Technical Input for Extending Competition in Transmission

OFGEM

Technical Report on Extending Competition in Transmission

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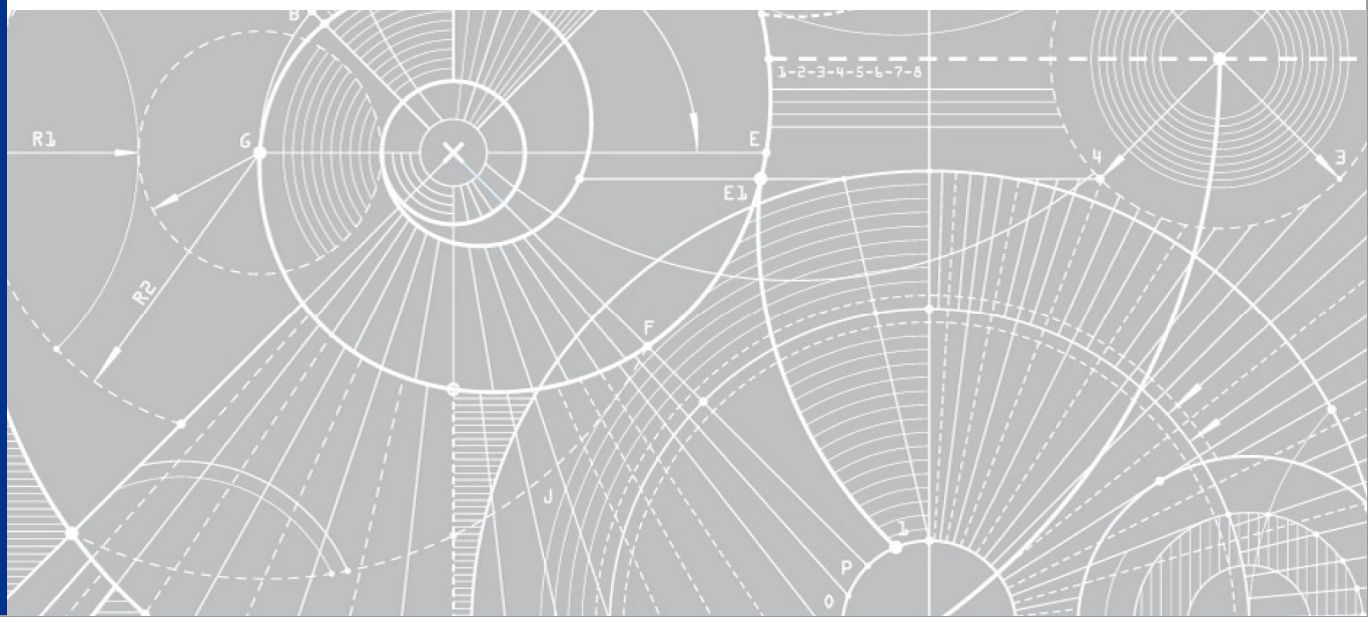

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Technical Input for Extending Competition in Transmission

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Contents

Executive Summary

Ofgem began to consider in 2012 whether the current arrangements for transmission system planning and delivery provided the most appropriate framework for the future – the Integrated Transmission Planning and Regulation (ITPR) project. Ofgem considers that the current framework for network planning and delivery is not fully achieving its objectives and that competition should be used to deliver transmission assets where it benefits consumers.

Ofgem undertook a consultation on competition in onshore networks and proposed that competitive tenders should be used for onshore assets. The draft conclusions in 2014[1] proposed three high level criteria that would be used to define whether a proposed project may be open to competitive tender:

- 'High value' - with Ofgem suggesting a range of £50m - £100m
- 'New' - completely new transmission infrastructure projects, including asset upgrades that involve new transmission towers
- 'Separable' - assets that can be easily identified as discrete construction projects that have limited interfaces with the existing network

Jacobs has been commissioned to provide technical assistance to Ofgem and recommendations for the development of the criteria outlined above against which potential network developments may be assessed to determine if they are considered suitable for open tender and subsequently awarded to a Competitively Appointed Transmission Owner (CATO).

A Jacobs led workshop was held with stakeholders in February 2015 to gauge industry views on the potential criteria and the factors to be considered when drafting definitions. The Jacobs' recommendations provided below are based on the study undertaken and the input from the stakeholder workshop.

New

We consider that the definition of the 'new' criterion should take into account the fact that most transmission projects involve some degree of works which is not entirely new. Therefore we recommend that Ofgem considers a broader definition of new to be 'substantially new' whereby the proportion of the work dedicated to new assets is more than a set percentage value (75%) of the total value of works.

Separable

We recommend that the following are included within the definition of separable:

- Ownership and control boundaries must be defineable for interface between parties, potentially in line with current criteria governing TO-TO interfaces.
- Assets within a project should be electrically connected, unless there is an overriding delivery or technology justification for non-contiguous assets to be within the scope of a project.
- Electrical separability is not a fundamental requirement for a project to be separable – but it may provide some ease of criteria definition and application. .

High Value

- The scope of the technical review undertaken by Jacobs was not to determine the absolute level of high value; this is to be set by Ofgem. Jacobs recommend that a whole life cost approach should be used to evaluate project costs rather than a simpler capital cost estimate.

[1] https://www.ofgem.gov.uk/ofgem-publications/90475/itprdraftconclusionssept2014.pdf

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to support Ofgem in its work on the Integrated Transmission Planning and Regulation (ITPR) project - Technical input for extending competition in transmission, in accordance with the scope of services set out in the contract between Jacobs and the Client. That scope of services, as described in this report, was developed with the Client.

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1. Introduction

1.1 Background

The UK's targets on renewable energy and decarbonisation are driving significant development of the electricity network to accommodate new forms of generation that are often intermittent and disparate. Currently, the UK has separate regulatory regimes for onshore and offshore transmission and interconnectors. Considering the scale of the transmission investment required, and the relatively short period in which these investments need to be made, Ofgem began to consider in 2012 whether the current arrangements for transmission system planning and delivery provide the most appropriate framework for the future – the Integrated Transmission Planning and Regulation (ITPR) project.

