Extending competition in electricity transmission: impact assessment

Updated Impact Assessment – Supporting Document

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Overview:

This document is an updated assessment of the impact of our decision to extend competitive tendering to onshore electricity transmission assets. It includes consideration of the benefits, costs and risks, scenario analysis and distributional effects.

We initially assessed impacts as part of the Integrated Transmission Planning and Regulation (ITPR) project, which supported our decision to introduce competition onshore for new, high value and separable projects in March 2015.

This updated impact assessment reflects our further understanding of impacts from our progress developing more detailed regulatory arrangements and from further evidence and analysis from stakeholders. It continues to show there are considerable benefits to consumers from extending competition onshore.

Contents

1. Approach

Chapter Summary

In this chapter we set out the background to our decision in March 2015 to introduce competition to onshore transmission assets. We also outline our approach to assessing impacts.

Introduction

1.1. We have decided to extend the use of competitive tendering to onshore electricity transmission assets that are new, separable and high value. We will run competitive tenders to identify parties to construct, own and operate these assets. We made this decision in March 2015, as part of our Integrated Transmission Planning and Regulation (ITPR) project.[1]

1.2. In this document we assess the impacts of our decision. It is an update to the assessment we made as part of the ITPR project, first in September 2014[2] and updated in March 2015. In line with best practice, we are updating our impact assessment to reflect our most recent understanding of impacts.

1.3. Our understanding has deepened as we have progressed with the implementation of our decision. We have been developing the arrangements for competition and engaging with stakeholders, publishing proposals for consultation in October 2015[3] and alongside this document in May 2016. We have also been working with the Department of Energy and Climate Change (DECC) to support the development of draft legislation, published in January 2016. The Energy and Climate Change Committee carried out pre-legislative scrutiny of this legislation, publishing its report and recommendations in May 2016.[4]

1.4. This updated assessment also takes into consideration two other impact assessments that have been published related to the introduction of competition onshore. In January 2016, DECC published a regulatory impact assessment

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[1] Integrated Transmission Planning and Regulation (ITPR) project: final conclusions, March 2015: https://www.ofgem.gov.uk/publications-and-updates/integrated-transmission-planning-and-regulation-itpr-project-final-conclusions
[2] Integrated Transmission Planning and Regulation (ITPR) project: draft conclusions, September 2014: https://www.ofgem.gov.uk/publications-and-updates/integrated-transmission-planning-and-regulation-itpr-project-draft-conclusions
[3] Extending competition in electricity transmission: arrangements to introduce onshore tenders, October 2015: https://www.ofgem.gov.uk/publications-and-updates/extending-competition-electricity-transmission-proposed-arrangements-introduce-onshore-tenders
[4] Energy and Climate Change Committee: Pre-legislative scrutiny of the Government's draft legislation on energy, sixth report of session 2015-16, May 2016: http://www.publications.parliament.uk/pa/cm201516/cmselect/cmenergy/776/776.pdf

alongside draft legislation.[5] Frontier Economics published an impact assessment in January 2016, commissioned by National Grid Electricity Transmission.[6]

1.5. This impact assessment has been carried out line with the requirements under section 5A of the Utilities Act 2000, and was developed in line with our IA guidance.[7]

Rationale for extending competition

1.6. We have been competitively tendering offshore electricity transmission licences since 2009 and have seen significant benefits as a result. Applying competitive pressure helps remove barriers to entry and reveal appropriate costs, thereby encouraging greater efficiency and innovation, ultimately leading to better value for consumers. We think by extending competitive tendering to certain onshore assets there will be benefit for consumers. It is also in line with our duty to carry out our functions in a manner we consider best calculated to further our principal objective (which is to protect the interests of existing and future consumers), wherever appropriate by promoting effective competition.[8]

Preferred option

1.7. The preferred option in this impact assessment reflects our decision to extend competition to onshore electricity transmission.

Competition for particular projects

1.8. Competition for construction, ownership and operation of assets that are:

- **New** – completely new transmission assets or complete replacement of transmission assets.
- **Separable** – ownership between these assets and other (existing) assets can be clearly delineated.
- **High value** – at or above £100m in value of the expected capital expenditure of the project

[5] DECC, Extending competitive tendering in the GB electricity transmission network, impact assessment, January 2016: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/493712/Impact_Assessment_-_Extending_competitive_tendering_in_the_GB_electricit___.pdf
[6] Frontier Economics, a cost benefit analysis of the potential introduction of competitively appointed transmission operators, January 2016: https://www.ofgem.gov.uk/sites/default/files/docs/ng_response_appendix_2_fronteir_economics_rpt-cato_cba-08_01_16_-_final.pdf
[7] Ofgem, 'Impact Assessment Guidance', 1 October 2013: https://www.ofgem.gov.uk/ofgempublications/83550/impactassessmentguidance.pdf
[8] Section 3A, Electricity Act 1989

1.9. Our analysis has shown that competing projects of this scale and scope will bring larger benefits while minimising certain costs. As we discuss the benefits and costs of the preferred option in this document and analyse project scenarios, we consider the rationale for this restriction.

1.10. Under the preferred option, incumbent parties continue to deliver onshore projects outside of these criteria under the RIIO framework. For these projects, the costs of competition are more likely to outweigh the benefits.

Competition under different models

1.11. Once we have decided that a project fulfils these criteria, we will run a competitive tender to appoint a competitively appointed transmission owner (CATO) to construct, own and operate the assets. We are developing two models for when and how we will do this.

- Under early CATO build, we would run a tender to determine a CATO to complete all necessary preliminary works (such as environmental impact assessments, high level asset design and securing planning consent), as well as to construct and operate the transmission assets.

- Under late CATO build, the SO or TO would complete all necessary preliminary works and we would run a tender to determine a CATO responsible for construction and operation.

1.12. During RIIO-T1, only Strategic Wider Works (SWW) projects that are high value, new and separable can be competed. For these projects we will use a late CATO build model, as all SWW projects will be too far advanced for an early CATO build tender by the time we are ready to run the first tenders. For projects that begin construction in RIIO-T2, all high value, new and separable projects will be eligible and we will choose to use either the early or late CATO build model when we decide whether to tender a project.

1.13. There are different potential benefits and costs of the early CATO build and late CATO build models which we explore in this impact assessment. In the scenario analysis in Chapter 4 we have focused our analysis on the late CATO build model, in order to make consistent assumptions on costs and to reflect our initial focus on the development of this model.

Generator variations

1.14. There are two further variations to the preferred option, where a generator is involved in the development of the project.

- Under both the early and late CATO build models, preliminary works are carried out by a generator rather than the SO or TO.

- A generator builds the project before it is competed.

1.15. We have not yet decided whether to develop these variations and so have not included them in the scope of this analysis. We recognise that they are a step beyond our current plans and would assess their impact separately if considering introducing them in future.

