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DEVELOPING EARLY MODELS FOR INTRODUCING COMPETITION IN ONSHORE ELECTRICITY TRANSMISSION NETWORKS

FINAL REPORT FROM THE ENERGY NETWORKS ASSOCIATION WORKING GROUP

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Glossary

Term	Definition
CATO	Competitively Appointed Transmission Owner
CBA	Cost Benefit Analysis
CDM	Construction, Design and Management
ECIT	Extending Competition in Electricity Transmission
EISD	Earliest In-Service Date
ENA	Energy Networks Association
EPC	Engineering Procurement Construction
EUR	Euro currency
DCO	Development Consent Order
FEED	Front End Engineering Design
FES	Future Energy Scenarios
GB	Great Britain
GBP	British pound currency
IDC	Interest During Construction
IP	Intellectual Property
ITPR	Integrated Transmission Planning and Regulation
ITT	Invitation to Tender
IWG	Industry Working Group
Ofgem	Office of Gas and Electricity Markets
OFTO	Offshore Transmission Owner
OHL	Overhead Line
MW	Megawatt
NOA	Network Options Assessment
RIIO	Revenue = Incentives + Innovation + Outputs
SO	System Operator
SQSS	Security and Quality of Supply Standards
TO	Transmission Operator
TRS	Tender Revenue Stream
UGC	Underground Cable
USD	United States dollar currency

1. Introduction

1.1 The onshore electricity transmission networks of Great Britain are currently owned and operated by three regional providers, Scottish Hydro Electric Transmission, Scottish Power and National Grid Electricity Transmission. The GB energy market regulator, Ofgem, licenses these to operate as regional monopolies with regulated revenue streams.

1.2 Ofgem, the industry and other stakeholders have been considering[1] how, rather than relying solely on the three regional providers, competition might be introduced into the onshore provision of transmission infrastructure, as this could offer the prospect of delivering new assets at lower overall cost to consumers, in the right circumstances.

1.3 Under the proposed regime, new transmission assets that meet certain predefined criteria could, subject to Ofgem's assessment, be the subject of competitive provision by so-called Competitively Appointed Transmission Owners (CATOs).

Early and Late competitive models

1.4 A key issue in developing a competitive process for onshore transmission is to decide where in the typical lifecycle of a transmission project the competitive process should be initiated. Under the so-called 'Late Model' of competition, the process would commence towards the end of the typical project development lifecycle when the initial design and consents have been obtained.

1.5 An alternative approach, the 'Early Model' has also been considered. Under this approach, developers would bid to develop the transmission project at an earlier stage in the project's lifecycle.

[1] The Integrated Transmission Planning and Regulation (ITPR) and Extending Competition in Electricity Transmission (ECIT) projects have been the main regulatory initiatives considering the issues.

1.6 An initial regime of onshore competition, the so-called 'transitional regime', will adopt the Late Model. This is largely because the first wave of new transmission projects under the current RIIO-T1 price control[2] potentially eligible for competition have already developed sufficiently into the lifecycle so as to only be consistent with competition under the Late Model. For new transmission projects under the RIIO-T2 regime, the Late Model could be adopted, building on the RIIO-T1 experience.

1.7 However, it is also recognised that an Early Model could be applied in the enduring regime as a complementary option to the Late Model. Such a model could be beneficial to consumers as, although seen by some as being more complex, it offers the possibility of introducing more innovation in the early stages of the project (e.g. in deciding on the technical solution to meet a specified transmission requirement) and, in so doing, deliver overall lower cost solutions to the benefit of GB consumers.

1.8 As such, whilst the Late Model will be used in the first instance, there is also scope for a complementary Early Model to be developed for use in the enduring regime. As a consequence, an Industry Working Group (IWG) was established under the auspices of the Energy Networks Association (ENA), with the task of developing a workable Early Model for the competitive provision of transmission assets.

Purpose and objectives of this report

1.9 To develop this Early Model, the ENA hosted a series of IWG workshops with interested parties of developers, investors and network providers during Autumn and Winter 2016. Chaired by Ben Graff of National Grid, the remit of the IWG was to develop the details of a workable Early Model for competitive onshore transmission, to complement the Late Model.

1.10 FTI Consulting LLP (FTI Consulting) was appointed to assist the IWG in developing this Early Model and to act as independent facilitators of a series of workshops with National Grid and the IWG. This report, prepared by FTI Consulting on behalf of the IWG, provides details on two possible Early Models of onshore competition in transmission. In doing so, it aims to reflect the broad consensus views of IWG members and to highlight differences of opinion and areas for further work where appropriate, for example in relation to some of the underlying trade-offs required.

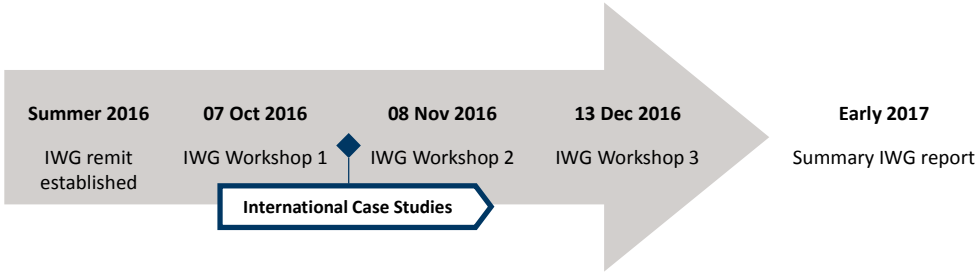
[2] These projects are also referred to as "Strategic Wider Works".

1.11 This report is intended to serve as a basis for further discussions between the IWG, National Grid, Ofgem and other interested parties, regarding a workable Early Model that could be, where appropriate, used in parallel with the Late Model. As part of such discussions, IWG members, National Grid and other parties may wish to respond to consultations that Ofgem or any other party might run in this area. This report should not be interpreted as being binding on any of the IWG participants and it does not in any way restrict them from expressing their views in the future.

Summary of the process

1.12 The process followed in developing a workable Early Model is set out in Figure 1 below.

Figure 1: IWG process and key milestones



1.13 As a first step, the IWG was given a mandate to review a potential Early Model and explore its features with the IWG attendees. The full list of attendees is presented in Appendix 2.

1.14 The IWG focused on different elements of a potential Early Model over a series of three workshops:

- In the first workshop the group developed its Working Group objectives and developed an "activity framework" to use as a basis for further discussion;
- In the second workshop the group used the activity framework to discuss an Early Model variant (based on Ofgem's Early Model) and identified the key lessons from a series of international case studies; and
- In the third workshop the group developed further details of the potential Early Model and discussed the Very Early Model variant.

1.15 Further detail, as well as examples of the outputs from each of these workshops is set out in Appendix 3.

1.16 A first draft of this report was circulated to the IWG members for comments and feedback, a summary of which can be found in Appendix 4.

1.17 In parallel with the workshops, the IWG suggested that, to understand the development of an Early Model in the GB context, it would be helpful to review international experience and precedents and identify consequent lessons learned. This was a key element of the work and the case study findings (full details can be found in Appendix 1) were integrated into the IWG workshop discussions in October and November, as well as into the proposed model designs.

1.18 This report therefore summarises both the IWG workshops and the international experience as set out above.

Restrictions

1.19 This report has been prepared for the benefit of National Grid for use for the purpose described in this introduction.

1.20 This report intends to reflect the combined views of the Industry Working Group as expressed by the participants in workshops that took place on 7 October 2016, 8 November 2016 and 13 December 2016. The views expressed herein do not necessarily reflect the views of FTI Consulting, its management, its subsidiaries, its affiliates, or its other professionals, members or employees.

1.21 FTI Consulting accepts no liability or duty of care to any person other than National Grid for the content of the report and disclaims all responsibility for the consequences of any person other than National Grid acting or refraining to act in reliance on the report or for any decisions made or not made which are based upon the report.

Limitations to the scope of our work

1.22 This report contains information obtained or derived from a variety of sources. FTI Consulting has not sought to establish the reliability of those sources or verified the information provided.

1.23 No representation or warranty of any kind (whether express or implied) is given by FTI Consulting to any person (except to National Grid under the relevant terms of our engagement) as to the accuracy or completeness of this report.

1.24 This report is based on information available to FTI Consulting at the time of writing of the report and does not take into account any new information which becomes known to us after the date of the report. We accept no responsibility for updating the report or informing any recipient of the report of any such new information.

Structure of this report

1.25 This report has five further sections, as set out below:

- In Section 2, we provide an Executive Summary of the report;
- In Section 3, we describe the typical lifecycle of developing a new onshore transmission asset and, in so doing, identify options for the different variants of the Early Model;
- In Section 4, we explain the key design parameters, or 'building blocks', that need to be decided for the Early Model;
- In Section 5, we set out the details of the Early Model that were favoured by the IWG; and
- In Section 6, we set out the Very Early Model variant that was also discussed, but not preferred, by the IWG.

1.26 Our report also has four Appendices:

- In Appendix 1, we set out a number of relevant case studies of competitive models drawn from other electricity markets as well as other sectors;
- In Appendix 2, we present the list of IWG workshop attendees and other stakeholders that were consulted in developing the Early Model;
- In Appendix 3 we set out the IWG workshop process in more detail; and
- In Appendix 4 we summarise the feedback and comments received from the IWG members in response to a first draft of this report.

2. Executive Summary

2.1 The onshore electricity transmission networks in Great Britain are currently owned and operated by three separate regional monopolies. Recently the energy regulator, Ofgem, and other interested stakeholders have been considering whether, rather than rely on the monopoly provision of onshore transmission assets, it might be possible to introduce competition into the sector. Competitive, provision of such assets may in some cases offer the prospect of introducing more innovation into the sector and delivering lower costs, to the benefit of GB consumers.

2.2 This initiative follows the introduction of a competitive process for the provision of offshore transmission assets that connect offshore wind farms to the onshore transmission network. To date 12 different offshore transmission owners (OFTOs) have been created, which own and operate offshore transmission networks worth £2.2bn.[3] Although a useful precedent to be aware of, OFTO examples to date were competed after the construction of the assets in question had been completed, which limits the parallels that can be drawn from them in relation to the competition for the delivery of new transmission assets.

2.3 A key issue in the development of a process to introduce competition is to decide where in the typical lifecycle of an onshore transmission project the competitive process should be initiated. There are two broad options: the so-called 'Late Model' under which tenderers compete to provide the transmission assets to meet relatively detailed technical specifications that have received the necessary planning consents; the alternative, so-called 'Early Model' introduces competition much earlier in the lifecycle of an investment project when only a high level outline of the transmission requirements has been specified.

2.4 To date, Ofgem and the industry have concentrated on the detailed development of the Late Model as it is potentially less complex and has reduced risks for bidders. As such, it can be implemented, and therefore deliver benefits to consumers, more quickly. The relative simplicity and lower risks of the Late Model also offers the prospect of a greater number of tenderers and more intense competition which, in turn, would be beneficial to consumers.

[3] Ofgem website, accessed on 12 January 2017

2.5 However, the Early Model holds the prospect of additional benefits to consumers. Most notably, because only the high level requirements for a transmission solution are specified, it potentially allows competing bidders greater scope for innovation in the way in which GB's transmission requirements are met. This, in turn, may feed through to lower consumer bills and/or a more secure transmission system. However, a significant downside of the Early Model is that it is necessarily more complex than the Late Model – by specifying requirements at a high level only, many more uncertainties of a transmission project would need to be managed by a successful bidder.

Background to this report

2.6 In summer 2016, in recognition of the potential benefits of an Early Model, Ofgem agreed that the Energy Networks Association (ENA) should consider as a work-package whether a workable Early Model could be developed, to complement the Late Model. The ENA asked Ben Graff of National Grid to chair a working group with members of the ENA to develop a workable Early Model to award a licence for a Competitively Appointed Transmission Owner (CATO) to be responsible for a new transmission asset. National Grid commissioned FTI Consulting to support this work.

2.7 Between October and December 2016, the ENA hosted three Industry Working Group (IWG) workshops independently facilitated by FTI Consulting. ENA members and other industry participants, Ofgem and National Grid all contributed to the process, culminating in the proposed Early CATO Model, which the group concluded could be workable subject to additional development of the detailed model design.

2.8 This report summarises the discussion and the conclusions reached by the IWG and, where relevant, paraphrases the relevant comments from the group participants.

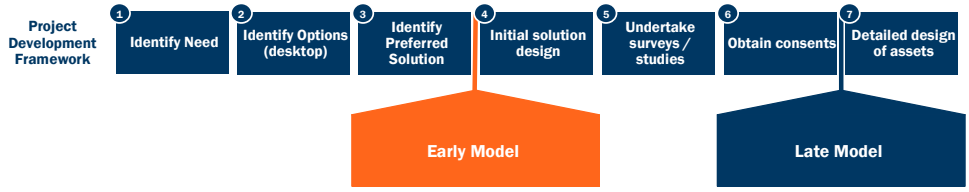
2.9 This Executive Summary sets out in more detail the rationale for the introduction of an Early Model for competition in onshore transmission, the main elements of the proposed model and a view on alternative model options. The next steps recommended by the IWG to be undertaken in the next two to three months are also set out.

The drivers of an Early Model

2.10 As already noted, there are two broad options for developing a model for competition in onshore transmission assets, shown below in Figure 2.

- The **Late Model**, developed by Ofgem, in which bidders compete for an opportunity to construct and operate transmission assets towards the end of the lifecycle of the project, notably after the planning permissions and consents have been obtained. This model will be used for the initial regime of onshore competition, where consenting and pre-engineering activities have already been started by the incumbent TOs.
- An alternative **Early Model** which introduces competition much earlier in the typical lifecycle, so that bidders compete to undertake an initial design of the asset and other preliminary works and obtain the necessary consenting, over and above the activities they carry out under the Late Model.

Figure 2: Early and Late Models: starting points



2.11 Ofgem has identified several advantages of the Late Model including lower risks for potential bidders, as the inherently complex and uncertain planning and consenting processes have already been completed prior to the initiation of the competitive process. Such reduction in the bidders' risk may enable them to compete more strongly on price, for the benefit of consumers.

2.12 However, it has been recognised that an Early Model may also generate potential additional benefits to customers in some circumstances. In particular, the Early Model (recognising that the advantages of an Early Model relative to the Late Model were not discussed by the IWG in detail):

- Has the potential to bring additional benefits and/or cost savings to GB consumers from driving **more innovative solutions**. This is because it allows bidders to compete before the design is fully developed, such that they can compete on a range of different designs and approaches to solutions to address electricity system requirements;
- May also **reduce handover risks** since a single entity (the successful CATO) is responsible for the design, development, consenting, delivery and operation of the asset, rather than separate entities being responsible for different stages of the project development; and
- May also, in some cases, help **avoid unnecessary duplication of some development costs** (which may eventually be passed on to consumers). This is because some bidders in the Late Model may choose to carry out their own analysis and surveys in preparation for the bid submission, rather than rely solely on the work carried out by the incumbent Transmission Operators (TOs), thus partially duplicating some of their work. This issue would be mitigated in the Early Model as the competitive process takes place before the preliminary works have started.

2.13 **International experience** showed that various early models have been successfully applied in other countries for power transmission assets and also in other infrastructure sectors. Although the GB system is different in a number of aspects[4], the evidence indicated that an Early Model could be replicated in the GB electricity transmission sector to emulate the successes achieved elsewhere.

2.14 The key findings from the international case studies included the following:

[4] For example, the GB system differs from the US and Canadian systems in terms of the structure of the regulatory regime and the planning rules.

- Examples from **Canada** in the electricity transmission sector showed that tendering at the high level design stage, early in the lifecycle of a transmission project, has generated cost savings of 22% on average (across several projects) using the System Operator (SO) reference design as the basis for the bid;
- Other examples from the **US** electricity transmission sector showed that even where the SO selects a preferred technical solution and a reference design, this does not preclude bidders from innovating further. For example, additional innovation may be possible by offering variant bids with alternative design options (such as different route of the asset); and
- **UK**-based precedents from other infrastructure sectors (for example, the London Bank tube station project) showed that finance savings can be considerable and that value can be created by incentivising parties to increase the benefits of an asset (rather than just minimising costs). Also, relative to the Late Model, there is evidence to suggest that, by having a single party responsible for the end-to-end process, there are greater incentives to accelerate the consenting process.

2.15 Based on the above, the IWG agreed that a workable Early Model would provide a useful **complement to the Late Model** and could be used, where appropriate, to deliver benefits to GB consumers.

Main components of the Early Model

2.16 The IWG explored a number of Early Model options. Its view is that the best basis for further discussion is a variant of the Early Model that was initially developed to a high level by Ofgem. The key features of this proposed workable Early Model identified by the IWG relate to three key areas:

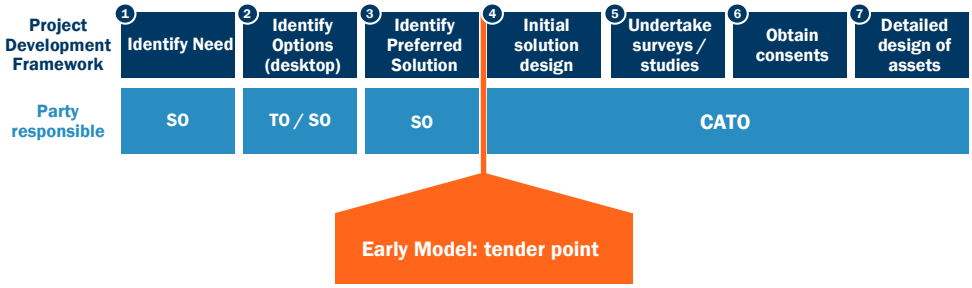
- the roles and activities of different parties,
- the tender design parameters; and
- the commercial incentives for CATOs.

2.17 We briefly summarise the key design features of each area in the following sub-sections.

Roles and activities

2.18 In the Early Model, the key activities at the start of the project lifecycle are undertaken by a number of players, including the SO, incumbent TOs, CATOs and Ofgem, as summarised in Figure 3 below.

Figure 3: Key roles and activities in the Early Model



2.19 As Figure 3 illustrates, in line with the current (non-competitive) arrangements, the **System Operator** first identifies a specific system need and chooses a **preferred solution** from the potential options that incumbent TOs propose against the system need.[5] The main new element is that, for projects to be competitively tendered, the SO defines a '**reference design**' of the preferred solution. The reference design specifies a broad definition of the asset class required (e.g. a transmission line, as opposed to storage or a reduced-build solution), the geographical start and end point of the asset, the required 'in-service' date and the required capacity.[6]

2.20 Subject to simple pre-qualification criteria and process, **CATOs competitively bid** for an opportunity to deliver an asset to meet this specification. The successful bidder would then be responsible for developing and delivering the transmission asset from this point onwards, i.e. the bidder would carry out the initial solution design, surveying, consenting, construction, delivery and operation of the asset.

2.21 **Ofgem** would **decide whether individual projects should be subject to a competitive process** at an early stage (following a recommendation from the SO as to whether the assets meet the competition criteria). Ofgem also runs the **competitive tender** and selects the winning CATO. The CATO earns exclusivity over the project delivery activities, as long as the project need remains in place and the CATO's costs do not exceed a pre-defined threshold.

5 This corresponds to the current NOA process.

6 Assuming a transmission line is chosen as the asset class identified as the preferred solution by the SO, it would be the CATO who would propose the specific type of transmission line (e.g. AC OHL, AC underground cable or HVDC).

Tender parameters and evaluation

2.22 At the point at which the Early Model envisages the competitive process occurring there are significant uncertainties which need to be considered. The two principal uncertainties are:

- First, the **need for transmission projects is highly uncertain**. Given long lead times, transmission investment needs to occur against a background of a highly uncertain evolution of GB generation and GB demand requirements. A decision to invest in a transmission asset needs to be undertaken recognising that it might not, because of changes in expected generation and demand outturn, be required. The exact capacity requirements may also change over time for the same reason. Hence, throughout the lifecycle of a project there is a risk – albeit a risk that is reduced as the project progresses – that the project may be cancelled.
- Second, the **cost of transmission projects is also highly uncertain**. Notably, the uncertainties of the consenting process mean that the outturn costs of a proposed project may vary significantly from the initially expected costs as result of changes required to meet planning requirements.