ITPR was a review of the existing arrangements for planning and delivering onshore, offshore and cross-border electricity transmission networks in GB. Ofgem's key objectives for ITPR were to ensure that the network is planned in an economic, efficient and coordinated manner and that asset delivery is efficient and so consumers are protected from undue costs and risks. Ofgem has decided that changes should be made to the current framework for network planning and delivery in order to meet future challenges. This includes using competition to deliver transmission assets where it benefits consumers. As part of developing the current framework Ofgem considers that competitive tendering for the provision of additional network infrastructure can provide a number of key benefits for consumers, including:

- placing downward pressure on capital and operating expenditure, therefore reducing costs;
- driving innovation in areas such as technology, design, supply chain management, the raising of finance and operations processes;
- allowing new ideas and sources of capital to enter the industry; and
- enabling investment in low carbon generation by creating efficient transmission investment which makes low carbon generation more economically viable.

However, the potential benefits must be weighed against the potential additional costs associated with third party provision, including:

- Higher potential transaction costs; and
- Greater potential regulatory costs (additional licensing, compliance, reporting etc.).

Ofgem considers that competitive tenders should be used for onshore assets that can be defined as new, separable and high value. The result is likely to be that some assets currently delivered by incumbent transmission owners (TOs) would be subject to a competitive tender in a similar way to offshore assets. Offshore transmission assets will continue to be delivered by competitive tendering. The ITPR draft conclusions document[2] proposed three high level criteria that would be used to define whether a proposed project may be open to competitive tender:

- 'New' - completely new transmission infrastructure projects, including asset upgrades that involve new transmission towers;
- 'High value' - with Ofgem suggesting a minimum threshold of somewhere between £50m-£100m; and
- 'Separable' - assets that can be easily identified as discrete construction projects that have limited interfaces with the existing network.

Jacobs has been commissioned to provide technical assistance to Ofgem and recommendations for the development of the criteria outlined above against which potential network developments may be assessed to determine if they are considered suitable for open tender and subsequently awarded to a Competitively

[2] https://www.ofgem.gov.uk/publications-and-updates/integrated-transmission-planning-and-regulation-itpr-project-draft-conclusions

Appointed Transmission Owner (CATO). The support provided by Jacobs aims to assist Ofgem in the drafting of the criteria, from a technical perspective, into detailed, defendable and practicable applications. Our role includes identifying the technical issues, complications and solutions to be considered when applying the criteria to potential transmission investments. Commercial aspects considered are only those directly related to technical aspects and did not include the identification or description of the scope of changes that would be needed to the industry codes to extend competitive tendering to onshore transmission.

1.2 Outline of Jacobs Approach

To further develop the proposed criteria from a technical perspective we have employed a three pronged approach:

- Evaluation of each criterion - Outlining factors to be considered when applying a criteria and working through each factor from a technical perspective to consider whether it remains a residual issue
- Developing our evaluation with Ofgem ITPR staff; and
- Stakeholder engagement – gathering stakeholder views on our technical evaluation of the criteria, factors to consider and residual issues.

This report outlines our main findings.

Chapter 2: Provides an outline of the Jacobs thinking prior to the stakeholder workshop.

Chapter 3: Captures the views expressed at the stakeholder workshop on the published criteria, the factors to be considered when drafting definitions and the remaining residual issues to be considered.

Chapter 4: Contains the Jacobs conclusions on the identified residual issues.

Chapter 5: Provides Jacobs overall conclusions and recommendations to Ofgem for consideration in the final drafting of the criteria definitions.

2. Jacobs' Thinking Prior to Stakeholder Workshop

Below we outline the approach we adopted in evaluating each criterion prior to the stakeholder workshop. These pre-workshop views were based on Jacobs's extensive experience with onshore and offshore transmission regimes and the technical issues associated with the design, construction and operation of transmission assets. Some guiding principles which were utilised by Jacobs during this work were:

- Technical considerations covered all aspects of a project including;
  - Project scope and definition
  - Design and construction, including associated construction risks
  - Operational requirements
  - Maintenance
  - Decommissioning.
- Simple definitions and methodology were more likely to be effective in the application of the criteria, even if the outcome on 100% of possible project scenarios may not be easily predicted.
- Based on the conclusion of the Evaluation of OFTO Tender Round 1 Benefits[3] (where the cost savings were estimated to be between 14 and 26 per cent of the total expected revenue stream) Jacobs has taken a broad view that potential benefits of the extension of competition to onshore transmission could be of the order of 20% of lifetime costs. This assumption was necessary in order that the potential process; complexity and additional project elements could be considered in context of savings which are potentially achievable based on the OFTO experience.

2.1 New

In its ITPR draft conclusions document[2] Ofgem suggested it would not compete assets that are already owned and that transferring ownership from an existing regulated party would be complex and lead to potential uncertainty. Ofgem also suggested that it was not clear that competitive tendering would have advantages over incumbent delivery for an upgrade to an existing asset, since that incumbent would have knowledge of asset's performance and experience of using the asset.

However, given the interconnected nature of the GB onshore electricity network, it is unlikely that all aspects of an identified transmission reinforcement will be considered entirely 'new' as most will involve some combination of new assets and modification/replacement of all or part of existing assets. The situation differs to the offshore transmission regime, where assets tendered to date have in effect consisted entirely or almost entirely of a new transmission spur to connect generators in a specific location. While some similar transmission spurs may be necessary in developing the onshore network, it is generally more complex – proposed reinforcements usually accommodate a number of additional generation/demand requirements across a range of locations. The reinforcement requirement identified to increase transmission capacity across a particular boundary is likely to include the construction of entirely new assets, but also the potential upgrade of existing assets, not necessarily all in the same location.

Below we outline some of the key factors that we considered should be taken into account in the definition of 'new' prior to the stakeholder workshop:

- Classification of project components – in particular how and whether it is appropriate to have a definition of 'new' that includes some existing assets, and evaluating whether limits (e.g. percentages) should be set for existing project content;

[3] https://www.ofgem.gov.uk/ofgempublications/90352/draftletteronoutcomeofconsultationontheevaluationofoftotenderround1benefits20140919.pdf

- Responsibility for asset refurbishment - consideration of who is best placed to undertake refurbishment works on existing assets (e.g. CATO or TO), particularly given the potential risk to others' assets. This issue has a strong link to 'separability';
- Linked to this is the need to ensure clear boundaries of asset ownership and the ability to transfer asset ownership if required to achieve the economic and efficient development of a project. Asset transfer is entirely achievable from a technical perspective but it will come with associated complications and issues that are not technical, but that represent additional project complexities and thus cost; and
- Where any 'new' assets join the existing network, or upgrades to existing assets, there is likely to be some level of 'joint' asset responsibility with the incumbent TO – this issue has a strong link to 'separability' and is considered in greater detail in the discussion of separability criteria.

