Joint Ofgem/DECC Offshore Transmission Coordination Project

Stakeholder briefing event:

consultants' reports publication

19 December 2011

DEPARTMENT OF ENERGY & CLIMATE CHANGE

ofgem E-Serve

Agenda

- Welcome and introduction
- TNEI/PPA Energy – Asset Delivery workstream
  - Scope and approach
  - Key findings
  - Q&A
- Break
- Redpoint Energy - Regulatory framework workstream
  - Scope and approach
  - Key findings
  - Q&A
- Wrap-up/next steps

Consultation on tender exercises under the enduring regime

- Published on 16 December 2011
    - Consultation ends 17 February 2012

- Focused mainly on OFTO build model

- Developed in the context of:
    - Significant investment opportunity of up to £14bn
    - More complex projects, including potential for more coordinated offshore networks in GB & Europe

Consultation on tender exercises under the enduring regime

- Key features of OFTO build
  - Generator will carry out pre-construction activities
  - Competitive tender process will appoint an OFTO
  - OFTO procures, constructs, operates, maintains & decommissions transmission assets

- Consultation also covers changes to generator build and our initial thinking on phased projects

- Key benefits of OFTO build :
  - Reduced capital expenditure for generators
  - Significant scope for innovation in design & financing solutions
  - Enhanced scope for new market entrants
  - Streamlined approach to OFTO appointment

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OTCG Results Presentation – Asset Delivery Workstream

Graeme Bathurst
Technical Director
Petrofac - TNEI

Newcastle, Manchester, London

Methodology: Overall

- Approach has been based around ODIS 2010 networks
  - Testing cost sensitivity, options and flexibility
  - Four National Renewable Build-out Scenarios
  - Three Zonal generation construction timelines
  - Two common transmission approaches (with sensitivity cases)
- Generic Cases have been used to test sensitivities
- Each Zone has been developed independently considering a developers perspective on full zone build-out
- Zones are then rolled up appropriately into the aggregate transmission costs for the national scenarios

Methodology: Development of Options

- Indicative generation scenarios developed bottom-up with timings based on national scenarios as well as practical project basis at the zonal level
- Capex modelling of the transmission networks done on a unit-cost basis
- Asset optimisation to consider the following key points:
  - location and capacity ranges of the offshore wind resources and possible onshore network connection points
  - timing of the project developments, connection requirements, network reinforcements, onshore generation
  - characteristics and readiness of network technology
  - required level of system reliability and security of supply (SQSS)

Generic Analysis

- Useful to establish materiality of network capex benefits
- To have validity these need to be representative of real offshore windfarm transmission systems
- Objective is to quantify relative value of:
  - Coordination 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

enterprise with energy

Generic Analysis – Key Messages

- The right transmission network design depends on the overall view of risk and benefit of the relevant stakeholders
- The physical arrangement of the site will not have a significant effect on the overall transmission capex
- The development sequence of the individual windfarm blocks needs to be co-ordinated to ensure efficient transmission investment
- The spread of capex for the full build-out is within 10-20%,
  - there is no relevant differentiation between the different network designs on a total capex basis
  - differentiation therefore needs to consider the other value drivers

Generic Analysis – Key Messages

- Higher capacity HVDC links (2GW) may have capital cost advantages due to the reduction in the number of export cables required
  - needs to be traded off against the higher level of anticipatory investment required and against the reduced level of phase development system security
  - 2GW VSC HVDC technology faces a number of challenges both in terms of converter technology, physical platform size and cable capacity
- Offshore interconnection may provide an alternate means to reinforce onshore boundaries in a cost effective and deliverable manner
  - The relative benefit depends on the wider works otherwise required for reinforcement and any future option value that those works may provide
- The value of combining an Interconnector with an offshore windfarm will depend on environment and trading strategy

Zonal Case Studies

- Each zone is assessed independently to uncover the significant factors behind the value and benefit of different transmission network options
  - capex from this analysis are then used to develop the aggregate national level transmission costs for further analysis
- The zonal analysis performed as part of this work used the "Radial" and "Integrated" networks as described in ODIS 2010 as the starting point
  - The purpose of this analysis is not to provide a critical assessment of the options put forward in ODIS in order to determine the approved design
- The analysis focused on the key issues within each zone focusing on a full zone build-out keeping perspective on the realistic phased development