2.23 The key challenge in developing the design of the Early Model is to consider ways in which these inherent uncertainties can be managed in a competitive environment in a way that is optimal for consumers.

2.24 This is in contrast to the OFTO regime and the Late Model of onshore transmission. In both these cases, the need for the asset is definitive and the cost uncertainties relatively low so that relatively simple bidding approaches can be used in the competitive process. Crucially, it means that such approaches cannot be applied directly to the Early Model. Instead, to manage the uncertainties, more complex bidding mechanisms are required.

2.25 In particular, an appropriate balance of cost flexibility needs to be incorporated into the bidding and assessment process such that CATOs face the right incentives to deliver cost savings for consumers.

2.26 As a result, in the Early Model, the bids submitted by CATOs include both quantitative and qualitative elements.

- The **qualitative elements** include, for example, the project narrative, deliverability and timelines, innovation, and a demonstration of system security compliance.
- The **quantitative (cost) elements** include fixed bids for preliminary works and best indicative bid for construction and operation, both subject to a range of cost re-openers.

- The **quantitative (financing)** elements include cost of equity, cost of debt and gearing.

2.27 Recognising the cost uncertainty inherent in the Early Model, CATOs would be allowed to bid a range of costs ('**cap and floor**') as opposed to a point estimate, both for capex and opex. Within the range of the cap and floor, the CATO's commercial risk would be partially shared with consumers.

2.28 In addition, to encourage bidders to reveal their true risk appetite and confidence in their cost estimates, the Early Model would require CATOs to bid on '**sharing factors**', i.e. the extent to which any additional unplanned costs of the project would be absorbed by the CATO or passed on to consumers. The IWG concluded that the **principle of a 'pain and gain' sharing mechanism** was appropriate, but that the detailed design (e.g. specific percentages and differentiation by type of cost) would need to be developed carefully to ensure appropriate behaviours were being incentivised.

2.29 CATOs would be reimbursed for their costs incurred during preliminary works (within their bid envelope), retrospectively and on an annual basis. For the construction works, the funding would only be provided after the delivery of the asset and would include the costs incurred plus Interest During Construction (IDC).

Commercial incentives

2.30 To manage the **cost uncertainties**, Ofgem would need to retain an option to re-tender any project at a later stage in response to material (e.g. 25%) increases in the CATO's projected costs relative to its winning bid. This option would be appropriately constrained and could include an allowance for a change in project scope, for example due to a change in system need.

2.31 To manage **need uncertainties,** in situations where the project was considered no longer necessary because of changes in generation and demand background, the CATO would be compensated for the costs incurred or committed up to the point at which a cancellation notice was issued. The CATO's construction revenue stream would not commence until the asset is available for use, incentivising timely delivery of the project.

2.32 One particular advantage of the Early Model is that the incentives for project **delivery** are well aligned throughout the project lifetime, as the same entity (the winning CATO) is responsible for the project design, consenting and asset delivery. The CATO is also responsible for the ownership and maintenance of the asset over its entire lifetime.

2.33 IWG discussions on the Early Model highlighted a trade-off between the incentives for CATOs to innovate on the project design and the benefits of sharing new innovative ideas with other parties, for the benefit of consumers. The IWG agreed that **Intellectual Property (IP) rights** should be protected at the tender stage to ensure bidder participation, although further thinking would be required on the detailed arrangements.

Alternative options

2.34 The Early Model set out above represents the broad consensus reached by the IWG during the workshops. For each component of the model, a number of other alternatives were explored, but they were thought to be less workable than the option outlined above.

2.35 The group also explored a specific variant of the Early Model, referred to as the **Very Early Model**. Under this variant, the **tender process starts even earlier**, as soon as the SO identifies a system need. This means that instead of bidding against a preferred solution and its 'reference design', would-be CATOs directly **bid potential solutions** to meet a given system need identified by the SO. For a number of reasons, including greater uncertainty on costs, project need, bid assessment and financeability, the IWG found **the Very Early Model to be less workable than the Early Model**.

2.36 Other options and issues discussed by the IWG participants included:

- **Pre-qualification process.** The group discussed the best way to run a process that would help accelerate the project timelines, while improving transparency and simplicity of the bid evaluation.
- **Bid parameters.** The group also discussed whether CATOs should bid their own cost proposals, or whether the bids should be defined against a set of industry standard ('Blue Book') costs.
- **Incentives for delivery.** The group discussed the appropriate type and strength of incentives for CATOs to deliver assets on time and within budget. These related to the timing of funding (cost recovery), the risk of projects being re-tendered, penalties for late delivery, and cost re-openers.

2.37 For a number of these issues, the group identified a common view on the best way forward, but several issues were thought to require additional analysis before forming a definitive view on the preferred option.

Next steps

2.38 Having articulated this workable Early Model, the IWG concluded that the appropriate next steps over the next couple of months would be for:

- This IWG report to be shared with Ofgem; and
- Ofgem to prepare a consultation on the design and implementation of the Early Model for the enduring onshore competition regime, to enable the ideas set out here to be reviewed and assessed more widely by the industry.

2.39 Following the consultation process, the analysis could be refined further, with a view to developing a formal basis for the Early Model, as a complementary approach to the existing Late Model.

3. Project Lifecycle

- **This section develops a framework for assessing the onshore competition models.**
- **Common across all transmission assets, there is a generic set of 11 project lifecycle activities, starting from the identification of a need for an asset, through development, to construction and delivery, with key roles currently played by the Transmission Owners, System Operator and Ofgem.**

3.1 Regardless of the particular asset type in question, investments in transmission assets tend to follow the same set of processes, or lifecycle. It commences with the identification of the need for a new asset and completes with the delivery of the new asset. The IWG's task was to consider where in the earlier part of the lifecycle competition should be introduced and to develop the details of how this competition might work in practice.

3.2 Before developing the details of a competitive model, it was agreed that a sensible starting point was to establish and agree the activities that typically need to be undertaken over the course of an investment in a transmission asset.

3.3 Once this was established and agreed, the IWG then identified possible options for where in the agreed lifecycle the competitive process could commence, as well as identifying some of the key issues associated with the Early Model in order to develop the necessary details.

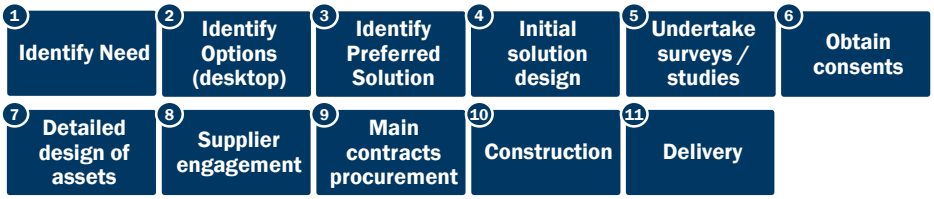
3.4 Therefore, this section sets out:

- A description of the key activities in a project lifecycle;
- Options for the introduction of competitive models in that lifecycle; and
- Key issues that need to be addressed in relation to the lifecycle of the competitive model.

Key activities in project lifecycle

3.5 The IWG identified 11 key steps in the typical lifecycle of a project. These are set out below in Figure 4.

Figure 4: Project lifecycle key activities



3.6 The activities set out in Figure 4 above are carried out by different parties, including the TO, SO and, in a competitive world, the CATO. Although they are ordered sequentially, for ease of exposition, some activities may in fact occur concurrently or be undertaken repeatedly. For example, changes to the project requirements may require that some of the activities are partially repeated before the final asset is delivered.

3.7 Similarly, some of the activities may be undertaken in parallel – for example, developers may choose to engage with certain key suppliers at the design stage of the project to reduce costs and to ensure deliverability of the project.

3.8 In the remainder of this subsection we briefly describe the nature of each of the activities, the parties responsible for the individual activities, and the key inputs and outputs from each stage. These activities describe the current arrangements, that is, without CATOs.

Stage 1: Identify Need

3.9 Under the first stage, the SO performs a **forward looking assessment on future levels of transmission congestion** across all the system boundaries, using the four Future Energy Scenarios (FES).[7] Each of these scenarios reflects different inputs in terms of the fuel costs, demand and supply of electricity and transmission capacity based on the FES (which is updated annually).

3.10 Using the four scenarios, the SO then identifies the **system requirements** in terms of additional MW capacity and/or asset replacement across each boundary to meet the relevant Security and Quality of Supply Standards (SQSS). Based on this, the **SO then articulates a system need** (if any) for a boundary reinforcement at specific locations on the network.

3.11 The SO also, at this stage, identifies any 'within boundary' upgrades that might be required.

[7] Note that Stages 1 – 3 described in this section correspond to the existing NOA process.

Stage 2: Identify options (desktop)

3.12 In the second stage, the SO issues **System Requirement Forms** which are used by the incumbent TOs as a basis for undertaking high level system analyses and desktop surveys (with occasional on-site surveys) to produce a **range of possible technical solutions** to meet the system need. These may include:

- Reinforcement of an existing asset;
- Reconfiguration of an existing asset;
- Construction of a new transmission line; or
- Another asset-based solution.

3.13 Using the analysis described above, the incumbent TOs then revert to the SO by offering potential solutions to meet these system needs. These options are filtered by the SO through an **initial assessment of high-level risks** and their feasibility.

3.14 In parallel, the SO may also offer potential solutions (for example non-asset-based solutions such as availability contracts or inter-trip services) to meet the system needs.

Stage 3: Identify Solution

3.15 At this stage, and in line with the existing Network Options Assessment (NOA) processes, the SO reviews the menu of options it receives from the TOs.

3.16 Typically, this assessment would be based on the proposed options' costs of construction (as estimated by the TO), the earliest in-service date (EISD), and forecast reductions in congestion costs.

3.17 The SO uses a **single year least-regret methodology** to produce a cost-benefit analysis (CBA) on each option, and to decide whether to **proceed, not proceed or to delay the decision** on any given option. One or more options may be selected, for example in cases where there is significant uncertainty around the comparative advantages of different options but the initial development costs are relatively low. The SO then identifies the preferred solution.[8]

[8] Under competitive arrangements, the SO also defines a 'Reference Design' specifically for the preferred solution that bidders can bid against.

Stage 4: Initial solution design

3.18 In this Stage 4, the TO will undertake **layout drawings** and decide on the **functional specification** of its solution. This stage is likely also to involve initial desk-based studies and site visits where appropriate. The TO identifies technical or geographic constraints and delivery timing requirements, making use of standard design solutions to produce a **high-level design** and time for delivery.

Stage 5: Undertake surveys /studies

3.19 At this stage, the TO undertakes a range of activities, including, for example, route corridor and environmental **impact assessments**, while continuing on-site visits as necessary. The TO also considers the relevant technical, environmental and legal risks, and possible mitigation options. For example, the TO may consider whether the project could impact upon special areas of conservation and what the implications may be for project deliverability.

3.20 Also at this stage, the TO typically carries out a series of **stakeholder consultations** (with local communities and other relevant organisations) and uses this information to feed back into the project planning.

3.21 This set of activities then enables the TO to:

- Develop a clear understanding of the project's constraints;
- Refine the project's cost estimate; and
- Prepare for the planning permission and consenting process.

Stage 6: Obtain consents

3.22 At this stage, the TO seeks to obtain all necessary **planning permissions and land rights** required for the project, which typically includes Development Consent Order(s). Where necessary, the TO may also use Compulsory Purchase Orders.

3.23 The TO also undertakes all necessary consultations as per Section 42 of the 2008 Planning Act (or Section 37 of the Scottish Electricity Act 1989), using proposed design variants (including limits of deviation).[9]

3.24 Upon successful completion of this stage, the TO has a **fully consented, well-defined project** to carry forward.

[9] When discussing the potential competitive arrangements, the IWG participants noted in relation to Stage 6 that during consenting, several options may need to be proposed, rather than one preferred option in order to allow the CATO adequate flexibility in project delivery.

Stage 7: Detailed design of assets

3.25 Having obtained the relevant consents and refined its delivery timelines, the TO then develops a **detailed design** of the assets. This includes for example:

- Detailed component designs;
- Layout drawings;
- Logistics planning; and
- Specification of construction techniques.

Stage 8: Supplier engagement

3.26 At this stage the TO starts to identify potential suppliers, entering into initial scope discussions and appraising costs. This results in a **refined project cost estimate**. The TO would also typically begin to book manufacturing slots with some of the main suppliers.

Stage 9: Main contracts procurement

3.27 In this stage, the TO initiates the main contract procurement process. It would typically issue and begin to evaluate tenders for suppliers, subject to the delivery timelines required for the asset itself and the planning permission time limits.

3.28 At the end of this stage, the TO would have the necessary **Engineering Procurement Construction** (EPC) **contracts** (or other contracting models) in place and be ready to commence the actual delivery of the required assets.

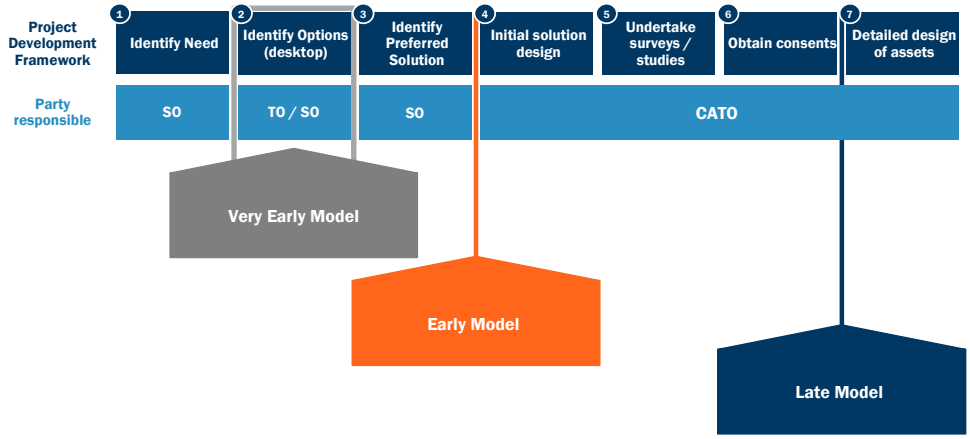
Stage 10 and 11: Construction and Delivery

3.29 Finally, the TO completes construction and delivery of the transmission asset, thus reaching the **end of project development**. Under the existing non-competitive arrangements TO would often use a competitive process to appoint third party contractors to carry out these two stages of the work.

Models for competition

3.30 Using the activity framework described above, the IWG has identified three possible variants of models for competition, each starting at a different point along the project lifecycle. These are shown below in Figure 5.

Figure 5: Potential variants of competition models



3.31 In all of the model variants considered, the SO remains responsible for identifying the system need. However, the three model variants differ in terms of the key roles and responsibilities by different parties.

3.32 In the **Very Early Model**, the competitive process takes place during Stage 2 – Identify Options. In this variant, CATOs (rather than just the TOs as is the case currently) are responsible for identifying and proposing **potential solutions to an identified system need**, which may include different types of asset or non-asset-based solutions. A winning CATO is then responsible for the remainder of the project lifecycle activities.

3.33 In the **Early Model**, a competitive tender takes place against a 'reference design' for a **preferred solution identified by the SO**. A winning CATO is then responsible for the initial design (Stage 4) and the remainder of the activities, including obtaining consents for the project.

3.34 In the **Late Model**, the tender takes place **after the consenting** of the project has been obtained. This variant of the model is the closest to the OFTO arrangements insofar as the project uncertainty is significantly reduced by the time the consents and planning permissions are in place.

Key lifecycle issues to address

3.35 The IWG identified two key issues that need to be addressed in relation to the lifecycle of a workable Early Model (the issues related to the proposed Early Model itself are considerably more complex and numerous, as set out below in Section 4). These issues are the management of uncertainty over the project lifecycle, and the definition of a 'reference design'. These are summarised in turn below.

Issue 1: Uncertainty management

3.36 The IWG noted that the certainty of the investment need[10] changes over the project lifecycle. As the development of any given asset progresses, the uncertainty regarding future electricity demand and generation profiles diminishes over time (although it never disappears altogether). In parallel, any uncertainty around the cost of the asset is also reduced over time.

3.37 The two major uncertainties around the electricity demand and supply in the future means that there is a constant uncertainty as to whether a particular transmission asset will actually be needed at a particular point in time in the future. This uncertainty means that the precedent from the OFTO experience of the tender process will not always be relevant.

Issue 2: Reference design

3.38 The IWG considered it to be important for a workable Early Model, that the solution (e.g. an asset) being developed is defined sufficiently clearly and robustly.

3.39 For this, the group thought that there would need to be a clear 'reference design' of the preferred solution selected by the SO. The CATOs would then compete to provide the assets to meet the specified 'reference design'.

3.40 In addition, there would also need to be a transparent process in place for the SO to select to the reference design (based on proposals from the incumbent TOs), to provide sufficient comfort and confidence to the potential investors.

3.41 However, the group also noted that appropriate provisions would need to be made for specific situations where the 'reference design' changed during the lifetime of the project for reasons outside of the CATO's control (this could be the case for example if the annual NOA process reversed a previous 'proceed' decision for a specific asset, such that either the scope or the scale of the project changed).

[10] Both the need for the asset itself and the specific capacity the asset is required to meet.

3.42 The IWG considered that the 'reference design' would need to include a number of details such as a broad definition of the asset class required (e.g. a transmission line is required, as opposed to a storage solution or a reduced-build solution), the start and end point of the asset where the solution is a physical connection, the required 'in-service' date and the required capacity.

3.43 International experience has shown that the use of reference designs can help frame the bidding process and attract investor interest. For example, in the East-West Tie Transmission Project in Ontario, Canada, bidders were asked to submit a proposal with reference to either a reference option, or a modified option which required further feasibility analysis.

3.44 The most attractive option to bidders appeared to be to submit a bid that used the reference option as the basis, with some modifications to the design. This demonstrated that the reference design can be successful in simultaneously attracting developer interest while also acting as a conduit for more innovation on the solution design. Further details on this case study and wider international experience can be found in Appendix 1.

4. Key design elements

- **This section complements the activity framework set out in Section 3 by articulating the 'building blocks' that need to be specified for the Early Model.**
- **This includes for example the timing of the tender, roles and responsibilities of different players, parameters that CATOs need to include in the competitive bids, approaches to assessing the bids, and a number of others.**
- **The IWG considered and discussed various options for each of the 'building blocks' as part of the development of the proposed Early Model.**
- **Although this section does not identify the preferred option for the individual blocks (this is covered in Section 5 and 6), it provides the background understanding of the wide range and complexity of different early models that could in principle be considered.**

4.1 For all variants of an onshore transmission competitive model, there are a number of common categories of parameters that need to be specified in order to ensure the model is adequately defined.

4.2 The IWG identified four high-level areas (or 'dimensions') that need to be specified for any model. These were the:

- **Tender point** – the stage at which the competitive tender is initiated;
- **Roles and processes** – the specification of the roles for different players at each activity stage and the processes that need to be followed;
- **Design parameters** – the quantitative and qualitative parameters that are used to assess the competitive bids; and
- **Commercial incentives** – the rules for allocating risk and revenues to CATOs.

4.3 This section sets out the four dimensions of competitive models and the possible parameter options within each of those dimensions, also referred to as the 'building blocks'. In principle, potential combinations and permutations of the building blocks could lead to a large number of different types of competitive transmission models.

4.4 The ability to analyse and compare different combinations of building blocks was a key factor in developing a workable Early Model. It enabled the IWG to understand the advantages and disadvantages of different features and ultimately select the best combination of the parameters for the proposed Early Model variant.