Given the existing working arrangements that exist between TOs/OFTOs and DNOs, we do not consider large residual issues exist with broadening the definition of new to include reasonable proportions of other projects/schemes which are not themselves considered as new. Clearly some additional costs will be incurred when establishing contractual agreements, but we do not consider that these will be a substantial component of a 'high value' project.

2.2 Separable

Ofgem has suggested that point-to-point projects, or those with a low number of interfaces with the existing network and that could be easily identified as a discrete construction project, may be a useful starting point for 'separable'. Ofgem suggested that a high number of interfaces could lead to additional complexities, with subsequent additional costs. Separability was also considered important for scoping a project and setting the parameters for the competitive tender.

In assessing a potential workable and applicable definition of 'separable' from a technical viewpoint we have considered separability from an asset ownership and asset construction perspective.

Below we outline some of the key factors that we considered should be taken into account in the definition of 'separable' prior to the stakeholder workshop, considering specifically the impact on operation, asset ownership and potential costs:

- Ownership separability – In order for an asset to be considered 'separable' from an ownership perspective, then a necessary prerequisite is the ability to define those assets owned by a CATO as separate from the rest of the network.
- Construction separability - We considered the most appropriate route would be for the TO to contract directly with CATO and for the TO to undertake work on existing TO assets. Some potential loss of competition for these works may result, with possible cost implications, but will be offset by reduced risk to the CATO than if it was to undertake the works directly.
- Joint ownership - Some assets may necessarily include a degree of 'joint' ownership, such as CATO ownership of assets in an incumbent TO's substation. There are no system operational issues envisaged, but there may be some commercial asset ownership issues if interfaces are not clearly defined (e.g. in the event of a fault at the interface point). However, we do not consider these issues to be material as such arrangements are a common occurrence within the industry (e.g. OFTO and DNOs) and can be addressed using existing protocols. There may be some associated cost to the CATO of training staff and agreeing procedures with TO – but we do not consider these costs material.
- Electrical separability - A project may be designed to ensure electrical separability to assist with the separation of asset ownership. Such electrical separability may assist system operation as shutdowns of the CATO owned network will only require CATO input. These can be done using current arrangements outlined in System Operator-Transmission Owner Codes (STC) etc. In terms of asset ownership, benefits from a commercial perspective may arise as the CATO is able to fully isolate its own assets. Such isolation can be achieved using existing procedures that are currently used for TO/OFTO shutdowns etc. However, 'designing in' electrical separability via the use of additional circuit breakers and disconnectors incorporated

into the design is likely to increase project costs and thus may not be the most 'efficient' design and so the potential benefits of competition must be balanced against potential increase in project costs.

- Interfaces – Technical interfaces between a TO and a CATO can be managed. The management of interfaces has an impact during not only the design and construction phases but also during the operational life of transmission assets. Jacobs considers that the additional costs of this management have to be considered against the benefit of the competitive process and that the additional costs of this management will not be significant for electrically contiguous high value projects, unless there are some particularly complex project construction interfaces to be considered.
- Contiguous assets - If reinforcement works are not electrically contiguous (i.e. directly and physically connected) then there may be an increase in physical and commercial interfaces and additional operational and construction complexity for both CATO and SO. If assets are contiguous then the CATO would only be required to agree a small number of operational and control boundaries with counterparties (e.g. the incumbent TO). If assets are not electrically contiguous then operational complexity, and therefore potentially cost, may increase if the CATO owns a range of disparate smaller assets. However, the size of the assets is a relevant factor – if a project consists of two equal sized, substantive but non-electrically contiguous assets, such as two large 420 kV substations, then the need to be electrically contiguous is small from a risk and cost perspective. There may also be particular project delivery (e.g. where the same assets are being installed at the same time in different parts of the system) or technology solutions (e.g. where network control system interfaces are required although assets themselves are not contiguous) where there would be benefits in tendering a project where the assets are not contiguous.
- Asset transfer - In order to provide construction and/or electrical separability some assets could be transferred from the incumbent TO to the CATO. Such a transfer of asset ownership will have little impact on existing system operation as the SO will still only need to interface with one party for operational issues (e.g. shutdowns, etc.) – with little change from the current situation. The transfer of any existing assets will bring with it a degree of technical risk that will be addressed during relevant due diligence, with associated costs. For the CATO, transferring ownership of assets may provide a benefit as it will own all assets up to electrical isolation, assisting maintenance management. Therefore, asset transfer is entirely achievable from a technical perspective but would come with associated complications and issues that are not technical, but that represent additional project complexities and thus cost. Still, experience from the asset transfer process necessary as part of the existing OFTO regime may be drawn upon when considering costs and commercial risks.
- Construction risk - Although few system operation or asset ownership issues arise, construction risk will need to be assessed in detail by the CATO based on potential interactions between construction works and existing assets. Assets may be electrically separate but physically co-located and require construction risks to be considered including health, safety and environmental. These risks are not believed to be a significant issue providing that appropriate procedures incorporating risk assessments and method statements are adopted.

2.3 High Value

Ofgem considers that a £-value threshold is appropriate in order to determine whether a project would be considered suitable for competitive tender. The likely threshold previously suggested by Ofgem was between £50m and £100m. We have not considered the absolute threshold levels that may be applied by Ofgem in our technical review, but have focused on those factors that may influence the definition of 'high value' and the issues to consider when applying the high value criteria.

Below we outline some of the key factors that we considered should be taken into account in the definition of 'high value' prior to the stakeholder workshop:

- Project scope - when attempting to assess the total value of identified transmission reinforcement, it is clearly vital to define the project and the scope of the project. All potential network upgrades have differing elements associated with them. Our discussion above highlights that not all aspects of potential network reinforcement identified may be appropriate for competitive tender. As a result, in assessing whether a

project is 'high value' consideration needs to be given as to whether only the cost of the assets to be owned by the CATO are included, rather than the entire project.