Counterfactual

1.16. As the counterfactual, we assume the continuation of current arrangements for the delivery of new, separable, high value transmission projects. The three incumbent TOs would plan, construct, own and operate the projects within their respective regions and this would be regulated under the RIIO arrangements. Where projects are significant network reinforcements, we assume that such projects would be delivered as SWW projects.

Regulatory change without introducing competition

1.17. In its analysis of the introduction of competition for onshore projects, Frontier Economics introduced a scenario where National Grid would deliver an onshore project under a project-specific regulatory arrangement, absent a competitive tendering exercise. We considered whether we should take a similar approach in designing a counterfactual, but have decided not to.

1.18. Frontier Economics analysis asserts that under a scenario where National Grid (or another incumbent TO) delivers under a project-specific regulatory arrangement, it can access debt markets as cheaply and efficiently as a CATO could. We agree this could be the case, however a lower cost of finance is not the only consideration in the selection of a bidder and not the only outcome we are trying to achieve. Moreover, we believe it is a combination of the regulatory structure and competitive pressure which encourages bidders to source the very best debt terms for each project. Incumbents TOs will be able to bid in a CATO tender and so will potentially also be able to deliver the project under the same regulatory package. We therefore do not propose an option or counterfactual that includes regulatory change without competition.

Our approach to assessing impacts

1.19. We have sought to assess the costs and benefits of the preferred option quantitatively where possible. We have set out some illustrative quantitative scenarios in Chapter 4 and explained the level of benefits that would need to be achieved in order for the benefits to outweigh the costs. In cases where there is limited value in using numbers, since uncertainties would make it spurious to do so, we have given a qualitative description of our expectation and the relative significance of the costs and benefits.

1.20. As part of our analysis, we have also used broadly comparative examples from GB and other countries when assessing potential benefits in Chapter 2 and making cost assumptions in Chapter 3. These include the OFTO regime in GB and international examples of competition for onshore electricity transmission assets. These examples are not like-for-like comparisons with the arrangements we are developing, however they are similar in approach in some cases, and all have introduced elements of competition. We draw relevant conclusions from them where it is appropriate to do so.

1.21. Some stakeholders have expressed a desire for our assessment to be more precisely defined, with more analysis of longer term, whole system or whole life benefits and costs, covering a wider range of affected parties. This revision of our impact assessment goes further in the detail of our analysis of costs and benefits and draws on additional evidence. However, we continue to take a generally broader, qualitative assessment of the effects of competition, with some quantification where data is reliable.

1.22. We consider this approach to be appropriate given the uncertainty over the development of the transmission network. While changes in the energy system and the generation mix mean that new, separable and high value transmission projects are likely to come forward, it is uncertain how many will be needed and when. We have nevertheless been able to make some illustrative scenarios of projects coming forward based on generic assumptions about their size and frequency.

Assessing impacts on specific projects

1.23. This impact assessment looks at the introduction of competitive tendering as a long-term regulatory approach. Some stakeholders have suggested that we may better define the case for competitive tendering through the use of project-specific impact assessments. The Energy and Climate Change Committee, in its scrutiny of draft legislation to support competitive tendering onshore, has recommended "that the legislation be amended to direct Ofgem to introduce project specific impact assessments". We are currently working with DECC to further consider the recommendation.

1.24. We do not think that project-specific impact assessments are efficient or appropriate before making a decision to run a tender. For RIIO-T1 projects, we will carry out additional assessment to confirm suitability for competitive tendering, looking at a number of factors, including the potential timing implications of running a tender, the transferability of progressed works and the value of potential savings for consumers. For RIIO-T2, projects will be developed with the competitive regime fully in place, and the decision for running a tender will be made earlier in the project's development, therefore parties will take forward work aware that a competitive tender will be run. We consider it is important to provide this clarity and certainty to the parties responsible for doing work and to the market as early as possible as this will help clarify responsibilities, provide confidence in our decisions/regulatory certainty, and help drive a more competitive market.

2. Benefits

Chapter Summary

In this chapter we assess the benefits associated with extending competition to onshore electricity transmission networks.

2.1. We have assessed where extending competition is likely to bring benefits for consumers. We have made a largely qualitative assessment of benefits, informed by a theoretical understanding of the benefits of introducing competition and by experience of similar competitive regimes.

2.2. It is particularly complex to quantify and monetise the efficiency and dynamic benefits of opening markets to competition, such as the scope of increased innovation and the introduction of new products, services and technologies. We draw on quantitative assessments of comparable competitive regimes as an illustration, but do not make our own quantitative assessment.

Capital and operational cost savings

2.3. Competitive tendering will place downward pressure on capital and operational expenditure. In regulating the incumbent TOs we have to estimate the efficient cost of constructing and operating new projects, based on the funding requests submitted to us by TOs. We can draw on independent expertise and benchmarks from other projects, but this cannot completely resolve the problem of information asymmetry where we do not know the true costs likely to be faced by monopoly companies. This is particularly problematic in the electricity transmission network, where new, high-value projects are specific in design and historically have not come forward often, making benchmarking difficult.

2.4. Effective competition can enable efficient costs to be revealed. Within some set parameters of project scope and regulation, the pressure of competition encourages parties to reveal the true cost of constructing and operating a project. Parties competing to be appointed as the CATO are likely to put forward lower costs than an incumbent TO estimating the costs of constructing and operating a particular asset under a traditional price control approach, where this competitive pressure is not at play. Cost discovery should also improve over successive tenders, as bidders gain experience, allowing them to price more competitively.

2.5. The introduction of competition onshore may, over time, have downward pressure on the capital and operational costs elsewhere on the onshore network, where the RIIO model is in place. Going forwards, when setting revenue for TOs under RIIO price controls, we will be able to compare and benchmark, where applicable, proposed capital and operational costs with those that have been achieved competitively.

Innovation

2.6. Competitive pressure and the involvement of new parties is likely to drive innovation. On an individual project basis, innovation can result in lower costs and better value for consumers as bidders seek to create innovative and cost-saving solutions in order to submit competitive bids. It also has wider benefits – innovations adopted by one party may be relevant for the rest of the industry and could help to drive down costs across the board, leading to benefits for consumers.

2.7. Depending on the tender model chosen, there may be progressive innovation in areas such as technology, design, supply chain management, the raising of finance and operations processes. Using examples from the OFTO regime, in financing, Greater Gabbard OFTO was the first UK and second EU project to use the innovative European Investment Bank (EIB) project bond credit enhancement (PBCE) product,[9] reducing the cost of capital and providing value to consumers. In technology development, TC Ormonde OFTO Ltd has been awarded funding through the 2014 Network Innovation Competition to develop an offshore cable repair vessel and universal cable joint.[10] This is intended to reduce the cost of offshore maintenance and produce benefits for consumers. We envisage CATOs having access to the Network Innovation Competition, which will facilitate similar innovative outcomes.