4.5 The range of options also meant that the IWG was able to analyse and understand early model variants more broadly and therefore have the confidence to make the high-level recommendations reached in this report.

Tender point

4.6 The competitive tender may take place at different stages of the project lifecycle. Three such points were illustrated earlier in Section 3, to define the Very Early, Early and Late Models (as noted in Figure 5 above).

4.7 Other potential tender points would also in principle be possible, and it is possible that two separate tenders could take place at different stages of a project lifecycle (e.g. one tender for the preliminary works stage and another tender for the construction and delivery stage). However, these options are not explored in detail in this report.

Roles and processes

4.8 Over the course of the project lifecycle, different activities can be undertaken by different parties. To define the Early Model, it is important to clarify the roles and responsibilities of different parties for each of the 11 activities of the project lifecycle, as well as for some additional activities that may need to take place in relation to the competitive process itself.

4.9 Therefore in this sub-section we set out:

- The **timelines and key roles** of different parties during the 11 activities of the project lifecycle; and
- The options for designing and including a **pre-qualification process** as part of the competitive tender.

Timeline of the project lifecycle activities

4.10 The 11 activities of the project lifecycle are currently carried out by a combination of the SO and the TO. Under a competitive model, CATOs would take on some of the TO activities and the model needs to specify:

- The new **roles and responsibilities** of the would-be CATOs before and during the tender process, and the role of the winning CATO after the tender process;
- The **dependencies** of CATOs on other players, particularly the SO, TOs and Ofgem; and
- The **handover arrangements** and any information sharing requirements between the parties resulting from the introduction of CATOs.

4.11 In addition to the 11 activities, there are other roles that may need to be played by Ofgem. A non-exhaustive list of examples of such roles includes deciding on the initiation of the tender process itself, data room hosting, question and information sharing between CATOs and the incumbent TOs, bidder pre-qualification, tender assessment, CATO licensing, and initial and final tender checkpoints.

Pre-qualification

4.12 A competitive model (whether early or late) is likely to include a pre-qualification process to select a limited number of potential bidders for the tender process and to accelerate the timelines required for the project development. The IWG considered that the pre-qualification process would need to be designed carefully to ensure that it does not impose excessive costs on the bidders on the grounds that these costs would most likely eventually be passed on to consumers (albeit indirectly).

4.13 The key issues to determine in relation to the pre-qualification process relate to the following elements:

- The **eligibility criteria**. This determines who can bid in the CATO tender process, and could include for example developers only, without full construction and financing capability, or full supply chain consortia only, or both of the categories.
- The **scope** of the pre-qualification process would determine exactly what bidders pre-qualify for, whether it is for a specific type of project, or whether it is a more general pre-qualification for different projects, potentially valid for a longer period of time.
- In addition, the **timing and frequency** of the pre-qualification process can vary. For example, the process can be run annually, or less frequently, or it can be a continually open window, such that a bidder can in principle pre-qualify at any point in time.
- The **number of bidders** who can pre-qualify at any point in time could be limited or unlimited, and the criteria used to pre-qualify potential bidders also need to be specified to provide potential CATOs with sufficient transparency.
- Finally, the pre-qualification process can be run by Ofgem, the SO or another third party (to be determined).

Tender design parameters

4.14 The Early Model needs to define the actual parameters of the tender, i.e. the information that CATOs are expected to submit, as well as the rules that are applied in selecting the winning bid. This section sets out the high-level tender evaluation criteria, bid metrics, and the evaluation process.

Tender evaluation criteria

4.15 The competitive tender process needs to apply a set of objective criteria to help Ofgem decide on the winning CATO.

4.16 The criteria may include **quantitative** (monetary or technical) criteria, **qualitative** criteria, or both. It may also be appropriate to define a set of **baseline reference parameters** against which CATOs submit their bid (for example standardised cost inputs indicating how much each standard component such as cable or a pylon is expected to cost).

4.17 The criteria for assessing bids typically need to be **transparently defined** and **shared with prospective bidders**. However, there are some options as to the level of detail that is shared with CATOs – for example, Ofgem may design a complete deterministic 'assessment matrix' with all the criteria, their relative weightings and other parameters such that bidders are able to fully understand how different elements of their bid are reflected in the overall assessment, and to tailor their bids to improve their chances of winning.

Core bid metrics

4.18 The main bid metrics[11] that CATOs would submit as part of the competitive tender process include the **costs of preliminary works**, **construction and operation**. The key options here include the breakdown of the cost bid – for example, whether the cost of the preliminary works and the construction are submitted separately, or whether the bid is even more granular (e.g. annual costs).

4.19 In addition, CATOs could be required to submit the **financing** components, including cost of equity, debt, and gearing. Again, each of the elements could be either specified separately, or as a single cost of capital figure. As set out in paragraph 5.48, the financing bid would be driven by the prevailing economic conditions forecasted over a long period of time and this would need to be adequately reflected in the Early Model design.

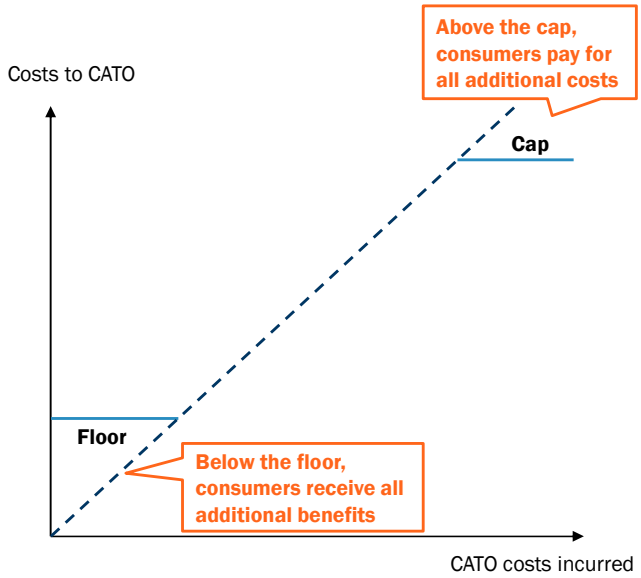
Cap and Floor

4.20 In addition to the actual cost bid, additional flexibility may be allowed to the CATOs to bid in the tender, to act effectively as a risk-sharing mechanism between the CATO and GB consumers.

4.21 One of the design options here is whether CATOs are allowed to bid a range of costs (between a cap and the floor), such that consumers share some of the associated risk of cost overruns and/or benefit from cost savings. The cap and floor-style arrangements could apply both to the capex and to the opex. The mechanics of this is illustrated in Figure 6 below.

[11] This section focuses on the quantitative (monetary) metrics. Additional qualitative bid metrics are discussed in paragraphs 4.28 and 5.58.

Figure 6: Illustration of Cap and Floor mechanics



4.22 As shown in Figure 6 above, under the cap and floor arrangements CATOs can bid a minimum and maximum cost of the project, reflecting the cost uncertainty perceived by the CATO and the willingness to absorb some of the cost risk.

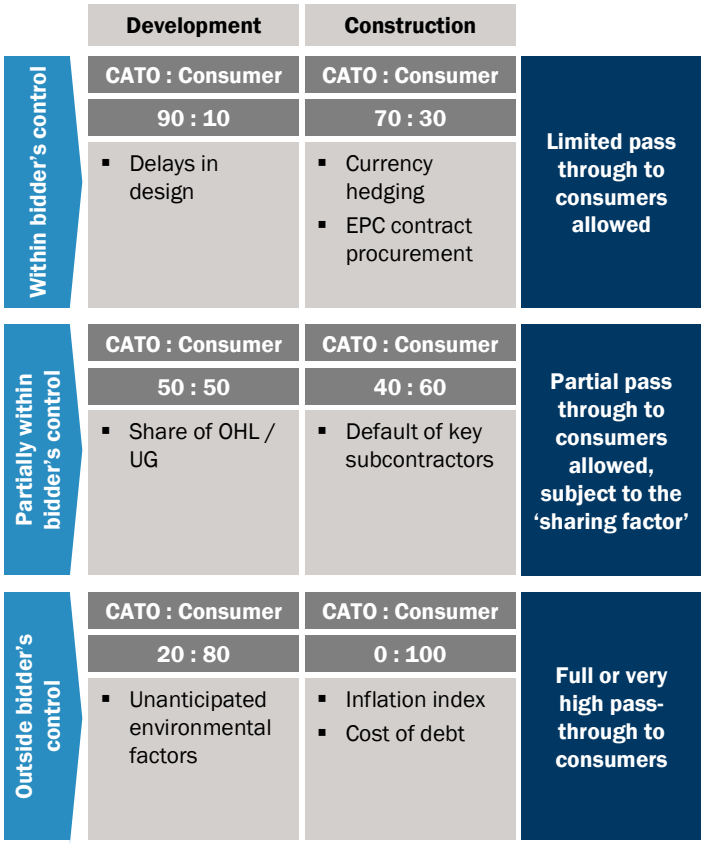
4.23 A project with a higher cap signals that the bidder is willing to take on more risk, which is more attractive to consumers.

Sharing factors

4.24 The second design option is related to potential cost re-openers. CATOs bid their costs subject to 'sharing factors' such that any **unplanned changes to the costs** would be shared with consumers, either partially or fully.

4.25 There may be different options in relation to the detailed design of such cost sharing factors – for example, whether these sharing factors are **symmetrical** between cost overruns and savings, how they vary by **different project stages** (preliminary works or construction) and which specific **cost components** they apply to. An example of a potential combination of sharing factors is shown below in Figure 7.

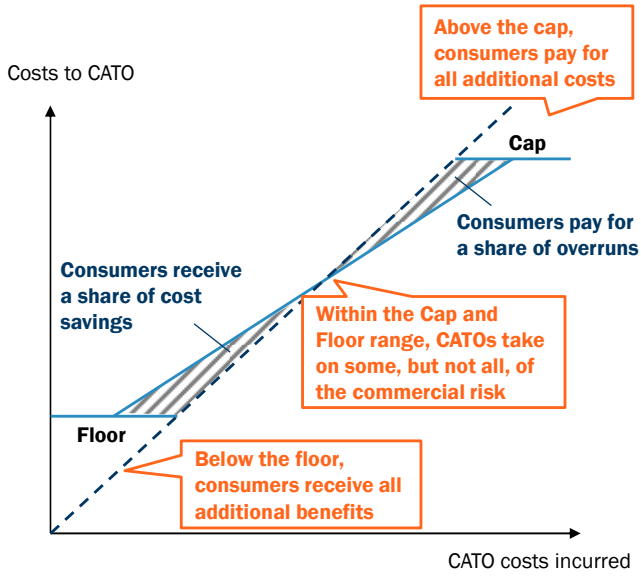
Figure 7: Illustration of sharing factors



4.26 As Figure 7 above illustrates, different degrees of cost pass-through may be allowed for different categories of costs, depending on the extent to which they are within CATO's control. The breakdown and numerical values in Figure 7 are shown for illustrative purposes only and should not be read as a part of the proposed Early Model.

4.27 It is possible that in the Early Model the Cap and Floor approach could be combined together with the 'sharing factors' being bid by CATOs. In that case, the two mechanisms would lead to a more complex interaction between CATOs' costs and the way any benefits or costs might be shared with consumers, as illustrated in Figure 8 below.

Figure 8: Illustration of the combination of Cap and Floor and sharing factors



Qualitative criteria

4.28 The use of qualitative criteria creates a challenge for the decision-maker, as it exposes the decision to a degree of subjectivity. However, there are relevant features of individual bids that are likely to require a qualitative assessment and this should form an integral part of the tender process.

Comparison and evaluation of bids

4.29 Finally, a transparent approach to comparing and evaluating competing bids needs to be developed.

4.30 The possible solutions range from a judgment-based decision to a fully deterministic decision, based on a pre-existing set of criteria, weights, and rules.

- A more **deterministic decision-making** process tends to be more objective and transparent (both to the decision maker and the CATOs), but is more challenging to set up such that it cannot be 'gamed'.
- Conversely, a **judgment-based decision-making** process is more flexible in terms of reflecting the relative merits of different bids, but it can also be perceived as subjective.

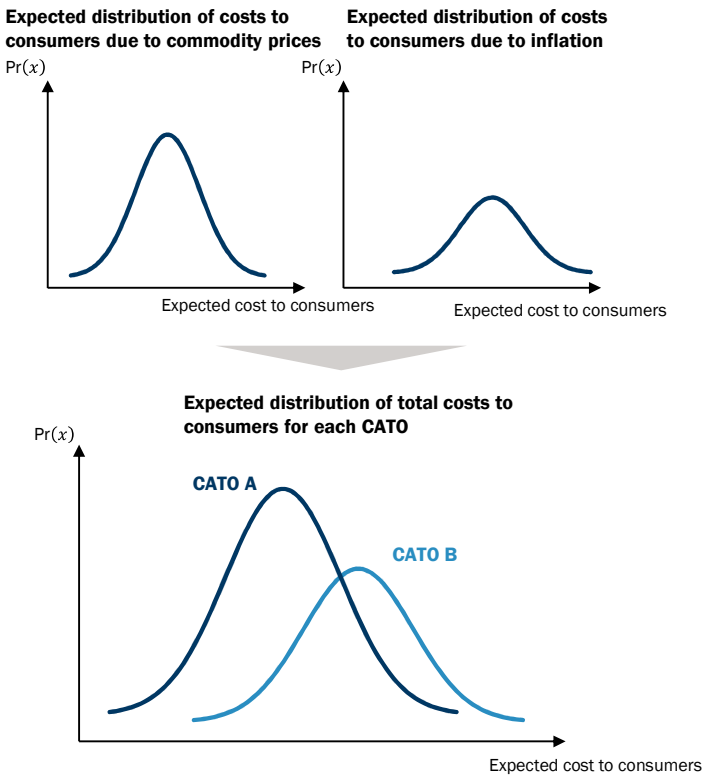
4.31 Depending on the complexity of the bid itself, there may be a need to augment a simple cost-based ranking of different bids with statistical analysis to reflect the **probability distribution of different cost outcomes** and the implications for consumers.

4.32 An **example of using such statistical analysis** to compare bids submitted by two different CATOs is shown in Figure 9 below (and discussed further in paragraphs 5.66 and 5.67).

- In the top panel, distributions of two different types of costs are illustrated.
- The bottom panel then illustrates how a number of cost components can be aggregated into a single total cost distribution. In the example below, the expected total costs for CATO B exceed those of CATO A. In addition, the distribution for CATO B is "wider", indicating that there is more uncertainty around the final cost outturn compared to CATO A.

4.33 This is intended to illustrate the high-level principles of using statistical analysis for assessing competitive bids. The actual design of such analysis would need to be developed carefully such that the process remained focused on identifying the best project (rather than a 'statistics competition').

Figure 9: Illustrative use of statistical analysis to assess bids



Payment flows / revenue recovery

4.34 Finally, Early Models also needs to specify at what stage CATOs would be funded for the work undertaken. The revenue recovery options were identified as a key concern by the majority of IWG participants.

4.35 Based on a range of international experience, one variant of the funding arrangements is the **pay-as-you go model**, where developers are compensated for the costs incurred on an annual basis or at specific milestones.

4.36 Alternative variants also exist where developers only recover their costs once the asset becomes operational. This then creates a **'dead zone'** between the costs being incurred and the revenues being received by the developer. In principle such variants create incentives for a timely delivery of the asset, as any delays reduce the developer's rate of return.

Commercial incentives

4.37 Finally, there are a number of options related to the specific commercial incentives for the CATOs concerning:

- The potential for **re-tendering** the project under specific circumstances;
- Potential **penalties** for late delivery of the asset;
- **Compensation** to the CATO in the event the project is cancelled;
- The rules for retaining **IP** for the asset development; and
- Asset **ownership and operation**.

4.38 Depending on the specific parameters set for the five categories above, CATOs can face very different incentives in terms of innovation, speed of delivery and even participation in a competitive process.[12] Such design choices can therefore have a significant impact on the feasibility and outcomes of the Early Model.

[12] For example, some IWG participants expressed a concern that if the project was cancelled and they were not compensated for the work carried out up to that point, they may be reluctant to participate in the competitive process in the first place.

Re-tendering

4.39 The Early Model is based on the premise of a single competitive tender taking place at an early stage of the project lifecycle. If the winning CATO is the **sole entity** responsible for the development and delivery of the asset, its incentives to deliver on time and/or within the cost envelope proposed may under some designs become blunted over time.

4.40 To mitigate this, there may be **exceptional circumstances** under which it may be appropriate for a project to be re-tendered (for example if proposed costs of the project bid increased considerably) such that the incentives for the 'incumbent' CATO remain adequate. However, the prospect of the project being re-tendered also creates additional risks to CATOs, which may disincentivise participation in the first place or lead to CATOs pricing this risk into their competitive bids.

4.41 Its design therefore needs to articulate clearly whether or not re-tendering may be triggered, and under what specific conditions this may be the case.

Penalties for late delivery

4.42 The existence of penalties for late delivery of the transmission asset has the potential to strengthen the **incentives for timely delivery**. However, sharper incentives may risk deterring CATOs from participating in the competitive process in the first place (or lead CATOs to price this risk into their bids).

4.43 Different options range from penalties being equal to the lost revenues by CATO, all the way to the full value of the congestion cost that the late delivery imposes on the SO. The views of the IWG members are summarised further below in paragraphs 5.88 and 5.89.

Project cancellation

4.44 The IWG identified a major risk that, as more information becomes available on the outcomes of costs and the actual need for the asset, the project is found to be no longer required and therefore be cancelled. This was seen as being particularly relevant for the Early Model given that the project need uncertainty is comparatively higher compared to the Late Model, as set out earlier in Section 3.

4.45 The group considered that a workable Early Model needs to address explicitly this issue and clarify the approach that would be taken to cost recovery by CATOs in the event of a project being cancelled.

IP retention

4.46 The rights that CATOs would have over the IP related to transmission asset development are a complex area that highlights the challenge of recouping costs of innovation, which is well known in many sectors including outside of energy.

4.47 The key challenge is to incentivise developers to design innovative solutions that benefit consumers, while compensating them adequately for the costs incurred in the innovative process. In the context of CATOs, the main question is whether CATOs would have an incentive to participate in a competitive process and to generate innovative solutions if they were obligated to disclose their IP at some point in the process.

4.48 Although complex, this issue has a number of parallels in other industries and the IWG considered that with sufficient care a practical solution could be designed that would balance the interests of all parties involved.

Ownership and operation

4.49 Finally, the ownership and operation of the asset upon delivery needs to be determined.

4.50 For example, CATOs could be responsible for the ownership and maintenance of the asset for its entire lifetime (as set out by Ofgem in the Late Model), but alternative structures could also be used. For example, the asset ownership and maintenance could be handed over to a third party upon delivery of the asset.

4.51 The separation of project design and operation may not be appropriate as it could potentially blunt the incentives for the CATO to design an asset that maximises its lifetime availability, diminishing the project's value to consumers.

4.52 The views of the IWG members regarding ownership and operation are summarised further in paragraph 5.93.

5. Early CATO Model

- **This section articulates the details of the proposed Early Model, by specifying the individual 'building blocks' that the IWG found most appropriate and workable, based on the range of options discussed.**
- **First, the Early Model involves a tender against a 'reference design' specified by the SO that sets out the preferred solution option. Although the SO, incumbent TOs and Ofgem retain critical roles during the project lifecycle, CATOs would be responsible for a wide range of activities, starting from developing the initial solution design, through consenting, all the way to construction, delivery and operation.**
- **Second, the tender process is based on a simple pre-qualification process, and requires that CATOs must submit a range of information (qualitative features, cost profiles, financing and cost re-openers).**
- **Finally, our proposed Early Model includes additional features designed to ensure that CATOs face the appropriate incentives to deliver assets on a timely basis and within budget. These include, for example, penalties for late delivery of the asset and an assurance that CATOs will be reasonably compensated for all works undertaken were the project to be cancelled.**

5.1 Having described the design variables that need to be decided in Section 4, we now set out in this section the Early Model that the IWG identified as potentially workable.

