



# **EVALUATION OF OFTO TENDER ROUND 2 AND 3 BENEFITS**

**OFFICE OF GAS AND ELECTRICITY MARKETS**

---

**MARCH 2016**

**FINAL REPORT**

Prepared by:

**Cambridge Economic Policy Associates Ltd**

---



**CEPA**

## CONTENTS

<b>1. Introduction.....</b>	<b>1</b>
<b>2. The OFTO regime .....</b>	<b>2</b>
2.1. A contestable asset-specific licensing approach .....	2
2.2. The regulated revenue stream .....	3
2.3. Cost allocation and payment flows.....	4
2.4. The tender process .....	5
<b>3. Methodology .....</b>	<b>7</b>
3.1. Step 1: review the outcomes from the tender rounds.....	7
3.2. Step 2: calculate the NPV pricing of the TR2 and TR3 projects .....	8
3.3. Step 3: model all counterfactuals on a like-for-like basis.....	8
3.4. Step 4: compare the NPV pricing and analyse the implications of the analysis.....	9
3.5. Taxation.....	9
3.6. The scope of the analysis .....	9
<b>4. Tender Round 2 and 3 outcomes .....</b>	<b>11</b>
4.1. Characteristics of the TR2 and TR3 projects.....	11
4.2. Trends in the Tender Revenue Stream .....	12
4.3. Financing costs.....	13
4.4. Operating costs .....	20
4.5. Summary .....	23
<b>5. The counterfactuals .....</b>	<b>24</b>
5.1. Licensed merchant counterfactuals.....	24
5.2. Regulated price control counterfactuals .....	25
5.3. Quantifying the counterfactuals.....	27
5.4. Cost of capital assumptions .....	28
5.5. Operating cost assumptions .....	30
5.6. Bid costs .....	34
5.7. Summary .....	35
<b>6. Findings .....</b>	<b>36</b>
6.1. Results by tender round.....	36
6.2. Comparison of tender rounds.....	38
6.3. Interpreting the results.....	43
<b>7. Distribution of benefits .....</b>	<b>49</b>

7.1.	The economics of UK offshore wind .....	49
7.2.	Transmission charging .....	51
7.3.	Distribution of savings .....	51
<b>8.</b>	<b>Conclusions.....</b>	<b>54</b>
<b>ANNEX A</b>	<b>OFTO Financing in Tender Round 2 and 3 .....</b>	<b>57</b>
<b>ANNEX B</b>	<b>Counterfactual assumptions.....</b>	<b>59</b>
<b>ANNEX C</b>	<b>Summary of TR1 findings .....</b>	<b>68</b>

## **IMPORTANT NOTICE**

This report has been commissioned by the Office of Gas and Electricity Markets. However, the views expressed are those of CEPA alone. CEPA accepts no liability for use of this report or any information contained therein by any third party. CEPA also accepts no liability for the use of data from third parties which has not been independently verified.

© All rights reserved by Cambridge Economic Policy Associates Ltd.

## Executive Summary

In 2009 the Government and Ofgem introduced a new licensing model to deliver offshore electricity transmission infrastructure in Great Britain (GB). Unlike the existing on-shore transmission regime, this involves a competitive tender process to appoint offshore electricity network operators who have the responsibility for operating newly constructed electricity transmission network assets, which enable the transmission of electricity generated by wind farms to reach the shore.

Ofgem has now completed three rounds of offshore transmission tender competitions, Tender Round 1 (TR1), Tender Round 2 (TR2) and Tender Round 3 (TR3).

Following on from a previous evaluation study that was undertaken by Cambridge Economic Policy Associates (CEPA) and BDO of the benefits achieved by the Offshore Transmission Owner (OFTO) regulatory framework for TR1, CEPA has been engaged by Ofgem to assess whether similar benefits – specifically cost savings – have also been achieved from TR2 and TR3 projects.<sup>1</sup>

### The framework of analysis

---

*The operating and financing costs locked in as a result of the contestable licence competitions for OFTO projects in TR2 and TR3 have been compared (ex post) to a range of counterfactuals that depict different cost paths, reflecting the respective underlying regulatory and other assumptions of each counterfactual. As such, these counterfactuals are internally coherent scenarios of the outcomes of alternative policies that could have been implemented in the absence of the adopted policy.*

We have undertaken an ex-post analysis of the outcomes achieved from applying the contestability based OFTO regime to the TR2 and TR3 projects. The main benefits focused on were the cost savings, such as from lower allowed operational and financing costs, arising from the implemented approach when compared to what might have happened in alternative counterfactual scenarios.

Central to our approach, and consistent with HM Treasury Greenbook guidance, is the development of counterfactuals to TR2 and TR3 and a comparison of these to the outcomes observed under the contestable OFTO regime. We have then considered not only the cost savings achieved by the OFTO regime under TR2 and TR3, but also the distributional question of who may have benefitted from these savings.

In this context, the counterfactuals can be seen as being internally coherent scenarios of what alternative policy options at the time *might* have reasonably been expected to be implemented in the absence of the adopted policy. As well as this counterfactual “lens”, we

---

<sup>1</sup> CEPA/BDO (2014): ‘Evaluation of OFTO Tender Round 1 Benefits’

have also sought to evaluate the effects of the contestable OFTO approach by comparing the outcomes which have been achieved under each successive tender round. This shows how the OFTO programme as a whole has developed over time and how the financing and operating costs of each of the OFTO projects has evolved, and, in particular, how OFTO financing costs compare to market benchmarks prevailing at the time, as regards the debt pricing and equity returns required by lenders and investors.

## Counterfactuals

---

*The counterfactuals capture two central policy alternatives to the OFTO regime that was introduced: licensed merchant generation solutions; and alternative licensed price control (monopoly) based approaches.*

The contestable OFTO licensing regime emerged from a set of options for the offshore transmission regulatory regime over the period 2006 – 2009.

The Government and Ofgem considered a range of “merchant” and regulated price control-based approaches at the time. The former were based on the experience of offshore oil and gas development in the UK, whereas the latter represent different ways in which the on-shore regime could have been extended off-shore (although the thinking precedes that associated with the recent development of a regulated route for electricity interconnector development in GB).

Given this context, and using the same approach as for the earlier TR1 analysis, the two central alternatives to the OFTO regime remain:

- licensed merchant generation; and
- alternative licensed price-control (monopoly) based approaches.

Two counterfactual variants of the merchant generation approach are utilised, one involving the generator owning the assets, the other involving a sale and lease-back between the lessor and the generator.

Three counterfactual variants of the regulated price control-based approach are used, two of which involve a scenario of extending existing Transmission Operator (TO) licences to include offshore transmission and one involving a “zonal” offshore licensing approach to offshore transmission.