- Project value - It is also necessary to consider which costs are appropriate to use when attempting to define the 'value' of a particular project. One simple option may be to consider only project capex, or capex and operation costs. However, when considering the cost of a project to the consumer, then it may be more appropriate to extend the application to include so called 'whole life' costs of a particular project so that the true costs and benefits of a project and options can be evaluated. If so, then potential complexity surrounds how to define 'whole life costs' and what to include in their evaluation. In addition, consideration needs to be given to the treatment of transactional costs associated with a project – while these costs are not necessarily 'project' costs, they are costs associated with the CATO model.
- Cost evaluation process - Through ITPR, Ofgem will require the SO to provide its assessment of options for meeting the needs of the network via a new network options assessment (NOA) process. The NOA process will appraise major network investment options and therefore the SO may be providing an initial project evaluation.
- Tender model – Different project elements may be tendered under the 'early' and 'late' CATO build models. Under the early model all pre-construction, planning and design costs will be included in the project and taken forward by the CATO. Under a 'late' model these costs may have already been incurred and therefore consideration needs to be given as to their subsequent inclusion (or not) in the 'value' of a project. The proportion of the total project value contributed by the pre-construction, planning and design costs will vary significantly depending on the nature of the project and the total value of the project. In addition project costs may change over time between the early and late CATO model. Typically pre-construction costs can represent around 10% of the total project costs.

3. The Stakeholder Workshop

A workshop was held with stakeholders on 12th February 2015 to gauge industry views on the criteria Ofgem proposed in its ITPR draft conclusions and the factors to be considered when drafting definitions. The workshop included a presentation by Jacobs of the three key criteria and broad considerations, factors and residual issues associated with each as outlined in Section 2. The workshop was arranged so each criterion was discussed in a round robin style – with each participant able to express views over the afternoon on each criteria.

Key conclusions from the stakeholder workshop are summarised below. Some additional non-technical comments on aspects such as “early v late” build model and “Incentives” were made. Although these subjects were not the purpose of the workshop these comments are captured within Appendix A together with a list of workshop organisation attendees.

3.1 New

3.1.1 Definition

A number of workshop attendees found it difficult to split the ‘New’ and ‘Separable’ criteria given the apparent interrelation between the two, especially around the interaction with existing assets. Separablity was considered by some to be the initial criteria consideration, with new following on after. Some also considered that project purpose and dependencies should have been included as a high level criterion.

3.1.2 Factors discussed

A number of stakeholders suggested simplicity was important when assessing relevant factors. How to define the project scope and value was considered by some a fundamental requirement – with links to the ‘high value’ criteria. Project scope should, it was thought by some, be based on sound benefits and not increased simply to reach a value threshold that may not be supported by other considerations.

A number commented that they considered it unlikely there would be strong market appetite to bid for general refurbishment activity. Although a project with ‘like for like’ asset replacement was thought to be more appropriate for tendering. It was recognised that projects could in practice include elements of existing assets and, therefore, that there may be a need to assess the impact of this on a project by project basis.

3.1.3 Residual issues

The scope of a proposed project impacts on the definition of ‘new.’ Several attendees made reference to National Grid Electricity Transmission’s (NGET) response to the ITPR draft conclusions consultation – NGET suggested that a ‘new’ project would not materially affect others’ assets, with projects classified as new including:

- New greenfield substation
- New transmission lines
- New transformers

And projects that would fail to be classified as new including:

- Innovative developments to existing assets e.g. dynamic line ratings
- Expansion of existing assets
- Refurbishment or replacement of existing substations, lines with towers, transformers

It was also recognised that there may be a need for project specific elements to be included in the process that may lead to greater complexity. If a wider definition of ‘new’ is applied it might not be straightforward to

separate the operation of the assets and ownership of the assets as joint ownership and liabilities are more likely to occur.

It was recognised that, if the definition of new is broadened, then elements of existing assets may arise in a given project, leading to the need for a 'project by project' assessment for competitive tendering. Whilst it was recognised that assigning arbitrary proportions of new/old might not be desirable, it was also recognised that percentage minimums for 'new' may be used as a guideline.

Linked to the broader definition of new and impact on project scope are the potential complications surrounding the transfer of assets. A clear view emerging from the workshop was that the transfer of assets, while possible, would lead to increasing complexity, particularly the transfer of older existing assets.

Consideration should be given to setting a minimum percentage guideline of new build within any project scope.

3.2 Separable

3.2.1 Definition

The factors identified around CATO/TO separability are well understood based on numerous existing examples of TO-TO, TO-OFTO and TO-DNO interfaces. None of these factors was thought to be a major issue and could be resolved by applying existing procedures and arrangements, or in some instances, by modifying these procedures.

3.2.2 Factors discussed

'Electrical separability' was discussed broadly in terms of a CATO-owned circuit breaker at each interface with the incumbent TO to ensure project electrical separation. Most stakeholders did not consider electrical separability a necessary pre-requisite for competitive tendering, and there was some agreement that providing additional circuit breakers purely to provide electrical separability was unlikely to be necessary or economically justifiable.

A number of attendees recognised that the risks associated with a CATO undertaking works in a TO's substation or adjacent to their assets can be managed, but some were also keen to express that these risks should not be underestimated.

There was strong debate around the main aspects of asset transfer.

- A number of attendees expressed the view that the transfer of assets to provide ownership or construction separability can be done, but there are a number of issues to be addressed, particularly around the transfer process and adequately compensating the original asset owner, including for the impact on any regulated asset base.

- Some expressed the view that transfer of assets should be avoided unless absolutely necessary due to the potential associated complications and costs. Key was the nature (including age) of the particular assets - a clear message emerged from some potential bidders that certain assets, such as OHL towers, would be considered a high risk asset transfer option given the potential lack of certainty on the condition of these assets and therefore risk to the CATO.

- On the other hand, transfer of ownership of less critical assets, such as a busbar, may be more acceptable to all parties.

- No attendees expressed any significant concerns with transfer of an existing route corridor (i.e. land), providing it did not include physical assets (e.g. towers).