5.2 The Early Model is briefly summarised below:

- At the outset, the SO identifies a system need and, with incumbent TOs' input selects a preferred solution (e.g. an asset) to be delivered.
- Pre-qualified CATOs bid, on the basis of quantitative and qualitative criteria, for an opportunity to deliver the preferred solution within the required timeline.
- CATOs are responsible for a range of activities, starting from developing the initial solution design, the consenting process, all the way to construction, delivery and operation.

- CATOs are funded on an annual basis for the preliminary works, and although they face a continual risk that the need for the project may disappear, this is acceptable given that all costs incurred prior to cancellation are reimbursed.
- The Early Model includes a set of clear commercial incentives designed to ensure that CATOs bid competitively on their costs, that risks to GB consumers are minimised and that CATOs deliver on the original bids.

5.3 Using the overarching activity framework and the design building blocks set out earlier, this section sets out in detail, for each element, the selected design options of the Early Model favoured by the IWG. We therefore describe in the following subsections four aspects of the Early Model:

- The tender point;
- The roles and processes;
- The tender design parameters; and
- The commercial incentives.

Tender point

5.4 Under the proposed Early Model, the SO identifies a system need for which incumbent TOs submit potential solutions. The SO would then select a preferred solution, to develop a Reference Design of the preferred solution against which a competitive tender can be held. Some of the IWG participants specifically noted that it is critical for the Early Model to define what exactly the potential CATOs are bidding for and thought that a Reference Design would be a useful output from the SO after Stage 3 to base bids on.

5.5 In the proposed Early Model, the Reference Design of the preferred solution is defined at a very high level, and typically only specifies a broad asset class (e.g. “transmission line”, as opposed to for example a specific form of a T-pylon). Some IWG participants thought it would be appropriate that in addition, the physical start and end points be specified early on, together with the system need and the capacity required.

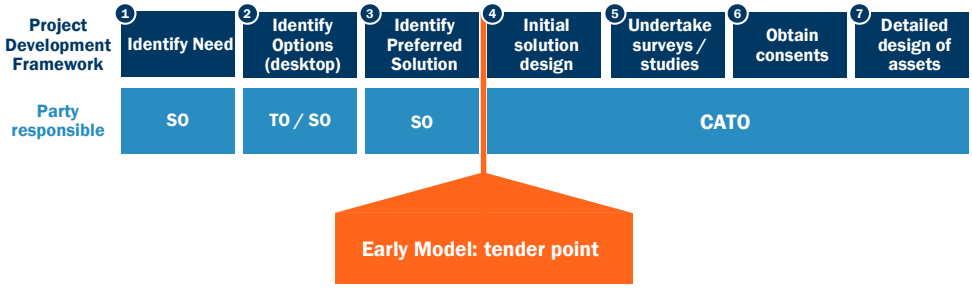
5.6 As an illustrative example, the SO could specify the Reference Design of a preferred solution as including two 400 kV circuits going from A to B, each with a 2,000 MW capacity, required to be operational in 2026. Importantly, the Reference Design would not specify whether this should be for example an Overhead Line (OHL), a cable or a tunnel.

5.7 Would-be CATOs could therefore either submit a bid directly for the Reference Design, or they could propose a variant bid which would use an alternative design, for example HVDC. This approach would therefore provide the required clarity for potential bidders[13] but would not prevent additional innovation from taking place.

5.8 For projects that are deemed to meet the competition criteria, Ofgem decides whether they should be subject to a tender process. The SO may assist Ofgem in deciding whether the project meets the competitive criteria. If so, pre-qualified CATOs submit their bids against the Reference Design described above. Ofgem then selects the winner, using the tender evaluation criteria set out further below.

5.9 The selected CATO is responsible for designing the solution, performing all consenting work (including the Development Consent Order (DCO) and consultations as per Section 42 of the 2008 Planning Act), construction, and operation of the transmission asset. The timing of the tender point is illustrated below in Figure 10.

Figure 10: Early CATO Model: tender point, roles and responsibilities



5.10 This variant of the Early Model is consistent with the international experience of similar competitive processes, including in the transmission sector itself.[14] Based on this experience, the tender is held after a preferred solution has been identified by the SO (after stage 3), but before the initial design has been firmed up (before stage 4).

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13 Additional clarity may need to be provided to ensure bidders understand which specific aspects of the Reference Design they may or may not be allowed to alter and provide design variants.

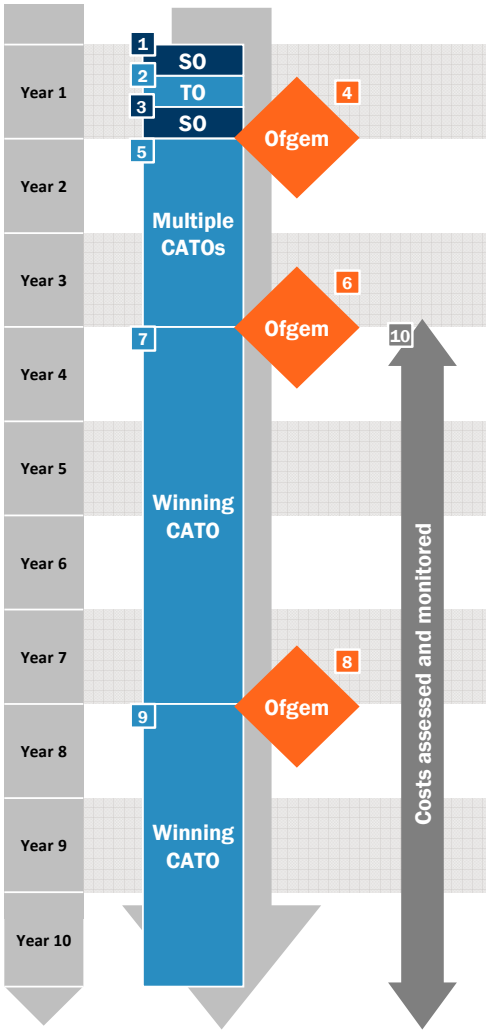
14 For example, for the Competitive Renewable Energy Zones Programme in Texas, the System Operator identified the need for a large transmission network expansion, and proposed several options. The regulator then chose the preferred option and ran a competitive tender, based on the preferred option, for selected bidders to deliver 5,800 km of 345kV transmission lines.

Roles and processes

5.11 The overall duration of the timeline will vary by project, but projects are likely to follow a similar pattern of activities. Figure 11 below sets out an overview of a stylised set of key timelines, roles of each participant and dependencies between different activities over the lifetime of the project.[15] The key roles here are played by the SO, TOs, CATOs and Ofgem.

[15] Importantly, this process runs against the background of the NOA process, which re-assesses, on an annual basis, the need for new transmission projects. Some IWG participants observed that this process might be challenging if it does not align to the annual NOA process, although this was not explored in detail.

Figure 11: Proposed Early Model: stylised timeline of activities and key roles



1. SO identifies a 'need' within the transmission system.
2. TO proposes solutions.
3. SO assists Ofgem in the assessment of whether the project meets competition criteria.
4. Ofgem conducts its initial tender checkpoint, validating the project's need, and sets a tender date.
5. CATOs (which include TOs) submit bids in the form of designs or variants on the preferred solution. This tender process includes:
   - The enhanced prequalification stage (3 months)
   - The outline proposals stage (3 months)
   - The invitation to tender stage (9 - 12 months)
   - The preferred bidder stage (3 - 6 months).
6. Ofgem evaluates bids and selects a preferred bidder. It then licences a CATO and allows funding for preliminary works.
7. Winning CATO performs all preliminary works (24 – 48+ months).
8. Ofgem conducts its final tender checkpoint, assessing any cost variations and finalising the CATO's revenue stream.
9. Winning CATO constructs and operates the asset (36+ months).
10. Cost re-openers applied to set allowed revenues.
    If the winning CATO's costs have risen more than a certain predefined margin (e.g. 25%) above the original bid, Ofgem may decide to retender the project.

Source: FTI analysis; based on Ofgem (2015), "Extending competition in electricity transmission: arrangements to introduce onshore tenders" and Ofgem (2016), "Quick guide to the CATO regime".

5.12 This section sets out the following aspects of the roles and processes in the proposed Early Model:

- Pre-tender roles;
- Tender process roles;
- Post-tender process roles;
- CATO of last resort; and
- Pre-qualification.

Pre-tender roles

5.13 At the beginning of the transmission asset lifecycle, the SO identifies the **project need** and, in **collaboration with incumbent TOs** (e.g. using the System Requirement Forms, similar to those used under the existing non-competitive arrangements), assesses potential options and selects a preferred solution. This corresponds to stages 1 – 3 in the activity framework set out in Figure 11, and is in line with the current ways of working between SO and TOs.

5.14 In parallel, Ofgem is responsible for running the **pre-qualification process**, which is set out further below in paragraphs 5.25 to 5.36. The SO then assesses whether the specific project is "new", "separable" and of "high value". If the project meets these criteria, Ofgem decides whether the project should be subject to a competitive process. If so, Ofgem then issues an ITT to potential (and pre-qualified) CATOs and the project proceeds to the tender phase.

Tender process roles

5.15 The **tender process** itself would be run by Ofgem, as is the case with the OFTO regime. As a first step, CATOs would be responsible for assembling bids which they submit to Ofgem for assessment (the detailed bid parameters that CATOs are required to submit are described further below). The final choice of the winning CATO resides with Ofgem.

5.16 Since the tender process may last longer than 12 months, some IWG participants expressed a **concern that** over the duration of the tender process **the need for the project may disappear**, for example given changes in the expected generation profiles.[16]

[16] Some IWG participants also expressed a concern as to whether procurement under the Early Model would take longer than under the Late Model.

5.17 While in theory it might be possible to devise rules that compensated bidders were this event to materialise, in general it was felt that tender cancellation (i.e. before a CATO contract was awarded) was an acceptable risk to the bidders. However, although there may not be any 'protection' for bidders against the risk of *tender* cancellation, it is important to recognize that this, alongside the wider risk of project cancellation, will be factored into potential CATO's bidding decisions.

Post-tender roles

5.18 After the tender has taken place, the winning CATO would be responsible for performing all the preliminary works, and constructing and operating the asset, which corresponds to stages 4 – 10 of the activity framework as set out in Figure 10 above. There is therefore a **clear handover** from the SO and TO at the point of a winning CATO being selected, such that the subsequent responsibility and liability for the project lies with the CATO itself.

5.19 Ofgem's main role after the tender process is to continue monitoring the selected CATO and to carry out the **Final Tender Checkpoint**[17] at the appropriate time.

5.20 The winning CATO has a **responsibility for reporting its costs** on a regular basis to Ofgem who in turn uses this information to assess whether the costs have at any point triggered a threshold that would require the project to be re-tendered.

5.21 In parallel, and independently of any CATO works undertaken, the SO continues to perform the NOA process. This may, at any stage, result in the need for the project or in the scope of the project changing. For example, the scale, timing or even the type of solution may change in response to external factors such as electricity demand profile. As discussed further below (sub-section on Commercial incentives), this may require that some of the steps of the project development process be re-traced. In some cases, the nature of the project may change so significantly that it may need to re-start from the very beginning (i.e. the SO re-articulating the system need).

CATO of last resort

5.22 In addition to the core roles set out above, the IWG agreed that it would be appropriate to consider further the options for a 'CATO of last resort' to be appointed in the event that no other bidding CATO was successful in the tender process.

[17] Under the Early model, this takes place after the CATO has completed the preliminary works – see Ofgem (2015), "Extending competition in electricity transmission: arrangements to introduce onshore tenders".

5.23 This could be the case for example if there were no bidders who submit a tender for a particular project or if none of the tenders are deemed to deliver the required project need.

5.24 However, the detailed arrangements for the CATO of last resort were outside of the scope of work covered in the IWG workshops and would need to be explored further.

Pre-qualification

5.25 The introduction of a competitive process (whether late or early) inevitably introduces an additional step in the process and therefore carries the risk of creating a delay in the overall delivery of the transmission asset, to the potential detriment of consumers. To mitigate this risk and to make the asset delivery more time-efficient, IWG considered that a pre-qualification process should be included as an **integral part of the Early Model**.

5.26 The IWG strongly agreed that Ofgem should run the pre-qualification process, for **consistency with the tender** process itself.

5.27 While the group noted that the pre-qualification process reflects a policy design choice that applies more broadly than just the Early Model, it considered some **specific characteristics of the pre-qualification process**. These aimed to ensure that a sensible number of bidders with the right capabilities and financial resilience was selected at each stage of the process in a way that best facilitated competition. This subsection therefore covers four specific aspects of the pre-qualification process, including:

- Eligibility of potential CATOs;
- Scope of pre-qualification;
- Timing and frequency of the process being carried out; and
- Selection of pre-qualified bidders.

Eligibility

5.28 The IWG considered that, as long as the bidders were able to demonstrate their capabilities across the supply chain, they should be eligible to provide bids for onshore transmission assets. Eligible participants would therefore **include developers, full supply chain consortia**, and other types of participants.

5.29 The group considered that allowing *only* consortia covering the full supply chain to pre-qualify to bid in the process may be inappropriately restrictive.[18]

5.30 In addition, members of the consortia would be allowed to change at a later stage, subject to meeting relevant competency criteria.

Scope of pre-qualification

5.31 The IWG considered whether it would be appropriate to issue separate 'sub-lots' or categories of tender (for example different sub-lots could relate to OHL developers and to UGC developers) for bidders to pre-qualify for different types of solution types, or whether a common basic pre-qualification was sufficient.

5.32 The IWG broadly agreed that there is limited benefit in developing specific 'Lots' for bidding. A **basic pre-qualification** for any type of project was considered to be the most appropriate.

Timing and frequency

5.33 The IWG agreed that there should be an **annual window for new candidates to pre-qualify**, such that previously pre-qualified CATOs do not foreclose new entry.[19] The group thought that a continually open window would create too much uncertainty for potential CATOs and would not be appropriate. Some participants also thought that it may increase the administrative burden for Ofgem, the costs of which may ultimately be passed on to consumers.

5.34 To reduce the administrative burden, IWG also agreed that the pre-qualification should be **valid for several years** (e.g. 5) across different types of projects. This was seen as a sensible compromise between an unnecessarily onerous process (if repeated every year), and a long-term or an indefinite pre-qualification which would not necessarily remain reflective of the bidders' capabilities.

[18] Some IWG participants thought that as there are a limited number of Original Equipment Manufacturers (OEMs) in the market, this might limit the potential number of full consortia that could compete.

[19] Such an annual window could be advertised using standard industry publications.

Selection of bidders

5.35 The IWG broadly agreed that at most **2 – 5 bidders should be allowed to participate** in a tender (i.e. at the ITT stage) for any given project and that the pre-qualification process should be developed accordingly. Some IWG participants noted that bidders are likely to be familiar with a two-stage pre-qualification process given the experience with OFTOs. The group thought that a larger number of CATO bidders would make it difficult to assess the competing bids and reduce the probability of winning and therefore impose excessively high bid development costs on the industry, as each CATO would include the price of developing unsuccessful bids into their tendered revenue streams.

5.36 In terms of the criteria used to select the limited number of bidders, the IWG broadly agreed that the process should **follow Ofgem's Late CATO Model and OFTO precedents**, for consistency with the best practice, and would include the financial health of the bidder, the size and composition of consortium and the team, experience, and capability.

Tender design parameters

5.37 The proposed Early Model specifies a clear set of tender parameters that CATOs would be expected to submit as part of their bid. Crucially, the composition and structure of these parameters are intended to take into account the project need uncertainty, such that the bids motivate CATOs to commit to specific cost bids, while allowing for uncertainty to be reflected as well, thus aiming to balance the interests of CATOs and consumers.

5.38 The IWG agreed that the tender process will need to apply a set of **objective criteria** to help Ofgem decide on the winner. The group also agreed that the tender process would be based on a structured **Invitation to Tender** (ITT), which would include both qualitative and quantitative criteria, similar[20] to the experience with OFTOs.

5.39 This section therefore sets out the following tender design parameters:

[20] The group noted that bidders would need to demonstrate more capabilities than in the OFTO regime, such as construction experience, to reflect the differences between the OFTO regime and the CATO models.

- The quantitative criteria submitted by CATOs;
- The qualitative criteria submitted by CATOs;
- The bid assessment process; and
- The resulting payment flows to CATOs.

Quantitative bid criteria

5.40 The quantitative criteria include both cost and financing elements and represent the core aspect of a competitive tender process. To identify the winning CATO, it is important that the bidders provide information about the costs they expect to incur for the entire lifecycle of the project.

5.41 The proposed Early Model makes a distinction between the preliminary works costs and construction and operation costs. This is because of the magnitude of the costs involved (the majority of the costs relate to the construction phase) and the fact that in the Early Model there is considerably higher uncertainty regarding the construction and operation costs relative to the preliminary works costs. The difference is illustrated below in Figure 12.

Figure 12: Preliminary works, construction and operation costs

5.42 This section therefore sets out the quantitative tender components that CATOs are required to submit as part of their bid, which separates the cost components into two parts, and also splits out the risk-sharing arrangements:

- Preliminary works;
- Construction and operation; and
- Risk-sharing arrangements (between CATOs and consumers).

5.43 In addition, this section also presents the preferred approach to comparing and evaluating bids.

Preliminary works costs

5.44 In the Early Model, bidders would be required to submit **fixed bids for preliminary works**. These would be subject to specific cost re-openers as set out further below. The fixed bid would **include bidders' return** (or profit).

5.45 One concern of the IWG was whether the fixed bids for preliminary works could be subject to '**gaming**' (e.g. some may choose to bid excessively low development costs in order to 'get in'), and the group therefore thought that the assessment criteria would need to be difficult to game. The overall view was that this may be a risk, but could be mitigated through appropriate weighting of the bids such that overall costs to consumers are accurately taken into account when assessing different tenders.

Construction and operation costs

5.46 Bidders would submit a best indicative bid for construction and operation of the asset. This would be based on two components: the **construction and operation costs** of the asset and the associated **cost of capital** (the latter would implicitly include CATO's required rate of return on equity, or profit). The combination of the two would then determine the implied annual revenues that the CATO would earn during the asset's operation.

5.47 There was a range of views on the preferred approach to the **cost of capital component** of the Early Model bids:

- Some participants thought that bidding a **fixed Cost of Equity** would be fine, but others preferred an indicative bid.
- Many participants broadly agreed that a **Best Indicative Cost of Debt (CoD)** would be appropriate, but they asked for more clarity on when the CoD would actually need to be fixed, or whether it would be simply 'passed through'.
- Some participants indicated that it would be important that CATOs demonstrate their **previous experience in raising finance** as part of the tender process (perhaps as a qualitative criterion).

5.48 While the Ofgem variant of the Early Model proposed that bidders would bid fixed return on equity, fixed gearing and an indicative cost of debt, the discussion at the IWG workshops indicated that additional work would be required to validate the most appropriate approach, including to assess the relative merits of different financial structures. For example, given the lifetime of the transmission projects, the prevailing economic environment over the long timeframe of a transmission project would have a material bearing on financing and therefore would need to be recognised appropriately.

5.49 The best indicative bid for construction and operation would also be subject to specific cost re-openers as set out further below.[21]

5.50 The IWG also discussed whether other elements of the bid could be quantified and monetised. For example, some participants thought that a quicker asset delivery could be translated into a monetary value of an earlier reduction in the congestion costs, and used as a factor in the overall bid cost-benefit assessment.[22]

Risk-sharing mechanisms

5.51 The IWG broadly agreed that the tender structure needs to recognise the inherent risks associated with the project development. The preferred Early Model therefore enables CATOs to share some of their cost risk with consumers and also incentivises CATOs to 'reveal' their true risk appetite, such that consumers' risks are limited.

5.52 This section examines two specific risk-sharing mechanisms for the proposed Early Model: the cap and floor bidding and the 'sharing factors'.