## Comparing the tender rounds to the counterfactuals

---

*The estimated cost savings, as against the range of merchant and regulated counterfactuals, are highest in TR3 on a normalised basis, while TR2 savings are generally higher than in TR1. Depending on the counterfactual chosen, savings range from £683m to £1,092m (NPV, 2014/15 prices) in total for all OFTO tender rounds to date.*

In Net Present Value (NPV) terms, for:

- **TR2**, which included four OFTO projects in total, the savings are estimated to be in the range of **£326m-£595m (2014/15 price base)**.
- **TR3**, which included two OFTO projects in total, the savings are estimated to be in the range of **£102m-£154m (2014/15 price base)**.

This compares to estimated savings in the range **£244m - £469m** (2014/15 prices) for TR1, which included nine projects in total.

To account for differences in the size and the number of offshore transmission projects in each tender round, the results were also compared on a percentage of the Final Transfer Value (FTV)<sup>2</sup> basis and on a percentage of the NPV of the OFTO tender revenue stream.

This analysis suggests that the savings are highest for TR3, with the cost savings for both TR2 and TR3 higher compared to TR1. For:

- **TR1**, the savings were estimated to be in the range 14%-27% of the FTV of the TR2 transmission projects;
- **TR2**, the savings are estimated to be in the range 23%-34% of the FTV of the TR3 transmission projects; and
- **TR3**, the savings are estimated to be in the range 32%-45% of the FTV of the TR3 transmission projects.

In total, across all three OFTO tender rounds (i.e. TR1, TR2 and TR3), **the savings as a percentage of the OFTO tender revenue streams are in the range 19-23% for the regulated counterfactuals and 22-31% for the merchant counterfactuals.**

Compared to the *regulated counterfactuals*<sup>3</sup> the analysis indicates:

- **Operating cost savings.** Using operating costs that were *bid* by incumbents in the transmission sector as part of OFTO tenders as a basis for developing benchmarks of the potential *allowed* operating costs under price control regulated counterfactuals, the analysis indicates there have been operating cost savings for both TR2 and TR3 transmission projects.
- **Financing cost savings.** Based on assumptions of the *allowed* cost of debt and equity in the regulated counterfactuals, the analysis indicates there have also been financing cost savings from the OFTO regime. The estimated financing cost savings are higher in TR2 and TR3 than TR1, with the estimated savings (on an FTV basis) greatest for the TR3 projects.

---

<sup>2</sup> FTV is the acquisition price paid by the OFTO to the windfarm developer for the offshore transmission assets.

<sup>3</sup> In the regulated counterfactuals allowed costs are determined through a negotiated settlement with Ofgem. In the case of contestable approaches these are set by bids, made under competitive pressure.

Compared to the *merchant counterfactuals* the analysis shows:

- **Financing cost savings.** As was the case in the TR1, both TR2 and TR3 show significant financing cost savings compared to the merchant counterfactuals. Consistent with the findings from the regulated counterfactuals, the estimated savings are greatest in TR3 out of all three tender rounds.

## Interpreting the findings

---

*The source of the savings differ depending on the counterfactual chosen. However, contestability can be seen to have driven benefits in two main ways.*

First, it has removed asymmetries of information that have traditionally put regulators at a disadvantage to operators as regards efficient operating costs.

Second, by freeing Ofgem from the need to set the required financial return, it has allowed the direct pass-through of actual financing costs sourced and agreed to by bidders, rather than Ofgem having to provide an allowance incorporating a degree of headroom. Providers of equity have needed to take a view on what returns are acceptable, whereas debt financing costs have been a straight pass-through.

Taken together Ofgem's approach can be seen to have enabled the alignment of true marginal operating and financing costs.

As well as between counterfactuals this dynamic can also be observed over time in which bidders can be seen to have learnt from previous rounds, not least in terms of price discovery.

These outcomes could not, however, have been achieved without a structuring of OFTO opportunities from a regulatory regime perspective that made bidders willing to bid efficiently. Key aspects of the 'market offer' that have enabled efficient pricing by bidders include the significant de-risking provided by the operational nature of the assets and twenty-year availability-based licences.

**The savings are highest in TR3 (i.e. relative to TR1 and TR2) because the OFTO projects have benefited from improved financing terms.**

The cost of capital for OFTO projects has fallen between the tender rounds, due to a reduction in underlying wholesale finance market rates over the 2010-2015 period, improvements in debt providers' terms (for instance, the terms of European Investment Bank finance and the margins offered by commercial lenders having reduced between tender rounds), benefits that OFTOs may be receiving from inflation linked financing and lower required rates of return by providers of equity to the sector.

In the case of the merchant counterfactuals, higher financing costs arise, in our view, from a less optimal allocation of risks than under the regulated OFTO approach. The latter has reduced the required risk premium relative to the former, specifically due to:

- lower payment (counterparty) risks under the OFTO approach, as a result of NGET (and ultimately consumers) guaranteeing payments;
- no exposure of the appointed OFTO to the performance of the associated offshore wind farm<sup>4</sup>; and
- the degree of consumer underpinning of regulated investment which exists, relative to a merchant approach.

In the case of the regulated counterfactuals, the cost of finance has not fallen to the same extent as observed in practice for OFTOs:

- *either* because the counterfactuals assume a higher *allowed* cost of financing, particularly as regards the cost of equity (if based on the benchmarks used by regulators in setting recent price controls); *and / or*
- the regulatory approach followed would not have permitted *allowed* financing costs to have fallen to the levels obtained (which reflect the underlying rates recently observed in the UK economy).

This means that the source of the financing savings from the OFTO regime, and the trend of increasingly savings from TR1 to TR2 and TR3, arise from a *combination* of:

- the benefits of competition that help to reduce asymmetry of information and drive lower financing costs; and
- the regulatory approach followed by Ofgem for OFTOs; in particular, the commitment to a fixed 20-year revenue stream and defined risks for post-construction, operational assets.

Achieving similar levels of operating cost under the regulated counterfactuals as those which have been achieved, relies on an assumption that the regulator could match a competitive dynamic in placing downward pressure on a regulated entity's costs, with the regulatory tools at its disposal.

The operating cost savings compared to the regulated counterfactuals arise as a result of comparing the appointed bidders in TR2 and TR3 with evidence of operating cost premiums in the bids of incumbent GB transmission operators in previous tender rounds. Alternative cost paths of what might have been achievable under these price control counterfactuals were then modelled to enable comparisons.

Whilst it is not possible to know with certainty what would have in practice have been the allowed cost under price controls, it would be consistent with economic theory to expect that competition for the market as took place in TR2 and TR3 would:

---

<sup>4</sup> Which may have applied to different degrees under the two merchant counterfactuals investigated (e.g. depending on the terms of the sale and lease back arrangement).



- encourage innovation and new ideas from new entrants, helping improve delivery and long-term efficiency of operating costs; and
- competition rather than regulatory negotiation being likely to drive costs lower.

