



Strategic Spares and Proposal for Universal Subsea Cable Joint

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Topics Covered

- Introduction to Elmeridge Cable Services (ECS)
- Requirement for Strategic Spares for Offshore Windfarms
- Universal Cable Joint for Subsea Cables
- Strategic Spares for Power cables for Offshore Windfarms



Elmeridge Cable Services – a potted history

- A privately owned company based in Basildon, Essex since 1999
- 22 employees with extensive experience in the design, manufacture, installation, jointing, test and commission of land and subsea cable systems
 - 10 Engineers/Project Managers/Office staff
 - 8 Full time Jointers with experience up to 400kV
 - 2 Oil Technicians
- A broad base of suppliers of high voltage cable systems, including nkt cables, LS Cables, Korea, 3M, Tyco and others
- **ecspert** Training School to deliver training on XLPE and oil filled cable systems
- Operate in all parts of the UK and many territories overseas including North America, Europe, Middle East, Southern Africa, Australia and New Zealand.



Current Installed Capacity Offshore

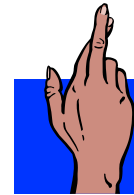
- There are 1,075 turbines installed in offshore windfarms around the UK
[RenewableUK October 2013]
- Approximately 530,000 metres of medium voltage inter turbine subsea cable
- Approximately 880,000 metres of subsea export cables, mostly high voltage
- **Excludes** the land cable connections from the beach joint to the on shore substations

Current Strategies

- Worry about it when it happens



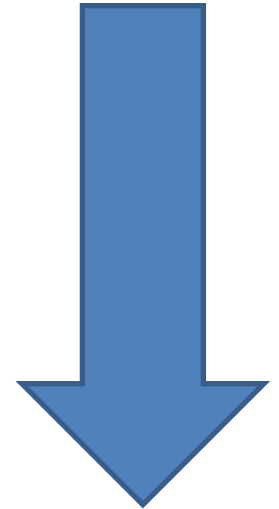
- We have some bits left over from the original installation



- Planned strategy with range of spare cables and accessories



Early Adopters



Mature Market



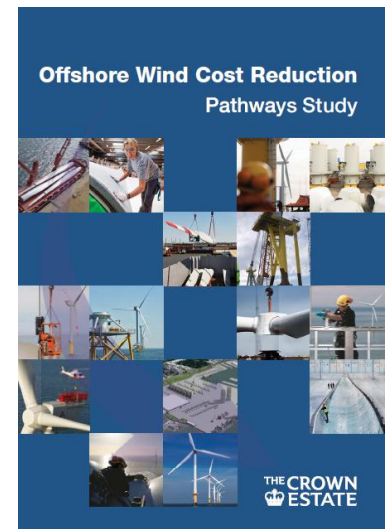
Current Strategies

- A developing and maturing industry
 - Technology is changing as lessons are learnt
 - Extending the boundaries of the cable technology from Round 1 (33kV) to Round 2 (132kV) to Round 3 (220kV, 400kV, HVDC)
 - New competitors in the cable supply market
 - More developers, owners, operators are participating in a growing number of installations
 - Crown Estate Offshore Wind Cost Reduction Pathways Study driving towards standardisation, co-operation and planning to reduce the cost of offshore generation. O&M (including repair) costs to be reduced.



Crown Estates Offshore Wind Cost Reduction Pathways Study - June 2012

- Reviewed the industry with a view to reducing the cost of offshore wind from £140/MWh to £100/MWh
- A number of challenges presented to the industry, most are beyond the scope of this presentation, however, overall a reduction by £20/MWh by 2020 associated with technology improvements including reduced O&M costs is identified.
- A reduction in repair times and costs through a managed spares strategy will play a part



Spares Strategy

- Three basic questions need to be answered:
 - What spares do I hold
 - Where should they be held
 - How many do I hold





What spares do I hold

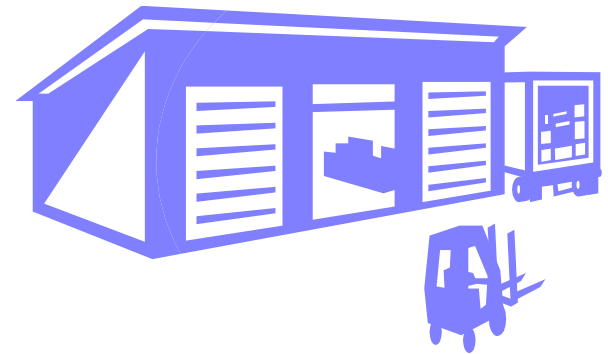
- Sufficient to make a repair to minimise downtime, balanced with the capital costs of purchasing and storing the spares
- Good analytical tools available to generate a scientific decision
- Capital costs could be high:
 - Terminations
 - Subsea repair joints (2 off)
 - Subsea cable
 - Land cable repair





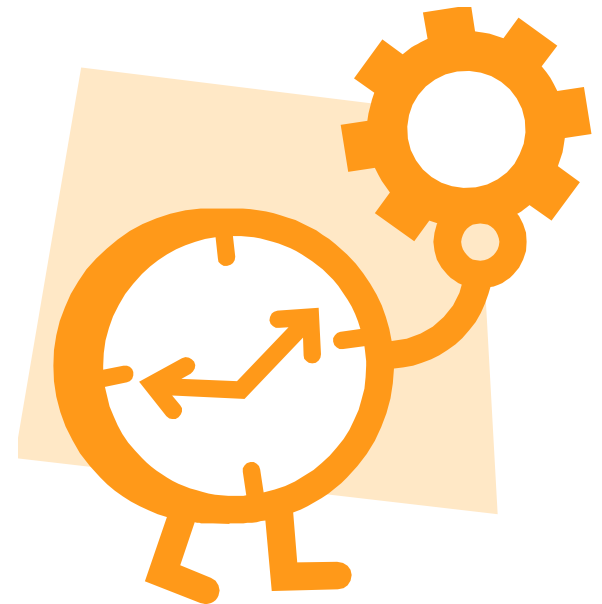
Where should they be held

- A large area is required to accommodate subsea cable drums
- Cable accessories will have shelf life items in them
- Some components may be sensitive to moisture or other environmental effects e.g. sunlight etc
- Security considerations
- Re-stocking and changing technologies



