Joint Ofgem/DECC Offshore Transmission Coordination Project

5th Expert Workshop

14 October 2011

DEPARTMENT OF ENERGY & CLIMATE CHANGE

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Agenda

- Welcome and introduction

- Generic network examples – key asset delivery issues and their commercial impact
  - Presentation
  - Discussion
  - Feedback

Break

- Key issues in determining the regulatory framework
  - Presentation
  - Discussion
  - Feedback

- Wrap-up/next steps

5th OTCG Expert Workshop – Asset Delivery workstream

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Agenda – Asset Delivery (WS1)

- Methodology
- Generic Examples
  - Effect of windfarm design considerations
  - Effect of technology selection
  - Effect of Boundary Reinforcement
  - Effect of Interconnector integration
- Consenting Considerations

Methodology - Generic Examples

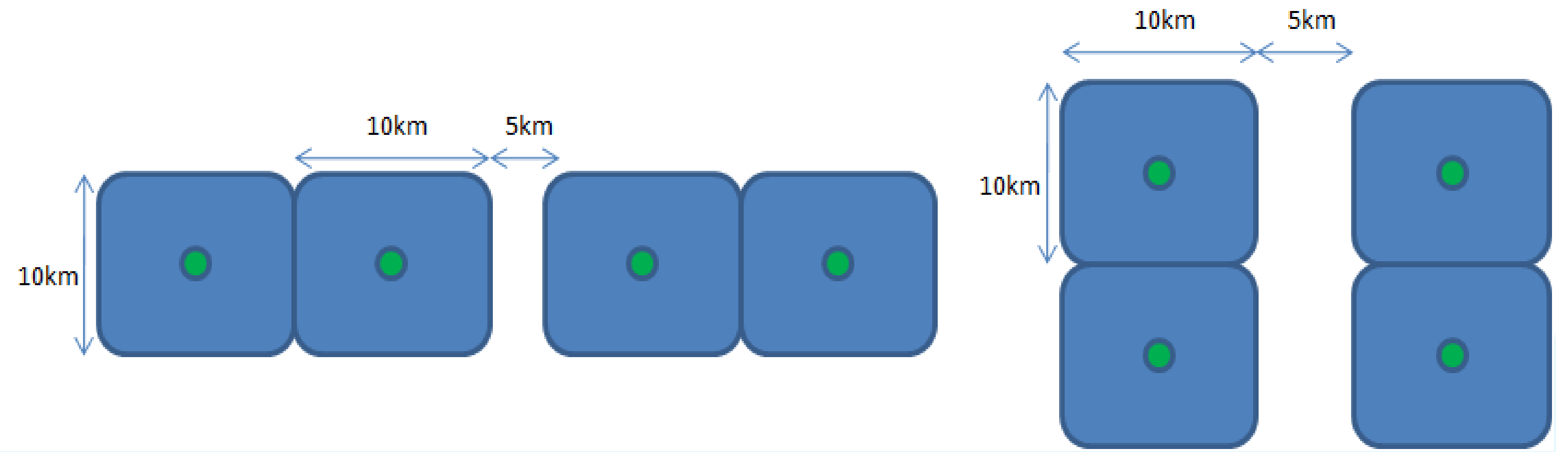
- Useful to establish materiality of benefits
- To have validity these need to be representative of real offshore windfarm transmission systems
- Objective is to quantify relative value of:
  - Co-ordination during zone build-out and method of such, including anticipatory investment where required
  - Effect of minimum levels of network security
  - Effect of zone shape on relative value
  - Value of higher capacity technology (i.e. 2GW HVDC links)
  - Value of offshore interconnection to provide SQSS benefit

Generic Examples

- Approach to test typical distances, layouts and relative capacities of the larger Round 3 zones
  - Export distances is taken as 120km
  - 500MW block covers 10x10km area with AC substation at centre
  - HVDC substations located on boundaries for access issues
  - Each 1000MW block has a 5km separation corridor
  - Cable lengths on straight-line basis with 1.2x diversion factor
  - Each 500MW AC platform has two 220kV links to HVDC platform
- Initially testing 2GW zone either complete or as first tranche of a larger zone build-out