## Conclusions

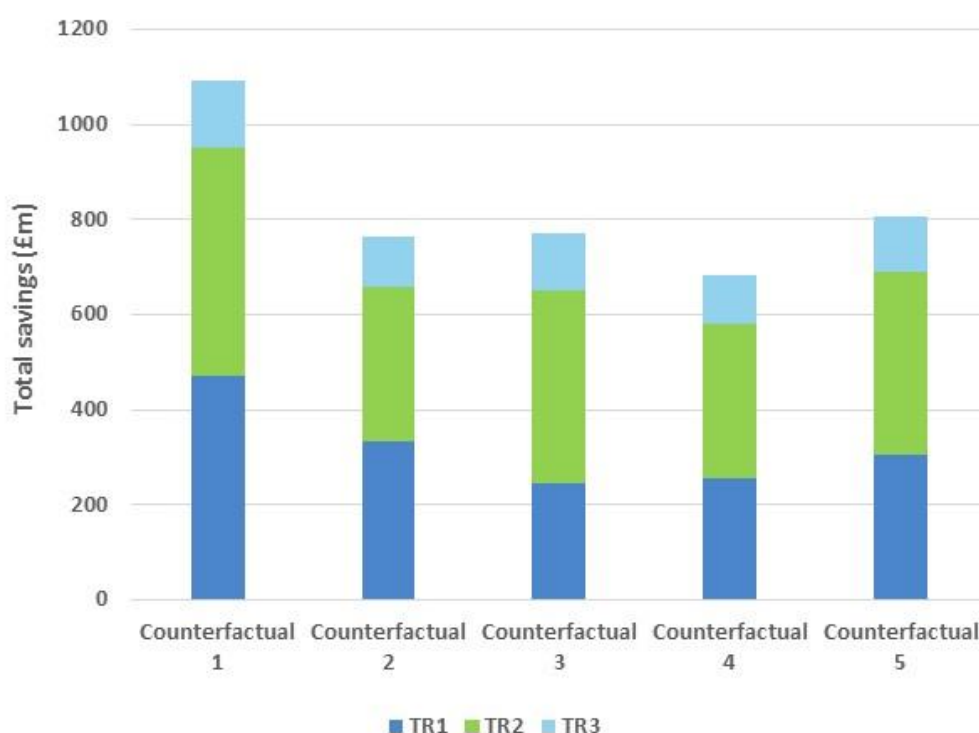
*The OFTO approach as applied to TR1, TR2 and TR3 has resulted in significant cost savings when compared to plausible merchant and regulated counterfactuals that might have been applied in the absence of the chosen approach.*

The analysis of TR1 concluded that the OFTO approach as applied in GB had delivered significant savings when compared to a range of plausible counterfactuals.

Extending this analysis to TR2 and TR3, suggests that the OFTO programme continues to deliver savings and indeed, on a normalised basis, the savings appear to have increased for TR2 and TR3, compared to TR1.

Figure 1 below shows the overall savings across the three rounds to date in NPV terms, taking into account bottom end estimates for operating cost savings in TR2 and TR3. Depending on the counterfactual that is chosen, the savings estimates range from £683m to £1,092m (2014/15 prices) in total for all OFTO tender rounds to date.

Figure 1: Total savings by tender round (NPV; 2014/15 prices)



Source: CEPA analysis

The analysis suggests that contestability has driven down operating costs and the cost of equity, whilst facilitating a pass-through of historically low debt costs, to a degree that cannot easily be envisaged under any of the counterfactual scenarios. Whilst understanding the distribution of benefits from the tenders is more complex,<sup>5</sup> it is clear that the contestable opportunity and market offering as defined for OFTOs has continued to deliver value for money benefits for customers and other users of the offshore transmission system.

There may be other instances where such a set of circumstances would allow a similar approach which would similarly deliver benefits – Ofgem, for example, is currently considering the extension of a contestable tender model to apply to onshore electricity transmission assets in of sufficient scale and appropriate scope. The experience to date of applying the OFTO regime to GB offshore networks, helps to demonstrate the types of circumstances and features of a ‘market offer’ which are likely to derive the greatest benefits under a contestable approach, notably the need for:

- large, new and separable assets that can offer the clearest opportunity for competition “for the market”;
- a well-defined structure with a clear risk profile that allows efficient, competitive pricing;
- a transparent tender process undertaken on a level playing field with standardised licensing and tender regulations; and
- a *programme* of opportunities to encourage tighter pricing as investors become increasingly comfortable with the risks and nature of the assets.

---

<sup>5</sup> The possible distribution of savings from the OFTO regime is analysed in detail in the main report.

## 1. INTRODUCTION

In 2009 the Government and Ofgem introduced a new licensing model, combining aspects of both competition and regulation, to deliver offshore electricity transmission infrastructure in Great Britain (GB). Unlike in other jurisdictions, this involves a competitive tender process to appoint new offshore electricity network operators who have the responsibility for operating newly constructed electricity transmission network assets, which connect offshore electricity generation (wind farms) to the shore.

Ofgem has now completed three rounds of offshore transmission tender competitions, Tender Round 1 (TR1), Tender Round 2 (TR2) and Tender Round 3 (TR3).

Cambridge Economic Policy Associates (CEPA) has been engaged by Ofgem to **assess the benefits that may have been achieved from the introduction of this competitive Offshore Transmission Owner (OFTO) regulatory framework as applied to the TR2 and TR3 projects.** This builds on a previous evaluation study undertaken by CEPA and BDO of the benefits achieved by the OFTO regime from TR1.

This report sets out the methodology we have used to assess these benefits, our findings on the estimated cost savings that have been realised from applying the OFTO regime to the TR2 and TR3 projects and how those savings may have been distributed between different industry parties (that is, consumers and generators) through the funding arrangements for offshore wind and offshore transmission in GB.

The rest of this report is structured as follows:

- in Section 2 we review the background and context to the including the regime's design principles and the TR1 process;
- in Section 3 we set out our approach to tender rounds assessment, including the analytical framework and modelling methodology used;
- in Section 4 we then review the outcomes of the tender rounds, in terms of financing costs, operational outcomes and the tender process itself;
- Section 5 presents the counterfactuals we have used to compare the OFTO regime against, including the assumptions on regime design and costs;
- in Section 6 we present our findings of the cost savings that may have been realised from applying the OFTO regime as compared to our counterfactuals;
- Section 7 considers the issue of who may have benefited from any cost savings that may have been realised the contestable approach adopted; and
- Section 8 provides conclusions.