Diversifying sources of labour and capital

2.8. Opening up investment opportunities to new parties allows different sources of labour and capital to enter the industry. New and prospective entrants in transmission network ownership could bring with them engagement from new suppliers, contractors, and financiers. This diversification should drive innovation and cost reduction through the supply chain and across different aspects of the project.

2.9. The involvement of new parties also enables us to increase the number of data sources we can use to benchmark the cost submissions of TOs and other transmission developers when deciding on the allowed revenue for a particular output. This will improve the reliability and accuracy of our assessment of efficient costs, although there will continue to be a need to take into account project-specific factors.

2.10. Some incumbent TOs have told us they think the scope for diversifying sources of labour and capital (and for competitive pressure in procurement practices more generally) is limited, given they already have competitive procurement practices in place. We see further potential gains from appointing the TO competitively - the CATO could bring in new suppliers, broadening the

[9] Ofgem, 'Ofgem grants offshore transmission licence for Greater Gabbard wind farm', 26 November 2013: https://www.ofgem.gov.uk/press-releases/ofgem-grants-offshore-transmission-licence-greater-gabbard-wind-farm
[10] Ofgem, Network Innovation Competition – TC Ormonde OFTO: https://www.ofgem.gov.uk/network-regulation-%E2%80%93-riio-model/network-innovation/electricity-network-innovation-competition/transmission-capital-partners

market, as well as efficiencies in their negotiation and management of suppliers. As CATO bidders naturally seek to improve their own competitiveness, they are likely to drive increased value from the supply chain.

Financing

2.11. We would expect bidders in a competitive process to put forward financing solutions that provide value for money to consumers. Competition will bear down on the cost of equity and debt, as bidders seek out investors and lenders. Bidders will look for the most efficient financing structure, including gearing, to reflect the risk of delivering the project.

2.12. CATOs will have long-term revenue certainty, potentially over 25 years, as set out in our October 2015 consultation. We expect this will facilitate higher levels of gearing than would otherwise be possible under a traditional price control approach. This enables the market to determine a cost effective, project-specific financing solution. As part of our assessment of bids, we will evaluate the financing solutions put forward. We will be looking to ensure that the level of gearing will lead to a robust and financially stable CATO, with costs of debt and equity at competitive terms.

Experience of financing for OFTOs

2.13. The experience of the offshore transmission regime is that bidders have been able to draw finance from a range of new sources and achieve financing savings over a traditional price control approach. There have also been significant operational cost savings. These savings have improved over successive tender rounds.

2.14. CEPA consultants analysed the estimated savings from the OFTO regime, including in financing and operations.[11] CEPA noted some possible reasons for the falling cost of capital for OFTO projects. It is partly due to a reduction in underlying wholesale finance market rates between 2010 and 2015, but also due to improvements in debt financing terms that the OFTOs have been able to negotiate, benefits OFTOs can receive from inflation linked financing and lower rates of return required by equity providers working in the sector.

2.15. Fluctuations in market rates for finance aside, over time, a similar downward trend in financing costs, and potentially also in operating and capital costs, could be conceivable for CATOs as the competitive tendering regime becomes more established, confidence grows among bidders and competition becomes more fierce.

2.16. While we expect that competition onshore will drive efficient finance structures and bear down on the cost of debt and equity in a similar way to offshore, CATO financing will differ in certain respects to that of OFTOs. OFTOs to

[11] CEPA, Evaluation of OFTO Tender Round 2 and 3 Benefits, March 2016: https://www.ofgem.gov.uk/publications-and-updates/evaluation-ofto-tender-round-2-and-3-benefits. More detail in Appendix 1.

date have assumed ownership of assets that have already been constructed. CATOs' financing costs may not match those achieved in the OFTO regime given the additional exposure to construction risk. The early CATO build model may experience higher financing costs than the late CATO build model, due to the requirement to obtain relevant consents.

2.17. Where a material construction risk premium applies, CATOs may re-finance once the asset has been constructed. As set out in our October 2015 consultation, we may introduce a debt refinancing gain share mechanism for CATOs to ensure consumers capture a reasonable proportion of any benefits. CATOs may also be able to structure debt during the construction phase more efficiently than offshore generators have done to date under the OFTO regime (where we set a cap on the interest during construction that an offshore developer can receive). Both of these factors may facilitate relatively close alignment between CATO and OFTO financing costs, particularly under late CATO build.

The early and late CATO build models

The early CATO build model

2.18. An early tender model carries potential bidder risks and uncertainties which impact the certainty of bid pricing. Risks may arise from consenting and surveying activity, or where there is a change in system need, requiring fundamental redesign of a project scope or even ultimately resulting in there no longer being a need for the project.

2.19. However, the potential risks and uncertainties of the early model are balanced against significant potential benefits; there is more scope for innovation in high level design, preliminary works and technology choice, widening the potential efficiencies that bidders could bring.

2.20. The use of broadly similar early build tender models in electricity transmission internationally gives some indication of the potential for savings. We looked at the following early model examples from North America:[12]

- On the Fort McMurray West project in Canada, the winning bid was approximately 20% below that of the original project cost from the incumbent network owner.
- On the East-West Tie line, also in Canada, the winning bid was 33% lower than the SO's original estimate and 22% lower than the incumbent's bid.
- On the Artificial Island project in the USA, where multiple bidding rounds were used, the winning bid was 60% lower than the lowest initial bid from the incumbent.

[12] Further detail on these examples, including an explanation of the savings calculation and data sources are given in Appendix 1.

2.21. These examples point to the potential for considerable cost savings. We cannot be conclusive that similar benefits will occur under an early model in GB; planning law and processes are different, and there is significant uncertainty in the generation background driving the need for and scope of future transmission investment in GB. This means the risk profile during the project development period in GB is not directly comparable to other jurisdictions where the early model has been used. Further, the above examples are based on winning bids for projects rather than outturn costs following construction. There is some flexibility for allowed costs to change under these early build models, to cope with uncertainties.

The late CATO build model

2.22. A late CATO build model should be more effective than the early model in revealing true costs in construction management, operations and management and financing. Given the more defined scope of the project being competed, we anticipate clearer, and in turn more competitive, pricing from bidders. This effect is further strengthened by the fact that some risks in preliminary works activities, including in securing planning consents, will no longer be present by the time of the tender.

2.23. The similarity of the late model to existing public procurement practices in GB, particularly to the OFTO and PPP/PFI regimes, means there will be some familiarity and experience among potential bidders and investors. This could result in a greater understanding of risks, more competitive pricing, and a potentially larger pool of bidders. The late CATO build model may therefore be able to deliver benefits more readily in the short term than the early CATO build model.