Generic Examples

- Some issues to consider and test:
  - Appropriate level of security/redundancy
  - Maximum link capacity and technology selection
  - Does zone shape significantly affect benefits
  - Level of anticipatory investment to capture benefit



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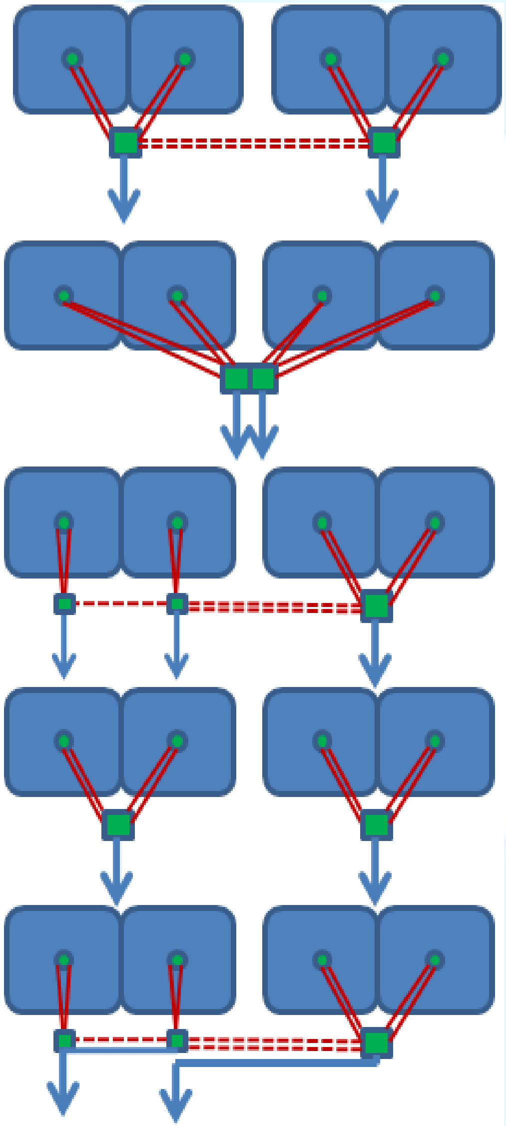
Generic Examples – Flat Layout

1) Independent with Stage 2 AC linkages
   (base capex, 95%-99.7% availability, no stranding risk)
2) Anticipatory co-location with AC linkages
   (+4% capex, 95%-99.7% availability, stranding risk)
3) Independent with essential security (AC)
   (+14% capex, 99.7%-99.9% availability, no stranding risk)
4) Completely independent development
   (-5% capex, 95% availability, no stranding risk)
5) Anticipatory cable over-sizing with essential security
   (+3% capex, 99.7%-99.9% availability, stranding risk)

Box layout has slightly different characteristics.



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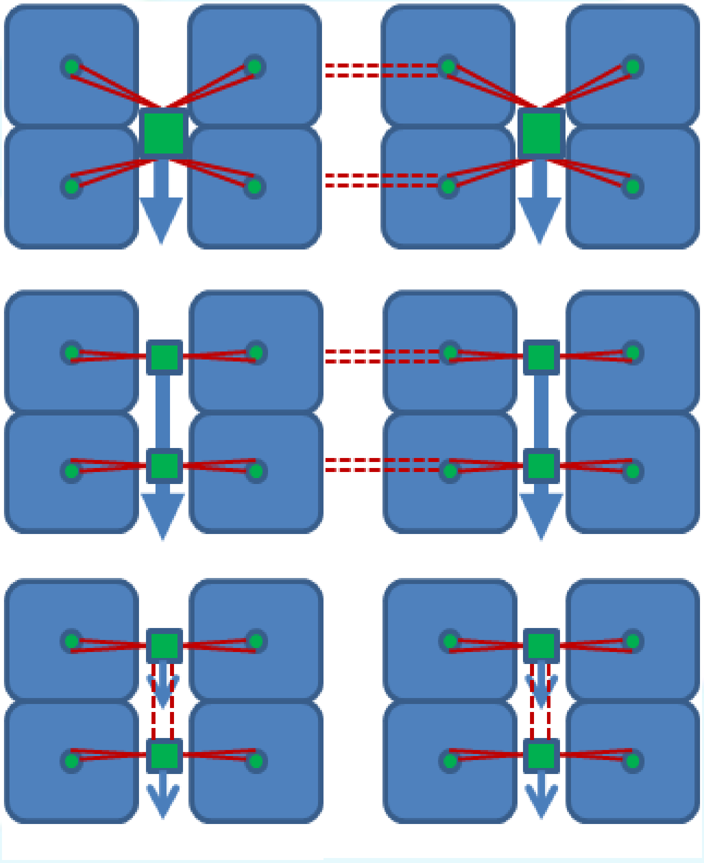
Generic Examples – Use of 2GW links

