

Lessons Learnt – Barrow Offshore Wind Farm

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Lessons Learnt Workshop held 23rd & 24th May 2006 and attended by major parties involved in Barrow Offshore Wind Farm

Covered six areas; Project Management, HSE, Sub-station, Foundations, Turbines and Cables.

Purpose of the workshop:

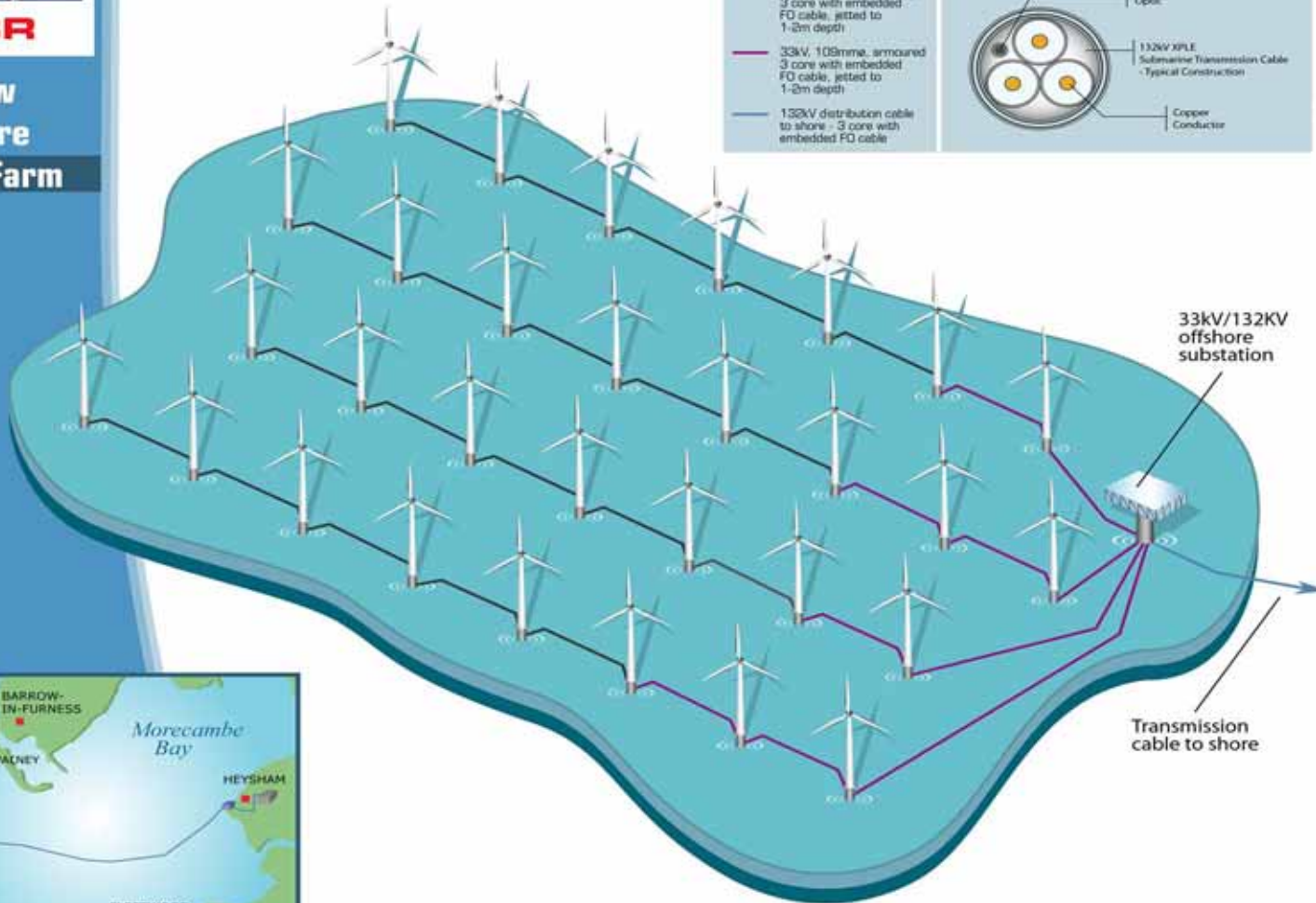
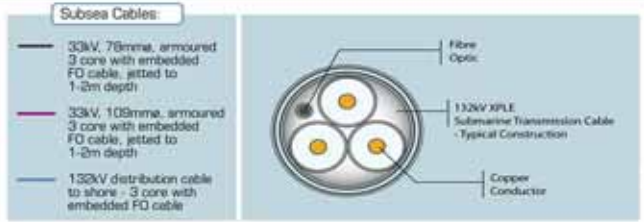
- **Gather all Lessons Learnt**
- **Gain maximum learning from project to develop offshore wind**
- **Share experiences between all parties**
- **Ensure all parties perceive project events uniformly**
- **Give participants chance to debate**