Zonal Case Studies - Summary

- Analysis of costs and network indicates that the Round 3 zones can be divided into the following three categories of differing levels of coordination and stakeholders

- Independent Connections
  - Bristol Channel, Isle of Wight, Hastings
- Coordinated to avoid future onshore reinforcements
  - Dogger, Hornsea, East Anglia
- Coordinated with planned offshore reinforcements
  - Moray Firth, Firth of Forth

National Scenarios

- Objective was to assess the impact of differing UK-wide delivery of renewable targets on the likely offshore transmission requirements
  - several possible variations have been collated as ‘National Scenarios’
- These offshore wind generation scenarios provided by Ofgem and DECC represent possible levels of offshore wind development
  - DECC Renewables Roadmap central range of 11-18GW of offshore wind in 2020
  - These do not reflect a view on the total eventual build-out of offshore wind but are to assess the impact and relative value of different design options

	Scenario A		Scenario B		Scenario C		Scenario D	
Year	**2020**	**2030**	**2020**	**2030**	**2020**	**2030**	**2020**	**2030**
R1/R2/R2ext/STW	9.3	10.5	9.2	10.5	9.1	10.5	9.2	10.5
Round 3	0	4.9	2.5	15.1	8.2	27.1	12.5	35.1
Total Offshore Wind	**9.3**	**15.3**	**11.6**	**25.6**	**17.3**	**37.6**	**21.6**	**45.6**

National Scenarios

- The potential savings from integrated development are most significant under the most ambitious scenarios
  - with the corollary that anticipatory investment and stranding risk is also greatest in absolute terms
- Quantification of anticipatory investment risk involves a high level of subjectivity as to the confidence that generation phases will progress

Pro-rata Base-line (£M)	T1 Capex	T2 Capex	T1 Pre-Construction	T2 Pre-Construction
Scenario A	3,900	3,600	80	70
Scenario B	9,100	8,400	210	200
Scenario C	14,100	12,500	280	320
Scenario D	18,000	15,400	360	390

National Scenarios

- There is value in the other benefits of integrated planning including:
  - deliverability and reliability of the network
  - opportunities for reinforcement of the onshore network
  - integration of international interconnectors
- It is critical to effectively ensure that the correct balance is struck between allowing sufficient anticipatory investment to keep open the options and reducing the risk of high levels of stranded costs
- A robust and consistent process is required to evaluate the options for anticipatory investment at each decision point
- It is also important that appropriate consideration is made as to the other non-technical factors which will influence final network design

Summary: Key Messages

- Integrated solutions that demonstrate the highest level of savings also present some of the highest stranding risk
- Difference in transmission design capex is relatively small compared with the overall costs of offshore generation development
- Differentiation between network design options therefore needs to consider the other value drivers such as:
  - energy availability
  - anticipatory investment required
  - overall deliverability
- To capture potential benefits, a transparent process must exist from the outset to give OFTOs/Developers assurance of how any AI will be treated

Summary: Key Messages

- Under an integrated approach to planning, interconnectors to could utilise some of the available OFTO assets
  - This would offer a capital saving, but would impact on the potential energy deliverability from both sources due to network constraints
  - Cost savings are significant when the capacity of the interconnector is small relative to that of the wind farm
- National NPC savings are in the range of 8%-16% for capex
  - The potential savings from integrated development are most significant under the most ambitious developmental scenarios
  - AI and stranding risk is also greatest in absolute terms

Part of the Petrofac group

Summary: Further Observations

- Onshore generation can also have significant implications on transmission network requirements (onshore and offshore), therefore the generation scenarios used for coordinated network design must recognise the significant uncertainties associated with all generation developments
- There is value in having a defined CBA process for the assessment of offshore network designs, as opposed to the application of deterministic rules as at present with NETS SQSS.
- It is vital that offshore networks are considered in conjunction with onshore networks in order to achieve a coordinated national transmission system that efficiently integrates all generation sources, both onshore and offshore

