Standards and Guidelines for Marine Renewables (Wave & Tide) Review and Development Workshop

Tuesday 25th March 2014, 09:30 – 15:30

(BMA Conference Centre, Queen Street, Edinburgh, EH2 1LL)

Mike Nichols

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Subsea Cable Lifecycle

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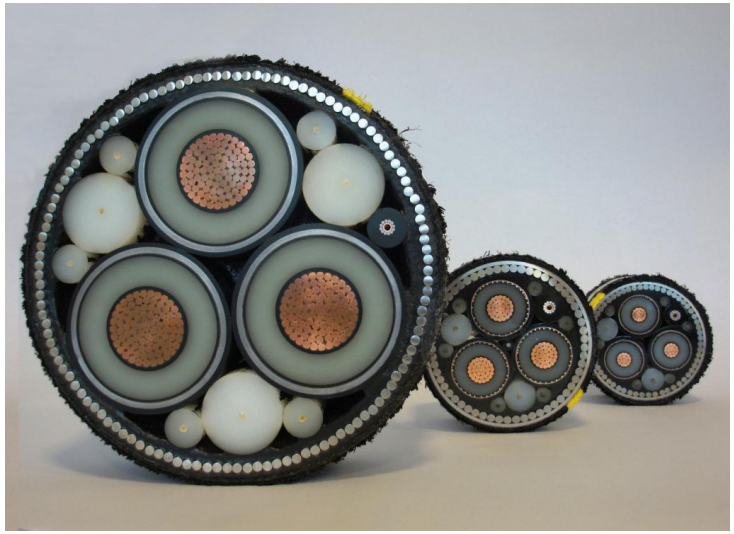
Subsea cable related items to be considered:

- Design
- Manufacture
- Loading and Transportation
- Offshore Cable Lay
- Inspection Maintenance and Repair
- Decommissioning
- (Offshore Cable Protection)
- (Operational Considerations, Connect/Disconnect)



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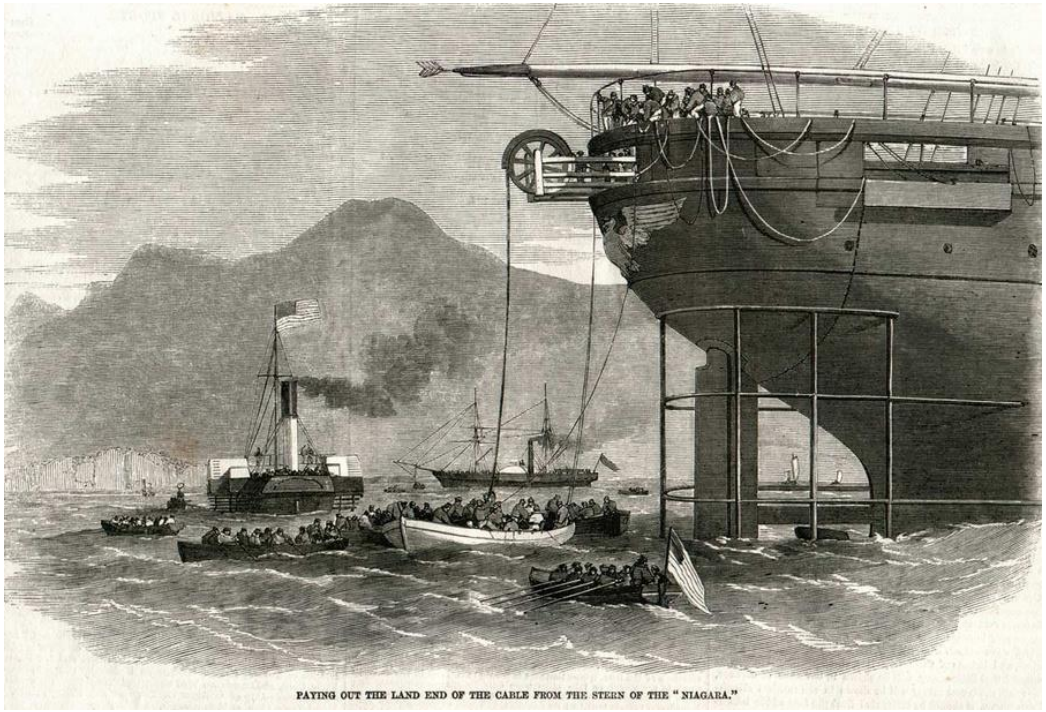
Why do we need more standards?