- Lessons can be learned from the OFTO regime in terms of transferring existing assets. The age of existing assets was considered by some a likely complicating factor e.g. assets which are already 20 or

30 years old. Concern was expressed by some that information may also be limited on well-established assets – increasing risk.

- The treatment of third party works[4] was discussed, including whether they should be included in a project scope in order to increase construction volumes/values or be kept separate to maintain simplicity. It was a general view that existing arrangements for the technical treatment of third party works would remain valid.

There were queries raised over how TO and CATO liabilities could be separated given the impact of one party's assets on the other party's network, or on the wider system. Some considered that this could be addressed by the SO at the development stage and also that this is an issue that affects the operation of the current transmission network. Some considered that existing procedures addressing the issue would need to be reviewed and strengthened.

No clear workshop view emerged on whether a proposed project should be electrically contiguous in order to be a candidate for tendering. While some commented it may be an important factor, others noted that the extent to which it was would depend on the size of the project and how elements of a project are delivered. It was also noted that projects can be, and are, owned which are not contiguous. Contiguous has different levels of importance for construction and operational phases in terms of operation cost and complexity.

Several attendees commented that risk is a factor throughout the process and needs to be considered at all levels. Some agreement emerged that 'everything can be done' but complexity has cost implications.

Some commented that the number of CATO's involved in a project or area of a network may be a factor as a number of separate CATOs in a specific area of the network may lead to an increased level of overall complexity due to the number of separate interfaces.

3.2.3 Residual issues

There was no unified or definitive view on what factors are relevant to separability, beyond the need for clear ownership boundaries between interfacing parties. However, a clear concern emerging from the workshop was the potential transfer of a company's existing assets to a CATO in order to provide electrical or construction separability. The concerns included:

- The impact on regulated asset base and how this would be addressed in future price controls;
- The potential impact on companies providing CATO funding if part of the assets could be transferred to a third party and impact on the rate of return, and;
- The costs associated with transfer of assets, timing of transfer and whether a potential CATO could have any associated rights and special powers transferred to them.
- The complications associated with transferring assets that have years or decades of service maintenance and operational history

As a result, the potential benefits of transferring assets to provide 'electrical separability' could possibly be outweighed by the issues around asset transfer. A particular example discussed was the transfer of OHL towers to a CATO for circuits that required re-stringing, with some suggesting this would lead to major issues and should not be undertaken.

Several attendees suggested that the risks associated with a CATO undertaking works in a TO's substation or adjacent to a TO's assets should not be underestimated. It was agreed by some that this happens at present (e.g. for a DNO connection) but that the potential risks can be significant and thus consideration should be given to having these works undertaken by the incumbent TO. Some suggested that any reinforcement works required on the existing network could be dealt with in a similar way to how Third Party Works are currently addressed under the CUSC, i.e. the incumbent TO undertakes the works with the costs allocated appropriately.

[4] Construction works undertaken by a contractor engaged by the TO for another party e.g. developer, CATO or OFTO

3.3 High Value

3.3.1 Definition

A general view was that whole-life costs should be included when determining project value to encourage more innovative solutions.

3.3.2 Factors discussed

Most who expressed a view concurred that only the CATO proportion of the project should be considered when assessing the value of a project for potential competitive tendering. Most also agreed that all consenting, pre-construction and transactional costs should be included, with 'whole life' costs considered the most appropriate by some.

There was no consensus on the use of constraint costs in assessing project value – at high level constraint costs could define the 'value' of a project but high constraint costs may not always equate to high project costs. However, given the criticality of circuits and subsequent impact of outages, one incumbent suggested that minimising outages (and thus constraints) should be considered when assessing whole life costs.

Some expressed concern that an SO estimate of costs and project need might not be sufficiently impartial if the SO is not considered fully 'independent', and therefore Ofgem may need to validate. However, there was also discussion and some agreement that a methodology could be worked out for the SO to apply that would be similar in principle to the NOA process.

One generator suggested timely project delivery is of high importance, particularly under the Contract for Difference (CfD) regime and should be taken into account when assessing project 'value.' In addition, 'high' value could also include potential for generator connections.

3.3.3 Residual issues

A number of participants expressed the desire for the criteria to be kept as simple as possible. Many also noted that if a project meets the 'separable' and 'new' criteria it will be very likely to meet the 'high value' threshold given a typical project size. Most agreed that only the CATO proportion of the project should be considered when assessing whether a project was of 'high value.'

Overall, many agreed that whole life project costs should be used – but little discussion was had as to what might be included in 'whole life' costs. Several considered that incentives for TO, SO and CATO are important given the criticality of many transmission circuits – with some value to consumers of a more coordinated approach and so potentially including outage / constraint cost management in whole life costs.

3.4 Summary

The main residual issues, and therefore areas for further investigation, emerging from the workshop were:

- Project definition – The need to clearly define what constitutes a project emerged as a key consideration across all three key criteria, in order to understand what all criteria would be applied to.
- Asset transfer – the complexities of transferring assets was noted in discussions on both the 'new' and 'separable' criteria, specifically with the expectation that this would be from an incumbent TO to a CATO. A clear view emerging from the workshop was that the transfer of assets, while possible, would lead to increasing complexity.
- Broad percentages of new assets - the relevance of considering general percentage minimums for new assets under the definition of the new criterion was discussed, specifically in the context of how projects are practically developed and how unlikely it would be that a whole project would ever be entirely new.

- Electrical Separability - The main conclusion in relation to ‘separability’ was the need to establish clarity over asset ownership and control between interfacing parties. ‘Electrical separability’ was not considered an essential requirement, but was recognised as having the potential to add some clarity around interfaces, albeit potentially with a cost.

- Scope of the high value criterion – there was some consensus that whole life costs on the CATO proportion of a project were considered the most applicable, although in practice the elements included within whole life costs need to be considered and relevant to only the assets being tendered.

4. Conclusions

Following the workshop we considered further the five residual factors that emerged to build our conclusions on which elements are relevant to Ofgem's technical definitions of the three criteria. The residual factors were:

- Project definition;
- Transfer of assets;
- Guideline for minimum percentage of new assets;
- Electrical separability; and
- Scope of the high value criterion.