1) 2GW platforms and cables with AC interconnection
   (Base capex, nominal availability)
2) Using 1GW platforms and 2GW cables
   (+8% capex, nominal availability)
3) Using AC interconnected 1GW HVDC links
   (+28% capex, highest availability)

Use of 2GW HVDC create additional exposure, stranding risk or create opportunity to invest in larger sites



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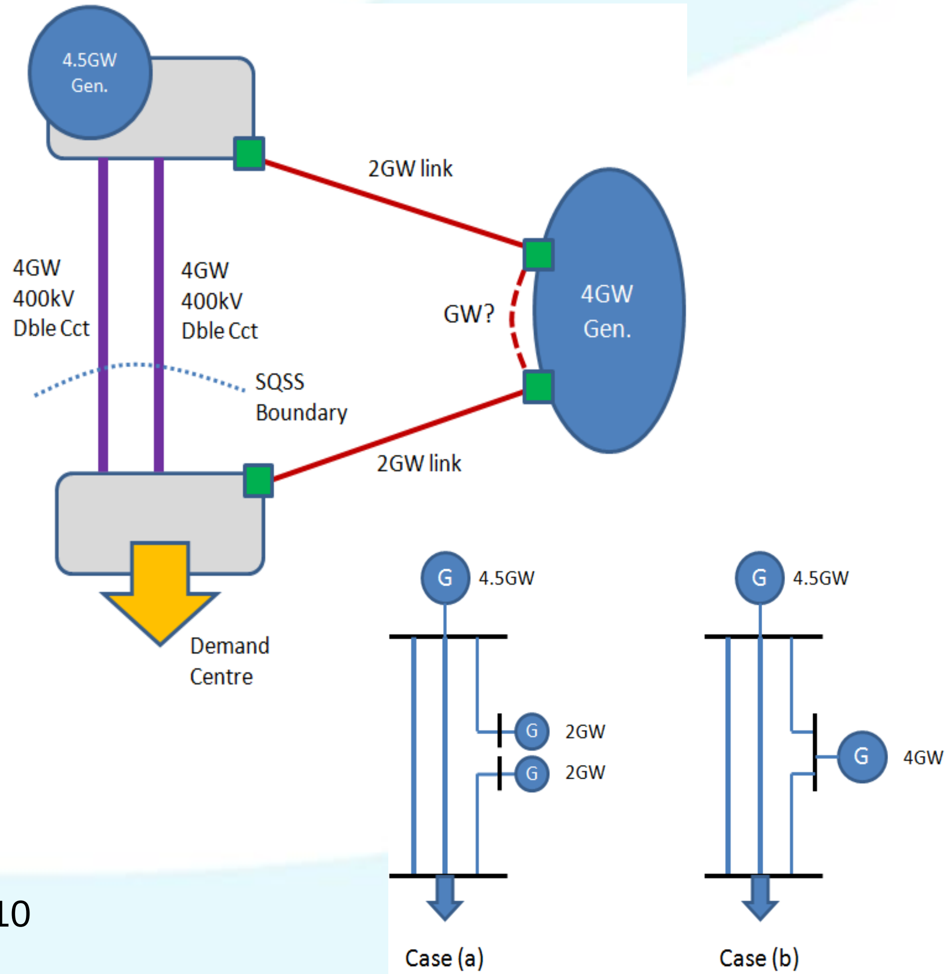
Generic Examples – Benefit of Offshore Reinforcement