## 2. THE OFTO REGIME

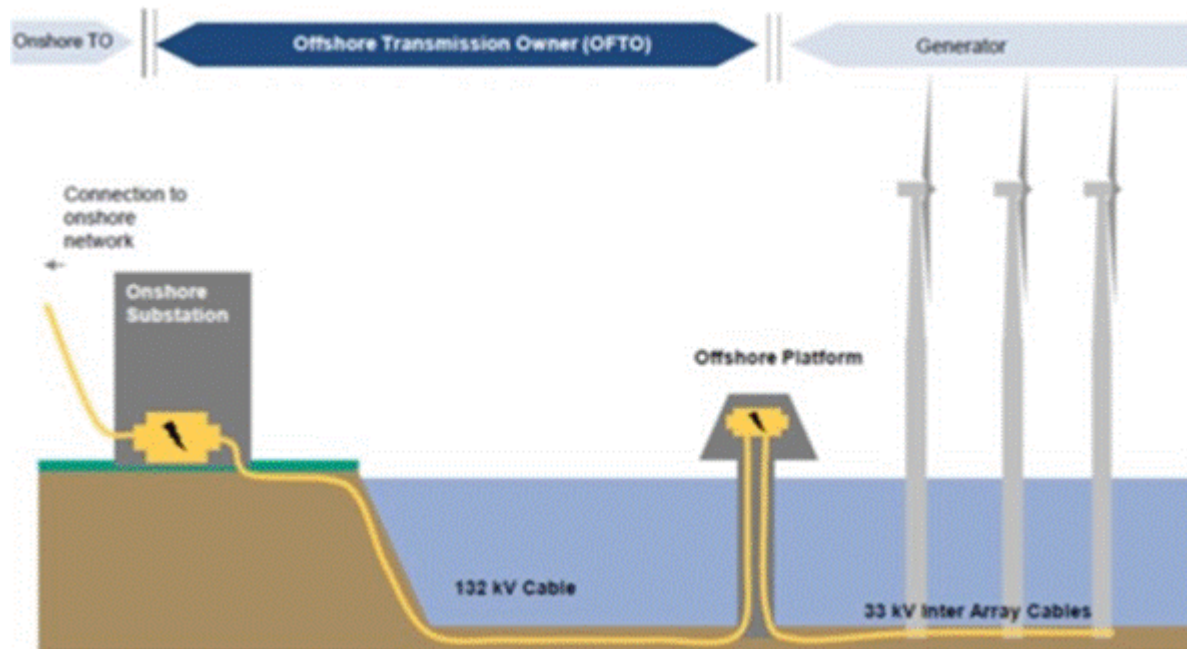
The OFTO regime that has been applied to the TR2 and TR3 projects is an “asset specific”-based licensing approach. Ofgem – following a competitive tender process to identify a preferred bidder – has awarded licences to own and operate specific offshore transmission assets rather than for a whole offshore zone or geographic area (which is the approach, for example, adopted for onshore electricity transmission).

In this section we discuss some of the key building blocks of the regime, including the structure of the regulated revenue stream, payment flows and the tender process itself.

### 2.1. A contestable asset-specific licensing approach

For TR2 and TR3 projects, the offshore electricity transmission licence is bid out to competing bidders to operate specific, generation-related, transmission assets. The successful bidder takes on the responsibility for the operation and maintenance of these specifically defined electricity transmission assets and their associated commercial risks. Unlike onshore electricity Transmission Owners (TOs), OFTOs for TR2 and TR3 projects do not manage an integrated electricity transmission system but a dedicated radial connection; this being one of the key differences between the existing offshore and onshore networks in GB.

*Figure 2.1: Illustrative offshore transmission assets*



*Source: Ofgem*

## 2.2. The regulated revenue stream

OFTOs are regulated by Ofgem through licences like other regulated energy networks in the UK (i.e. there are both standard and amended standard licence conditions). Like onshore networks, OFTOs are subject to, albeit an amended form, of price control (comparable to regulation by contract).

The key building blocks of the regulatory revenue stream which then apply to OFTOs under the regulatory regime are as follows:

- The OFTO is entitled to a stable, 20 year, Retail Price Index (RPI) inflation-linked revenue stream (the Tender Revenue Stream (TRS)) in return for operating, maintaining and the decommissioning the transmission assets.
- The TRS is constant in real terms over the 20-year life of the OFTO licence – whilst the licence contains a price control, there are no price reviews as the TRS is fixed (in real terms) for 20-years at the time of licence award.
- OFTOs are incentivised to perform as efficiently and effectively as possible, primarily through an availability incentive which means that OFTOs receive an availability-based revenue stream.<sup>6</sup>

The OFTO's 20-year TRS reflects the costs of acquiring, operating and maintaining the assets. This includes O&M costs, insurance costs, special purpose vehicle (SPV) management costs, decommissioning costs, taxes and financing costs related to the acquisition of the assets from the offshore generation developer.<sup>7</sup>

Costs such as O&M and financing are based on the successful bidders' bid, while the acquisition price reflects the assessment by Ofgem of the economic and efficient costs of developing and constructing the transmission assets incurred by the windfarm developer, the Final Transfer Value (FTV). The TRS that is enshrined in the OFTO's licence is adjusted before financial close, to reflect the FTV.

For TR2 projects, the TRS is fully indexed to RPI inflation, as was the case in TR1. However, for TR3 projects, bidders have been offered the opportunity to bid the level of inflation indexation that they required, known as a "biddable" indexation mechanism.

The biddable indexation mechanism allows bidders at the time of tendering to bid the proportion of the TRS they would like to have indexed to RPI which is then combined with the bidders' starting TRS in a net present value (NPV) calculation using a predetermined inflation forecast and discount rate.

This calculation is performed such that the interactions between the starting level of the TRS and the future inflation payment obligation from the starting TRS value are suitably reflected in the price evaluation, where alternative indexation proportions are proposed by bidders at

---

<sup>6</sup> Drawing comparisons with the UK Private Finance Initiative (PFI).

<sup>7</sup> The SPV is the company established for purposes of financing and operating the asset.

the tender stage. This will be linked to the most competitive financing solution in the market at the time.

The text box below summarises the steps that were followed for the price evaluation at TR3 based on an NPV calculation.

#### **Text Box 2.1 – NPV evaluation as applied by Ofgem in TR3**

For TR3, prospective OFTO bids will consist of two numbers. (1) A first year TRS requirement and (2) a percentage representing the proportion of that TRS that will increase with RPI over the length of the revenue term. The proportion of TRS not indexed to RPI will remain constant in nominal terms.

Ofgem will use an inflation assumption to project the actual cash flows for the default 20 year revenue period based on the proposed proportion of TRS indexed and then discount those cash flows to present values. The cash flows can then be added together to produce a total present value of revenues.