Thank You

Graeme Bathurst
graeme.bathurst@tnei.co.uk

Stakeholder briefing event – regulatory, commercial and incentive issues and options

Ilesh Patel, Director

Monday 19th December 2011

Agenda

- **Introduction**
- **Context**
- **Approach**
- **Findings**
    1. *Benefits and risks of coordination*
    2. *Cost-benefit analysis*
    3. *Potential barriers to delivering coordination*
    4. *Possible measures to address these barriers*
    5. *Assessment of Illustrative policy packages*
- **Summary of key conclusions**

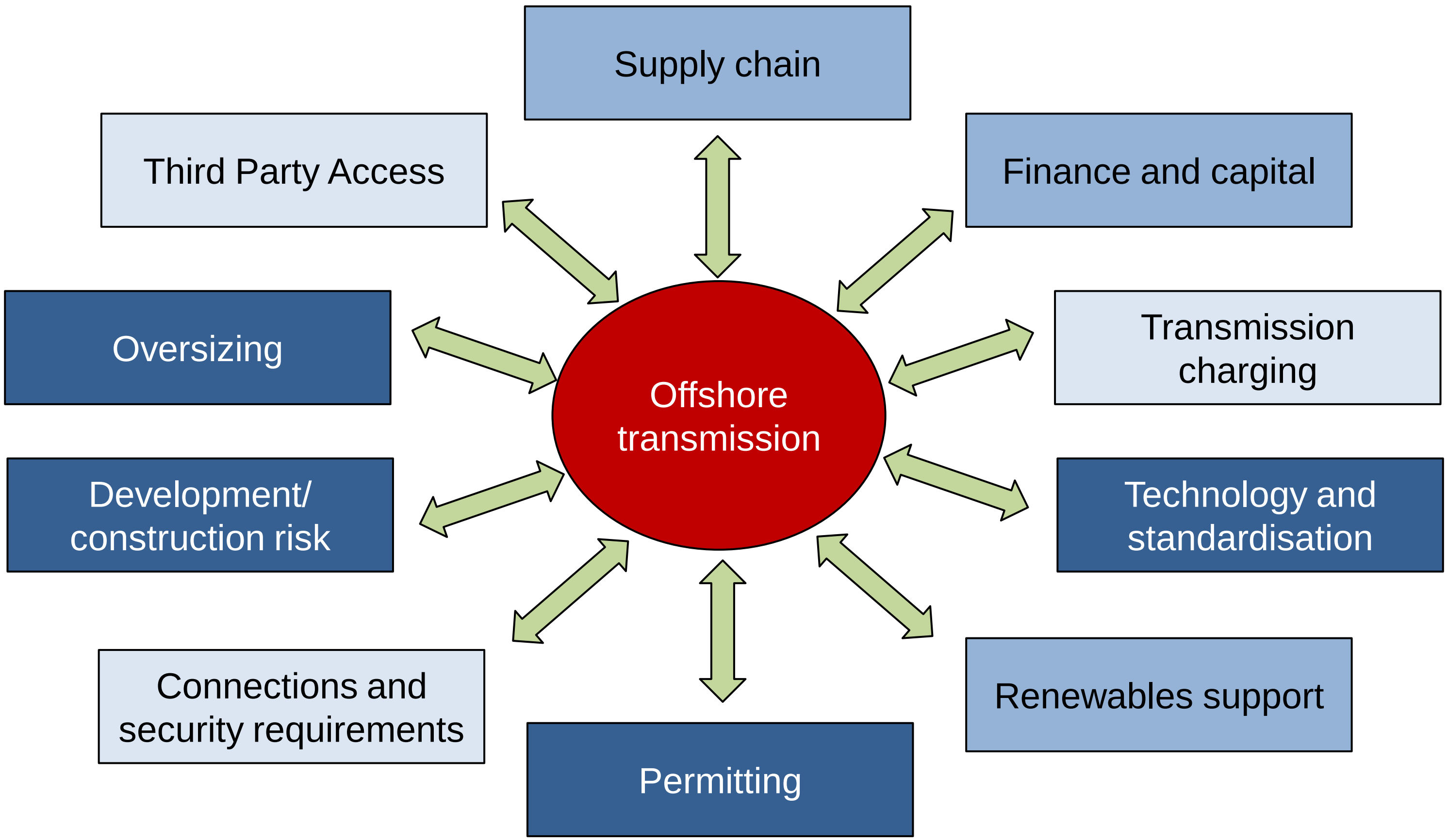
Introduction

REDPOINT

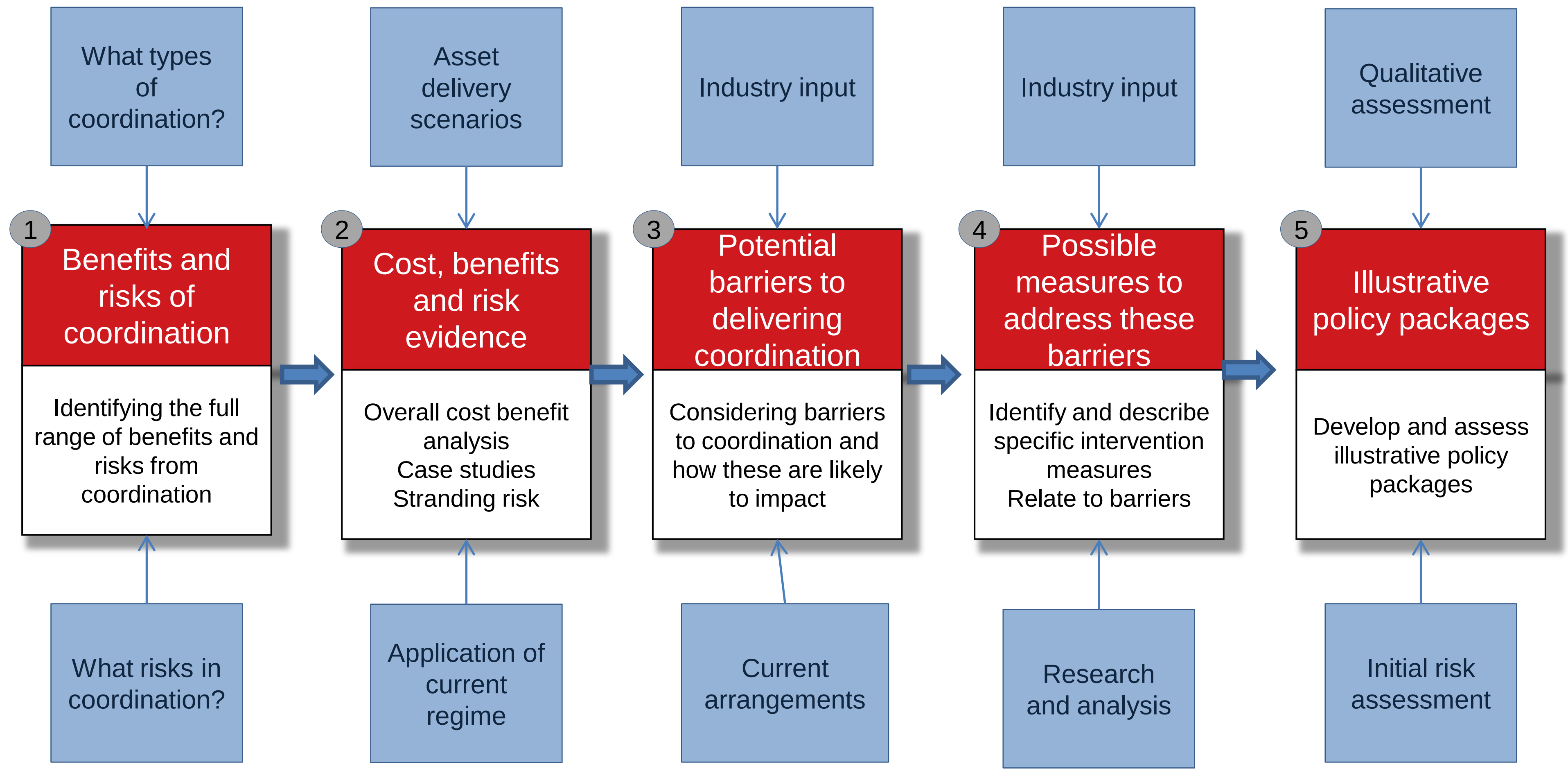
- Redpoint was commissioned by Ofgem to assess the regulatory framework, commercial arrangements and economic incentives for coordination in offshore transmission.
- Review focused on collating and identifying barriers to coordination and integration across all key facets of the current regime, assessing risks and those best placed to manage them, quantifying costs-benefits and developing potential solutions.
- We have sought and benefited from the views of a number of industry participants both on a bilateral basis and through the various Offshore Transmission Coordination Group (OTCG) meetings and expert workshops convened by Ofgem and DECC.