PAYING OUT THE LAND END OF THE CABLE FROM THE STERN OF THE "NIAGARA."

Cable laying has been carried out since the 1850s

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CIGRÉ Technical Brochure 177	*Accessories for HV cables with extruded insulation*
CIGRÉ Technical Brochure 194	*Construction, laying and installation techniques for extruded and self contained fluid filled cable systems*
CIGRÉ Technical Brochure 303	*Revision of qualification procedures for HV and EHV AC extruded underground cable systems*
CIGRÉ Technical Brochure 379	*Update of service experience of HV underground and submarine cable systems*
CIGRÉ Technical Brochure 398	*Third-party damage to underground and submarine cables*
CIGRÉ Technical Brochure 415	*Test procedures for HV transition joints for rated voltages 30 kV (Um = 36 kV) up to 500 kV (Um = 550 kV)*
CIGRÉ Technical Brochure 476	*Cable accessory workmanship on extruded high voltage cables*
CIGRÉ Technical Brochure 483	*tions for wind*
CIGRÉ Technical Brochure 490	*extruded*
CIGRÉ Technical Brochure 496	*Recommendations for testing DC extruded cable systems for power transmission at a rated voltage up to 500 kV*
CIGRÉ Technical Brochure 560	*Guideline to maintaining the integrity of XLPE cable accessories*
CIGRÉ Electra 171	*Recommendations for mechanical tests on sub-marine cables*
CIGRÉ Electra 189	*Recommendations for tests of power transmission DC cables for a rated voltage up to 800 kV*
CIRIA Guideline C683	*The rock manual - The use of rock in hydraulic engineering*
CIRIA Guideline C685	*Beach management manual*

ETA are aware of around 100 Standards and Guidelines that could be deemed relevant to subsea power cable design and installation.

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Are we doing anything new?

YES! - We are being asked to deviate from some of the established guidelines for cable route planning.

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We need to install cables in tidal conditions which up to now would have been deemed “no go”.