2.24. There is a relatively limited number of examples, and they are not wholly comparable to the proposed GB arrangements. However they do indicate potential benefits:

- The generator-build OFTO regime in GB, which could be considered a very 'late' tender model for a constructed asset, has seen progressive improvements over tender rounds in operational and financing savings compared to a theoretical non-competitive regulated approaches. These savings, for projects in all tender rounds to date, are estimated at 23-34% of the value of the projects.[13]

- Internationally, there is some evidence from Australia of tenders being run where bidders were not responsible for obtaining planning consent and land rights. However, we do not consider that the available data is sufficiently robust to allow us to quantify the benefits of tendering.

[13] Based on data from CEPA, Evaluation of OFTO Tender Round 2 and 3 Benefits. Further detail of CEPA's findings and methodology are in Appendix 1.

2.25. Beyond the transmission sector, we believe the low cost of capital delivered by tendering the Thames Tideway project demonstrates the potential for competition to drive consumer benefits under a late type tender model in GB. While there were many features that influenced the extent of construction risk being taken on by the winning bidder, which we are not proposing to implement for CATOs, the winning bid WACC[14] of 2.497% was substantially below the original estimate of 3.29%.[15] .

2.26. The Thames Tideway project is a relevant example of a tender being run when preliminary works (including procurement of construction contracts in this case) are already in place. It demonstrates that significant consumer benefits can be realised, despite there being less scope for design innovation. However, we do not expect to replicate these financing costs for CATO projects given that our proposed regulatory construct and risk allocation is different.

[14] Weighted average cost of capital

[15] See for example: http://www.oxera.com/Latest-Thinking/Agenda/2015/The-Thames-Tideway-Tunnel-returns-underwater.aspx

3. Costs and risks

Chapter Summary

In this chapter we estimate the costs associated with extending competition to onshore electricity transmission networks. We also consider the potential risks.

3.1. We have estimated the costs of introducing competitive tendering to new, separable, high value onshore projects. On the basis of our experience with the offshore transmission regime, we are able to estimate certain costs, particularly to Ofgem and bidders in the tender process, which we think are broadly comparable. For all other costs, we have made estimates based on our continued development of, and consultation on, competitive arrangements onshore. We have treated costs as the incremental costs over the counterfactual and so have allowed for costs that would be saved from activities under the counterfactual that are no longer needed.

Ofgem set up costs

3.2. Ofgem will incur costs in setting up the onshore competitive regime, which it is anticipated will largely build on the systems and processes of the offshore regime. There are however a number of new costs associated with the design of new regulatory arrangements for onshore competition.

3.3. We estimate that Ofgem will incur set-up costs of £2.5-3.0m before launching the first tender, regardless of the subsequent volume or frequency of tenders. These costs will be passed through to NGET and ultimately suppliers, generators and consumers through network charges.

Ofgem tender costs

3.4. Ofgem incurs costs in managing competitive tenders. These relate broadly to staffing, technology and external advice on legal, technical and financial matters. Ofgem tender costs from OFTO Tender Rounds 1, 2 and 3 were approximately 1% of the Final Transfer Value of the assets. Based on this, we estimate these costs for CATO tenders to be 1% of the capital value of projects.

3.5. We recognise that running a tender for a CATO will be different to an OFTO in some respects. We will face additional costs to assess construction proposals, but will avoid costs at the point when the asset is constructed, in cost assessment and facilitating due diligence. We would also have a reduced workload on SWW assessments, when comparing to the counterfactual. Although the size and pipeline of projects to be tendered onshore is uncertain, it is reasonable to conclude from current planned SWW investments that individual projects could have values over £500m, larger in size than previous OFTO projects. There are likely to be economies of scale with tendering larger projects. In the round, we think that 1% of capital costs is a reasonable long-run estimate for CATO tenders.

Bidder costs

3.6. Bidders will incur costs when preparing bids, engaging with the supply chain, and, in the case of the successful bidder, engaging in the processes required ahead of taking over the project (such as further due diligence and transaction costs in acquiring the preliminary works). Based on our experience of the OFTO regime, we estimate the cost to the successful bidder at 2% of the capital value of a project. The successful bidder can recoup these costs through its revenue, which is collected from suppliers and generators through transmission charges and ultimately passed through to consumers.

3.7. Successful bidder costs from OFTO Tender Round 1, 2 and 3 ranged from approximately 1-3% of the Final Transfer Value of the assets. These costs may differ for CATO tenders. There will be additional costs in putting together a bid that includes construction, but due diligence on constructed assets will be avoided. As with Ofgem tender costs, there are also potential economies of scale for projects larger than we have seen for OFTOs. In the round, we consider that an estimate of 2% is an appropriate long-run average for CATO tenders.

3.8. Unsuccessful bidders will also incur bid costs and these will vary depending on the tender stage which the bidder reaches. In contrast to successful bidder costs, these costs remain with the unsuccessful bidder and are not passed on. To a degree, these costs could be factored into future bids if the unsuccessful bidder bids in multiple tenders; however, the bidder would need to weigh this against the lower chance of winning a subsequent tender.

Interface costs

3.9. Interface costs are incurred where TOs, the SO and DNOs interact in their activities to operate and maintain the network. We have considered these in two respects:

- **Inefficiency at interfaces** - Poor management of interfaces can result in suboptimal management of capacity, system operation, outage planning and maintenance programmes. These costs would be borne by TOs, SO, suppliers and generators both through network charges and as a result of any lost opportunities in the wholesale market.

- **Cost of managing interfaces -** In order to minimise costs of inefficiency at interfaces, service agreements, coordination mechanisms between parties and monitoring processes are put in place. While these mechanisms minimise the potentially significant costs of inefficiency, there are costs associated with their set up and implementation. They would fall to TOs and SOs, but ultimately passed through to consumers through network charges for suppliers and generators.

3.10. When a new CATO is added to the network, it creates additional interfaces. Since only new and separable projects will be competed, the number and complexity of interfaces for a CATO will be minimised.

3.11. Industry codes, standards and processes already in place to manage interfaces between multiple parties can be extended to CATOs. Assuming the effectiveness of these existing processes, and the separable nature of a competed project, we consider that there would be no or limited additional costs from inefficiency at new CATO interfaces. We do not expect there to be a material additional cost of managing interfaces since mechanisms are already in place.

3.12. We assume, as a base case that interface costs will be zero. There are alternative views that additional interfaces costs could be more significant, including certain costs put forward by Frontier Economics in its analysis. Although we have not seen persuasive evidence to support this view, for completeness we have carried out a sensitivity analysis with higher interface costs alongside our scenario analyses in Chapter 4.

Pre-tender costs for the SO and TO

3.13. We expect that the incumbent TO, or potentially the SO from RIIO-T2, will incur additional costs under a late CATO build model, in undertaking preparatory steps in advance of a tender and supporting the tender process once commenced.

3.14. We have made generic cost estimates, for the purpose of this impact assessment. For any future project that is tendered, we will make an assessment of efficient costs incurred by the incumbent TO or SO. The estimates here do not prejudice those assessments.