Risk sharing mechanisms - Cap and floor[23]

5.53 The proposed Early Model allows CATOs to **bid a range of costs**, rather than a single best view, would be appropriate and would reflect the uncertainty on the actual project costs. Some participants thought that such flexibility was likely to encourage more bidders to participate which would benefit the competitive process.

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21 The IWG also discussed whether "pre-defined sharing factors should be used (and if so should they vary by project), or should reference costs be used (Blue Book)?".

The precedent was based on 'Blue Book' costs used in the other industries, where different elements are costed up separately and bidders use a common set of reference costs in order to develop their bids.

There was a mixed view from different members of the IWG as to whether this was the best approach and this may need to be explored further, including how such an approach would interact with any bid flexibility such as 'sharing factors' (see below), and how the reference costs would be determined.

22 However, if the asset was not required earlier, and would therefore not reduce congestion costs at that time, this criterion would not apply.

23 The definition of Cap and Floor in this context relates to *costs* and therefore should be interpreted differently from the way the term is used for interconnectors. In the latter case, the range relates to *revenues* earned by the asset.

5.54 However, the IWG also agreed that the actual levels of cap and floor, as well as its detailed mechanics, would need to be carefully developed to ensure it **incentivised the right behaviours**.

Risk-sharing mechanisms - Sharing factors

5.55 The IWG broadly agreed that it would be appropriate for CATOs to bid in the 'sharing factors', as the mechanism would help **reveal bidders' true risk appetite** and willingness to absorb cost risks rather than pass them on to consumers.

5.56 The group also broadly agreed that separate sets of sharing factors for development and construction might be appropriate, and that the factors could also vary depending on the type of cost (e.g. the extent to which it is within the bidder's control).

5.57 However, the group found that the complex sharing factors with multiple types of cost categories and percentages could become very complex, and that there could be **simpler solutions, e.g. pain-gain sharing for the whole bid**. Some IWG participants also suggested that the methodology could be further simplified by fixing total costs or sharing factors, rather than asking bidders to submit their own values. The ultimate preference would depend on the types of market behaviours that Ofgem sought to engender.

Qualitative criteria

5.58 The IWG identified the following qualitative criteria to be reflected in the competitive process (although not all of them were considered to be equally important):

- Project narrative;
- Environmental impact;
- Benefit / costs to communities;
- Deliverability, including timeline (this was seen as particularly important);
- Innovation (e.g. innovation in design, financing, but some IWG participants also thought that operational and maintenance innovation could also be considered*;*
- Security of supply impact (for example indirect benefits outside of the immediate transmission boundary);
- SQSS compliance, which would be a minimum requirement;
- Additional 'value add'[24], which would be different from cost minimisation, though some the IWG participants cautioned that this could be seen as gold-plating the bids;
- Availability (which would also be incentivised when the asset becomes operational); and
- Future-proofing.

5.59 The IWG considered that the evaluation of these qualitative criteria would need to vary. For example, it may be more appropriate to use a **binary** (pass/fail) criterion for some factors (e.g. SQSS compliance), or a **scored assessment** on a scale of 1-5 for other criteria.

5.60 Some of the categories could also be reflected in a '**bonus point**' that would fall outside of the main assessment, but can be used to break ties between bidders.

[24] Experience from the Bank tube station in London (see Appendix 1) showed that evaluating the bids on the value they added (e.g. in terms of reducing overall passenger transfer time) rather than just cost-minimisation resulted in an outcome that was better for consumers overall. However, such an approach would need to be designed with care to avoid the system being 'gamed'.

Bid assessment

5.61 The IWG agreed that the bid assessment to identify the winning CATO would need to bring together both the qualitative and quantitative aspects of CATOs' bids, as set out above. In addition to the assessment of the qualitative criteria set out in the section above, the quantitative criteria would also need to be assessed and ranked.

5.62 The range and complexity of the bid structure (for example, separate bids for preliminary works and construction and operation, as well as financing criteria and multiple risk-sharing elements) would drive the complexity of the bid assessment itself.

5.63 If the tender assessment was to reflect numerous quantitative criteria, it would be necessary to attribute a weight or another scoring mechanism to each of the criteria. The IWG considered that a 'deterministic matrix' might need to be used in order to provide clarity to potential bidders on the scoring mechanism used and the relative importance of different quantitative and qualitative components. The criteria, weightings, matrices and any other aspects of the bid assessment would need to be shared with the prospective bidders ahead of the tender.

5.64 However, the group also agreed that a more detailed analysis of such a matrix would need to be performed to agree a suitable weighting of different criteria and scoring rules. This was considered to be manageable and relatively standard practice.

5.65 The IWG recognised that more complex tenders (e.g. ones including multiple cost elements, cap and floor ranges and sharing factors) could rapidly become challenging from an assessor's perspective. For example, the 'deterministic matrix' might include a large number of parameters and relative weights and it would become challenging to design it in such a way as to identify the bids that are most beneficial to consumers. It may also become difficult for the assessor to demonstrate transparency and fairness, which could leave the process open to challenge.

5.66 **Statistical analysis** was discussed as one of the options that could be used to assess complex bids. However, a number of participants **did not feel comfortable** with using statistical methods as a means of ranking different projects. They were concerned that it creates a risk that the bidder with the best statistician would win the tender, and not necessarily the bidder with the best project.

5.67 The relative uncertainty around this approach was also driven by the **lack of precedents** identified by the IWG.

5.68 Among those participants who were more comfortable with the idea of using statistical tools to identify the preferred bidder, the sense was that it would be important for the decision-making process to be transparent. Some participants thought that Ofgem should share the statistical model with bidders and should also carefully explain its application to the tender assessment.

5.69 Overall, the sense in the IWG was that even though finely-tuned incentives of a complex tender process may in principle be able to deliver more competitive outcomes, the **transparency of models based on simple pain-gain sharing mechanisms may on balance be more attractive**.

5.70 Overall, the IWG concluded that more work would be required in order to finalise an appropriate bid assessment framework such that the right balance was found between bid simplicity and an appropriate reflection of the cost uncertainties.

Payment flows / revenue recovery

5.71 The payment flows to CATOs need to strike a balance between the uncertainty of the project need (which means that there is an ongoing, albeit diminishing, risk that the project may be cancelled) and the incentives for the CATO to deliver their bid on time and within the original budget.

5.72 The IWG broadly agreed that an **annual repayment of the preliminary works** costs would work best. This is because at the tendering stage the bidders would have a relatively high degree of confidence in the associated costs (relative to the construction costs). This payment would cover all of the CATO's costs as per their original bid, unless and until the project need disappears (or re-tendering has been triggered – see the section below regarding commercial incentives).

5.73 The IWG also considered that additional work would be required to determine exactly how costs and risks would be allocated if CATO failed to obtain the required consents. One relevant example of an incentive structure (although this was not explored with the IWG) relates to Heathrow Airport. In relation to planning costs for Heathrow Airport, the Civil Aviation Authority[25] proposed that costs above a certain threshold should be subject to a risk-sharing arrangement which allows the developer to recover 105% of their costs incurred if a DCO is granted, but only 85% of their costs if the DCO fails to be granted. This creates a clear commercial incentive for the developer to obtain the required consents.

[25] Civil Aviation Authority, 2016, "The recovery of costs associated with obtaining planning permission for a new northwest runway at Heathrow Airport: final proposals".

5.74 For the construction costs, the payment would be made after the delivery of the asset, with **Interest During Construction** payments included (although not included as a standalone bid parameter), to incentivise timely delivery. This was considered to be more appropriate, given that, at the tendering stage, the bidders would face a relatively high uncertainty of costs (relative to the preliminary works costs).

5.75 This payment structure would create a **'dead zone'** between costs incurred and revenues earned, but this seemed acceptable to the majority of participants, as long as it was compensated through the IDC.

5.76 Funding for the construction costs would also be subject to the flexible bid parameters (e.g. cost re-openers) set out below, and subject to a form of Ofgem's 'Economic and Efficiency Test'.

5.77 The group agreed that the test would need to be specified in further detail, but the general sense was that it was appropriate for Ofgem to continue monitoring the costs of individual CATOs.

Commercial incentives

5.78 Finally, the IWG considered a number of specific commercial incentives that the Early Model should create for potential CATOs. This section sets out the incentives related to (i) re-tendering, (ii) late delivery, (iii) project cancellation, (iv) IP, and (v) ownership and operation of the assets.

Re-tendering

5.79 In the Early Model, the selected CATO is chosen on the basis of its initial bid, including the costs and (if appropriate) associated cost sharing factors.

5.80 The IWG explored whether, and under what circumstances, it may be appropriate for Ofgem to re-tender a project at a later project development stage, if the costs increased significantly beyond what the CATO originally bid. For example, it may be that a planned route that formed the basis of the overall bid assessment might have to be altered in some way (e.g. a more significant share of undergrounding may be required), or there may be other unanticipated changes that emerge during the consenting stage. Equally, the project requirements themselves might change.

5.81 If the expected costs of a project rise following the award of a tender, the question over the extent to which the CATO or consumers should bear the increase in the costs needs to be answered. While we have considered the cost sharing factors between CATOs and consumers in the previous section, to the extent that consumers bear some of the higher-than-expected costs, it is reasonable to examine what implications this might have for the project.

5.82 The IWG considered the incentive properties of different arrangements (for example whether the project need should be re-stated in some cases, or whether the project should be re-tendered in others). The group thought that the arrangements would need to balance the need to incentivise CATOs to deliver the project within the budget they bid, without imposing an excessive cost risk on the bidders, while also protecting consumers from any excessive cost increases.

5.83 Overall, the sense was that the answer to the cost sharing question would depend on the actual drivers of the cost increases, and the extent to which they could have (or should have) been anticipated by the CATO.

5.84 While the IWG broadly agreed that there may be conditions under which re-tendering of a project may be appropriate, the group thought these would need to be highly significant and involve for example a material change of scope or cost increase. Very **clear rules and criteria** would need to be developed to provide an appropriate degree of certainty to CATOs to avoid **the risk of judgement-based re-tendering** which would create a perception of regulatory risk and could also deter CATOs from participating and/or increase their costs of capital.

5.85 The IWG broadly agreed that the threshold would need to be reasonably "material", say the costs would have to increase by around **25%** (although the exact figure could be different). The group thought that this particular threshold should be set by Ofgem[26], rather than bid by CATOs, to make the process more straightforward and transparent.

5.86 The IWG also broadly agreed that the need for re-tendering could be assessed on a continuous basis. The group recognised that this would require a **regular cost reporting** by the CATO to Ofgem, but this did not seem to be excessively onerous (i.e. CATOs would most likely have to report their costs anyway).

5.87 Finally, some participants asked whether the incumbent CATO would be allowed to bid if the project was re-tendered, and how it would be possible to mitigate any concerns of its potentially unfair advantage. The general sense was that the specific rules would depend on the reasons for which the project was being re-tendered (e.g. whether this was driven by something within the CATO's control or by an external event) and that in any event the re-tendering process would need to ensure a **level playing field among bidders**.

Penalties for late delivery

5.88 The IWG considered that penalties for a late delivery of the asset should **not exceed the amount of revenues** the CATO would lose as a result of the delay. In particular, the penalties should not be as high as the full congestion charge costs that the late delivery may impose on the SO.

5.89 Some IWG participants thought that higher charges would discourage CATOs from participating in the tender in the first place, or could lead to bidders effectively "pricing in" this additional risk into the bids, potentially to the detriment of GB consumers.

[26] CATOs could also in principle bid the threshold they would be willing to accept, this was not seen by the IWG as being excessively complicated.

Project cancellation

5.90 The IWG considered that if the project need disappears and the project is cancelled, a CATO should still be **compensated for the costs incurred** (or committed) up to the cancellation notice was issued. CATOs would not be compensated for any further costs after the project was cancelled.

5.91 Importantly, the risk of project cancellation is not specific to the Early Model. Under the current (non-competitive) arrangements as well as under the Late Model, any project developed by the incumbent TOs may be cancelled. The associated development costs are still present and the models only differ in terms of the cost recovery mechanism applied. For example, currently the costs of a cancelled project lie with the TOs and are ultimately passed on to consumers.

IP retention

5.92 The IWG believed that IP rights should be protected at the tender stage to ensure participation. Some participants also thought that if the project was being re-tendered, then the IP may have to be disclosed, but overall, no firm conclusion was reached.

Ownership and operation

5.93 The IWG broadly agreed that, upon delivery of the transmission asset, the **ownership and operation** responsibility for the asset should **remain with the CATO** for the asset's lifetime. This would result in a fully aligned interest in developing a reliable asset.

6. Variant of Early CATO Model

- **This section presents an alternative approach to developing a competitive model, referred to as the Very Early Model, which brings forward the competitive process to a stage where CATOs bid on potential solutions to a system need and can therefore innovate on the type of solution offered.**
- **The Very Early Model uses the same activity framework for the project lifecycle and the same 'building blocks' as the Early Model which enables a direct comparison between the two models.**
- **This model identifies a key trade-off between a greater scope for innovation in solution and the increased investment uncertainty.**
- **Overall, the IWG found the Very Early Model to be less workable than the Early Model. This was for a number of reasons cited by different participants, including greater uncertainty on costs and project need, higher complexity of bid assessment, more difficulties in obtaining finance and limited precedents from international experience.**

6.1 Having discussed the Early CATO Model set out in Section 5, the IWG then sought to explore alternative approaches to the Early Model, to assess whether there may be other approaches that might also be workable.

6.2 The starting point of the model was seen as a key factor and the group discussed how a variant of the Early CATO Model might work with a tender point taking place at an earlier stage in the project lifecycle. This variant is referred to below as the **Very Early Model**.

6.3 This section sets out the key differences between the Early and the Very Early Model in terms of the tender point timing, the associated roles and processes and the implications for the workability of the Very Early Model.

Background to the Very Early Model

6.4 The Very Early Model was defined using the same overarching activity framework as was used for the Early Model. This allowed for a transparent comparison between the two variants.

6.5 The IWG sought to explore this model to improve its understanding of the implications that an earlier tender would have on the workability of the model.

6.6 The group noted the fact that there were **few precedents from international experience** that would indicate that a Very Early Model was viable.

6.7 However, the group also noted that the Very Early Model in principle allowed for significantly **more innovation** to take place in terms of the potential technical solutions offered. This was because it requires CATOs to bid their individual solutions to a 'system need' defined by the SO. Therefore, there is no preferred technical solution identified, and no reference design to bid against.

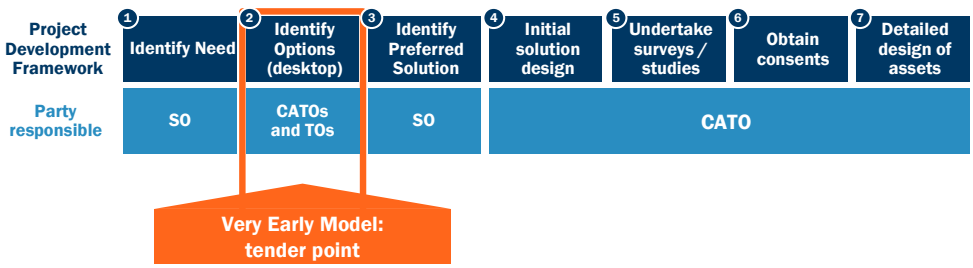
6.8 It was important for the group to understand how the potential benefits of greater innovation (if indeed it were to materialise) compared to the additional challenges of the Very Early Model.

Tender point

6.9 The Very Early Model begins, as with the Early Model, with the SO identifying a system requirement. The SO then also assists Ofgem in determining whether the project meets the competition criteria.

6.10 Crucially, it is no longer only the incumbent TOs only who then propose potential solution options to the SO. Instead, in the Very Early Model, CATOs propose options to meet this need, which are evaluated by Ofgem, to choose a preferred solution. The bids for the potential solutions are submitted by pre-qualified CATOs (i.e. each CATO bids for its own solution proposed) and the successful CATO is then responsible for designing, consenting, constructing, and operating the asset it proposed.

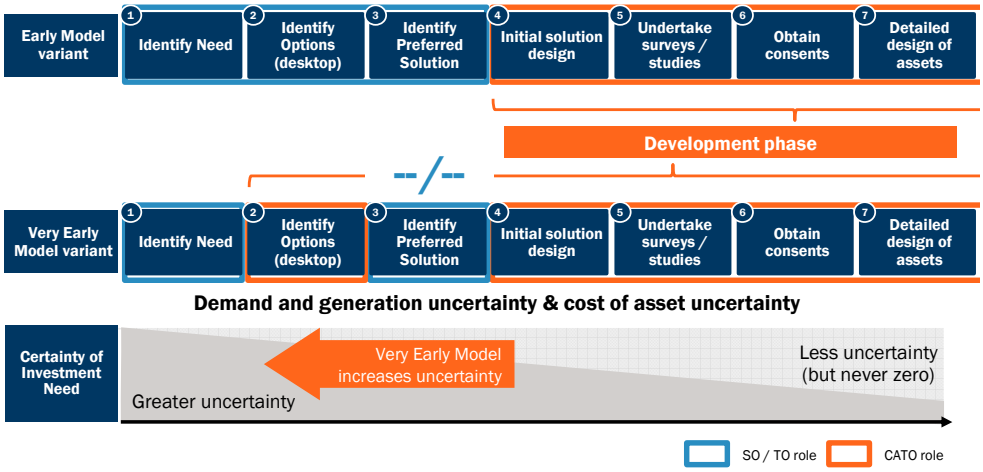
Figure 13: Very Early CATO Model: tender point



Increased investment uncertainty

6.11 Importantly, the **uncertainty of the investment need is higher** for the Very Early Model, given that the tender takes place at an earlier stage of the project development (perhaps 1-2 years before the Early Model) and allows a greater number of potential options to be developed. The additional time therefore increases the likelihood that at some point over the lifetime of the project, the project need may change and/or disappear altogether.

Figure 14: Increased uncertainty under the Very Early Model



6.12 The increased uncertainty was found to be a key feature of the Very Early Model, with important implications for bidder behaviour. Participants in the IWG workshops voiced a number of concerns driven by this increased uncertainty[27] relative to the Early Model, including for example whether it was still possible to assess the robustness and deliverability of the proposed solutions, treatment of IP rights and ability to obtain low cost finance.

27 Some areas of uncertainty may be qualitatively similar to the Early Model, but the IWG participants expressed concerns about the perceived increase in uncertainty.

More innovation in the solution

6.13 On the positive side, the Very Early Model opens the **potential for more innovation in the solution** type compared to the Early Model. This is because potential CATOs can put forward new and creative solutions to the system need identified by the SO and are therefore not constrained by a 'reference design' that specifies the solution type.

6.14 For example, in **PJM's competitive transmission model** (similar in tender point to the Very Early Model), bidders were asked to put forward proposals to resolve voltage and stability problems at the Artificial Island generating complex in southern New Jersey. The type of solutions proposed varied considerably, including a transmission cable, a 500 MVAR SVC device, a large high speed optic cable and a step-up transformer.

6.15 This illustrated the potential for the Very Early Model to incentivise genuinely novel ideas, which might not have been identified by an incumbent TO (although given the experience and expertise of the incumbent TOs this is difficult to demonstrate).

Roles and processes

6.16 The overall duration of the transmission project is expected to be **similar under the Early and the Very Early Model**, as most of the activities that need to be carried out remain the same. However, the key difference relates to the roles of different parties in terms of proposing potential solutions.

6.17 The IWG concluded that the Very Early model could begin before the SO had selected a preferred solution, with a tender carried out just after the SO has identified the system need.