Context

- Analysis takes into account the considerable uncertainty in offshore deployment, other related regulatory reviews and key development issues



Approach


What types of coordination?
Asset delivery scenarios
Industry input
Industry input
Qualitative assessment
1
Benefits and risks of coordination
Identifying the full range of benefits and risks from coordination
2
Cost, benefits and risk evidence
Overall cost benefit analysis
Case studies
Stranding risk
3
Potential barriers to delivering coordination
Considering barriers to coordination and how these are likely to impact
4
Possible measures to address these barriers
Identify and describe specific intervention measures
Relate to barriers
5
Illustrative policy packages
Develop and assess illustrative policy packages
What risks in coordination?
Application of current regime
Current arrangements
Research and analysis
Initial risk assessment

1. The benefits and risks of coordination - What does coordination involve?

REDPOINT

A coordinated approach to developing transmission networks requires that expansion takes into account the full range of developments on the network, trading off the benefits and risks from coordination to arrive at an optimal design.

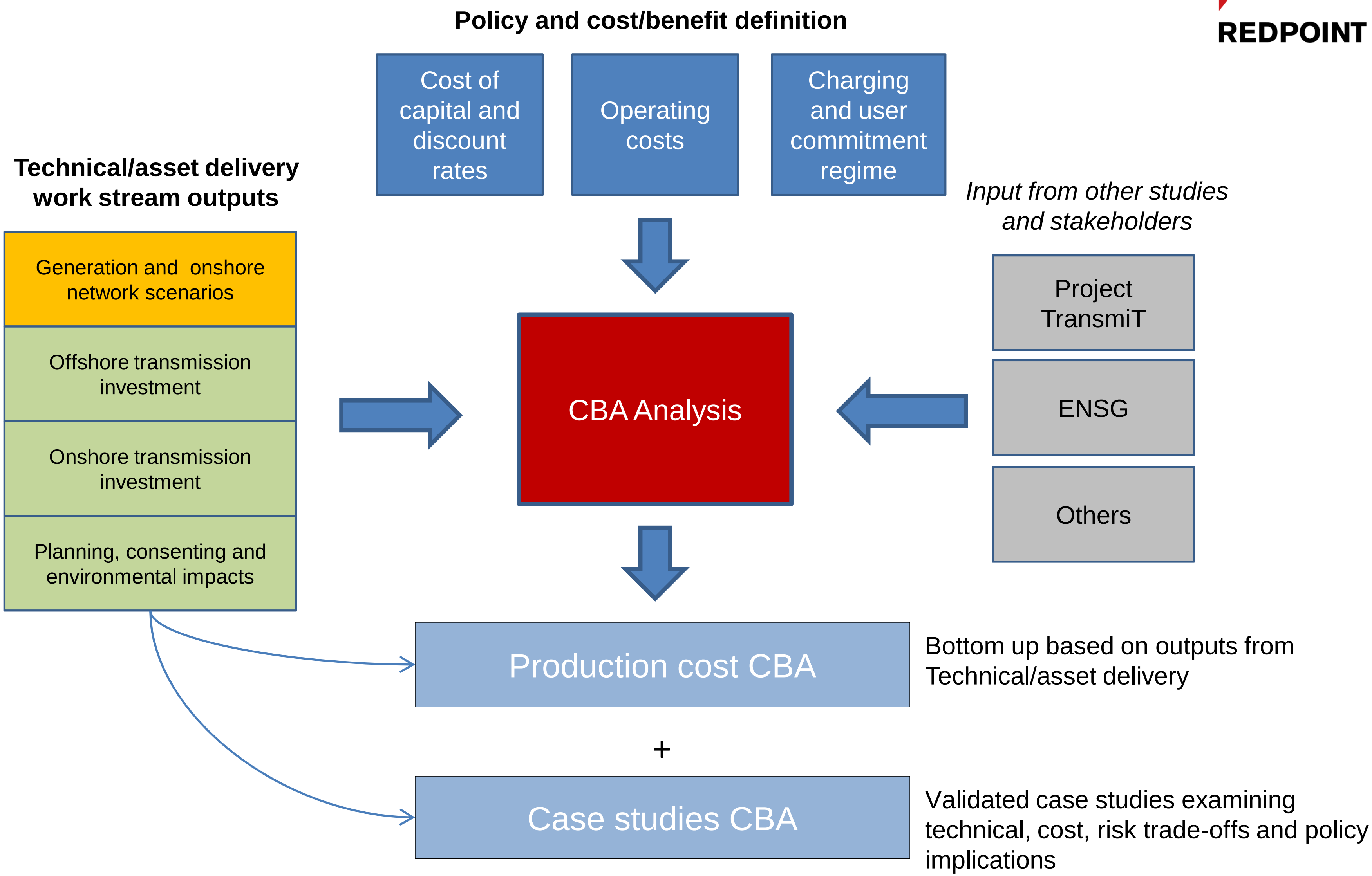
- Four key types of coordination have been identified through the work for the Offshore Transmission Coordination Project:
  - coordination within wind farms (or within zones that are being developed by a single developer),
  - the use of offshore transmission links to address constraints across transmission boundaries in the onshore network,
  - coordination across different offshore zones, *and*
  - linking with international interconnectors.