TO costs under the late CATO model

3.15. In RIIO-T1, the pre-construction elements of an SWW project will continue to be carried out by the incumbent TO and have previously been funded as part of RIIO. Under the late CATO build model, we are proposing that the TO also produces and maintains a tender specification, compiles and submits documents to the project date room and responds to bidder due diligence enquiries. The TO could also be required to undertake additional preliminary works, such as additional survey activity, where this would improve the robustness of bid assumptions.

3.16. These additional costs will be partially offset against costs to the incumbent TO in the counterfactual that are avoided – particularly the preparation of an SWW project assessment submission for Ofgem. We think the additional pre-tender costs for a TO are limited, and estimate it at c£1m per project.

SO costs under the late CATO model

3.17. Under the late CATO build model in RIIO-T2, we have previously proposed that the SO could carry out the same activities before and during the tender that a TO would in RIIO-T1, both in terms of preliminary works and any additional work to support a tender. We are still considering this proposal in the context of the SO's wider role and incentive framework. For the purpose of this impact assessment, we have assumed the SO carries out these activities and incurs the costs, however we are yet to confirm that as our final position.

3.18. Assuming the SO carries out this role, this would mean:

- A redistribution of preliminary works costs from incumbent TO to SO representing a new cost to the SO.
- SO activities to support a tender, as described above for the TO, and incremental to the counterfactual, are likely also to cost £1m per project.
- Given that the SO currently does not carry out preliminary works, as TOs currently do, we estimate SO incremental costs could be higher for the first project, estimated at £2m, to reflect the need to put skills and processes in place, dropping to c. £1m for subsequent projects.

SO and TO costs under the early CATO model

3.19. Under the early CATO model in RIIO-T2, the CATO will take forward the preliminary works and so the cost of those works is redistributed from the incumbent TO to the CATO. For the SO, there will be some costs involved in supporting the tender process and providing information to bidders. Given the project’s early stage of development, we expect these would be less than £1m.

Risk of project delays and non-delivery

3.20. For high-value projects over £100m, delay or cancellation of a project could result in considerable costs. The CATO or TO may incur higher construction costs, or indeed sunk costs in the case of non-delivery. The SO may incur higher constraint costs. Both the CATO or TO and affected generators could incur increased financing costs where the risk profile of the project is perceived to increase.

Managing existing risks

3.21. Delay or non-delivery could occur for a number of reasons at different stages in a project’s development, independent of whether a competitive approach is used. For example, there could be changes in the need for the project, unforeseen ground conditions or extreme weather events. We plan to develop regulatory arrangements, to be reflected in licences and industry codes, that both encourage the management of delay and cancellation risks by parties involved, and where appropriate share risks that cannot be efficiently managed with consumers.

3.22. While these risks under a competitive regime are consistent with the counterfactual, risk will transfer to the CATO at an earlier or later point depending on the tender model. Under an early CATO build model, there is greater risk that the need for the project will change after the tender is run, compared to the late CATO build model. In such a scenario, we may compensate bidders or CATOs accordingly, depending on the point in the tender process at which the need falls away.

Managing new risks

3.23. There are potentially new sources of delay or non-delivery risk due to the addition of the competitive process itself, or due to the CATO being less capable to deliver the project. This was an observation of the Energy and Climate Change Committee in its scrutiny of possible legislation to support onshore competition. We are introducing policies to mitigate these risks and avoid potential costs.

- When deciding whether to run a tender for a project in RIIO-T1, in addition to considering whether projects are new, separable and high value, we will also consider the effects of tendering projects where incumbent TOs have already undertaken significant pre-construction work. We will consider the timing implications of any decision to tender, the transferability of works undertaken by the TO to the incoming CATO, as well as the value of potential savings for consumers.
- From RIIO-T2 onwards, we will have established arrangements for competition, which will be clear to industry parties
- For all tenders, we have flexibility to run our processes in parallel with ongoing preliminary works, avoiding knock-on delays in project development.
- Our selection of the CATO will take into account the CATO's capabilities, expertise and the credibility of their proposed timelines.
- We will encourage efficient and timely construction by starting the CATO's revenue on completion of construction.
- As a contingency measure against non-delivery, we are developing a CATO of last resort mechanism.

Risk to security of supply

3.24. We do not expect the risk to security of supply for GB consumers to be increased through competing new, separable, high value onshore transmission projects. Some stakeholders have raised concerns that the proposed regime may have detrimental impacts on security of supply, caused by project delays and cancellations (discussed above), by encouraging poorly constructed or poor quality assets, or by increasing system fragmentation and interfaces in the network (discussed above).

3.25. There will be arrangements in place to minimise these sources of security of supply risk. As discussed, we expect industry codes and processes to manage interfaces effectively and, also discussed above, we are introducing policies to minimise any risk of project delay that may be introduced.

3.26. To address the risk that the CATO does not construct or operate its assets to an acceptable standard, we will assess closely the capabilities of bidders and the robustness of their proposals. Once appointed, CATOs will have enforceable licence obligations regarding the maintenance of the transmission asset. We will have incentives in place (eg an availability incentive, amongst other possible incentives) to ensure the CATO networks are providing a secure supply of electricity. We will also ensure that CATOs are subject to relevant technical and system standards and codes.

4. Scenario analysis

We estimate costs for illustrative project scenarios and present these proportionate to the size of the total investment.

Scenario Analysis

Approach

4.1. The uncertainties around the pipeline of projects meeting our criteria for competitive tendering and the exact costs and benefits mean that we do not consider that it is possible to arrive at a single monetary estimate of the impact of competitive tendering. Certainty regarding the costs and benefits is also made more difficult by the limited comparable regimes from which we can draw reliable existing evidence.

4.2. Instead, we have outlined some scenarios to demonstrate the potential scale of some costs and benefits, using justified assumptions. The scenarios assume a particular number of projects of a particular size are competed over a defined timeframe. We assume that these projects are new, separable and high-value, in line with our preferred option. We recognise that these scenarios are illustrative and not exhaustive.

4.3. We have assumed under all scenarios that the late CATO build model will be used. This is indicative of the short-term (ie during RIIO-T1), however the use of the early CATO build model from RIIO-T2 is possible.

Cost assumptions

4.4. The cost assumptions in the scenario analyses are based on our assessment of costs described in the Chapter 3:

- **Ofgem set-up costs –** £3m. We have adopted the higher range of our estimate, as a conservative assumption of cost. This cost is fixed regardless of the number and size of projects.

- **Ofgem tender costs –** 1% of the capital value of projects.

- **Bidder costs –** 2% of the capital value of projects.