4.1 Project definition

In its final ITPR conclusions document Ofgem concludes it will enhance the SO's role to identify system needs and assess options to meet these needs via a new network options assessment (NOA) process to appraise major investment options[5]. The SO will therefore make a recommendation on which options it expects to be the most efficient and economic way of meeting system needs. Ofgem has also decided that the SO will be required to lead the development of some options. This will include early development of options (including desktop analysis of the capacity to be provided, technology choices and high level routing for onshore transmission projects) that the SO expects would meet the criteria for onshore competitive tendering.

As part of this process the definition of a project is fundamental before any project can be offered for competitive tender. Two key elements must be defined:

- Project scope – with clear and precise definition of what is included and excluded from a project and project timing; and
- The system performance criteria (as defined by the SO) that the project must satisfy.

Key factors the SO should consider when determining the project scope will be:

- Project Deliverability – A project may require sections of work that are delivered over a number of stages and across different geographical, system and indeed technology boundaries. How the elements of the project can best be delivered from a technical perspective will be a fundamental driver as to how projects are defined e.g. two new substation build requirements which are in the same geographic area but are separated by 5 years in terms of programme, could be separated as projects. However, two similar new substation builds that were to be implemented at the same time or sequentially with little time separation would likely qualify for a single project;
- Location – Works which are disparate in terms of location would normally only be combined for sound technical reasons, linked to technology or strong network interaction. Projects should not be bundled (or separated) to influence project value; and
- Technology – Often the nature of the technology will justify projects being combined into larger elements where volume of similar technologies may generate benefits e.g. section of OHL or cable works. Alternatively technology may lead to logical separation out of elements where the individual elements are of significant size e.g. separation of HVAC network reinforcement from an HVDC interconnection.

Following the definition of a project, the criteria should then be applied to determine whether the identified project, or part of a project, is suitable for competitive tender.

The system performance criteria, including aspects such as delivery timescale, of the project should be set by the SO such that the competing CATOs can evaluate solutions and submit tenders which fully meet system

[5] https://www.ofgem.gov.uk/ofgem-publications/93917/itprfinalconclusionsdecisionstatementpublicationfinal-pdf

requirements. Performance criteria will range from simple asset ratings through to aspects such as Energy Availability and Scheduled Energy Unavailability on projects such as HVDC reinforcements.

4.1.1 Our view

While the SO will identify options and lead the early development of some options, project scope should also include tightly defined delivery packages and performance criteria that can be subsequently used in the competitive tendering process. We also consider that a key objective for Ofgem in determining the overall methodology by which the criteria are applied and projects defined should be to ensure that the project requirement, scope and options, prepared by the SO, are undertaken in a consistent and independent manner.

4.2 Asset transfer

A common view emerging from the workshop was that asset transfer may lead to additional complications, with some assets more complicated to transfer than others (e.g. existing, aged assets). As a result, asset transfer should be avoided unless essential to achieve the economic and efficient development of a project. However, depending on project scope, the transfer of assets, initially from the incumbent TO to the CATO, may be necessary in some limited circumstances for a competitively tendered project.

For projects which are substantially new the requirement for asset transfer will be limited to where ownership and operational boundaries can be simplified through transfer of assets rather than through existing ownership boundary mechanisms which apply between TO-TO, TO-Generators and TO-OFTOs. Moreover, the challenges relating to asset transfer are, in the main, commercial rather than technical. However, given the depth of discussion on this topic during the stakeholder workshop it is worth exploring this area further for completeness. These challenges include:

- The age of the asset – in particular whether the asset is existing and relatively new, or existing in mid-life or well established and closer to the end of its technical life. Younger assets are generally much easier to transfer as suitable information should be available from the construction and commissioning process, OEM (Original Equipment Manufacturer) warranties may still be in place and asset condition and residual life should be well understood. If an asset is older, then more effort (and cost) will be required to assess aspects such as asset deterioration, current levels of maintenance, how hard the asset has been worked over its life to date, the residual life of the asset and the availability of suitable records;
- More generally the level of available data and knowledge of an asset, including design / specification, maintenance and outage history, and whether the information available is configured so that it can form part of the asset transfer process;
- How embedded an asset is - An asset that is discrete will be easier to transfer as less effort is required to consider multiple technical interfaces between the asset to be transferred and the remaining system. Assets which are fully embedded are potentially very difficult (and costly) to transfer.
- The level (and resulting cost) of the technical due diligence required given the condition and age of the asset, and the level of data and knowledge available on the asset;
- The higher the value of an asset, the more worthwhile the potentially costly process of asset transfer – but the greater the impact on the incumbent TO's asset base, with associated complications of how this could be managed from a regulatory perspective (e.g. under a price control. For low value assets the costs associated with the process of asset transfer may not be justified – although if a low value assets forms part of a high value scheme, the costs incurred may be proportionately small and therefore justify transfer if it provided benefits in the economic and efficient development of a project.
- Complexities specific to particular asset types, including
    - Overhead lines (OHL) with potential need to separate towers and conductors;
    - Substations, where part assets may need to be transferred and interfaces can be complex;
    - Transformers, where operational life history will be key to determining residual life and likely asset condition; and

- Underground cables, where asset information may be limited

4.2.1 Our view

Some asset transfer may be appropriate for some potentially competitive projects and the need to transfer some assets should not rule out a project from a competitive tender on a technical basis. The potential additional time and cost that asset transfer will add to any project needs to be considered together with the impact on the incumbent TO's asset base and the expected benefits on any particular project of competition. Overall if a project is of high value, then allowing a relatively small proportion of this project to be composed of existing assets should not be a significant barrier to competition in terms of the complexity of transferring those assets, subject to consideration on a case by case basis of factors such as the types of assets involved (e.g. OHLs), their age, and the amount of data available on them. However, consideration will need to be given to how an incumbent TO is remunerated for any assets transferred to another party.

4.3 Minimum percentage of new assets

Following on from our initial analysis and the discussion at the workshop about the scope of projects rarely being limited to entirely new assets, we recognise that the criteria need to take into account the potential for any project to include changes or works on some existing assets and still be suitable for competitive tendering. The above discussion on asset transfer demonstrates the feasibility of transferring some assets. Consequently we have considered the potential use of a percentage minimum value of new assets as part of a definition of a 'substantially new' criterion.

We envisage that where a project contained a certain percentage by cost of new assets, above a given minimum threshold, then it would satisfy the a 'substantially new' criterion and be suitable for competitive terndering (assuming it was also high value and separable).