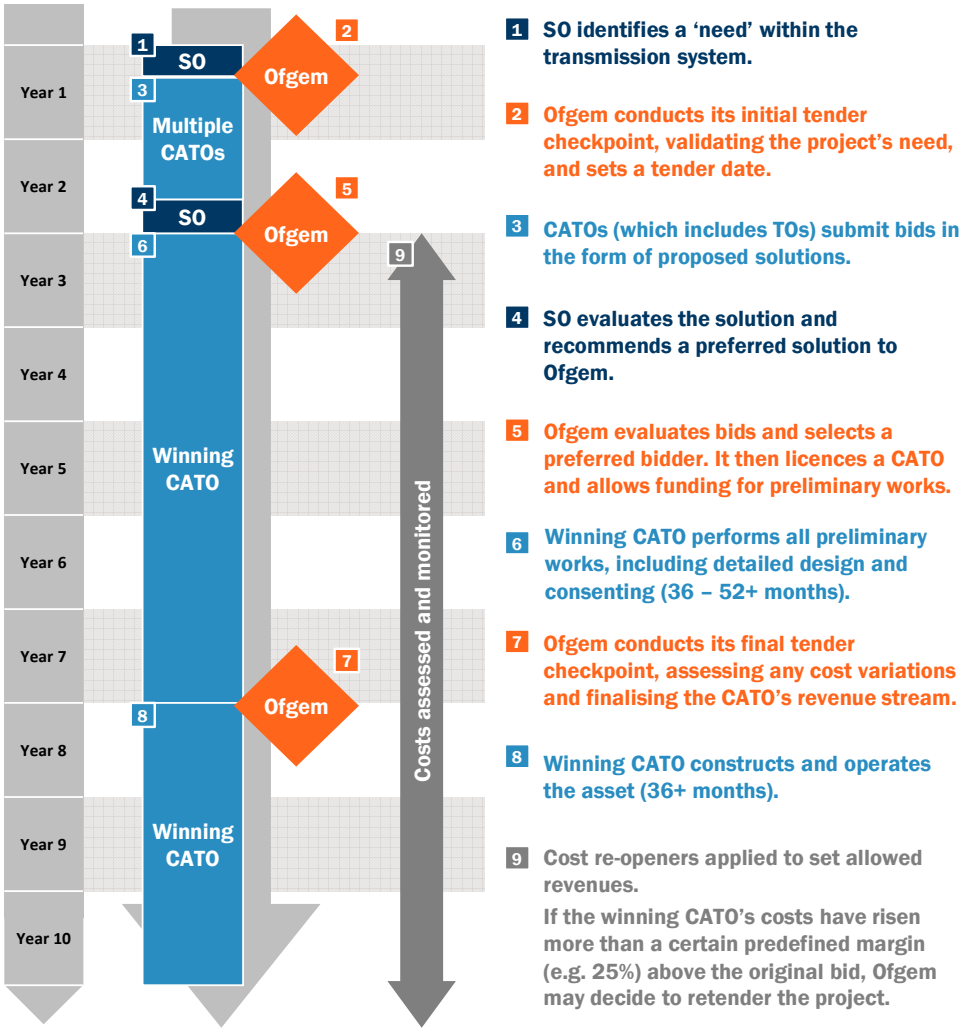
6.18 The CATO tender itself would augment the options identification phase (Activity 2) such that both CATOs and incumbent TOs would propose potential options. This would be a new role for the CATOs relative to the Early Model.

6.19 The remainder of the timeline would be roughly similar to the Early Model, as well as the key roles and dependencies between the market participants.

6.20 Although the timing difference of the Very Early Model appears to be relatively small in the context of the overall project timeline, the fact that it requires CATOs to take on a very different role in articulating potential solution options for a system need is a fundamental difference to the Early Model.

6.21 This difference creates **additional uncertainty and risks** for the bidders and also **increases the complexity of the bid submission**[28] (for the CATOs), **assessment** (for Ofgem) and **deliverability** (for GB consumers). It therefore creates a very different set of incentives for the CATOs and other parties. This is explored in more detail in the following section.

Figure 15: Very Early Model: stylised timeline of activities and key roles



[28] For example, for CATOs to be able to submit a bid under the Very Early Model, they would require access to a model of the GB transmission system in order to propose robust solutions. In turn, this would require that such a model was kept up to date and that any confidential information was handled appropriately. While not unsurmountable, these complications would increase the difficulty of making the Very Early Model work.

A comparison between Early and Very Early CATO model

6.22 Overall, having explored the details of the potential Very Early Model, the IWG found it to be less workable than the Early Model against a set of criteria agreed between IWG attendees. This finding was driven by a number of observations, as set out below.

6.23 **Cost competition.** The increased project uncertainty in the Very Early Model makes it **more challenging to put together a cost-competitive bid**, as the costs, cost-sharing factors and other tender elements need to reflect a higher risk that the project will not go ahead. Some IWG participants also remarked that it would be much harder to obtain low cost finance under the Very Early Model relative to the Early Model, due to the timescales and increased uncertainty involved.

6.24 **Bid assessment.** More complexity in the bidding process (e.g. comparing very different technical solutions with different likelihood of being viable) makes the assessment process for the Very Early Model **more challenging and potentially less transparent**, which increases the regulatory burden on Ofgem. Some IWG participants thought it was even more important to assess the robustness and deliverability of proposed solutions in the Very Early Model, and some also considered that the bid assessments were more open ended in this variant of the model.

6.25 **Process.** The introduction of a competitive process at an earlier stage creates additional challenges for the process itself. The IWG thought it would be challenging to ensure the competition in the Very Early Model remained fully focused on costs, and some thought it almost looked like a '**design competition'**. Some in the group also queried whether CATOs would require NOA validation to eliminate some of the increased project need uncertainty.

6.26 **International precedents.** The case studies explored (see Appendix 1) demonstrate that the **value of increasing innovation is relatively limited**, as significant cost savings are achievable from innovative design and financing (as opposed to innovative solutions). There have also been notable **difficulties with implementing models similar to the Very Early Model** (e.g. PJM's Artificial Island), related to cost overruns. At the same time, innovative financing becomes more achievable the later in the project lifecycle the tender is run, as uncertainty falls. Finally, some IWG participants expressed a concern that given that neither the Early Model nor the Very Early Model have been used before in UK onshore transmission, and implementing the Very Early Model at this stage would be akin to 'running before we can walk'.

Appendix 1 International Case Studies

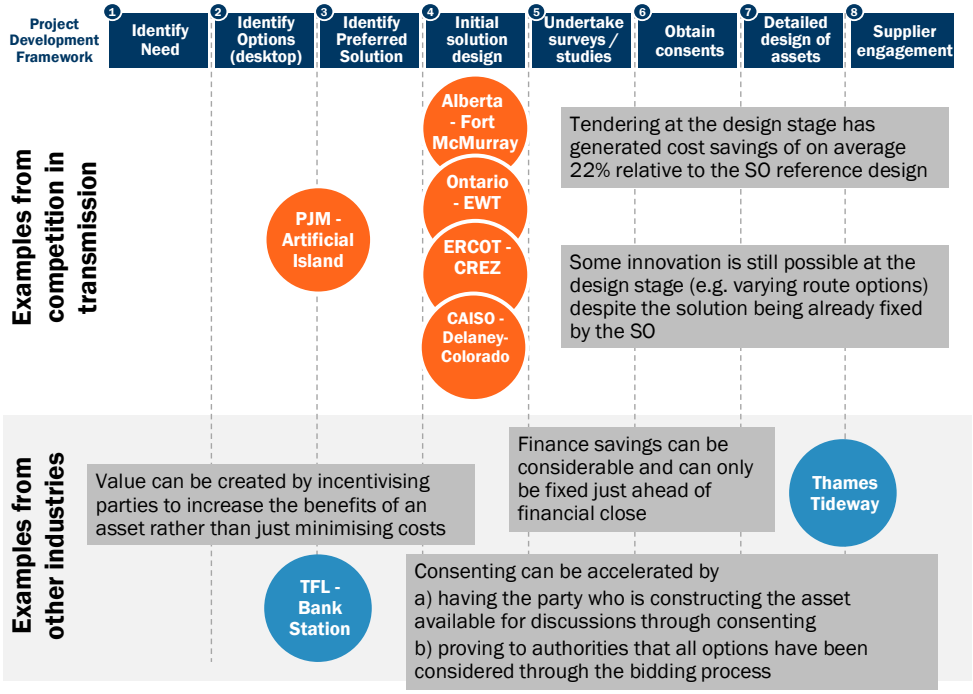
A1.1 The IWG suggested that to understand the development of the Early Model in the GB context, it would be helpful to review a range of international experience and precedents and identify key lessons to be learnt from it.

A1.2 The key learnings from the international case studies reviewed as part of this work include:

- The Early Model is a more workable option than the Very Early Model;
- An exhaustive review of all options makes the consenting process easier and quicker;
- Earlier models promote innovation in design, while later models promote innovation in finance;
- Innovation (in the design phase) is possible even after a baseline solution has been chosen; and
- Design and financing innovation can generate significant cost savings.

A1.3 Figure 16 below summarises the core case studies explored as part of this work, many of which have been discussed in detail in the industry workshops.

Figure 16: Summary of key learnings from case studies



A1.4 Further details on each of the case studies (and a few additional ones) are set out in the following pages.

Fort McMurray West Transmission Line[29]

A1.5 Teams were encouraged by the regulator to bid for the opportunity to develop, design, build, finance, own, operate and maintain the 500kV Fort McMurray West Transmission Project.

A1.6 The risks were shared between the SO and the private provider.

Tender Process

A1.7 The asset was proposed for Edmonton, Alberta, Canada.

A1.8 The key stakeholders included:

- Alberta Utilities Commission (regulator); and
- Alberta Electric System Operator (SO).

A1.9 The proposed asset was a 500 km 500 kV transmission line, worth CAD 1.43b (approx. £ 0.88b).

[29] Alberta Electric System Operator (2013), "Fort McMurray West 500kV Transmission Project, Project Information Brief"; Stakeholder engagement on 24 Oct 2016; Alberta Electric System Operator website, accessed on 13 January 2017; Alberta Powerline website, accessed on 13 January 2017; Ofgem (2016), "Extending competition in electricity transmission: impact assessment".

A1.10 Bidding progressed as follows:

(1) There were initially a large number of interested parties, which quickly fell when bidders were notified that they needed to fund pre-construction work (CAD200m) with equity for a number of years before regulatory returns commenced.

(2) Five teams proceeded after the Request for Qualifications stage.

(3) During the Request for Proposals stage, the regulator held several collaborative meetings with each of the five bidders.

(4) Each bid had to demonstrate proficiency in a number of criteria areas, set by the SO, with regards to its credibility, deliverability and robustness. If a party met all criteria areas, they were able to submit a final bid.

(5) Final bids were evaluated on cost only.

(6) The lowest bid that satisfied these criteria was awarded the project.

A1.11 The key dates and timelines were as follows:

(1) Request for Expression of Interest: May 2013 to June 2013.

(2) Request for Qualifications: July 2013 to December 2013.

(3) Request for Proposals: January 2014.

(4) Company selected: December 2014.

(5) Construction begins: January 2017.

(6) Energisation date: June 2019.

Insight into early models

A1.12 The tenderer had to obtain regulatory approvals.

A1.13 Collaborative meetings with bidders improved bid quality and reduced uncertainty.

A1.14 The tenderer ensured compliance with environmental legislation, while the SO bore the risk of delay or rejection of regulatory approval.

A1.15 By requiring indicative credit ratings, non-viable candidates were quickly eliminated.

A1.16 The contract was awarded at a fixed cost, with pre-agreed adjustments for changes in inflation, wages and materials.

A1.17 The winning bid was a partnership between the TO's private arm and the US-based EPC firm Quanta Services.

A1.18 The financing part of the bid provided indicative equity, debt and gearing levels but the debt finance was only fixed by the winning bidder just before construction.

Impact of Competition

A1.19 The SO detailed the functional specifications, but not how they would be met, thereby incentivising innovation and cost efficiency.

A1.20 The conservative estimate for cost savings is CAD400m (£247m), around 20% of original bid relative to the SO's initial estimate.

Conclusions

A1.21 This is an early model where the SO detailed the functional specification of the project (innovation in design routing but no innovation in solution, which had already been chosen by the SO) and also bore the risk of delays due to rejection of regulatory approval (taking on consenting risk).

A1.22 Bids were for fixed NPV costs with specific pre-agreed cost adjustments.

A1.23 Despite the bid taking place after the preferred solution was specified, costs savings were significant (c. 20%).

A1.24 So far, the project is on track for construction to begin in 2017.

East-West Tie Transmission Project (EWT)[30]

A1.25 In June 2011, the Ontario Power Authority (OPA) identified the need for a new transmission line in North-Western Ontario.

A1.26 The Ontario Energy Board (OEB) specified an initial reference design for the transmission line but private providers were invited to innovate around this.

Tender Process

A1.27 The asset was proposed for Ontario, Canada

A1.28 The key stakeholders included:

- OEB (regulator);
- OPA (SO); and
- Transmitters (bidders).

A1.29 The proposed asset was a 447 km 230 kV transmission line worth CAD 400m (approx. £ 247m) for development and construction, and CAD 4m (approx. £ 2.48m per year) for maintenance costs.

[30] Ontario Energy Board (2012), "East-West Tie Line, File No. EB-2011-0140, Phase 1 Decision and Order"; Ontario Energy Board (2013), "East-West Tie Line, File No. EB-2011-0140, Phase2 Decision and Order"; Ontario Energy Board website, accessed on 25 August 2016.

A1.30 Bidding progressed as follows:

(1) Seven transmitters expressed interest.

(2) In the first phase of the decision process, the SO collaborated with bidders to define the selection criteria (included plan for engagement with the First Nation as well as more conventional shareholder engagement, which fed into a composite score).

(3) In the second phase, the bids were evaluated on each of the criteria, and the eventual winner was chosen.

(4) The winning bidder was UCT (NextEra, Enbridge, and Borealis).

A1.31 The key dates and timelines were as follows:

(1) Request from Minister of Energy: March 2011.

(2) Expressions of interest requested: August 2011.

(3) Phase 1 Decision and Order issued - requirements: July 2012.

(4) Phase 2 Decision and Order issued – award: August 2013.

(5) In-service: 2020 (revised from 2018, currently ahead of revised schedule).

Insight into early models

A1.32 Providers were asked to state whether they were pitching for the reference option (after stage 4), or a modified option, which required a further feasibility analysis (after stage 3).

A1.33 Most applicants submitted slightly modified designs.

A1.34 UCT (winning bidder) recommended one major change to the reference design (specifically the type of transmission towers and the type of steel used).

A1.35 This model is the OEB's default procurement method. They believe it improves economic efficiency and leads to better outcomes for the consumer.

Impact of Competition

A1.36 The modified design should reduce costs, and lead to a smaller footprint. The winning bidder represented 33% savings over the original estimate of costs by the SO, and 22% over the incumbent bidder.

Conclusions

A1.37 This was an early variant of the competitive model where bidders were invited to pitch against a reference design defined by the SO. Most bidders proposed limited modifications, and were able to achieve significant cost savings (c.33%).

FERC 1000[31]

A1.38 Order No. 1000, initiated and issued in 2010, is a Final Rule that reforms the Commission's electric transmission planning and cost allocation requirements for public utility transmission providers. The rule builds on the reforms of Order No. 890 and corrects remaining deficiencies with respect to transmission planning processes and cost allocation methods.

A1.39 The order has:

- delivered cost containment; and
- increased innovation.

A1.40 However, it has also led to:

- the growing cost of the tender process;
- challenges in evaluating complex bids; and
- the need to amend the process depending on the project and bidders (i.e. a generic one-size-fits-all approach is not feasible).

A1.41 Table 1 below presents a summary of the Order's cost savings from selected projects.

Table 1: Summary of cost savings from FERC 1000 projects

Region	Project	Initial cost estimate (USDm)	Winning bid cost (USDm)	Decrease in cost (USDm)	Decrease in cost (%)
CAISO	Suncrest SVC	50	42	8	16%
CAISO	Estrella Substation	35	24	11	31%
CAISO	Delaney -Colorado River	300	225	75	25%
CAISO	Harry Allen – Eldorado	144	133	11	8%
PJM	Carson-Rogers Road	73	49	24	33%
SPP	Walkemeyer	17	8	9	52%
Total		**619**	**481**	**138**	**22%**

[31] FERC website, accessed on 16 Jan 2017; NEXTera Energy (2016), "Delivering the benefits of competitive transmission to New England's ratepayers while balancing the need to maintain system reliability".

Artificial Island, PJM[32]

A1.42 This is an early competitive tender with a tender point similar to the Very Early Model where a problem was identified and different solutions were considered at multiple bidding rounds. This did lead to innovative proposals using a range of technologies. The project has been suspended due to cost concerns and changes to the system need.

Tender Process

A1.43 The project was proposed for New Jersey, US to resolve voltage and stability problems at the Artificial Island generating complex in southern New Jersey.

A1.44 The key stakeholders were:

- PJM (SO); and
- Bidders.

A1.45 The proposed assets accepted were a

- 5 km, 230 kV transmission cable;
- 500 MVAR SVC device;
- large high speed optic cable; and
- step-up transformer.

A1.46 Bidding progressed as follows:

(1) PJM evaluated 26 proposals, judging system performance, constructability and cost.

(2) PJM analysed the electrical properties of these proposals, and an engineering consultant evaluated constructability risks to project cost and schedule.

(3) On this basis, all or part of five proposals were selected for further consideration and solution development.

A1.47 Cost re-openers were allowed for the winning bid under the following conditions:

[32] PJM (2015), "Artificial Island White Paper".

- Changes in applicable laws and regulations.
- Obtaining governmental approvals and permits.
- Obtaining necessary property rights for construction.
- Environmental permitting, remediation and mitigation.
- Orders of courts or action or inaction by governmental agencies.

A1.48 The key dates and timelines were as follows:

(1) Proposals open: April 2013.

(2) Projects awarded to LS Power (transmission line), PSE&G, and PHI (expansion of interconnection facilities): March 2015.

(3) Project suspended: August 2016 (due to concerns around rising costs).

Insight into early models

A1.49 The SO identified the requirements that a solution needed to meet (e.g. maximise power, reduce operational complexity, improve stability, and maintain operating limits).

A1.50 Bidders bore planning risk.

A1.51 A judge was employed to ensure that all bids were treated equally, lowering the risk of conflicts between bidders, and between bidders and the buyer.

A1.52 This project demonstrated that the Very Early model could lead to a range of proposals, and allowed scope for innovations in solution.

A1.53 Despite an upper cost limit, the project has since been suspended due to cost concerns.

A1.54 Projects were awarded to LS Power (transmission line), PSE&G, and PHI (expansion of interconnection facilities). Other TOs and generating firms were also bidders.

Impact of Competition

A1.55 Introduction of cost caps on building process for all but certain exogenous factors, and a range of technical solutions.

A1.56 A saving of 60% of the incumbent's original bid of USD 692m, but suspended due to cost concerns.

Conclusions

A1.57 This was a competitive process with a very early tender point where the SO specified technical problems (power, stability, etc.) and let the bidders specify the solution.

A1.58 This example demonstrates that a very early approach can drive innovation (over 26 proposals were evaluated by PJM; 5 were selected for further consideration and development).

A1.59 However, before these projects could be progressed further, they were halted due to cost concerns, in part due to changed system circumstances

Delaney-Colorado Transmission Line[33]

A1.60 In its 2013-2014 planning process, the CAISO identified an economically-driven need for a new 500 kV transmission line between Delaney Substation and Colorado River Substation, and initiated a competitive process to find a sponsor to finance, construct, own, operate and maintain the project.

Tender Process

A1.61 All transmission line projects in California are subject to state regulatory approval (CPUC General Order 95).

A1.62 The proposed asset was a 115-140 mile 500 kV transmission line, worth $300m in 2014 prices.

A1.63 Bidding progressed as follows:

(1) The CAISO received project sponsor applications on behalf of five project sponsors

(2) While the bid solicitation window was open, the ISO maintained a question and answer matrix detailing questions from prospective project sponsors and the ISO's responses so that all interested parties would have access to the same clarifying information.