- **SO costs** – covering possible pre-tender activities, £2m for the first project, £1m for subsequent projects, applicable from RIIO-T2 (2021).[16]

- **TO costs** – covering possible pre-tender activities, £1m per project, applicable in RIIO-T1 (until 2021).**Scenario assumptions**

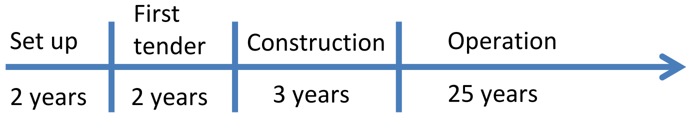
4.5. Our scenarios are underpinned by assumptions on timing and number of projects tendered. We have constructed two groups of scenarios and made assumptions on timing.

- **Scenario group 1** – This group looks at variances in project number. Each scenario assumes a project size of £500m, a choice loosely based on the size of projects we think may come forward under RIIO-T1 SWW. We assume a consistent two year gap between when each project is tendered. Each scenario has a different number of projects coming forward – 1, 2, 3 or 4.

- **Scenario group 2 –** This group looks at variances in project size across the RIIO-T1 and RIIO-T2 period. Each scenario in the group assumes a single project of £500m tendered immediately following set up of the scheme in the RIIO-T1 timeframe, in line with our estimates of project size for this period, and two projects in the RIIO-T2 timeframe (where tender processes begin in 2021 and 2023). Each scenario has a different value for each RIIO-T2 project - £100m, £500m or £1bn.

- **Project groupings and number –** in both groups of scenarios we assume each project will have a separate tender process, to reflect a situation where projects come forward at different times and are unable to be grouped into rounds as we have done for OFTOs. We have only modelled 3-4 projects per scenario for simplicity, although more projects may be competed beyond that.

- **Timeline** – under both groups of scenarios, we assume 2015 as a start year for scheme set up, with the first tender starting in 2017. We assume two years for scheme set up, when Ofgem set up costs will fall. Then for each project, we assume two years for the tender process, when Ofgem tender costs, bidder costs, and SO/TO costs will be incurred and then three years for construction.[17] We assume 25 years of CATO operation, when interface costs will be incurred (modelled in a sensitivity analysis).



[16] Assuming SO carries this role out in RIIO-T2
[17] We make slightly different generic timing assumptions to that of DECC in its impact assessment.

Calculations

Total costs

4.6. In each scenario, we calculated each cost element in net present value terms (2015 prices) and totalled them.

- For Ofgem tender costs and bidder costs, the cost was calculated from a percentage of the capital value of the projects in each scenario. The values given to the projects in the table are capital values on construction in constant prices. These were discounted at a rate of 3.5% to give their present value, of which a percentage was calculated.

- For costs that are expressed as monetary values in our assumptions (Ofgem set-up costs, SO costs and TO costs), these costs are assumed as constant and profiled along expected timelines. They are then converted into net present value using a discount rate of 3.5%.

Costs as a percentage of asset value

4.7. The total costs in a scenario, in net present value terms (2015 prices) are expressed as a percentage of the value of all the projects in a scenario, also in present value terms.

Scenarios

Table 1: Scenario group 1

Scenario	One Project of £500m	Two Projects of £500m	Three Projects of £500m	Four Projects of £500m
Total costs *Includes Ofgem set up cost, Ofgem tender costs, bidder costs and SO and TO costs*	£16.5m	£29.2m	£41.8m	£52.8m
Costs as a percentage of asset value	3.92%	3.58%	3.54%	3.46%

Table 2: Scenario group 2

Scenario	RIIO-T1: One project of £500m RIIO-T2: Two projects of £100m	RIIO-T1: One project of £500m RIIO-T2: Two projects of £500m	RIIO-T1: One project of £500m RIIO-T2: Two projects of £1bn
Total costs *Includes Ofgem set up cost, Ofgem tender costs, bidder costs and SO and TO costs*	£23.1m	£40.1m	£61.4m
Costs as a percentage of asset value	4.10%	3.55%	3.34%

Sensitivity analysis of interface costs

4.8. We have assumed that interface costs in the above scenarios are zero. As mentioned in Chapter 3, arguments have been made by others that they could be higher. Taking a central scenario from each of the scenario groups as a base case, we have modelled two sensitivities where there are interface costs.

- The first assumes that interface costs are £3m for the first project and £1.5m for each subsequent project. This is based on an assumption that some efficiencies in management of interfaces will be made after the first project. We consider that this represents a high value assumption for any potential additional interface costs.

- The second assumes that interface costs are 0.25% of the capital value per annum, the estimate used by Frontier Economics in its analysis. We don't think this a valid assumption as we don't consider that there is any direct linear correlation between project size and numbers/complexity of interfaces, however we have included it for completeness.

4.9. The following table shows the effect that higher interface costs have on costs as a percentage of asset value, in net present value terms.

Table 3: Interface costs sensitivity analysis

Scenario	Three Projects of £500m	RIIO-T1: One project of £500m RIIO-T2: Two projects of £500m
Costs as a percentage of asset value *No interface costs*	3.54%	3.55%
Costs as a percentage of asset value *Including interface costs of £3m for first project, £1.5m for each subsequent project*	3.79%	3.81%
Costs as a percentage of asset value *Including interface costs of 0.25% of asset value per year*	7.51%	7.53%

Conclusions

4.10. In the scenarios that we have modelled, the cost of introducing competition onshore is estimated at 3.3-4.1% of the value of projects involved. The analysis also shows that scenarios with lower value projects have relatively higher costs, supporting the restriction of competition to high-value projects.

4.11. Our qualitative assessment of benefits highlights the potential for these costs to be outweighed by savings made in capital, operation and financing costs. The OFTO regime has been estimated to have brought consumers net savings of 23-34% of the value of OFTO projects, when compared to regulated counterfactuals.[18] Although a direct read across is not possible to onshore projects, this provides a strong indication that competition in GB electricity transmission can bring significant savings. Even if savings were to be half as high onshore in percentage terms, this would be well above cost thresholds we have modelled in these scenarios, and also above those in the higher interface cost sensitivities.

[18] More detail on these savings in Appendix 1

5. Distributional effects and other considerations

Distributional effects

Ofgem

5.1. We have highlighted in Chapter 3 costs for Ofgem of the set up and running of a competitive process. These costs fall directly on Ofgem but are passed through to NGET (for set up costs) or to the CATO (for tender costs) and ultimately onto consumers through network charges on generators and suppliers.

Incumbent TO and the SO

5.2. Extending the use of competitive tendering may result in some projects being developed by a new CATO rather than by the incumbent onshore TOs. In such cases the incumbent TO would not receive the regulated returns for that investment.

5.3. As highlighted in Chapter 3, under a late CATO build model, the incumbent TO faces some additional costs to carry out activities to support the tender in RIIO-T1. We have yet to confirm who will carry out these activities in RIIO-T2, but we have used the assumption in this assessment that it could be the SO. We are currently proposing that these costs will be passed on to the CATO, which it will recover from generators, suppliers and ultimately consumers through network charges.