- Offshore site has onshore connections that span a boundary
  - SQSS reinforcement triggered
  - N-D gives 0.55GW overload
- Options available
  - (a) onshore reinforcement
  - (b) offshore AC interconnection to enable transfer capability
- Option (b) requires additional 0.4GW offshore transfer capacity above developer minimum (1GW)
  - Sequence of connection is critical to avoid onshore reinforcements



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Generic Examples - Interconnectors

- Independent : Windfarm and Interconnector are not interconnected
- Integrated : Interconnector terminates at offshore windfarm
  - Option 1 : Firm generation and non-firm interconnector
  - Option 2 : Firm Interconnector and non-firm generation
  - Option 3 : Offshore MITS, Firm Interconnector and Firm Generation and NETSO manages constraint risk/cost
- Integrated approach has significant potential cost saving when Interconnector capacity is small relative to windfarm
- Value of interconnector will depend on environment and trading strategy
- Technology selection for HVDC links (CSC Vs VSC) and project timing needs to be addressed early as these may prevent benefit capture
- Significant regulatory and legislative issues to address

Commercial Implications of Design Choices

- Transmission design options have implications beyond that of economically efficient network development
  - Provision of sufficient export security/resilience for generators
  - Who faces stranding risks from anticipatory investments
  - Technology selection issues need to weigh capital cost savings against funding costs of increased delivery and operational risk
- All of these have implications on the financial position of the overall electrical energy system
  - i.e. Transmission is only 20% of the overall system cost
  - Phased development options may have higher value

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Consenting and Deliverability

- Analysis of schemes shows that a Networked approach can reduce the number cables or size of onshore substations
  - This may be material in the ability to achieve a minimum impact solution
  - Some of these are due to the use of higher capacity links (2GW) and as such may be eroded if technology is not viable
  - Some of these benefits are reduced by the need to maintain minimum resilience through a phased build-out of the zone
  - Cases that provide offshore boundary reinforcement may be more deliverable due to the avoidance of new onshore transmission lines
- Anticipatory coordination of the cable corridors, or substation planning may have benefits on delivery

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Thank You

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Asset delivery - discussion

1. What are the key commercial impacts that result from these asset delivery issues relating to coordinated outcomes?

2. How would these issues impact on the economics of the generation project? Which would be most important?

Key issues in determining the regulatory framework

Session outline

- Context:
  - how does coordination feed into DECC and Ofgem objectives
  - update on the problem statement

- Optimising the design of the network

- The process for handling anticipatory investment

Determining the regulatory framework – DECC and Ofgem objectives

- The key question for DECC and Ofgem is how we can ensure that the development of offshore electricity infrastructure best facilitates the delivers our objectives now and in the future.
- For offshore transmission, the relevant objectives are:
  - enabling the 2020 renewables target to be met;
  - enabling the 2050 decarbonisation targets to be met;
  - contributing to our energy security; and
  - ensuring cost-effectiveness and value for money for the consumer.

These can be broken down into a number of high-level project assessment criteria:

Assessment criteria	**Relevant factors include**
Support timely build of offshore generation and wider sustainability	Transmission delivery risk; impact on timing and economics of generator projects ; level of disruption from any changes; local environmental impacts.
Promote reliability and security of supply	Offshore transmission system security; incorporate interconnection where economic; flexibility in system operation.
Deliver economic benefits	Ability to deliver economic and efficient transmission network in face of uncertainty; provide correct incentives (including innovation/efficiency drivers and locational signals); financeability of offshore investment.
Ensure a fair/proportionate distribution of benefits, costs and risks	Efficient allocation of risks; fair allocation of costs; consumers not exposed to significant stranding risk unless they stand to benefit.
Be deliverable and flexible	Able to adapt; complexity; potential unintended consequences.