In addition to the capital (or life cycle if such an approach were adopted) costs of the new assets the cost of the non-new element would need to include any project asset refurbishment cost and the cost to the CATO to compensate the incumbent for transferring its assets and the loss to the incumbent's regulatory asset base. There would also need to be a robust mechanism to independently verify the value of assets to be transferred.

There are also considerations around the scope of what assets could be transferred. Any asset transfer would have to be justifiable for economic and efficient project delivery where existing assets need to be refurbished or upgraded. Safeguards in these areas would be required to mitigate the risk of existing assets being added to projects arbitrarily to inflate the project value and achieve a certain cost threshold.

4.3.1 Our View

Given the above, we consider that a definition of 'substantially new' would therefore include a minimum of 75% entirely new assets. This minimum would ensure that the permitted 25% of project cost associated with changes or works on existing assets is high enough to include the cost of compensating an incumbent TO for the assets, as well as covering the upgrade/refurbishment costs, while ensuring that the majority of the project costs relate to the provision of new infrastructure in line with Ofgem's policy intent.

The simplicity of applying a percentage minimum to the definition of new is attractive, specifically in terms of simplifying the process and providing clarity to stakeholders. However, there are significant challenges around cost assessment, potential for gaming against the high value threshold, complexity around dealing with projects on the margins of any threshold value and the potential transaction costs of significant amounts of asset transfer.

4.4 Electrical separability and electrical contiguity

A common view emerging from the workshop was that electrical separability is not a necessary pre-requisite for a project to meet the separable criterion. However, electrical separability may be a 'nice to have' that provides

some benefits to the competitive process – including benefits of simplifying and clarifying project scope, responsibility and asset ownership. It is therefore useful to identify the practical issues underpinning electrical separability – including an evaluation of the potential costs and benefits electrical separability may provide for both the incumbent TO and CATO.

In some cases, creating electrical separability where it otherwise is not required would lead to additional project costs. Therefore, it will be necessary to balance whether or not the complexities and resulting cost of designing in electrical separability are justifiable vis-à-vis total project cost. Overall on 'high value' projects the benefit of designing in electrical separability may outweigh the proportionally low cost of achieving electrical separability.

4.4.1 Our view

Electrical separability is not essential for a project to be considered appropriate for competitive tendering. However, given that electrical separability may provide some benefits, the SO should consider the costs of achieving electrical separability in its option development.

Conclusions as to aspects which should be included within the definition of separability;

- Ownership and control boundaries must be implemented as per current criteria governing TO-TO interfaces;
- Any asset transfer must be consistent with project scope;
- Any additional project scope which may be included to provide electrical, construction or ownership separability, such as additional circuit breakers, that enable a project to be conceived, specified or delivered as a competitive project, would have to be justifiable on the basis of benefits that will be delivered. Inherently the additional project scope should not be a significant value compared to the total project value and Jacobs recommends that Ofgem consider a limit of 5% of total project value identified by the SO as the maximum that could be considered as viable to provide electrical separability. If the additional project scope exceeds this value then the potential benefits of the competitive process, after taking into account tendering and transaction costs, could be at significant risk of not being realised. This is taking into account the potential 20% benefit of benefits from the competitive process outlined in Section 2.1. (For most high value projects it is anticipated that the value of any such additional project scope would be significantly less than 5% of total project value); and
- Whilst technical interfaces between a TO and a CATO can be managed the management of interfaces has an impact during not only operational life of transmission assets but also during construction. Jacobs considers that the additional costs of this management have to be considered against the benefit of the competitive process and that the additional costs of this management will not be significant for electrically contiguous high value projects unless there are some particularly complex project construction interfaces to be considered.
- For non-contiguous projects the number of interfaces will increase and on this basis it is considered that assets forming a project should be contiguous unless there is a case to justify otherwise. The case to justify non-contiguous assets may be based on an overriding project delivery or technology justification.

4.5 Scope of the high value criterion

Based on our initial analysis and the discussion at the stakeholder workshop, we consider further the relevance of whole life costing for the evaluation of project costs against the high value criterion. Although there was general agreement in the workshop on the principle of using whole life costing, little consensus emerged (as time limited discussion) over the definition and application of 'whole life' costing in this context. Therefore, there are a number of issues to be considered when attempting to use and define whole life costing as part of the high value criteria:

- Costs to include in 'whole life' costs -
    - At a very basic level capex is an initial determination of project cost. However, lifetime operational and maintenance costs are a significant component of project costs - these will vary by project but typically

in a range from 5-20% of total capex - and should also be taken into account over the life of the project.

- There are also other costs that it may be appropriate to include, such as decommissioning costs, losses and externalities (visual amenity, property devaluation and minimising outage costs etc.) that will vary considerably between projects.
- It may be possible to adopt an adapted version of the asset management 'whole life' costing approach as part of the 'high value' criteria for project assessment. Adopting a common asset management whole life cost approach based on a standard pro-forma would ensure that competitive projects are evaluated on a like for like basis.

- Whilst there is widespread adoption of a life cycle approach to asset management (e.g. through ISO 5500) there currently is no consistent approach to assessing 'whole life' project costs in detail.
- The life of a project is also an important consideration in determining the 'whole life' cost. Options include an assets' depreciation life, technical life and design life. Other relevant considerations are whether to include indexation and discount rates over this period to determine a cost expressed in present value.

Based on the above there are complexities involved in both determining the elements applicable to whole life costs in this context in addition to determining how in practice any assessment of these costs should be built and applied. However, if whole life costing is not used (and only a simple project capex applied) then it may send the wrong message in terms of behaviour – using only project capex would go against Total Expenditure (TOTEX) principles, plus it may raise concerns (expressed at the workshop) over competition being a 'cost of capital battle' based on a narrow capex definition.