(3) The ISO provided the project sponsors opportunities to correct deficiencies in their applications.

(4) The ISO determined that all five bidders were qualified, and chose primarily based on the bidders commitment to cost containment.

A1.64 The key dates and timelines were as follows:

[33] California ISO (2015), "Delaney-Colorado River Transmission Line Project, Project Sponsor Selection Report".

(1) Bid window opens: August 19, 2014

(2) Bid window closes: November 19, 2014

(3) Posting of qualified bidders: April 15, 2015

(4) Company selected: July 10, 2015

(5) Projected In-Service Date: May 1, 2020

Insight into early models

A1.65 The ISO specified line characteristics, but bidders were responsible for project timelines, engineering measures, acquiring rights-of-way and environmental permits, post-construction operation and maintenance.

A1.66 In submitting their bids, potential sponsors identified additional risks that could have affected the project schedule or cost.

A1.67 CAISO commented that the process resulted in some strong and innovative cost containment proposals.

A1.68 The winner was DCR Transmission, LLC (DCRT), a joint venture owned by Abengoa Transmission & Infrastructure, LLC and an affiliate of Starwood Energy Group Global, Inc.

Impact of Competition

A1.69 Because the Delaney-Colorado Transmission line was justified solely based on economic benefits to ratepayers, the CAISO communicated to bidders that cost-containment proposals were the most important selection criteria. The result of the competitive process was strong and innovative cost containment proposals.

Conclusions

A1.70 Four of five bidders agreed to binding capital cost containment proposals, reducing the risk of cost overruns for ratepayers.

A1.71 Cost containment proposals were generally equal to a capital cost estimate in 2015 dollars including contingency funds. One bidder included an explicit risk margin.

A1.72 Cost caps were subject to increase under specified conditions such as project changes required by the ISO or a regulatory agency, for force majeure events or other change in law.

A1.73 The winning bid, which produced the lowest projected revenue requirements, covered up to a specified amount in route risk.

Competitive Renewable Energy Zones (CREZ) Programme[34]

A1.74 The regulator used competitive tenders to appoint transmission developers for a large programme of transmission network expansion. The project came in under-budget.

A1.75 Innovation allowed from initial design but with consenting risks managed by regulator.

Tender Process

A1.76 The asset was proposed for Texas, USA.

A1.77 The key stakeholders included:

- Public Utility Commission of Texas (regulator);
- Electric Reliability Council of Texas (SO, or ERCOT).

A1.78 The programme included 186 projects, spanning 5,800 km with 345 kV transmission lines, worth USD 6.9b (approx. £ 5.64b), with an average project cost of USD 37m (approx. £ 30.35m).

A1.79 Bidding progressed as follows:

(1) Initially PUCT requested ERCOT conduct a study, with stakeholder input, to evaluate transmission improvements required to serve CREZ in 'the most beneficial and cost-effective manner'.

(2) Four options were proposed by ERCOT, and one was eventually selected.

(3) PUCT laid out a selection rule, looking at financial factors, expertise, projected costs, proposed schedule, and previous transmission experience.

(4) 8 bidders were chosen, and those with little experience had to provide feasibility reports and other assurances.

A1.80 The key dates and timelines were as follows:

[34] ERCOT (2014), "The Competitive Renewable Energy Zones Process"; North American Wind Power website, accessed on 13 Jan 2017; Lori Cobos (2014), Presentation on "CREZ Evolution, Lessons Learned, & Future Outlook in ERCOT"; Transmission Hub website, accessed on 13 January 2017.

(1) State Senate Bill passed: 2005

(2) Initial interest sought by PUCT: January 2007

(3) ERCOT commissioned to study options: November 2007

(4) ERCOT file study on scenarios: April 2008

(5) Scenario chosen: October 2008

(6) Finished work: 2014

Insight into early models

A1.81 This is an example of an early variant of the competitive model. The SO identified a need and proposed four high level options (stages 1 and 2). The regulator then chose its preferred transmission option (stage 3).

A1.82 Bidders notionally took on planning and consenting risk. However the regulator legally designated the zones, settling questions of need and cost recovery, and minimising actual consenting risks.

A1.83 One of the primary bidders was Oncor, a TO and service provider.

Impact of Competition

A1.84 By inviting bidders to take on planning and consenting risk, the regulator allowed for significant innovation in a large scale project.

A1.85 All required projects were completed without significant delay and at 3% under budget.

Conclusions

A1.86 This is an early variant of the competitive model where the SO identified a need and the regulator chose a preferred transmission option. Among the electricity transmission case studies included in this report, it is the only model where the physical assets have been completed to date (although a number of other assets are currently under construction).

A1.87 In addition, the regulator helped bidders minimise consenting and planning risks. The projects were delivered by 2014 and were 3% under budget.

Bank Station Capacity Upgrade Project [35]

A1.88 London Underground's (LU) Innovative Contractor Engagement (ICE) was pioneered on the project to upgrade Bank Station.

A1.89 Four bidders were engaged to develop innovative solutions to replace an established base case option.

Tender Process

A1.90 The key stakeholders were the London Underground and the Bidders.

A1.91 The estimated final cost of the asset was £564m.

A1.92 Bidding progressed as follows:

(1) Pre-dialogue stage – invitation to participate, PQQ submissions, shortlists.

(2) ICE Dialogue stage – regular dialogue between LU and bidders to explain LU requirements and existing base case, requests to proceed (RTP) submitted by bidders.

(3) ITT – Bidders asked to confirm elements that they considered to be innovations, tender queries submitted for additional clarification.

(4) Evaluation and Award - Top two ranking bidders taken forward for further negotiations. With contract awarded to Dragados SA.

A1.93 The key dates and timelines were as follows:

[35] London Underground (2014), "Innovative Contractor Engagement, Project Report".

(1) Tender published on OJEU: November 2011.

(2) Pre-dialogue completed: May 2012.

(3) ICE Dialogue completed: October 2012.

(4) ITT completed: March 2013.

(5) Contract awarded: July 2013.

Insight into early models

A1.94 This is an example of a very early variant of the competitive model where bidders were given the task of maximising the benefits of station within a broad envelope of technical constraints

A1.95 Bids were scored on Value = Benefits / Cost so that bidders could increase value by increasing benefits as well as decreasing costs. The winning bidder increased benefits by 45% and reduced costs by 10% relative to the initial estimates. A good example of this was a decision by the winning bidder to straighten a curved walkway, and add a travellator. The increase in cost was more than offset by the increase in the benefits (i.e. reduced travel time).

A1.96 IP was protected by creating a legally binding agreement which compensated bidders if their innovation was used in the final solution, even if they were not the winning bidder.

A1.97 Public inquiry (similar to consenting) was much quicker than normal and faced no objections because TFL had evidence that it performed an exhaustive search of options and because the contractors used for the construction phase were present for inquiry.

A1.98 The process has not been used by TFL since – possibly due to the political challenge of paying multiple bidders to design a single asset.

Impact of Competition

A1.99 The project featured a total of 24 registered innovations, 10 from the winning bidder.

A1.100 £62m reduction in estimated final cost, a 5 week reduction in closure duration of the Northern line (from 22 weeks to 17 weeks), and a £35m saving in social dis-benefit.

Conclusions

A1.101 This is an example of an approach that challenged bidders to develop innovative designs to improve on an existing base case option. The LU (equivalent to the SO role) was actively engaged with bidders throughout the process, and compensated unsuccessful bidders for innovations produced.

A1.102 The result was a highly innovative design that is projected to deliver significant cost savings.

Thames Tideway Tunnel[36]

A1.103 In 2005, as part of widespread upgrades to London's sewage network, Thames Water identified the need for a deep storage and conveyance tunnel.

A1.104 Two sets of tenders were run: a tender to finance and deliver the project, and tenders to construct.

Tender Process

A1.105 The asset was proposed for London, UK.

A1.106 The key stakeholders included:

- Ofwat (regulator);
- Bazalgette Tunnel Limited (infrastructure provider); and
- preferred joint-ventures (construction).

A1.107 The project involved 24 construction sites (11 along the river bank), at a total cost of £4.2b in 2014.

A1.108 Bidding progressed as follows:

[36] Tideway website, accessed on 10 November 2016; Ofwat (2015), "Reasons for designating Bazalgette Tunnel Limited as an infrastructure provider responsible for delivering the Thames Tideway Tunnel"; Ofwat (2014), "Consultation on the regulatory framework for the infrastructure provider that will deliver the Thames Tideway Tunnel Project".

(1) Both sets of tenders followed the same process:

(2) Interested parties submitted a PQQ, based on which Thames Water made a shortlist and invited successful parties to tender.

(3) Successful parties submitted tenders, and were allowed to submit variants of the initial solution.

(4) Thames Water used "most economically advantageous tender" (MEAT) criteria to select a preferred bidder.

(5) Bazalgette Tunnel Limited (BTL) will be paid by Thames Water, financed through increased consumer bills.

A1.109 The key dates and timelines were as follows:

(1) Planning decision, investigation works, bids submitted: 2014.

(2) Main works and financing contracts awarded: 2015.

(3) Construction to begin: 2016.

Insight into early models

A1.110 This example does not provide a direct insight into early models, since it is an example of a late variant of the model (in fact even later than the Late Model as defined by Ofgem, as the tender took place *after* stage 7). In particular:

- Contracts were awarded after the Development Consent Order ('DCO') was obtained.
- The DCO was submitted in Feb 2013 and granted in Mar 2015.

A1.111 More innovative solutions were dismissed during the earlier stages (2 and 3) due to their high cost.

A1.112 "Strong competition for both construction and financing has driven down costs" – Martin Baggs, CEO of Thames Water.

A1.113 By taking on consent risks and defining the funding model for the project, Thames Water was able to give bidders certainty, leading to more competitive bids.

A1.114 Bazalgette bid a WACC of 2.5%, lower than 3.7% industry average.

Impact of Competition

A1.115 Innovation was limited to construction and financing.

A1.116 The competitive tenders reduced the expected construction costs and required rate of return, lowering the cost of the tunnel from £70 - £80 per household per year (as originally estimated by Thames Water) to £20 - £25.

Conclusions

A1.117 A late variant of the competitive model where Thames Water issued two separate tenders – for the construction, and for the financing and delivery of the Tunnel.

A1.118 The tenders were opened before the DCO was awarded, but Thames Water took on the consenting risk.

A1.119 This gave bidders more certainty and encouraged competitive bids. The innovation was limited, but the competitive tenders resulted in large cost savings for consumers.

Joint Strike Fighter Program[37]

A1.120 The Department of Defence (DoD) ran a competition to choose a provider to develop and manufacture the next generation of jet fighters.

Tender Process

A1.121 The key stakeholders included:

- DoD (defines specific capabilities the fighters must have); and
- Large defence contractors (bidders).

A1.122 The F-35 Joint Strike Fighter is now expected to cost USD400b (approx. £324b) for 2,457 planes as of April 2016. This was almost double the initial estimate.

A1.123 Bidding progressed as follows:

(1) The DoD defined specific capabilities (e.g. short take off vertical landing, common design).

(2) Multiple firms were engaged to propose different designs.

(3) Firms receive no compensation for work done on design.

(4) Designs were then shortlisted, and successful firms were given USD750m (approx. £613m) in 1997 to develop and produce prototypes.

(5) Prototypes were then flight tested and a final decision was made based on how well prototypes met the DoD's specifications.

(6) The winning designer, Lockheed Martin, was then awarded the contract to develop and manufacture the F-35.

A1.124 The key dates and timelines were as follows:

[37] JSF History website, accessed on 4 October 2016; Popular Mechanics (2016), "WTF-35: How the Joint Strike Fighter Got to Be Such a Mess".

(1) Designs shortlisted: 1997.

(2) Prototypes tested: 2000.

(3) Contract awarded: to Lockheed Martin in 2001.

Insight Into Early Models

A1.125 This is an example of a very early variant of the competitive model (between stages 1 and 2).

A1.126 Shortlisted designs receive a fixed development budget for producing prototypes, which incentivises firms to persist with development.

A1.127 There were large cost overruns at the construction phase because the DoD:

- wanted an aircraft that would be used by all branches of the U.S. military and other nations, causing large technical complexities; and
- tried to manufacture the planes while final ground and flight tests were conducted. This made final modifications very expensive.

A1.128 The DoD had no alternative option when costs began to overrun.

A1.129 Incentives need to be maintained throughout the project lifetime for a CATO model to succeed.

Impact of Competition

A1.130 Produced an aircraft that was projected to be many times more effective than its older counterparts in multiple combat roles.

A1.131 The program has large cost overruns and no cost savings during the construction phase; development costs were within budget.

Conclusions

A1.132 An example of a very early model in the development phase, where the DoD asked bidders to submit initial designs (with no cost compensation) against a high-level “need” specification, but not an actual preferred option.

A1.133 Two of the bidders were funded (USD750m each) to develop a prototype.

A1.134 However the construction phase was later heavily criticised for large cost overruns.

Airports Commission Competitive Dialogue (CD)[38]

A1.135 Under CD, the client identifies a problem to be addressed, opens a dialogue, and only invites tenderers to bid competitively when their proposals are at an advanced stage.

A1.136 The airport expansion scheme attracted innovative solutions, but conventional solutions were selected.

Tender Process

A1.137 The key stakeholder was the Airports Commission.

A1.138 The proposed costs for each of the options were:

- £18.6b (Heathrow third runway);
- £13.5b (Heathrow, north runway extension); and
- £9.3b (Gatwick).

A1.139 Bidding progressed as follows:

(1) 8 'sift criteria': strategic fit, economy, surface access, environment, people, cost, operational viability, and delivery.

(2) In Phase 1, 32 initial proposals were received by the Airports Commission. This list was reduced to three options (two Heathrow, one Gatwick) in the interim report. These three reports were made more detailed and were evaluated in Phase 2.

(3) Recommendation published.

A1.140 The key dates and timelines were as follows:

[38] Airports Commission (2013), "Information note providing detail on Phase 2 of the Airports Commission's work programme"; Airports Commission (2013), "Guidance Document 02: Long Term Capacity Options: Sift Criteria".

(1) Established: September 2012.

(2) Dialogue opened: February 2013.

(3) Initial proposals published: August 2013.

(4) Interim report published: December 2013.

(5) Rejection of Thanes estuary: December 2013.

(6) Consulting period closed: February 2015.

(7) Report published: July 2015.

(8) Decision delayed by May Government: June 2016.

Insight into early models

A1.141 This is an example of a very early model (stage 1)

A1.142 A need was identified, but the commission did not state a preference on how it was to be solved. They were however constantly involved in the process.

A1.143 Innovative solutions were proposed, such as the Thames Estuary (aka 'Boris Island'), and proposals from universities in London and Cardiff.

A1.144 The advantages of transparency and iteration come with disadvantages of exposure to political risk (in the UK, MPs near the sites opposed the expansion of those sites), with decision timelines intentionally avoiding election periods.

Impact of Competition

A1.145 In theory, CD should lead to maximum innovation as the competitive process is continued for as long as possible.

A1.146 As CD theoretically offers the greatest visibility on costs, it should reveal the most cost-effective solution.

Conclusions

A1.147 Competitive dialogue is an approach to a very early model in which the regulator/SO is actively engages with bidders throughout the development phase.

A1.148 A competitive tender however is not run until later on in the project lifetime (stage 3)

UK OFTO – OFTO Build: Generator EPC[39]

A1.149 A proposed model (that has not been implemented yet) in which Ofgem runs a tender to appoint an OFTO responsible for constructing and operating offshore transmission assets.

A1.150 The OFTO Build: Generator EPC variant generated the most interest.

Tender Process

A1.151 The key stakeholders include:

- Ofgem;
- consortia (bidders seeking to own, construct, and operate transmission assets, usually asset management firms); and
- generators (owner and operator of the generator asset).

A1.152 Ofgem's Tender Round 3 worth approximately £400m in total.

A1.153 Bidding would progress as follows:

(1) Ofgem tenders out as per status quo (EPQ, then ITT, etc.).

(2) The appointed OFTO enters into an EPC contract with the generator, and finances the construction of the transmission assets.

(3) The generator will therefore bear all construction risks, and receives milestone payments from the OFTO.

Insight into early models

A1.154 This is an example of a late model (at stage 10). However, a key difference between the OFTO regime and the Early Model considered in this report is that OFTOs were not responsible for actually building any assets. As a result, any parallels between the two approaches need to be considered carefully.

A1.155 Note that this is similar to the "OFTO Generator Build" version.

A1.156 This model grants the generator financing for a specific part of the wind farm.

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[39] Ofgem (2014), "OFTO Build: Providing additional flexibility through an extended framework"; Ofgem (2015), open letter on "EPC Contract Principles for OFTO Build Tenders".

A1.157 The OFTO is also protected from construction risk.

A1.158 Other proposed variants that gave OFTOs responsibility for the construction of the transmission assets were not as well received by stakeholders. The industry seemed to prefer a late model.

Impact of Competition

A1.159 Limited to innovative financing approaches.

A1.160 Financing cost savings for OFTOs, since they bear no construction risk. The generators in turn need not worry about obtaining potentially expensive financing for the transmission assets.

Conclusions

A1.161 A late model where Ofgem runs a tender to appoint an OFTO responsible for construction and operation of a transmission asset.

A1.162 The bidders are protected from construction risk via an EPC with the generator.

A1.163 Ofgem proposed “earlier” variants of the model that exposed OFTOs to some construction risks however they seemed to prefer this “later” variant.

Appendix 2 IWG attendees and other stakeholders

A1.165 The IWG workshops were attended by a wide variety of ENA members, and representatives from System Operators and Ofgem.

A1.166 Table 2 lists the IWG workshop invitees. Other stakeholders engaged as part of this work are listed further below.

Table 2: List of IWG invitees

Name	Organisation
Ben Graff (Chair)	**National Grid**
Alan Kelly	SP Energy Networks
Andrew Ryan	Ofgem
Anna Ferguson	Atkins Global
Arina Cosac	Ofgem
Bart Volbrecht	NuGen
Ben Feather	Addleshaw Goddard
Chris Veal	Transmission Investment
Craig McTaggart	SP Energy Networks
Dan North	Balfour Beatty
Danny McMillan	SSE
Elizabeth Lunn	Energy Networks
Fiona Muir	SP Energy Networks
Gary Thornton	Diamond Transmission Corporation
Lloyd Griffiths	National Grid
Heather Stewart	Scottish Government
Ignacio Medina Lopez-Chicheri	Ferrovial
James Norman	Ofgem
Jennifer Owen	National Grid

Name	Organisation
John Sinclair	Balfour Beatty
Ken Robertson	KBR
Leticia Pelizan	SSE
Luis Alvargonzalez	Ferrovial
Malcolm Burns	SSE
Mari Toda	EDF Energy
Mark Askew	Energy Networks
Mark Tunney	National Grid - EBD
Matthew Knight	Siemens
Mike Lee	Transmission Investment
Nigel Fox	National Grid
Parth Mehta	Siemens
Paul Leddie	SSE
Peter McKessick	SSE
Peter Papanastasiou	LSTC
Philip Jenner	Horizon Nuclear Power
Saad Mustafa	Ofgem
Simon Deacon	Renewable Energy Systems Limited
Simon Ludlam	Etchea Energy Partners
Vladimir Ivic	John Laing Group

A1.167 We also engaged a number of individuals outside the IWG with additional expertise on the international case studies. This included:

- a consultant involved in the Fort McMurray bidding process;
- an FTI Consulting expert from Boston focused on consulting for North American ISOs;
- a project manager on the Bank Station Capacity Upgrade project; and
- a director involved in the Heathrow Expansion Programme.

Appendix 3 IWG workshop process

A1.168 As described in the main body of the report, the IWG arranged to meet in three separate Industry Workshops which took place between October and December 2016.

A1.169 Each of these workshops was structured around a slide pack which covered the main issues and discussion points and was intended to support a debate among the participants.