*Source: Ofgem<sup>8</sup>*

### **2.3. Cost allocation and payment flows**

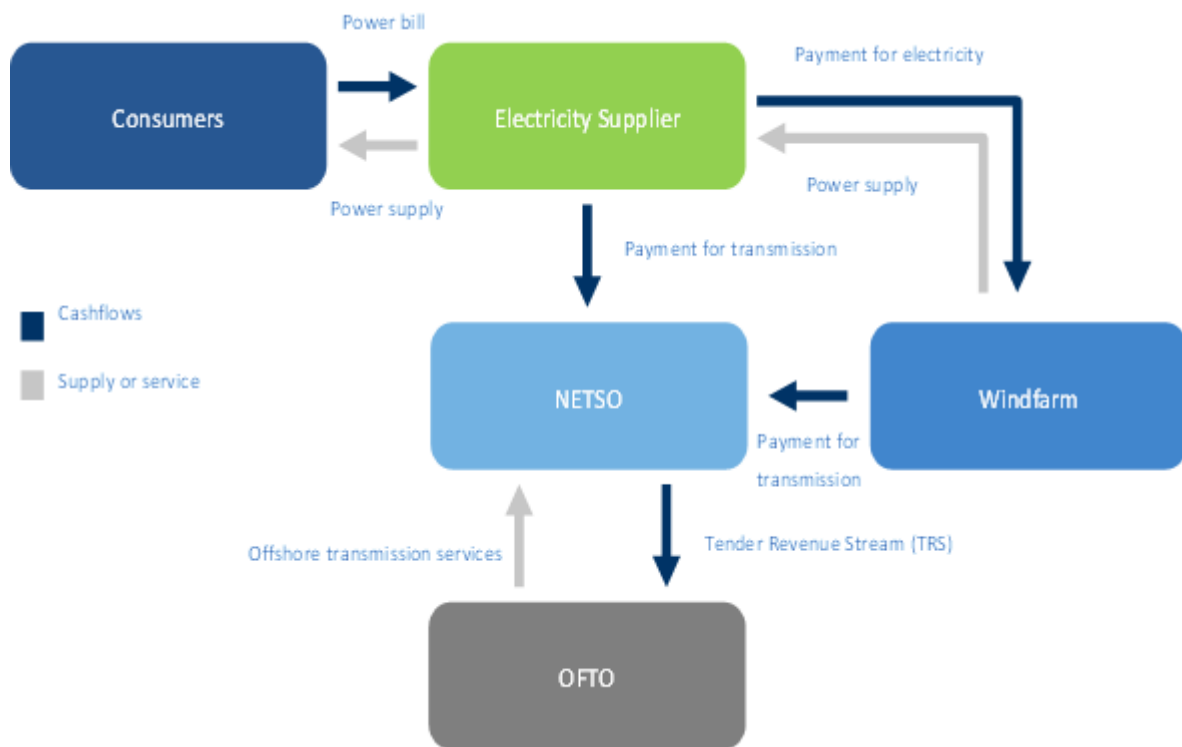
Importantly, the TRS is paid to the OFTO by the GB NETSO (National Grid Electricity Transmission (NGET)) which then recovers these revenues as parts of its Transmission Network Use of System Charges (TNUoS) from generators and suppliers according to the principles of the GB TNUoS charging methodology – see Figure 2.2.<sup>9</sup>

---

<sup>8</sup> Ofgem (2014): ‘TR3 licence decision letter’

<sup>9</sup> As described below, the current TNUoS charging methodology results in a proportion of the cost of offshore transmission being recovered from the specific offshore generator who uses the transmission assets. The remaining proportion of the cost is recovered through residual transmission charges paid by all suppliers and generators, who buy access to the transmission network.

Figure 2.2: Payment and service arrangements for offshore transmission



Source: KMPG<sup>10</sup>

A consequence of the above is that the OFTO does not rely on the offshore generator for any of its revenue, thus reducing payment risk. Although the GB NETSO relies on the offshore generator to fund a proportion of an OFTO's allowed revenues<sup>11</sup>, it is underwritten by the consumer should the offshore generator fail to pay its share. The adopted TNUoS charging approach, as the cost recovery mechanism for OFTO revenues, as a consequence, impacts on the allocation of the costs associated with the transmission projects tendered as part of TR2 and TR3, as well as the allocation of certain risks between industry parties.

## 2.4. The tender process

For both TR2 and TR3 projects, the tender process for the transfer of the OFTO assets has been run alongside or post completion of the asset construction process. There have then been a number of stages in this bidding process.

For TR2, Ofgem ran an initial pre-qualification stage (to identify bidders experience and capabilities), followed by a Qualification to Tender (where bids are based on generic and project specific information memoranda) and an Invitation to Tender (ITT) stage.

An alternative process was followed for TR3. In this case, Ofgem ran what was referred to as an Enhanced Qualification to Tender stage, which combined elements of the pre-qualification

<sup>10</sup> KPMG (2014): 'Offshore Transmission: An Investor Perspective – Update Report'

<sup>11</sup> Through what are termed "local" TNUoS charges.

and Qualification to Tender stages in TR2, to help to improve the timing and the duration of the tender process, and the associated transaction costs.

As with TR1, structuring of the procurement programme as tender rounds has also meant that bidders have been able to dedicate resources to the process and the “OFTO opportunity” within specific time windows. The licensing and tender regulations have also created a standardised approach for the tender process which may have helped to improve the attractiveness of the opportunity for investors.



### 3. METHODOLOGY

We have undertaken an ex-post analysis of the outcomes achieved from applying the Transitional OFTO regime to the TR2 and TR3 projects.

Central to our approach, and consistent with HM Treasury Greenbook Guidance, is the development of counterfactuals to TR2 and TR3 and a comparison of these to the (factual) outcomes observed under the contestable OFTO regime. We consider not only the cost of service savings achieved by the OFTO regime under TR2 and TR3, but also the distributional question of who may have benefitted from these overall savings.

A central part of our evaluation framework has, therefore, been determining and quantifying counterfactuals to the OFTO regime. In this context, the counterfactuals are what we consider to be internally coherent scenarios of what alternative policy options *might* have reasonably been adopted in the absence of the current policy, at the time of its implementation.

The contestable OFTO licensing regime emerged from a set of options for the offshore transmission regulatory regime over the period 2006 – 2009. The Government and Ofgem considered a range of “merchant” and price control based approaches at the time, based on the experience of offshore oil and gas development in the UK and OFTOs proceeding the development of a regulated route for electricity interconnector development in GB.

Therefore, our counterfactuals start from two central alternatives to the OFTO regime:

- licensed **merchant** generation counterfactuals; and
- alternative **regulated** price control based approaches.

Whilst subsequent events, such as the development of a regulated (‘cap and floor’)<sup>12</sup> regime for electricity interconnectors in GB, would suggest that the merchant counterfactuals are less likely to have been an approach pursued offshore, they remain included as part of our TR2 and TR3 counterfactual analysis, partly as a reference point of the potential impact of the regulatory unpinning provided by the OFTO approach.

In the rest of this section we set out each of the steps in the analysis, including the modelling methodology used for developing the counterfactuals

#### 3.1. Step 1: review the outcomes from the tender rounds

We reviewed the pricing of the winning OFTO bids for each of the projects and TR2 and TR3 and compared the outcomes to TR1. We also reviewed the costing that inputted to the TRS that the OFTOs were willing to offer to own, finance and maintain the offshore transmission

---

<sup>12</sup> Under the cap and floor approach, developers of electricity interconnectors identify, propose and build interconnectors and there is a cap and floor mechanism to regulate how much money a developer can earn once in operation. If applying for a cap and floor regime developers have to comply with all aspects of European legislation on cross border electricity infrastructure.

assets for the 20-year period. This included the financial pricing (cost of debt and cost of equity) and O&M costs of the winning OFTO and other bidders.