Bidders

5.4. We highlighted the costs to bidders in Chapter 3. These remain with the bidder, unless it is successful, when it recovers these costs as part of its revenue, collected through network charges. Bidding costs are an additional cost to incumbent TOs, if they choose to participate.

CATOs

5.5. New CATOs will benefit from the opportunity to develop onshore transmission assets, and receive regulated revenue for doing so. This will be recovered through network charges.

Supply chain

5.6. Companies and individuals supplying goods and services in the construction and operation of transmission assets may face increased costs from engaging with an increased number of parties, as they engage with bidders and potentially an increased number of TOs. However, this also benefits supply chain companies by widening business opportunities.

Generators and demand users

5.7. If competition lowers the overall networks costs, as we anticipate, costs faced by generation and demand users through network charges will be lower. We have highlighted potential risks to generators of project delays in Chapter 4, however we expect these to be mitigated through our regulatory policies.

Consumers

5.8. Costs falling directly on Ofgem, incumbent TOs, the SO or CATOs are recovered through transmission network charges on generators and suppliers, who in turn will pass these network costs on to consumers. Similarly, capital, operation and financing savings that we highlighted in Chapter 2 will be passed through to consumers in the same way. We believe there will be a net saving for consumers.

5.9. We do not foresee any additional impacts of our decisions on vulnerable consumers as a subset of GB consumers. However, consumers who have lower incomes will see greater relative improvements in the affordability of their electricity.

Geographic distributional impact

5.10. Projects across GB can be tendered. We cannot say at this stage which projects in which locations are likely to progress, as this is dependent on changing need and generation background.

5.11. Where a competed project is located has an effect on generators. What generators pay to use the transmission network is determined by factors such as the configuration of the system at a particular location, the design of the generator connection and the cost of the reinforcement to the local network and any wider reinforcements required. We would expect generators closer to a CATO to benefit more from reduced network charges. However, transmission charging does not pass through cost savings in only a localised fashion. Savings from a particular CATO project would also be passed on to all users (both generation and demand), including those in regions other than where the CATO is located.

5.12. We may run a tender for projects during the RIIO-T1 period if they are at or above the £100m threshold and they are SWW projects. Since the value threshold for a SWW project in England and Wales is higher, at £500m, there are different thresholds between England and Wales and Scotland. Depending on the projects that come forward, the different thresholds may or may not lead to differences in the size of projects that are tendered in the two regions. Any potential for this is restricted to the short term, up until 2021 and is also dependent on the size and timing of projects being developed.

Strategic and sustainability considerations

Low carbon electricity

5.13. Much of the anticipated transmission investment over the coming decades is aimed at ensuring the transmission system enables low carbon electricity generation and use. On the whole, we expect the introduction of onshore competition to decrease the costs of this investment. These impacts would contribute to reducing the overall costs of moving to low carbon technologies, assisting with their deployment and use in GB.

Environmental impacts

5.14. We have also considered whether there would be any difference in how a CATO manages and mitigates environmental impacts, landscape visual impacts and other impacts on communities, compared to an incumbent TO. Some stakeholders have raised concerns over the CATO's ability and willingness in this regard.

5.15. Overall, we would not expect this to be materially different. We understand that the planning consent process places important obligations on project developers and we would expect CATOs to comply with them. We will also develop a robust tender process that selects appropriately qualified parties who will be able to take on the responsibilities and obligations of being a CATO, including those relating to managing environmental and other impacts. We are also considering what obligations and incentives should be placed on CATOs to manage these impacts in the longer term.

5.16. There are differences in the planning regimes in England, Wales and Scotland. We think that robust arrangements can be put in place across all planning regimes in due course. As we develop the arrangements to introduce competition, we plan to say more about their interaction with planning regimes.

Appendix 1: Examples of competition in electricity transmission

There are examples of where electricity transmission tendering has led to benefits, both in GB and abroad. Legal and regulatory frameworks, as well as planning regimes, differ from country to country and each example differs in aspects of what is competed and how. We cannot therefore expect exactly the same benefits and costs from introducing competition for onshore transmission in GB. Nevertheless, similarities in approach mean we can compare themes and trends, to give indications of the potential for benefits onshore in GB.

North America and Australia

Competition was introduced in these examples into already well-developed electricity networks with established regulatory and legal frameworks. They therefore provide useful reference points, however the models introduced differ in certain aspects to our planned arrangements for onshore competition in GB.

Table 4: North American and Australian examples

Example and description	Benefits
Alberta, Canada The Alberta Electricity System Operator (AESO) used a competitive process to appoint a party to develop, build, finance, own and operate the Fort McMurray West 500 kV project. An early build model was used.	The successful bidder for the Fort McMurray West project was selected based on a bid of $1.43 bn Canadian for project life costs. This compares favourably to AESO's original estimate of $1.8 bn Canadian for capex costs alone. The estimated cost achieved through competition was therefore approximately 20% lower.[19]

[19] Norton Rose Fulbright, Nexus 2016 A Global Infrastructure Resource, http://www.nortonrosefulbright.com/knowledge/publications/138633/albertas-fort-mcmurray-west-500-kv-transmission-project

Table 4 (continued): North American and Australian examples

Example and description	Benefits
Ontario, Canada An early stage tender of the East-West Tie line. The need for the investment was identified by the regulator and Ontario's Independent Electricity System Operator (IESO).	The selected bidder proposed development and capital costs of c.$400m Canadian. This compares to an estimated capital cost from the SO before the competition of $600m Canadian and a bid of c.$513m Canadian from a local incumbent as part of a bidding consortium. The winning bid was therefore 33% lower than early estimates and 22% lower than the local incumbent's bid.[20]
Texas, Competitive Renewable Energy Zone (CREZ) programme The Public Utility Commission of Texas (PUCT), the regulator, used competitive tenders to appoint transmission developers for a large programme of transmission network expansion, needed to connect wind farms in eastern Texas to western regions where major population zones are located. Bidders were required to take planning and consenting risk.	An initial cost estimate of US$4.9bn for a programme of 109 projects was made, however, 168 projects have been completed at an estimated cost of US$6.9bn.[21] Underestimation in the scale of the programme makes cost comparisons difficult. We understand that all required projects have been completed without significant delays.