1. The benefits and risks of coordination - summary

REDPOINT

Potential benefits	Potential risks
– Reduced total capital expenditure, – Reduced operating expenditure, – Reduced local environmental impacts, – Fewer planning and consenting issues, – Reduced connection timing risk for generators once a coordinated network is established, – Increased transmission system flexibility and security of supply, and – Greater consistency with wider European developments (eg flexibility to link with other networks including international networks and the trade which may result).	– Stranding risks associated with anticipatory investment, – Technological challenges, – Increased project complexity, and – Potential temporary reduction in transmission system flexibility and security of supply for early phases.

2. Cost-benefit analysis - overall approach



2. Cost-benefit analysis – key conclusions

REDPOINT

	NPV to 2030 £m (real 2011)		Reduction in cost from coordination	
	T1 (radial)	T2 (coordinated)	NPV £m (real 2011)	As a proportion of radial NPV
Scenario A	£5,784	£5,290	£494	8.5%
Scenario B	£12,468	£11,396	£1,072	8.6%
Scenario C	£19,275	£16,908	£2,367	12.3%
Scenario D	£23,976	£20,483	£3,493	14.6%

- Benefits from a coordinated build increase significantly with the total volume of generation capacity
  - Under Scenario D, there are net present value benefits of almost £3.5 billion from a coordinated build if perfect foresight is assumed.
  - However, under Scenario A there are only £500 million in net present value gains. This is due to the reduced scope for coordination where there is less offshore generation.
- Stranding risk not quantified
  - Analysis from specific case studies of Round 3 zones shows that stranding risk can be significant for specific assets.
  - West of Isle of Wight zone - a 50% increase in investment is required during the first stage of build to achieve a coordinated solution, creating significant stranding risk of more than £100 million on just over £200 million of assets.

3. Potential barriers to delivering coordination

REDPOINT

Problem	Commentary
Anticipatory investment process uncertainty	Lack of clarity on process and adequacy of existing tools to give certainty on funding for anticipatory investment to keep open desirable coordinated outcomes
Network optimisation	An optimised network would allow a given volume of generation and demand to be connected efficiently and economically including a coordinated approach where this is beneficial (taking into account current and future consumers)
Risk–reward profile of coordinated investments	Even if there is an adequate anticipatory investment structure, it is not clear whether the risk–reward profile (given TNUoS charging and user commitment rules) for coordinated investments will be acceptable for generators
Interconnector-OFTO regulatory interface	Uncertain/possibly inadequate regulatory framework for interconnector-OFTO connections
Planning and consenting barriers to anticipatory investment	Planning/wider consenting process for anticipatory investment needed to facilitate coordination can be unclear (IPC guidance could prevent consenting beyond firm need) or can involve multiple applications
Technology risks and asset incompatibility	There could be a need for some standardisation to help ensure interoperability and extendibility, particularly if many players and manufacturers are involved. Some of the technology that is key to unlocking cost savings (and means coordination becomes beneficial) is not yet available and the supply chain is relatively small