### **3.2. Step 2: calculate the NPV pricing of the TR2 and TR3 projects**

We use bid data on each TR2 and TR3 project provided to us by Ofgem on the breakdown of individual cost items (e.g. financing costs, O&M expenditure, transaction and management (e.g. SPV-related costs)) as a percentage of the final annual TRS.

These figures are projected to apply across the full 20-years of the OFTO licence for all the transmission projects which were included in TR2 and TR3. This results in a total, real, projected pricing base for each TR2 and TR3 project, broken down by individual cost categories (e.g. financing costs, operating costs etc.).

The real pricing base for the TR2 and TR3 projects, by individual cost item, is then converted into NPV totals for each of the tender rounds. The analysis is, therefore, undertaken in real NPV terms, and based on the TRS which were bid by the ultimately appointed OFTOs, rather than their outturn costs. The final results comparing the results of the OFTO tender rounds to the counterfactuals are presented in 2014/15 prices.

### **3.3. Step 3: model all counterfactuals on a like-for-like basis**

The third step is to model the counterfactuals' revenue streams and calculate the NPV of each for the duration of the revenue stream (equal to 20-years to be consistent with the current assumed economic life of the offshore transmission infrastructure).

The revenue stream for each of the counterfactuals is estimated using a 'building block' modelling approach, meaning that the revenues are built up from estimates of the counterfactual operators' possible operating and financing costs. To estimate each of the building blocks, we have needed to make a series of assumptions of how costs vary by project and the timing of when the assets were commissioned. These assumptions are detailed as part of our discussion of the counterfactuals in Section 5.

Consistent with our TR1 analysis, counterfactual operating costs are modelled using alternative assumptions of the counterfactual cost as a percentage of project FTV. For financing costs, the assets are straight-line depreciated over 20-years and the average of the starting and closing asset base in a given year is then used to calculate the return on the investment under each of the counterfactuals, applying a Weighted Average Cost of Capital (WACC) as a proxy for financing costs.

In this methodology it is pricing of transmission services under the counterfactuals which is modelled, not actual costs incurred by the service provider. In other words, it is what the users of the offshore transmission services for each tender round project would have paid, given how the prices of the transmission services could have been set, which is matters for the comparative analysis.

We are, therefore, comparing on the one hand, the known NPV pricing of the projects where the contestable OFTO regime was applied, with *estimates* of the NPV pricing of a range of “regulated” and “merchant” counterfactuals (see Section 5) of delivering the same offshore transmission services on the other.

This basic assumption in the framework of the analysis is particularly important when making comparisons between the *contestable* OFTO regime and the “regulated” *monopoly*-based counterfactuals. For example, as we explain in Section 4 and 5, the relevant benchmark for the cost of capital of the OFTO regime in our analysis is the *allowed* cost of capital by the regulator, and *not* the actual cost of capital of the transmission network operator. This is because in both cases, we are making a like for like comparison between the *ex-ante* pricing under the OFTO regime and the counterfactuals that have been modelled.

This also means that the analysis is completed from the perspective of the users of the transmission services provided by the OFTOs.

### **3.4. Step 4: compare the NPV pricing and analyse the implications of the analysis**

The fourth and final step is to compare the NPV pricing under the OFTO tender round to the NPV pricing of the counterfactual. We then analyse the implications of the findings from the comparative analysis (as presented in Section 6).

For example, if cost of service savings are identified for TR2 and TR3 under the OFTO regime, we seek to explore the factors that may have driven the savings that the analysis would imply. As is explained in the introduction, where savings are identified, we also seek to identify *who* may have benefited from the implied saving (as presented in Section 7).

### **3.5. Taxation**

Our analysis of TR1 included an estimate of the tax savings potentially achieved by OFTOs compared to the counterfactuals. This was derived using a simplified tax allowance calculation (based on similar principles for onshore network price control reviews and assumptions on the treatment of capital allowances) although the savings were presented separately from figures for operating and financing cost savings.

We have not included tax savings directly in the analysis for TR2 and TR3 on the basis that although this may be a saving in the OFTO sector, it is likely to be matched by a corresponding additional cost to taxpayers elsewhere. Taxation however, is a distributional question for the sector of who might have benefited from any implied savings and so we discuss this as part of the more general discussion of distributional issues in Section 7.

### **3.6. The scope of the analysis**

The OFTO regime was applied to project generation connectors, as the developers of these projects had either at the time already started one or all of: award of construction contract

and construction works (TR2); or selected a generator-build option (TR3). It was, therefore, not an option that these generation connection projects could have been constructed by a party other than the offshore wind farm developer.

For our counterfactual analysis, we have, therefore, assumed that a similar principle would have applied. We assume the FTV for the projects tendered under TR2 and TR3 applies under all counterfactuals. This means that in the case of alternative regulated counterfactuals, we assume that the same cost assessment process would have been applied by Ofgem to establish the FTV of these projects.

## 4. TENDER ROUND 2 AND 3 OUTCOMES

In this section we review the outcomes of both TR2 and TR3, including the financing and operating costs which were bid as part of the tenders, the sources of financing and the general trends in TRS pricing between tender rounds.

### 4.1. Characteristics of the TR2 and TR3 projects

Ofgem commenced the second *transitional* tender round of offshore transmission tenders (TR2) in November 2010 (Tranche A) and December 2012 (Tranche B) which included four projects in total. TR3 commenced in 2014 and is the first set of projects that will have been competed under the enduring offshore transmission regime.

The projects included in TR2 were:

- Lincs;
- London Array;
- West of Duddon Sands; and
- Gwynt y Môr.

The two projects in TR3 are:

- Westermest Rough; and
- Humber Gateway.