[20] Ontario Energy Board. Initial project estimates: http://www.ontarioenergyboard.ca/OEB/_Documents/Documents/EWT_OPA%20_Report_20110630.pdf; Bid data: http://www.ontarioenergyboard.ca/oeb/_Documents/EB-2011-0140/Dec_Order_Phase2_East-WestTie_20130807.pdf

[21] North American Wind Power report on CREZ: http://www.nawindpower.com/online/issues/NAW1307/FEAT_01_Nearly_Completed_CREZ_Lines_Unlock_Wind_Congestion.html

Table 4 (continued): North American and Australian examples

Example and description	Benefits
Artificial Island, PJM (USA) PJM (the Independent System Operator for 13 states and the district of Columbia) ran an early stage competitive tender to select a transmission owner to develop, build, finance own and operate the Artificial Island project.	The winning bid was US$275m, after several bidding rounds. The comparator here is the initial bid of the incumbent of £692m, as the closest to a non-competitive price that is available (although there was some competitive pressure from the first bidding round). The winning bid was approximately 60% lower.[22] The technical proposals included a wide range of technologies demonstrating the potential scope for competition to drive innovation in design. One of the main innovations realised through the tender process was the introduction (bidder initiated) of caps on project costs.
Victoria, Australia[23][24] The Australian Electricity Market Operator (AEMO), has competed transmission projects in Victoria that are separable from the network. It makes project recommendations and initiates procurement before a tender where bidders compete on price and capabilities.	By mid-2013, 13 out of 15 projects had been awarded to the incumbent. We have not been able to source cost data to study any change to costs estimated before the tender. Despite there being few new entrants, it has been suggested by some stakeholders that efficiency has been achieved by removing the incentive on the TO to overstate investment needs. In the case of one project we looked at, the Heywood Terminal Station upgrade, there is evidence of planning consents having been obtained before the tender, making this closer to our late CATO build model.[25]

[22] PJM, initial bid costs: http://www.pjm.com/~/media/committees-groups/committees/teac/postings/artificial-island-project-recommendation.ashx
PJM, final project costs: Final project cost:http://www.iso-ne.com/static-assets/documents/2015/10/pjm_mcglynn.pdf
[23] AEMO website: http://www.aemo.com.au/About-the-Industry/Resources/Victoria-Metrics/Efficiency-in-projects
[24] AEMO tender and evaluation process: http://www.aemo.com.au/About-AEMO/~/media/Files/Other/corporate/Tenders/Tender_and_Evaluation_Process_for_Contestable_Augmentation_in_Victoria_Final.ashx
[25] Based on the ITT document accessible here: http://www.aemo.com.au/About-AEMO/Tenders/Invitation-to-Tender-ITT-for-the-Construction-Ownership-and-Operation-of-Heywood-Terminal-Station

GB offshore transmission

Competition for offshore transmission in GB is well established and to date, there have been three tender rounds under the generator-build model, where competition is for ownership and operation of a constructed asset. We recently commissioned CEPA consultants to analyse the savings that have been achieved in financing and operations, relative to theoretical counterfactuals. The finding here are taken from that analysis.[26]

Of the theoretical counterfactuals that CEPA compared the offshore competitive regime to, two were regulated price control counterfactuals (which they denoted as 3 and 4) which are relevant when considering the lessons that can be drawn for this impact assessment.

- **Counterfactual 3** – where onshore TOs have their exclusive onshore transmission licences extended offshore, and the offshore transmission services are included within the existing onshore price control arrangements.
- **Counterfactual 4** – where onshore TOs have exclusive onshore transmission licences extended offshore , but a dedicated offshore price control (elements of which are fixed for longer periods than a standard price control cycles) is applied to the offshore and offshore services.

CEPA took the financing and operational costs for OFTOs in all tender rounds to date, which are projected over the 20 years of an OFTO licence, and converted these into net present value terms (2014/15 prices) using the time preference discount rate of 3.5%. It then compared these to modelled estimates of operators' possible operating and financing costs under the counterfactuals. In the following table the cost differences (as savings in favour of the OFTO regime) are expressed as a percentage of the total value of OFTO projects upon transfer to the OFTO, after construction.[27] These project values were also converted into 2014/15 prices.

[26] CEPA, Evaluation of OFTO Tender Round 2 and 3 Benefits, March 2016: https://www.ofgem.gov.uk/publications-and-updates/evaluation-ofto-tender-round-2-and-3-benefits
[27] In its report, CEPA expresses savings as a percentage of project transfer value and as a percentage of the OFTO's tender revenue stream. We are using the former, as this gives a clearer comparison with the scenario analysis in this document.

Table 5: Savings from the OFTO regime as a % of the value of projects

	Counterfactual 3	Counterfactual 4
Financing savings	11%	8%
Operational savings	18% - 25%	18% - 25%
Total net savings *Savings from financing and operations, minus costs of the tender process*	26% - 34%	23% - 31%

South America

Competition was used in South America to deliver a rapidly expanding electricity transmission network – a different context to the GB network, where the models used were different to the ones we are developing. They show, nonetheless, that benefits of competition have been realised in practice.

We provided the context to these examples in our previous version of this impact assessment in March 2015 as part of the ITPR project,[28] which was supported by research from Imperial College London and Cambridge University.[29] We do not have updated data on these examples for this update of our assessment, but note our previous work for reference.

[28] ITPR Final Conclusions, supporting impact assessment: https://www.ofgem.gov.uk/sites/default/files/docs/2015/03/itpr_final_conclusions_impact_assessment_publication_final.pdf

[29] Imperial College London and Cambridge University Electricity Policy Research Group, 'Integrated Transmission Planning and Regulation Project: Review of System Planning and Delivery', June 2013: https://www.ofgem.gov.uk/ofgem-publications/52727/imperialcambridgeitprreport.pdf

Appendix 2: Scenario cost breakdown

A full breakdown of cost calculations from scenarios in Chapter 4. All costs are shown in present value terms (2015 prices), in £m to one decimal place.

Table 6: Scenario group 1 cost breakdown

	One Project of £500m	Two Projects of £500m	Three Projects of £500m	Four Projects of £500m
Ofgem set up costs	£3.0m	£3.0m	£3.0m	£3.0m
Ofgem tender costs	£4.2m	£8.1m	£11.8m	£15.4m
Bidder costs	£8.4m	£16.3m	£23.6m	£30.5m
SO costs	£0.0m	£0.0m	£1.6m	£2.4m
TO costs	£0.9m	£1.8m	£1.8m	£1.8m
Total costs	£16.5m	£29.2m	£41.8m	£52.8m
Costs as a percentage of asset value	3.92%	3.58%	3.54%	3.46%

Table 7: Scenario group 2 cost breakdown

	RIIO-T1: One project of £500m RIIO-T2: Two projects of £100m	RIIO-T1: One project of £500m RIIO-T2: Two projects of £500m	RIIO-T1: One project of £500m RIIO-T2: Two projects of £1bn
Ofgem set up costs	£3.0m	£3.0m	£3.0m
Ofgem tender costs	£5.6m	£11.3m	£18.4m
Bidder costs	£11.3m	£22.6m	£36.8m
SO costs	£2.4m	£2.4m	£2.4m
TO costs	£0.9m	£0.9m	£0.9m
Total costs	£23.1m	£40.1m	£61.4m
Costs as a percentage of asset value	4.10%	3.55%	3.34%