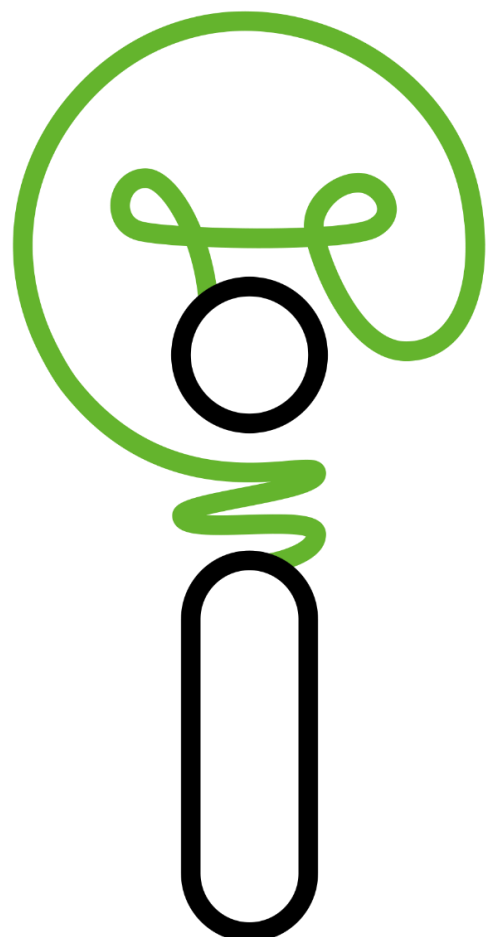
Business email disclaimer

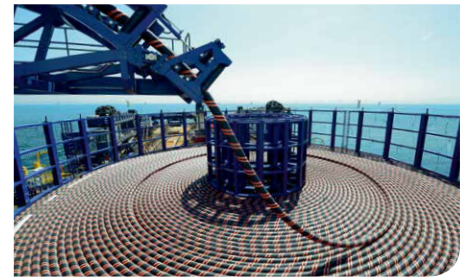
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EV099

Dogger Bank economic impact analysis (2014)

Not confidential





Dogger Bank Economic Benefits

May 2014

Background

In mid 2013, Forewind commissioned management consultancies GENECON and Parsons Brinckerhoff to undertake a study to identify the potential economic benefits from the development of offshore wind farm projects in the Dogger Bank Zone in the North Sea. The study looked at the opportunities both for the UK as a whole and for the two most relevant regions, the North East and Yorkshire & the Humber.

The study assessed the potential high and low investment levels, and identified the potential employment and Gross Value Added (GVA)¹ gains based on three development options, namely the delivery of two, four or six 1.2 gigawatt (GW) wind farm projects in the Dogger Bank Zone. The study covered the potential benefits accrued from the project management and development of the wind farms through to the manufacturing, installation, and operation and maintenance phases.

Figures from detailed assumptions were combined with the results of a high-level review of the existing supply chain to develop model-based scenarios for each build out option. Metrics and weightings from national accounts and industry sources were applied to derive the likely economic benefits. Two approaches were used to determine a range of benefits and the actual benefits could fall anywhere within that range.

Scenarios and supply chain

The scenarios developed for the study represent an achievable but optimistic view of supply chain activity in the UK as well as in the North East and Yorkshire & the Humber regions (NE&YH). Each development alternative – two, four or six 1.2 GW projects – was considered in terms of high or low supply chain content.

The difference in supply chain content between the high and low scenarios is largely dependent on the ability of the UK to secure more original equipment manufacturing (OEM)² capacity, nationally or in the NE&YH. The establishment of a turbine fabrication plant in the Humber, as was recently announced by Siemens, falls into this category.

The levels of investment and benefits for a total of six scenarios were included in the study, comprising high and low supply chain considerations for each of the three build out options. The potential new jobs and the add-on boost to the economy were derived for all the scenarios. This fact sheet will focus on those figures for the mid-range scenario – four projects – in line with the number of projects Forewind currently has in the planning process.

Forewind has two development consent order applications for four projects totalling 4.8 GW in the planning system. Dogger Bank Creyke Beck, comprising two 1.2 GW projects, is now in the examination phase

while Dogger Bank Teesside A&B, a further two 1.2 GW projects, was accepted for examination by the Planning Inspectorate at the end of April 2014.

UK economic benefits

With its current industrial base, the UK could provide up to 38 per cent of the total content of the Dogger Bank projects, and for the mid-scenario of four wind farms, this equates to an investment of close to £7 billion.

However, if new relevant manufacturing facilities are established here, UK based companies could secure up to 72 per cent of the content, which equates to an investment of around £13 billion in the four-project scenario.

Delivering the four Dogger Bank projects currently in the planning process could create more than 4500 new direct and indirect jobs and generate an additional £1.6 billion for the UK economy (GVA). With the successful establishment of new manufacturing facilities, however, the UK could see around 9000 new jobs created giving a £3.4 billion boost to the national economy (GVA).

Together the projects currently with the Planning Inspectorate could generate enough green electricity each year to power the equivalent of around 3.5 million British homes.

¹ GVA measures the contribution to the economy of each individual producer, industry or sector. It is the primary measure of productivity in the UK.

² Defined in this study as facilities for the main components required for a Wind Turbine Supply Agreement – i.e. nacelles, blade sets and towers. Other OEMs that could develop in this definition include the potential for additional cable manufacturing (onshore and offshore).

North East and Yorkshire & the Humber economic benefits

With its current industrial base, the North East and Yorkshire & the Humber (NE&YH) could provide up to 36 per cent of the total content of the Dogger Bank projects, equal to an investment of up to £5.5 billion in the four-project scenario. This figure could increase to up to 61 per cent (worth £9.3 billion) with additional relevant manufacturing facilities established in the area.