4. Possible measures to address barriers

REDPOINT

Potential problem	Potential solutions
Anticipatory investment process uncertainty	Clarify regulatory arrangements; Enhanced AI process – pre-approved; Enhanced AI process – contracted
Network optimisation	Relax 20% cap; Extended ODIS; Expanded NETSO role; TO delivery of active network; Regional OFTO; Central authority blueprint
Risk-reward profile of coordinated investments	Clarify regulatory arrangements; Sharing of risk with consumers and/or OFTOs; Open season arrangements; Consumers underwrite
Interconnector-OFTO regulatory interface	Regulatory compatibility
Planning and consenting barriers to anticipatory investment	Facilitate anticipatory investment in planning process
Technology risks and asset incompatibility	Standardisation of operating parameters; Standardisation of assets; Sharing of new technology risks

5. Illustrative policy packages - overview

REDPOINT

- *Developed illustrative policy packages through consideration and analysis of the various intervention measures described above and their capacity to address the identified problems*
- *The packages combine a number of different policy measures and represent different approaches and are presented for illustrative purposes and to facilitate qualitative analysis*
-
  - **Package 1– 'Inform and enable'**
    - incremental changes to the existing regime, with the emphasis on clarifying arrangements for coordinated investment.
  - **Package 2 – 'Market led evolution':**
    - builds on the first package by proposing an additional role for a central body and changes to user commitment.
  - **Package 3 – 'Regional monopoly'**
    - facilitates coordination through a regional (or zonal) OFTO, with regular price controls as per the onshore regime.
  - **Package 4 – 'Blueprint and build'**
    - establishes a common vision of a coordinated offshore transmission network through an independent central body empowered to establish a blueprint.

5. Illustrative policy packages - assessment

REDPOINT

- *Where modest assumptions are made on the development of offshore generation and/or the outlook is highly uncertain the incremental changes in packages 1 and 2 offer benefits versus the current arrangements with relatively low implementation and stranding risk.*
- *Where significantly more ambitious development of offshore generation is expected with some certainty, then packages 3 and 4 can offer significant benefits but at significantly increased regulatory, implementation and stranding risk and with major changes required to the current arrangements.*

Criteria	Package 1 Clarify and inform	Package 2 Market led	Package 3 Regional monopoly	Package 4 Blueprint and build
Support timely build of offshore generation to 2020 (inc. costs to generators)				
Support timely build of offshore generation to 2030 (inc. costs to generators)				
Local environmental impacts				
Reliability of GB transmission network				
Flexibility in system operation				
Deliver economic benefits of coordination				
Promote economic efficiency through charging and role of markets				
Impact on innovation/dynamic efficiency				
Risk of stranded transmission assets				
Impact on supply chains				
Financeability of offshore generation				
Financeability of offshore transmission				
Breadth of potential investors				
Optimise onshore reinforcement costs				
Risk for consumers				
Risk of excessive rents				
Efficient allocation of risk				
Flexibility to deal with range of future possibilities				
Compatibility with current arrangements/risk of disruption				
Level of complexity and administration cost				