As is illustrated in Table 4.1 the size of the projects in TR2 and TR3, particularly TR2, have been greater than in TR1.<sup>13</sup>

*Table 4.1: Size of offshore projects*

Project	Tender Round	FTV (£m)	MW
Average TR1	TR1	128	230
Gwynt y Môr	TR2	359	576
Lincs	TR2	322	270
London Array	TR2	480	630
West of Duddon Sands	TR2	269	389
Westermest Rough	TR3	170	205
Humber Gateway	TR3	171	220

*Source: Ofgem and CEPA*

*Note: 2014/15 price base*

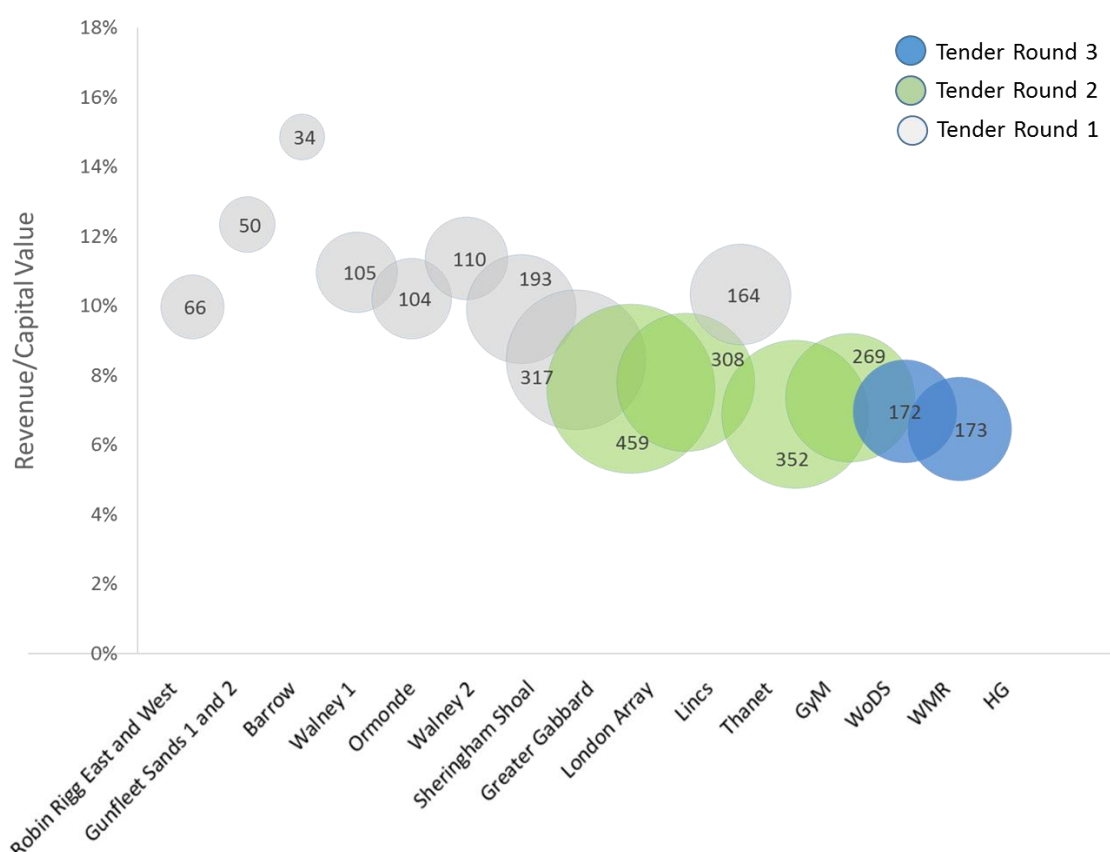
---

<sup>13</sup> With the exception of Greater Gabbard, which was the largest project in TR1 at a total FTV of over £300m.

## 4.2. Trends in the Tender Revenue Stream

One of the main trends than can be observed between the OFTO tender rounds run by Ofgem to date, is that the TRS as a percentage of FTV has been falling between the tender rounds, as is illustrated in Figure 4.1 below.

Figure 4.1: TRS as a percentage of FTV between OFTO tender rounds



Source: CEPA analysis of Ofgem data – the bubble sizes show project FTV (£m)

Note – TR3 is the indicative TRS as the projects have yet to reach financial close

The fall in the ratio of the TRS to FTV is particularly pronounced for TR3, raising the question: what is driving the fall in the TRS which the market is willing to offer to finance and maintain the offshore transmission assets?

In the subsections below, we discuss the outcomes achieved in both TR2 and TR3 for both OFTO financing costs and operating costs. We have excluded tax from our analysis (for the reasons detailed in Section 3) although this forms a component of the OFTO's required TRS. Taxation is instead discussed as part of the distributional issues in Section 7.

### 4.3. Financing costs

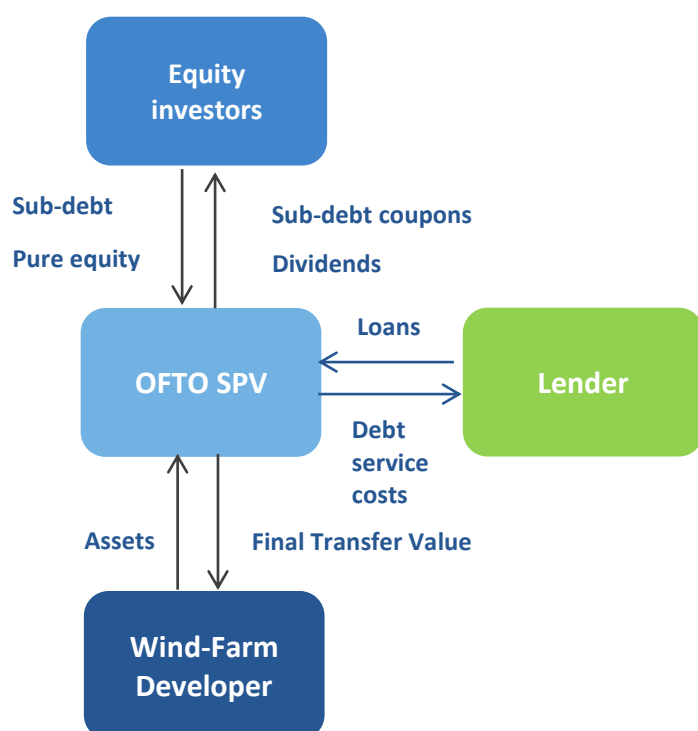
Financing costs can comprise as much as 80% of an OFTO's cost base over the life of its regulated revenue stream. The cost of capital of the projects, is, therefore, crucial to whether the tendering regime is achieving value for money for the users who pay for the offshore transmission infrastructure (generators and consumers).

Bidders have flexibility over the financing structure they put forward as part of their bid, so long as the deliverability of the proposal is convincing and the proposal enables the investor to put forward a competitive TRS (i.e. both financial robustness and price are considered by Ofgem in the tender evaluation process).

OFTO projects to date have generally adopted a highly leveraged "project finance"-type structure, with a mix of equity, shareholder subordinated loans and long term senior debt (sometimes with reserve facilities to cover short-term liquidity needs). When these structures have been used, equity has usually been structured into a sub-debt component and pin-point ordinary share equity (i.e. a very small equity holding).<sup>14</sup>

This has been the case in TR2 and TR3, where all of the OFTOs have used SPV-type structures to finance their projects, rather the projects being corporately financed on balance sheet, as shown in Figure 4.2.