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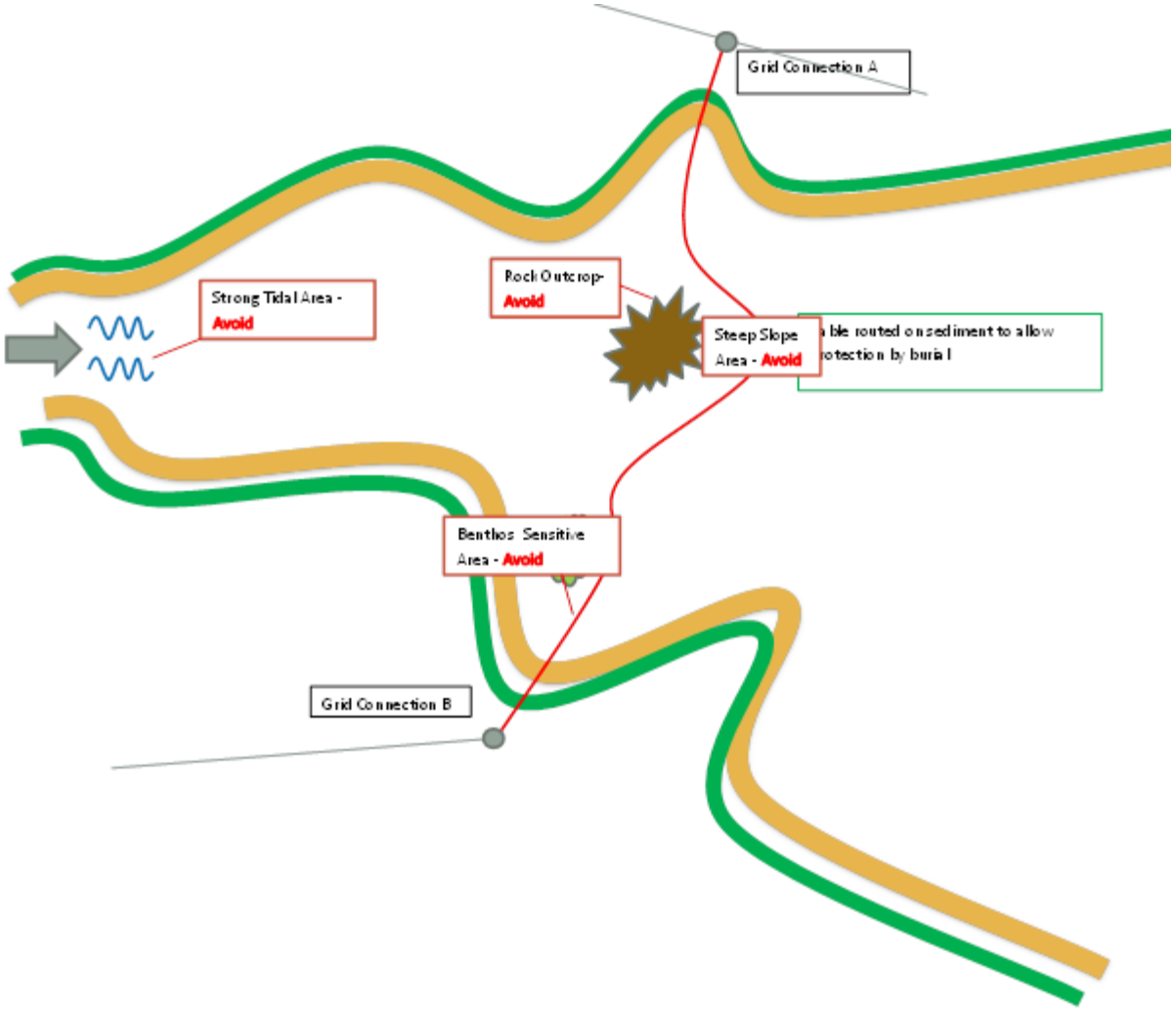
Typical Cable Lay Planning



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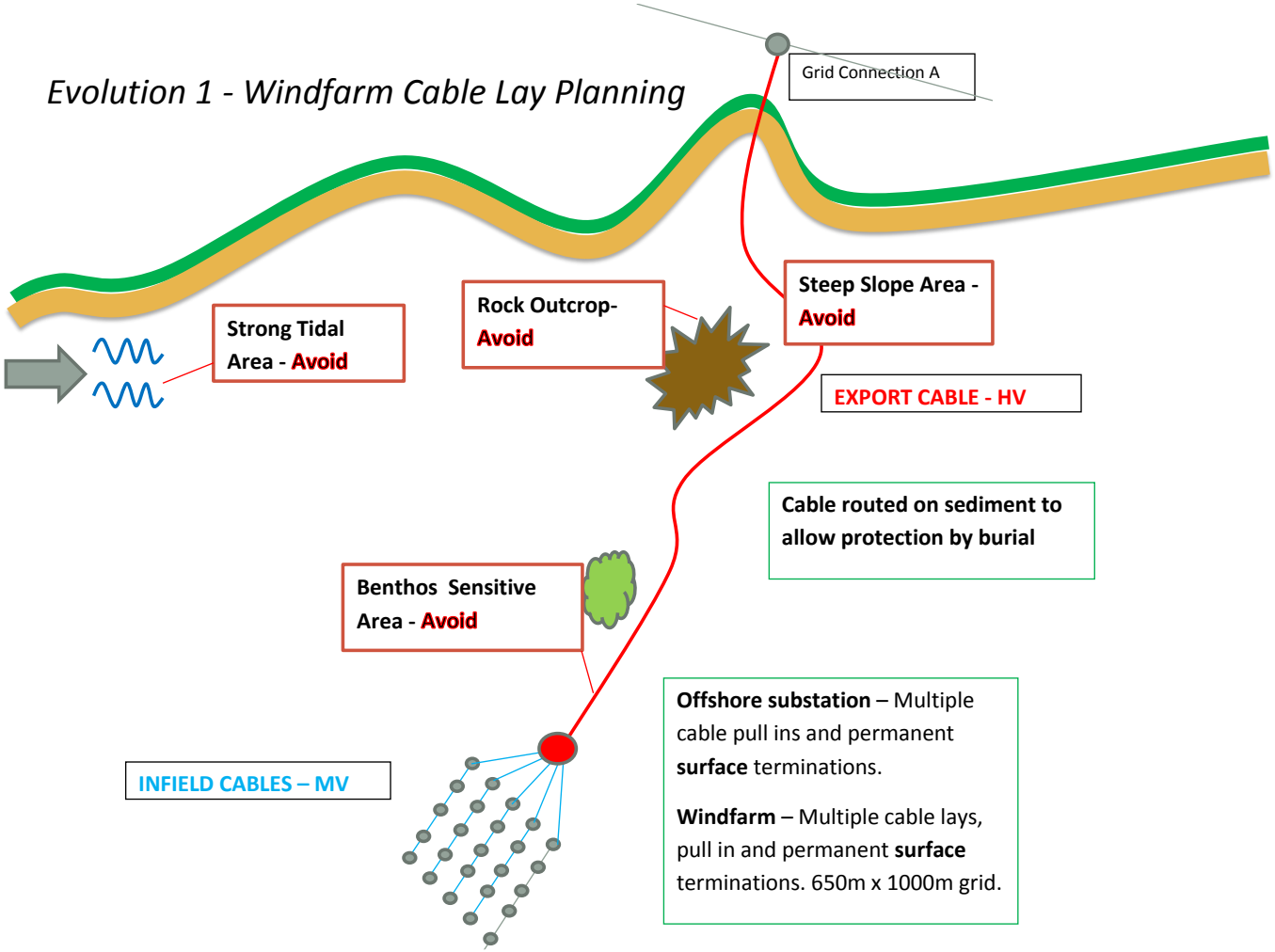
Evolution 1 – Windfarm Cable Lay Planning