The four Dogger Bank projects currently in the planning process could create more than 4000 new regional jobs generating an additional £1.3 billion for the North East and Yorkshire & the Humber economies. With the successful establishment of new manufacturing facilities, around 7000 new regional jobs could be created generating an additional £2.2 billion for the regional economy.

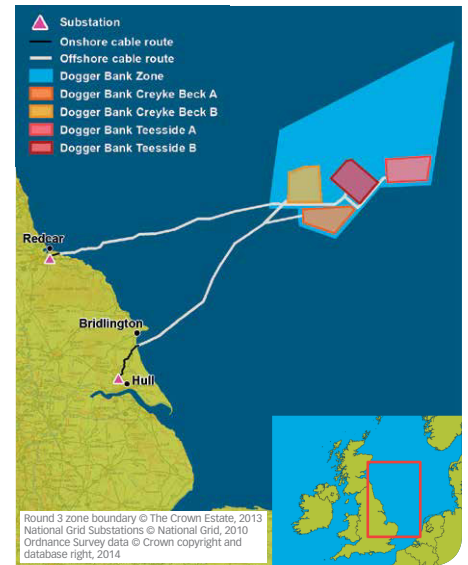
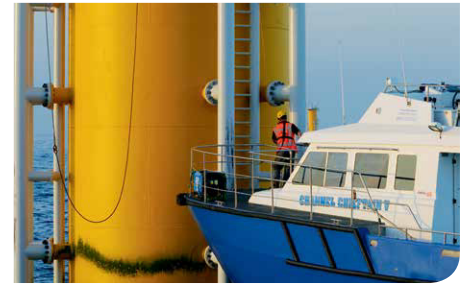
While the highest number of new jobs will be in the manufacturing, construction and installation phases of the Dogger Bank projects, the jobs in the operation maintenance phase will be longer term and individually generate a higher return to the UK economy. In effect these represent jobs for generations.

The NE&YH regions are well placed to secure a high proportion of the work

associated with the Dogger Bank Zone. The regions are geographically close to the Zone but also have existing strengths in terms of large-scale production, port and port-side facilities and offshore industry support. This gives businesses located in the NE&YH regions a competitive advantage over the rest of the UK, increasing their chances of winning a high proportion of the work.

This competitive advantage is linked to:

- The region’s proximity to the Dogger Bank offshore wind farm, proposed cable corridors and construction ports, which could result in cost efficiencies.
- The existing skilled workforce has a higher than UK average competence in large-scale manufacturing, offshore oil and gas, engineering and logistics. A fifth of all national manufacturing and a seventh of all national energy production jobs are located in NE&YH.
- Identified port-side availability around the Humber, Tees, Sunderland, Tyne and Blyth.
- Significant historic and continued ports and renewables sector-led promotion activities within the Humber, Tees Valley, Sunderland, Tyne and Blyth areas.



Combined results table

Potential Dogger Bank Economic Benefits – UK, NE&YH Regional Scenarios									
		UK Content	NE&YH Content	UK Spend	NE&YH Spend	UK FTE Jobs	NE&YH FTE Jobs	UK GVA	NE&YH GVA
Scenario 1: 2.4 GW by 2025	Without OEM	38%	36%	£3.5bn	£2.8bn	2,250 – 2,400	2,050 – 2,200	£650m – £900m	£550m – £750m
	With OEM	72%	61%	£6.7bn	£4.7bn	4,250 – 4,750	3,450 – 3,750	£1.2bn – £1.7bn	£900m – £1.2bn
Scenario 2: 4.8 GW by 2029	Without OEM	38%	36%	£7.0bn	£5.5bn	4,450 – 4,750	4,100 – 4,350	£1.1bn – £1.6bn	£1.0bn – £1.3bn
	With OEM	72%	61%	£13.4bn	£9.3bn	8,500 – 9,050	6,900 – 7,350	£2.7bn – £3.4bn	£1.7bn – £2.2bn
Scenario 3: 7.2 GW by 2030	Without OEM	38%	36%	£10.6bn	£8.3bn	6,700 – 7,150	6,150 – 6,550	£1.7bn – £2.4bn	£1.5bn – £2.0bn
	With OEM	72%	61%	£20.0bn	£14.0bn	12,750 – 13,550	10,350 – 11,000	£3.3bn – £4.5bn	£2.5bn – £3.3bn

Summary

The Dogger Bank projects present a real opportunity to help support the UK and regional economies and drive forward the Government’s economic growth agendas.

Both the location of Dogger Bank and the technical requirements for delivery present a particularly substantial opportunity for the North East and Yorkshire & the Humber. Their historic strengths, existing skills in large-scale production and marine support facilities add weight to the locational advantages.

The highest number of new jobs will be in the manufacturing, construction and installation phases of the Dogger Bank projects. However the jobs in the operation

& maintenance phases will be longer term and will individually generate a higher return to the UK economy.

Operation and maintenance jobs in particular provide long-term sustainable employment gains and in effect create jobs for generations.

To maximise the economic benefits from the Dogger Bank development, the UK needs additional manufacturing companies to establish operations here. This would provide a facilities focal point and foster the development of a supply chain cluster. To achieve this will need a coordinated effort at all levels from public agencies and the private sector.

Headline and technical reports

Both the full technical study, including a detailed description of the methodology, and the non-technical headline report “Dogger Bank Offshore Wind Farm Economic Benefit Study” can be found at www.forewind.co.uk

Contact

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