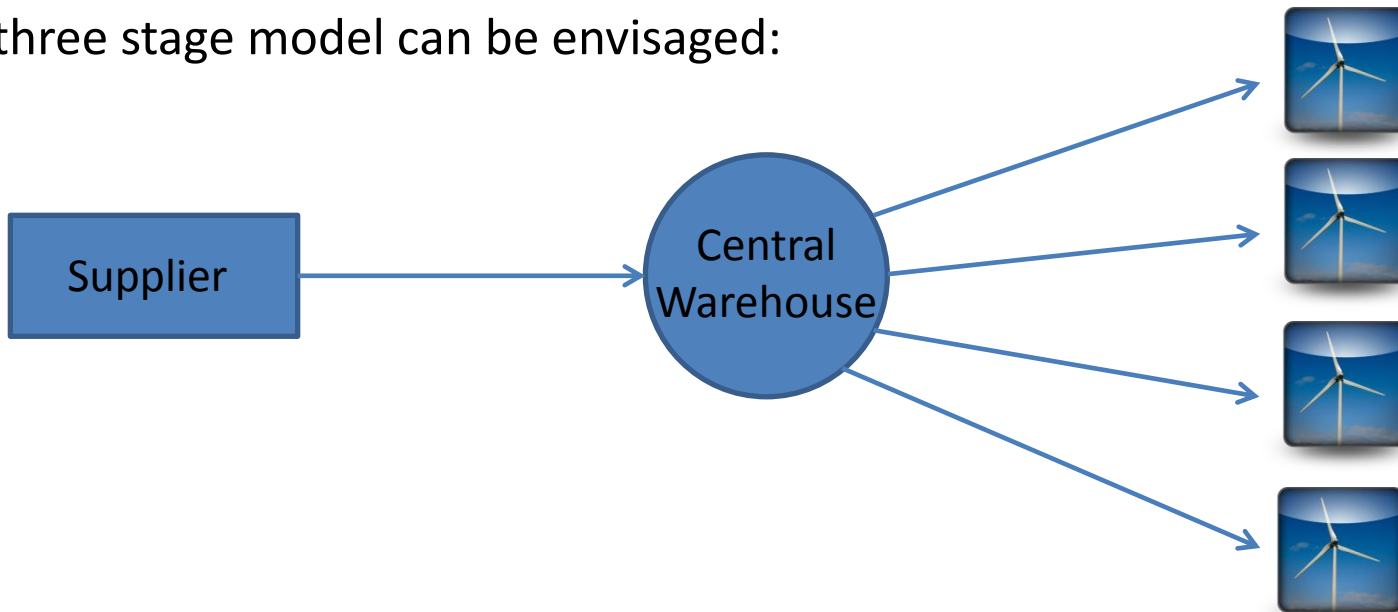
How many do I hold

- Accuracy of fault location
- Repair strategy to be implemented
 - Repair joints and short length of cable
 - Complete replacement
- Criticality and lead time
 - Subsea cable in short lengths: 12 months
 - Subsea repair joints: 4 to 6 months
 - Land cable equipment: 12-16 weeks



Optimisation of Spares – Pooling Strategies

- Sufficient owners/operators and developers in the market to Pool resources
- A three stage model can be envisaged:





Pooling Strategies

- Commercial Pooling
 - Several operators purchase a Strategic Spares Service from a 3rd Party
 - The 3rd Party could be the manufacturer but if more than one supplier is required to stock the inventory it is better to be an independent specialist niche company
 - Each operator contracts separately with the Service Provider negotiating their own service levels and fees. No need to disclose operational data to competitors.



Pooling Strategies

- Commercial Pooling
 - Benefits of shared resource
 - Service Fee based on demand per operator
 - Capital costs reduced
 - Improved pricing as Service Provider can negotiate with supplier for the whole spares package
 - Service Provider responsible for managing materials, logistics and replenishment



Universal Subsea Cable Joint

- Pooled strategic spares to reduce capital costs
- Fast response to failures, materials of the shelf and maintained in date
- Will accommodate a range of cable designs and manufacturers
- Range taking capability
- Quick to assemble
- Incorporates HVPD monitoring technology to enhance the installed system



Universal Subsea Cable Joint

- Electrical component based on the premoulded type of joint
 - Quick to install
 - Proven technology
 - Range taking
- HVPD OHVMS technology incorporated into design
- External mechanical components
 - Based on highly successful 33kV design, 35 years installation experience
 - Range taking



Universal Subsea Cable Joint

- Testing Programme – Current Position
 - Design Concept completed
 - Manufacturing drawings being prepared
 - Funding to be secured for full development and type test programme
 - Due to commence 2014



Universal Subsea Cable Joint User Group

- Group of network owners/operators/maintainers working collaboratively with ECS and HVPD to maintain:
 - The technology
 - Strategic stock levels
 - Skills base
 - Strategic Repair Response
- Would provide a strategic spares solution to the UK Industry
- Addresses the issues of co-operation, standardisation and reducing O&M costs as identified by the Crown Estates Report