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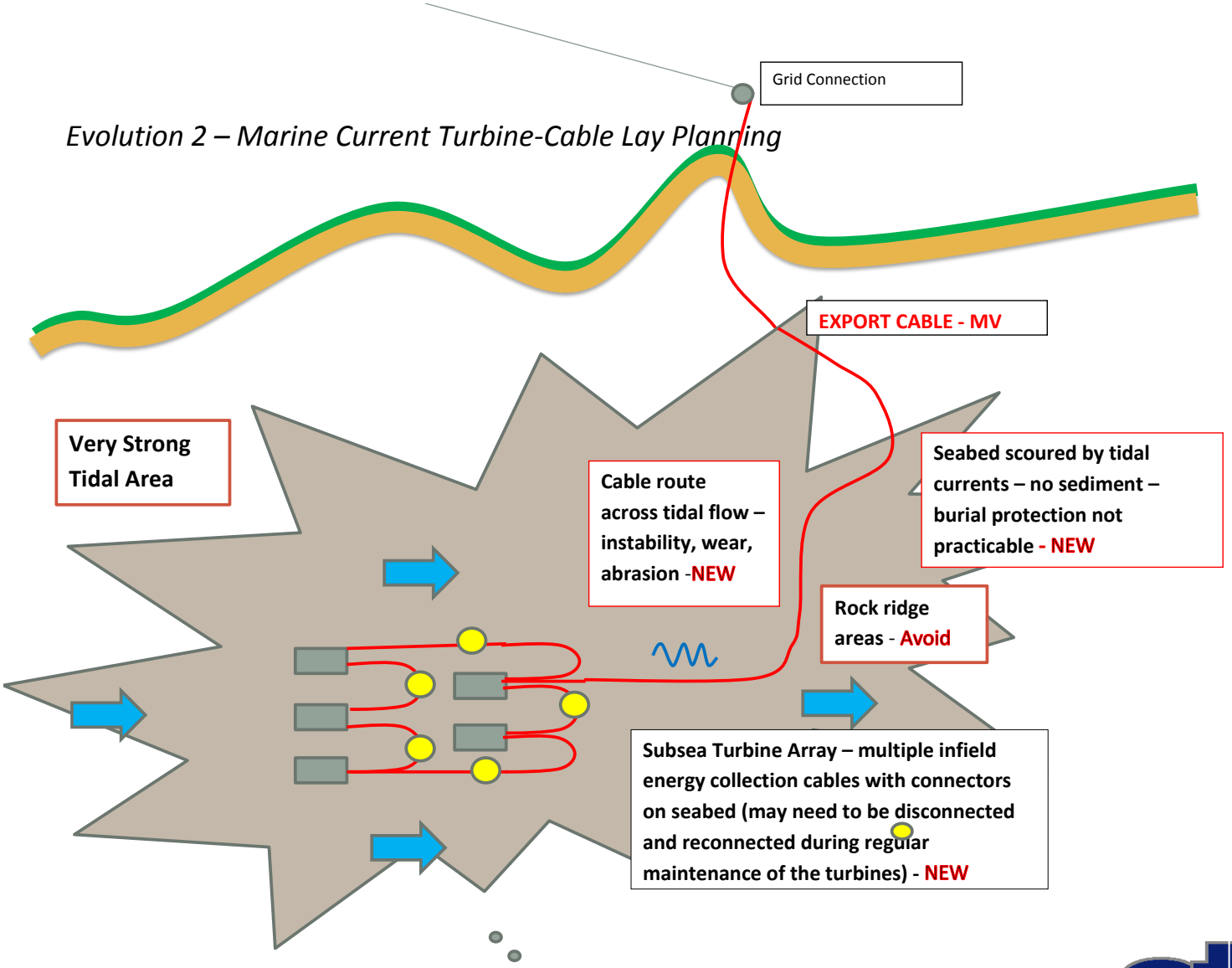
Evolution 2 – Marine Current Turbine Cable Lay Planning