Summary of key conclusions

REDPOINT

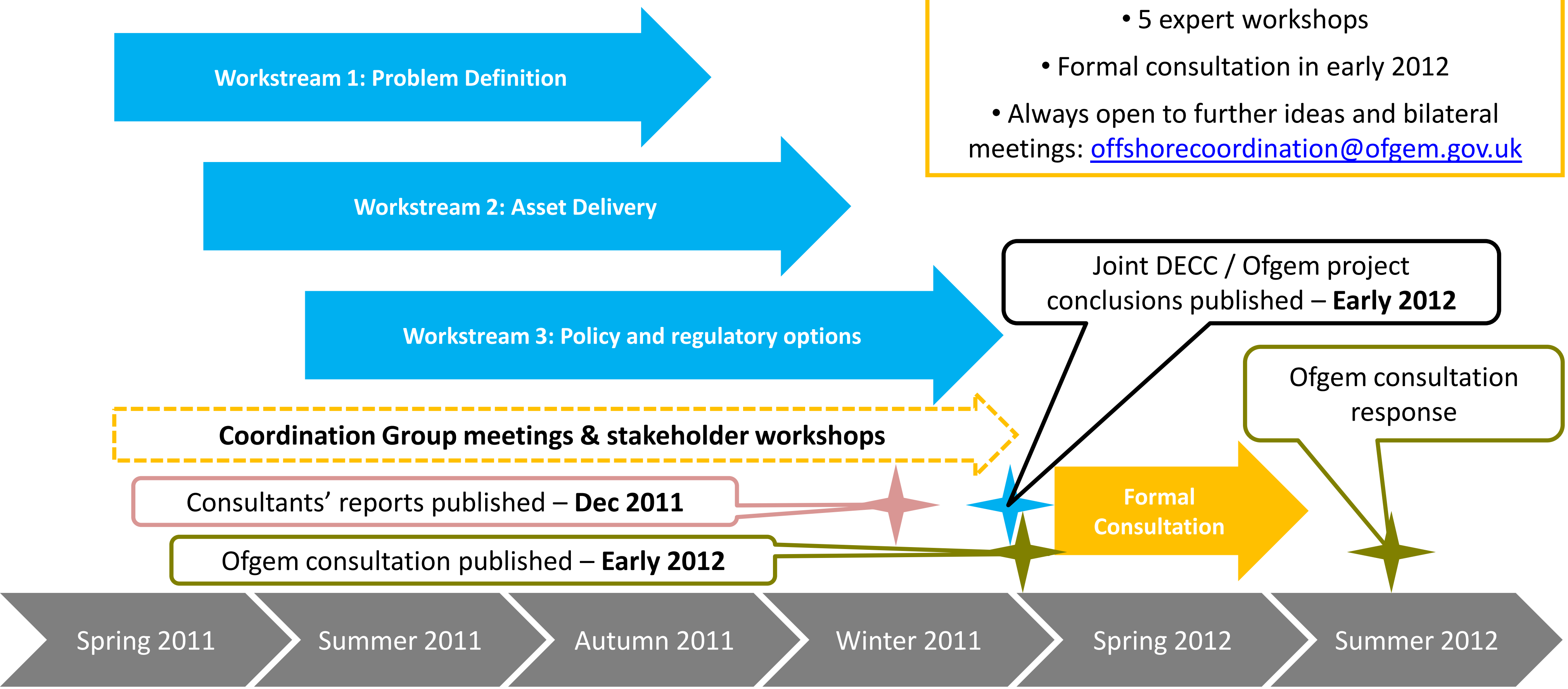
- Current arrangements are likely to deliver some coordination, but the extent will be limited by the barriers identified
  - uncertainty about the anticipatory investment process
  - user commitment
  - potential planning barriers
  - technology risks and asset incompatibility
  - regulatory regime does not facilitate linking with international interconnectors
- Potential remedies
  - guidance on anticipatory investment for transfer values and perhaps a more explicit *ex ante* approval process
  - changes to user commitment (e.g. CMP 192) and adaptation of the existing offshore charging methodology to accommodate coordinated developments
  - regulatory compatibility between offshore transmission and interconnectors
  - anticipatory investment facilitated in the planning process
  - standardisation of voltage and control systems through an industry process.
- Significant uncertainty about future build of offshore generation poses a fundamental challenge for a more centralised approach.

Thank you

Ilesh.Patel@redpointenergy.com
+44(0)7887795924

Wrap up / Next steps

Coordination Project Plan



Stakeholder engagement

- 7 OTCG meetings (final one 24 January)
- 5 expert workshops
- Formal consultation in early 2012
- Always open to further ideas and bilateral meetings: offshorecoordination@ofgem.gov.uk

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