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Determining the regulatory framework – problem statement

	Barrier	Description
1	AI Process	Currently no explicit process or guidance on how offshore anticipatory investment will be treated by Ofgem, creating uncertainty and reticence
2	Network optimisation	NG has to make connection offers without full information; may not be adequate info on network evolution; possible issues around NG ability to re-optimise connections
3	Consenting	Current government guidance appears to rule out consenting of anticipatory assets; other non coordination-specific planning issues also exist
4	Risk reward	Questions around security and charging requirements for generators for bootstraps that originate from their offshore assets; uncertainty over application of connect & manage
5	Regulatory boundaries	TO/OFTO and OFTO/interconnector boundaries lack clarity on regulatory treatment
6	Technology	There are HVDC supply chain constraints; no standardisation between manufacturers; some technologies necessary for coordination are not yet commercial

This is still a work in progress

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Determining the regulatory framework – optimising the network (1)

- National Grid, as NETSO, is required to develop and maintain an efficient, co-ordinated and economic system of electricity transmission
- The connection offer process is one of the key means through which it delivers this
- We have already seen the NETSO making offers that demonstrate a coordinated approach
- These offers can be re-optimised over time as new information emerges on the most economic and efficient configurations

Are there improvements that can be made to this process to help deliver the most economic and efficient outcome?

Specifically, points for discussion could be:

- Does the NETSO have the right information and incentives/obligations to provide the optimal overall outcome?
- Does it need a clearer picture of the likelihood of projects coming forward? How could anticipatory investment be based on this information while minimising stranding risk for consumers?
- Does the process for NETSO decisions on re-optimising connection offers need improvement? How could this be done while allowing economic re-optimisation and ensuring the costs/benefits of the change are fairly aligned?

Determining the regulatory framework – optimising the network (2)

- The NETSO is also obliged to produce an annual Offshore Development Information Statement (ODIS)
- ODIS provides information aimed to facilitate the long term development of the offshore electricity transmission system by providing a view of how the network might possibly develop in the future against changes to electricity energy requirements
- This is principally achieved through a scenario-based analysis (different offshore generation scenarios, radial vs integrated approach) with a main focus on 2030

Are there improvements that could create a better vision/roadmap of how the network might evolve to better inform developers/OFTOs/wider stakeholders?

Specifically, would it be useful to pull out more on how the network might evolve in the face of uncertainty between scenarios?

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Determining the regulatory framework – anticipatory investment (1)

- Anticipatory investment (AI) is possible under the current OFTO regime but there is perceived uncertainty about how Ofgem will handle it in the ex-post cost assessment under generator build
- Previous discussions and TNEI work have flagged that some AI could be beneficial to keep open option of pursuing a more coordinated outcome
- Key issue will be the level of uncertainty over whether the benefits of AI will emerge (eg subsequent phases do not come forward, or do so but with a delay), and the potential for asset stranding

→ ***trade-off between certain upfront costs and uncertain future benefits***

Allocation of stranding risk would be a key element of an AI process - what would be the most efficient and effective allocation of the risk of AI in different coordination examples?

For example, where AI has potential future benefits:

- for later phases within a zone
- for other zones
- in avoiding the need for onshore reinforcement
- for possible future interconnection

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Determining the regulatory framework – anticipatory investment (2)

– If a new process is taken forward for providing extra certainty over the treatment of anticipatory investment then a number of issues would need consideration. Specific questions to consider would include:

- who should identify/be able to trigger anticipatory investment?
- should the main focus be on pre-construction or construction activity? Should any Ofgem approval process differ between them?
- who funds the anticipatory investment?
- at what stage is regulatory certainty needed?

We recognise this list is not comprehensive and would be keen to hear views on what the most important design issues for a new AI process would be.

Determining the regulatory framework – discussion

Optimising the network

- Are there improvements that can be made to the connection process to help deliver the most economic and efficient outcome?
- Are there improvements that could create a better vision/roadmap of how the network might evolve to better inform developers/OFTOs/wider stakeholders?

The process for handling anticipatory investment

- What would be the most efficient and effective allocation of the stranding risk resulting from AI in different coordination examples?
- What would be the key design issues in implementing an AI process?

Wrap up / Next steps

Next steps

- OTCG meeting 1st November
- Publication of consultants' reports end 2011
- Further stakeholder engagement leading up to consultation
- Publication of consultation document early 2012