A1.170 The following sections include examples of the topics that were discussed during each of the workshops.

IWG Workshop 1 – 07 October 2016

A1.171 In the first IWG workshop, the group agreed the overall timeline and objectives of the workshops.

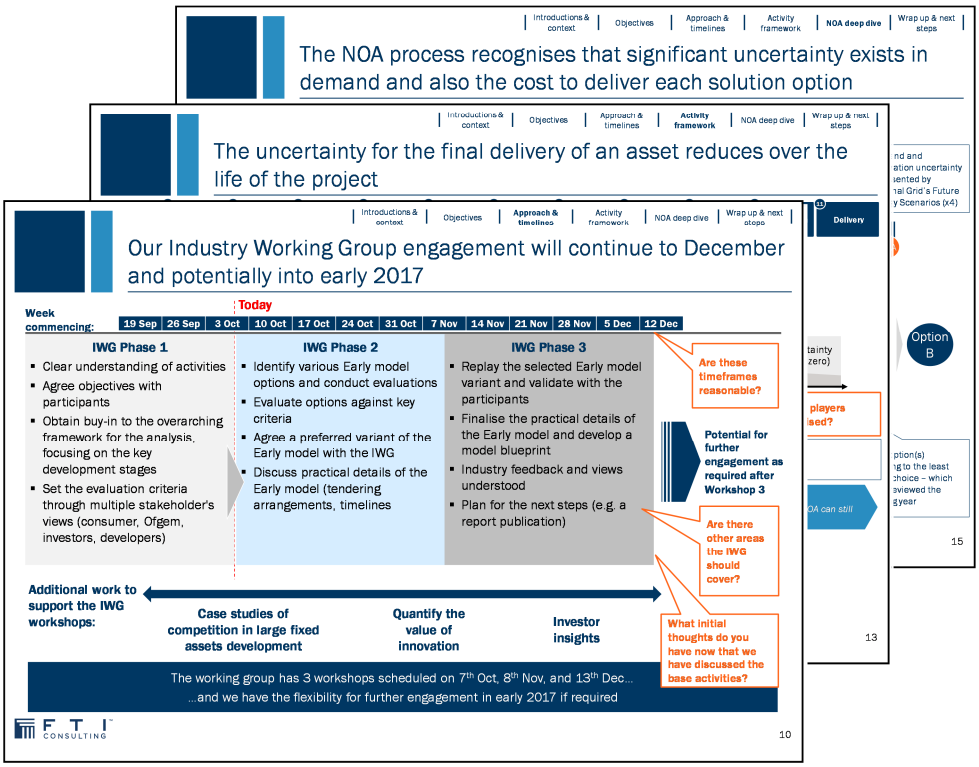
A1.172 The group explored in detail the individual stages of a transmission project lifecycle and the evolution of the associated project risks and uncertainties.

A1.173 The group also discussed how the CATO tender process takes place against the background of the relatively new annual NOA process.

A1.174 Finally, the group identified the need for a review of international experience and precedents to inform further debate.

A1.175 Figure 17 displays some of the key slides from this workshop.

Figure 17: Key slides from IWG Workshop 1



IWG Workshop 2 – 08 November 2016

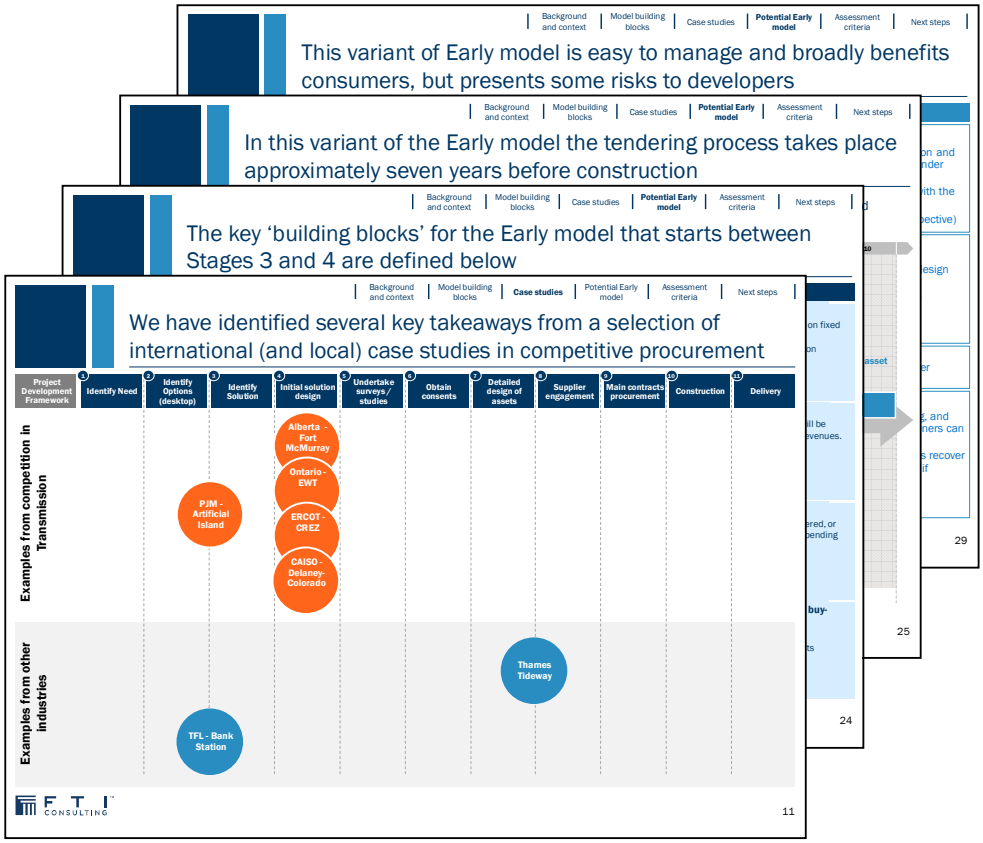
A1.176 In the second IWG workshop, the group discussed a range of international precedents for competitive processes in the transmission sector as well as in wider large-scale construction industries.

A1.177 The group then explored a variant of the Early Model that was consistent, in terms of its timing, with much of the international experience, including the timelines, key players involved and their roles, main bid metrics and the risks and returns faced by CATOs.

A1.178 The group evaluated this Early Model against a set of criteria including consumer value for money, tender management, incentives and risks for participants.

A1.179 Figure 18 displays some of the key slides from this workshop.

Figure 18: Key slides from IWG Workshop 2



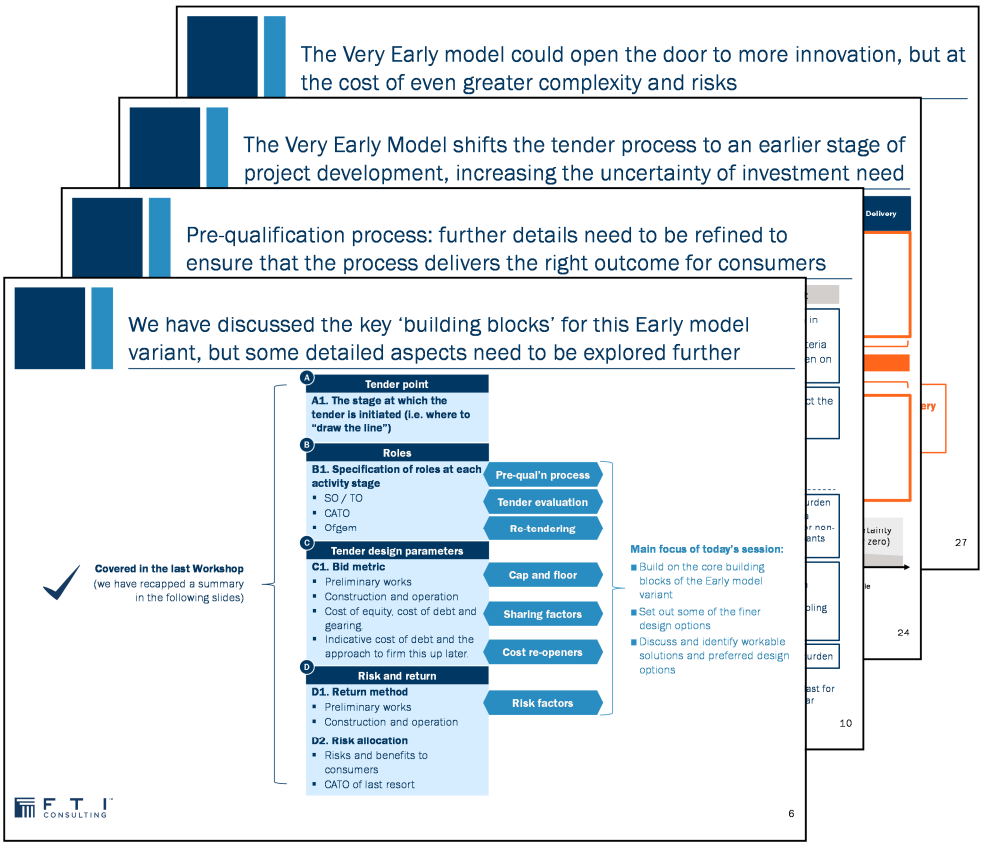
IWG Workshop 3 – 13 Dec 2016

A1.180 In the third IWG workshop, the group continued refining the Early Model, focusing on elements that had not been covered in the second IWG workshop, including for example the pre-qualification process, more detailed bid flexibility options (such as sharing factors and 'cap and floor'-type arrangements), as well as the tender assessment criteria.

A1.181 The group also explored the alternative Very Early Model variant, which introduced the competitive process at an earlier stage. The IWG then compared the two model variants to assess the pros and cons of each. On balance, the majority of the IWG participants considered that the Early model was more workable than the Very Early Model. Some participants were concerned that pushing for a Very Early Model would be too far removed from Ofgem's current default Late Model.

A1.182 Figure 19 displays some of the key slides from this workshop.

Figure 19: Key slides from IWG Workshop 3



Appendix 4 Feedback from IWG participants

A1.183 In January 2017, a first draft of this report was circulated to the IWG participants, for comments and feedback, and to validate that the report adequately reflected the views of different participants, including where there was a diversity of views within the group.

A1.184 In response to the draft report, several IWG participants provided feedback, which was in general positive. Several IWG members noted that this report was a good reflection of the IWG workshops and some commented that they considered it to be a helpful step in developing a workable Early Model.

A1.185 This Appendix sets out a summary of the feedback received across the following categories:

- **Clarifications.** Several IWG members suggested specific changes to the wording used in some parts of the report, where they thought additional clarity would benefit the reader. These changes have already been made directly in the relevant parts of the main body of this report and have therefore not been listed in this Appendix.
- **Activity framework.** Several comments related to the activity framework of a typical transmission project, including the roles and responsibilities of various parties at different stages of a project's lifecycle. These comments have been summarised below and addressed as appropriate.
- **Validation of the report's findings.** Some IWG members provided comments and suggestions that were consistent with this report and did not need to be addressed further. These comments have been summarised below and a cross-reference to the relevant sections of the main body of the report has been added where appropriate.
- **Early vs Late Model.** Some participants also commented on the choice between an Early Model and a Late Model for CATOs, which provided valuable insights that, however, went beyond the scope of the IWG workshops and this report. These comments are briefly summarised below, but have not been explored in further detail.

A1.186 A number of the comments received related to issues that were not discussed in detail in the workshops. As a result, we consider that more work needs to be done with the wider industry to address them adequately. While they have not been covered in detail in the main body of the report, they have been reflected in the action points below, noting the need for further work on them.

A1.187 A range of views were expressed at the workshops and through the feedback received in response to the first draft of this report. Though this report aims to present what we observed to have been the general consensus on a workable Early Model, it should be noted that not all parties necessarily agreed with all the proposals as set out in this report. Where a consensus was not reached, we have set out where further work needs to be done, including on the issues raised in this Appendix.

Activity framework

A1.188 One of the IWG participants questioned if there was a need to define the **Construction, Design and Management** (CDM) roles and responsibilities and their interaction with the different stages of the activity framework. We consider that this will need to be covered when articulating the Early Model in more detail as part of further work.

A1.189 Some participants raised issues regarding the **Reference Design** specified by the SO, with specific comments including:

- One IWG member suggested that there may be conflicts of interest if the SO's Reference Design was based on options proposed by the incumbent TO, if the TO could also participate in the CATO tender process. In a fully developed Early Model, appropriate safeguards would need to be in place to mitigate such risks of conflicts of interest.
- One IWG member noted that the details of the Reference Design (whose requirements are fixed and can be varied by the CATOs, for example through a 'variant bid') will need to be worked up in more detail. Another IWG member noted that the reference design may need to be more specific than just the geographical locations (e.g. specific positions on the existing network). The level of detail used for the Reference Design will need to be further refined in the fully developed version of the Early Model.

A1.190 Under the Very Early Model, this report notes (see paragraph 6.21, footnote 28) that bidders may require **access to a model of the GB transmission system** to propose robust solutions. One participant noted that this would be necessary under the Early Model as well, for example to check transient stability issues. Bidders' access to a model of the GB transmission system may therefore need to be explored further to assess whether it should form part of the Early Model.

A1.191 One of the participants queried where on the activity framework the **Front End Engineering Design** (FEED) would sit in relation to the Late Model. As set out in this report, the stages of the activity framework sometimes overlap and there is therefore no direct mapping from the FEED to the individual activities. This will need to be clarified in relation to the Late Model (which was not the focus of this report), as well as the Early Model, as part of further work.

A1.192 Stages 1 to 3 of the activity framework are essentially a description of the NOA process. As such, some IWG participants questioned the **interaction of the Early Model with the NOA**, specifically if any changes need to be made to the NOA process in the context of the Early Model. The Early Model, as set out in this report, does not envisage that changes to the NOA would be necessary at present. However, the interaction between the two processes would need to be explored in more detail in the future.

A1.193 One IWG member highlighted that there may be challenges with obtaining **planning consents** in case a large number of CATOs become involved, some with limited familiarity with the process (recognising that in the Early Model there will typically only be a single winning CATO which will go through the planning process itself). This issue, as well as the additional costs from the perspective of the planning authority, may need to be further considered as part of developing a more detailed Early Model.

Validation of the report's findings

A1.194 One participant recalled that the IWG did not support the proposal to use a **statistical approach** to assess bids. Moreover, the same participant flagged that there are no known uses of this approach in previous procurement exercises. This is consistent with paragraphs 5.66 and 5.67 in the main body of this report.

A1.195 One participant noted that the IWG did not support **penalties** equivalent to consequential SO losses or constraint costs. This is consistent with paragraph 5.88.

A1.196 One participant noted that the IWG did not support a different party to be responsible for **ownership and operation** under the Early Model than that responsible for development and construction. This is consistent with paragraph 5.93.

A1.197 One participant, in reference to paragraph 5.17, considered that the general consensus was that bidders should be **reimbursed** for some costs **in the event that tenders were cancelled**. To clarify, we consider that the broad view of the IWG was that bidders would be reimbursed for costs already incurred if the project was cancelled after it has been awarded to a particular CATO. No development costs would be reimbursed (since no development costs would have been incurred, only tender-related costs) if the project was cancelled before it was awarded.

A1.198 One IWG member suggested that it was not clear how the trade-offs inherent in different **financial structures** would affect a bid's assessment (for example different combinations of the cost of equity and associated gearing levels). As set out in paragraph 5.48, the most appropriate approach to assessing financial structures has not been fully developed at this stage and needs to be explored as as part of future work to develop the model further.

A1.199 A participant queried the necessity of referring to Interest During Construction (IDC) in paragraphs 5.74 and 5.75, stating that bidders would include IDC in their total revenue stream as part of the tender. The reference to the IDC was intended to explain how the "dead zone" between construction costs and revenues would be dealt with. The report does not intend to suggest that IDC be a separate element of any CATO's bid (see paragraph 5.42 on the quantitative bid components).

A1.200 One IWG member suggested that the **time to complete a project** could also be used as a core bid metric, for example where earlier delivery could lead to additional consumer benefits. This has been considered by the IWG and is consistent with the comments in paragraph 5.50, footnote 22.

A1.201 A simpler **alternative to a complex set of sharing factors** was suggested by one IWG member (partly because there is a risk that the degree of 'controllability' over different costs may be perceived to be subjective and partly because the probabilistic assessment may be too complicated). This is consistent with the commentary on different bid assessment approaches, in paragraphs 5.65 to 5.70.

A1.202 A participant questioned if CATOs would be compensated for having to redesign the asset if the project need **changes due to a change in environment**. This report recognises that this is an issue and describes some circumstances under which the project need may change (or disappear entirely – i.e. the project is no longer needed). The report also considers whether CATOs would be compensated when it discusses risk-sharing mechanisms in paragraphs 5.51 to 5.57 and project cancellation in paragraphs 5.90 to 5.91. However, the arrangements for compensation driven by a change in environment may need to be developed in further detail going forward, to explicitly consider all the possible circumstances that may plausibly arise.

A1.203 One IWG member also drew attention to the **uncertainty regarding the optimal design in specific geographical areas**, for example where the uncertainty on future load profile is significant due to new renewable build. This report recognised that the Early Model will need to address the issue of changing project scope or size (see paragraph 5.21) and that this should be explored further.

A1.204 One IWG member emphasized that it is important that the **pre-qualification process does not exclude new entrants**. This is consistent with the broad view of expressed at the IWG workshops and with paragraph 5.33.

A1.205 One IWG member flagged that some aspects of the risk allocation mechanism in the Early Model could be subject to **'gaming'** and that this would need to be addressed going forward. This is consistent with paragraph 5.45 of the main body of this report.

Early Model vs Late Model

A1.206 Some IWG members commented on the choice between the Late Model and the Early Model for a given transmission project. One IWG member suggested that the Early Model would be less beneficial for those projects that are likely to require multiple iterations of the design, while another queried the relative benefits and costs of the two models.

A1.207 As set out in Section 1, the focus of this report is to develop a workable Early Model, as a complementary one to the Late Model, rather than to compare and contrast the two models. The criteria for choosing between them will need to be explored as part of further work.

Other comments and feedback

A1.208 One participant highlighted that the report does not discuss the extent to which the design of the Early CATO Model might be robust to the **future evolution of the GB electricity network** (e.g. the growth of distributed generation, the SO's changing role, and the development of whole system solutions). Further work on future-proofing the model against changes to system planning would be helpful in articulating a more detailed version of the Early Model, although this would be an issue that relates to the broader policy design rather than just the development of the Early Model.

A1.209 For projects where there is a low likelihood of a change in need, one participant suggested that Ofgem could **ask bidders for more firmness** in pricing or scope, which may lead to greater benefits for consumers. While there may be scope for varying specific tender requirements on a case by case basis, this has not been discussed in detail with the IWG and would need to be considered as part of further Early Model development.

A1.210 One participant requested more clarity as to why **'availability'** would need to be a qualitative criterion, as they considered that it would be reflected in the Tender Revenue Stream (TRS) bid. The Early Model envisaged that the incentive to maximise availability would indeed come indirectly through the quantitative (monetary) bid, but the IWG considered that a narrative regarding availability could also be included among the qualitative criteria. In any event, detailed assessment criteria would need to be refined as part of further Early Model development.

A1.211 Another participant referred to paragraph 6.23 and queried why costs bid in the Very Early Model would need to reflect the **risk that the project might not go ahead** if costs will be reimbursed for cancelled projects. As set out in paragraphs 5.51 to 5.57, depending on the actual cost-sharing approach in place, CATOs may be reimbursed for the costs incurred *subject to the cost-sharing factors*, which, in some circumstances, mean that not all actual costs are reimbursed. This risk was perceived by the IWG to be higher in the Very Early Model relative to the Early Model, given that the tender takes place at an earlier stage and therefore costs are known (or perceived to be known) with less certainty.

A1.212 Finally, a practical arrangement for the **CATO's funding** (including the underlying money transfer) may need to be developed as part of further work on the Early Model.