4.5.1 Our view

We consider that project value should include an element of lifetime project costs – with costs evaluated over the appropriate depreciation life of the project. Ofgem should consider an asset management style whole life costing approach that includes capital, operational and maintenance programmes over the life of the project to ensure a consistent approach is used to both determining the value of a project and comparing competitive tenders. We consider specifically that the following elements should be considered:

- **Capital costs** (including land, materials, equipment and construction services)
- **Planning**, consenting and other development costs
- Internal **project management** or operational management costs
- **Insurance** and/or **contingency** (to the extent that this could be priced effectively)
- **Operation and maintenance**
- **Decommissioning**
- **Transmission losses** (to the extent that these are relevant to design decisions and/or could be reduced by different design choices)

In order to produce an initial evaluation of these costs Ofgem should consider the following:

- **Level** – The scope of review undertaken by Jacobs was not to consider the level of high value, this is to be determined by Ofgem taking into account the benefits to be realised from a competitive approach along the costs of tendering and interface costs.
- **Project Life** – This should be set by Ofgem for the appropriate number of years consistent with the CATO regime
- **Reference** – Costs should be indexed to the same year as that set for the high value level and a discount rate applied to project evaluation set by Ofgem to achieve a project present value

Although the scope of the work undertaken by Jacobs has not been to consider the determination of the level of high value we recommend that Ofgem consider applying a 25% margin to simplify the process for the

determination of whether a project meets the high value criterion. If the project value is 125% or more of the high value level; then it clearly meets the criteria. If the project value is less than 75% of the high value threshold; then it does not meet the criteria. Between 75% and 125% then it is suggested that a more detailed consideration of the project value could be undertaken before a final decision is taken on the eligibility of the project. The plus or minus 25% project capex has been adopted in initial cost benefit analyses underpinning the Needs Cases for various transmission projects, such as Caithness Moray.

5. Summary of Recommendations

The Jacobs' conclusions and recommendations provided below are based on the study undertaken and the input from the stakeholder workshop.

New

We consider that the definition of the 'new' criterion should take into account the fact that most transmission projects involve some degree of works which are not entirely new. Therefore we recommend that Ofgem considers a broader definition of new to be 'substantially new' whereby the proportion of the work dedicated to new assets is more than a set percentage value (75%) of the total value of works identified by the SO.

Separable

We recommend that the following are included within the definition of separable:

- Ownership and control boundaries must be defineable for interface between parties, potentially in line with current criteria governing TO-TO interfaces.
- Assets within a project should be electrically connected, unless there is an overriding delivery or technology justification for non-contiguous assets to be within the scope of a project.
- Electrical separability is not a fundamental requirement for a project to be separable – but it may provide some ease of criteria definition and application. Any additional project scope which is included[6] within a project to provide electrical, construction or ownership separability, such as additional circuit breakers, that enable a project to be conceived, specified or delivered should not be a significant value compared to the total project value. Jacobs recommends that Ofgem consider a limit of 5% of total asset value identified by the SO as the maximum that could be considered as viable to provide electrical separability. If the additional project scope exceeds this value then the potential benefits of the competitive process, after taking into account tendering and transaction costs, could be at significant risk of not being realised.

High Value

The scope of the technical review undertaken by Jacobs was not to determine the absolute level of high value; this is to be set by Ofgem. Jacobs recommend that a whole life cost approach should be used evaluate project costs rather than a simpler capital cost estimate.

General

Some general recommendations of Jacobs to Ofgem to assist the preparation of the criteria definitions and the methodology by which these should be applied are:

- Clearly defining project scope is an issue of key consideration across all three criteria. Ofgem has decided that the SO will identify transmission reinforcement options and lead the development of some options. This will include early development of options that the SO might expect would meet the criteria for onshore competitive tendering. When considering any proposed project, scope and definition are fundamental to the application of the criteria. While the SO will identify options and lead the early development of some options – project scope must also include tightly defined delivery packages and performance criteria.
- Some asset transfer may be appropriate for some potentially competitive projects and the need to transfer assets should not rule out a project from a competitive tender on a technical basis. The potential additional

[6] By the SO or by the CATO during tendering

time and cost that asset transfer will add to any project needs to be considered together with the impact on the TO's residual asset base and the expected benefits of competition on any particular project.

- The existing asset owner is likely to be best placed to undertake any upgrade or refurbishment works required on existing assets.
- Whilst technical interfaces between a TO and a CATO can be managed, the management of interfaces has an impact during not only operational life of transmission assets but also during construction. Jacobs considers that the additional costs of this management have to be considered against the benefit of the competitive process and that the additional costs of this management will not be significant for electrically contiguous high value projects unless there are some particularly complex project construction interfaces to be considered.
- For non-contiguous projects the number of interfaces will increase and on this basis it is considered that assets forming a project should be contiguous unless there is a case to justify otherwise. The case to justify non-contiguous assets may be based on an overriding project delivery or technology justification.

Appendix A. Stakeholder Workshop

The attendees at the workshop were from the organisations are listed below:

- Babcock International Group
- Balfour Beatty Investments
- Diamond Transmission Corporation
- Jacobs
- National Grid Electricity Transmission
- National Grid European Business Development
- Ofgem
- Renewable UK
- RWE Innogy
- Scottish Hydro Electric Transmission
- Scottish Power Energy Networks
- The Department of Energy and Climate Change
- Transmission Investment

Early/late model

While not specifically addressed in the workshop, many attendees expressed views on the early/late tender model. Many considered that the early tender model is likely to deliver most value as it offers greater scope for innovation in design and cost. Several suggested that the early model could be based on the network options assessment (NOA) process – with the SO highlighting boundary reinforcement requirements and potential CATOs offering design solutions for the defined need. However, it was also noted that, while the early build may offer more innovative engineering solutions, it will result in higher bid costs.

One incumbent expressed the view an early model would require the release of less potentially commercially sensitive information, e.g. pre-construction costs and technical knowhow.

One incumbent expressed the view that the late model offered little difference to the current situation – with the TOs contracting out tenders to construct specific projects.

A relatively common view expressed was that a late model could become a cost of capital battle – with very small cost differences in very small areas becoming highly influential in winning – 'bidding with a toothpick' (as with the OFTO process).

Incentives

A number of participants expressed the view that incentivising the 'right' behaviours was important – for the SO, incumbent TO and CATO. The costs, incentives and implications of system operation and management was highlighted – the current system of outage planning was described as 'a bit random' – any outage overruns may have a significant impact on another's assets, plus on potential constraint costs.

A number of attendees asked Ofgem for a better understanding of the threshold levels outlined for Strategic Wider Works (SWW) and the opportunity to revisit these if not enough projects come forward.