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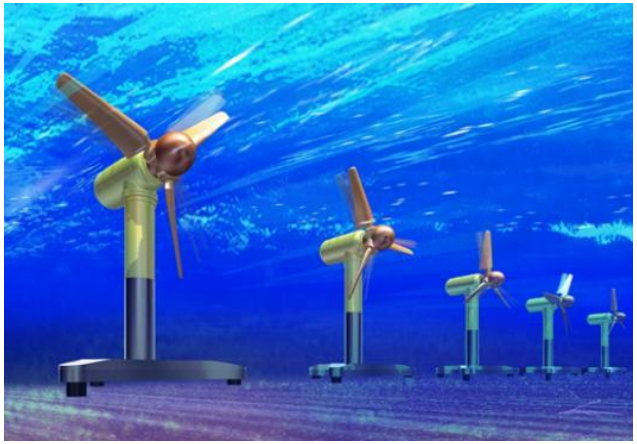
Some Things To Consider:



Cable Design:

- Seabed Stability
- Resistance to Strumming on Seabed
- Resistance to Abrasion
- Handling during intervention

Cable Manufacture:

- Minimise inbuilt torque (reduce risk of “coils” during installation) (May mean un-coilable designs?)

Cable Route Planning:

- Relationships to flow direction.
- Optimisation of route length versus life risk

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Some Things To Consider (Cont.):

Loading and Transportation

- Optimisation of transport methods
  – freighter rather than cable ship?
- Transport storage method suitable for laying.
- Recycling of reels

Offshore Cable Lay

- Lay vessel type– Optimisation, size, control methods, cost, availability.
- Lay vessel station keeping in strong tidal flows.
- Limitations - Neaps/Springs – Planning
- Pre termination of cables?
- Layouts of turbines.
- Cable lay control – Direction, initiation, speed, catenary control and shape, touchdown accuracy , residual tension

Some Things To Consider (Cont.):

Offshore Cable Lay (Cont.)

- Safety, Contingencies
- Turbine interface
- Cable testing
- Post – lay Cable survey

Protection

- Requirement – what is real risk?
- Methods
- Implementation

Maintenance and Repair

- Strategy/Methods
- Spares holding
- Availability of Equipment

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Some Things To Consider (Cont.):

Maintenance and Repair

- Strategies/Methods/Timescales
- Spares holding
- Availability of equipment

Operation/Lifetime

- Connect/Disconnect Requirement
- Wet mate/ Dry mate
- No of Cycles
- Fitting/Testing
- Survey

Decommissioning

- Strategy

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