Barrow Offshore Wind Farm



KBR Graphics / 5023-01



WIND TURBINE GENERATORS

- 90m² rotors
- 75m AMSL hub height
- 30 Vestas 3MW turbines
- 4.75m monopile foundations
- 500m spacing along rows
- 750m spacing between rows

OFFSHORE SUBSTATION

- 132/33kV power transformer
- 33kV switchgear
- 132kV switchgear
- Meteorological instruments including wind vanes and anemometers mounted on lattice mast

LOCATION

- Eastern Irish Sea near Barrow-in-Furness
- Approx. 7km from Walney Island

Onshore Works:

- Land based distribution cables 3 x 70mm² bundled together and trenched to min 500mm with FO cables
- Backfilled onshore viaduct
- Existing onshore substation - modifications by others

(Graphical representation not to scale)

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1. Project Management

What went well & not so well

- **Good communication between BOWind and VKBR – both formal and informal**
- **Good Public Relations, few complaints from general public**
- **Good Safety Record**
- **Timescales: too short to deliver in one season**
- **Risks not properly understood**
- **Discontinuity of project team**

Project Management continued...

Improvements

- **Sufficient resourcing => continuity of staff**
- **Empowerment of project team & simplified decision making**
- **More collaborative & open form of contract, involve supply chain early on**
- **More realistic & achievable schedule**

2. Health & Safety

What went well & not so well

- **No ownership Lessons Learnt from previous projects – this would have been good to follow through & build on**
- **Positive attitude to H&S at all levels**
- **Competent contractors chosen who were familiar with CDM**
- **Time for review of RA&MS would ensure more H&S input**
- **Structures were unclear for reporting**

Health & Safety continued...

Future Improvements

- **Timely delivery of documentation for H&S review**
- **Publish Lessons Learnt & ensure future use**
- **Lay out clear lines of reporting to all parties involved**
- **In future have a suitable contingency plan for winter working**

3. Substation

What went well & not so well

- **Modular concept improved speed of build**
- **Load out went smoothly, good planning**
- **Power up went smoothly, simplicity of design**

Future Improvements

- **More upfront detailed design allowing completion before final paint finish**



4. Foundations

What went well & not so well

- Good facilities at H & W in Belfast
- Drilling equipment was a prototype
- Costly dive time was required for J-Tube solution

Future Improvements

- Grout seal design improved during installation
- Detailed soils information at design

5. Turbines

What went well & not so well

- Excellent facilities for pre-assembly, equipment hire & security
- Good site management structure
- Installation vessel divided focus between cable and turbine installation

Future Improvements

- Development of installation sequence
- Improved access to turbines

6. Cables

What went well & not so well

- Resolution & ROV: fit for purpose
- Divers well prepared for dive windows
- Cable routes & protection - problematic

Future Improvements

- Integrated design of J-Tube, cable, installation & protection
- Development of installation methods & tools

Conclusion

- **This project was a learning process for all involved.**
- **Despite weather related challenges, Wind Farm successfully operating!**