Figure 4.2: Leveraged OFTO project finance structure



Source: KPMG and CEPA

<sup>14</sup> KPMG (2014): 'Offshore Transmission: An Investor Perspective – Update Report'

### 4.3.1. Financing of OFTOs

#### The tender process has allowed a range of financing solutions to be applied to projects

In Annex A we have summarised the key elements of the financing packages which each of the OFTOs in TR2 and TR3 have adopted at financial close, as sourced from InfraNews. This shows that:

- TR2 and TR3 projects have been financed through a range of capital (bond) and credit (bank) market debt financing solutions;
- the OFTOs have continued – as was the case in TR1 – to adopt highly leveraged financing structures (e.g. gearing typically 80% and above<sup>15</sup>); and
- the winning tenders have been able to attract finance from a range of sources, including the European Investment Bank (EIB).

Figure 4.3 below illustrates some of the financing institutions that have invested capital in OFTO projects in TR2 and TR3.

Figure 4.3: Sources of debt and equity finance in winning TR2 and TR3 bids



Source: CEPA and InfraNews

<sup>15</sup> Bidders have been able to achieve lower cover ratios in TR3, allowing for more debt as a percent of capital structure.



The EIB has played a particularly important role in the OFTO sector since its inception and this continued through TR2 and TR3. The EIB's participation has helped underpin very competitive debt financing packages being offered by bidders, either through direct lending by the EIB to OFTO projects, or in the case of Greater Gabbard in TR1 and West of Duddon Sands in TR2, through making available its project bond credit enhancement facility.<sup>16</sup> However, as discussed below, the terms of EIB finance have also not remained constant between tender rounds, which has meant the financing terms achieved by individual OFTO projects has depended on the time at which the projects were tendered.

In TR2 and TR3, some of the tenders were also successful in attracting institutional investors into the project financing. Both West of Duddon Sands and Gwynt y Mor have recently been financed through the public bond market, facilitated by the larger size of the two projects (in FTV terms) compared to the majority of the projects in TR1. In addition, the maturing of the institutional bond market (public bond and private placements) in recent years has allowed institutional investors to provide more competitive offers.

### Comparison to other regulated sectors

Of course, access to the capital markets, and many other sources of finance, already exists within other parts of the GB energy networks sectors. National Grid, for example, is one of the largest corporate issuers of public bonds in the Sterling Eurobond market.

Like OFTOs, National Grid and other energy network operators, have also had access to EIB financing. For example in 2014 the EIB agreed to provide £1.5bn for investment by National Grid across its onshore electricity transmission network.<sup>17</sup>

What, however, is different about the OFTO regime is the tender process *and* regulatory structure (e.g. the fixed 20-year revenue stream) help drive:

- **Alignment of regulated revenues with the marginal cost of capital.** This is achieved in the case of OFTOs by having individual project tenders, rather than needing to apply an average WACC to a Regulatory Asset Base (RAB) which will contain a portfolio of projects and the sunk investment of historic capital expenditure programmes.

*Project* risk profile is therefore well defined, and so can be efficiently priced by OFTO bidders in fixing the required marginal *project* debt and equity rates of return.<sup>18</sup> It is this *actual* project cost of capital which is paid by customers.

---

<sup>16</sup> The project bond credit enhancement (PBCE) is a guarantee facility where additional liquidity will be provided for the project if required, allow enhanced recovery for senior lenders by reducing outstanding debt and acting as a first-loss piece in the financing structure.

<sup>17</sup> <http://www.eib.org/infocentre/press/releases/all/2014/2014-248-largest-ever-eib-loan-provides-gbp-1-5-billion-for-national-grid-investment.htm?media=newsletter>

<sup>18</sup> This is aided by the fixed 20-year revenue stream. It has help OFTOs to match the duration of their debt finance to the length of the revenue term, removing refinancing risk.

For an equivalent outcome to be delivered under price control reviews (i.e. regulatory negotiation), requires:

- a) the regulatory framework to be structured like OFTOs – i.e. separate project based price controls – that allow the regulator to capture the true risks and marginal cost of capital of an individual project; and
  - b) an assumption that the regulator (in this case Ofgem) could make a true assessment of the actual cost of capital to allow the project to be financeable over the course of its economic life – i.e. absence of any headroom in setting the allowed rate of return e.g. due to financeability duties.
- **Removal of asymmetry of information.** One reason to expect that the contestable OFTO process would drive a better outcome than a regulatory negotiation, is simply because it reduces the need for regulatory judgement to be applied in setting the return expectations of the regulated sector.

In contrast to onshore energy networks, by removing this decision from Ofgem, the financeability issue in the case of OFTOs is instead ‘put’ to the market, removing any natural conservatism that might be expected in setting regulated allowed returns - particularly given that the risks of setting the cost of capital too low are for the consumer, and therefore the regulator, generally considered higher than if the cost of capital is set too high (e.g. risks of underinvestment).

- **Continued competition between financing sources.** Another positive feature of the contestable tender process in enabling efficient financing of OFTOs, is that the tender process provides the opportunity for alternative financing packages and sources of project financing to continually compete against one another. In contrast to a scenario where there is a single network service provider (i.e. a monopoly) there is also competitive pressure on the *sponsors* of the projects, both in getting the very best debt terms as well as their own required equity returns. This should help ensure the TRS which is paid by the users of the transmission assets reflect the most competitive cost of debt and equity at the time of bidding.

#### **4.3.2. Benchmarking of financing costs**

In this section we compare the terms of financing that have been secured by bidders in TR2 and TR3 to a range of market and regulatory benchmarks.

First, we compare the terms of the debt financing packages achieved by individual projects and between tender rounds. This includes the terms of the OFTO’s commercial debt and changes in the terms of EIB financing.

We then compare evidence of the required equity rates of return in OFTO bids to other tender infrastructure opportunities – e.g. Private Finance Initiative (PFI) projects – and allowed equity rates of return in regulated sectors.

## Cost of debt – commercial lending

On commercial lending we reviewed evidence on the cost of debt for the thirteen projects tendered under the OFTO regime to date (i.e. TR1, TR2 and TR3) and compared it to a 20-day average of the iBoxx (non-financials) investment grade debt index. We found that project issuances were generally closely aligned with the market benchmark at the time of financial close, i.e. the *marginal cost of capital* at the project financial close date. Whilst this is not a perfect comparator for all OFTO projects (the iBoxx non-financials index is also a 10-year plus maturity index which compares to a typical weighted average loan life (WALL) for OFTO projects of ~ 12 years<sup>19</sup>), the conclusion seems valid.

Declining interest rates in the UK as well as internationally is certainly one of the reasons for lower financing costs contributing to a downward trend in the TRS to FTV ratio between OFTO tender rounds (see Figure 4.1 above), given that debt financing costs typically constitute around 75-80% of an OFTO's TRS. However, there is also evidence that the risk premiums commercial lenders have commanded from OFTOs have also declined between rounds. Bank margins for projects in TR1 for example, have been quoted as in the range of 210-220 basis points<sup>20</sup> whilst projects such as Lincs (TR2) and Humber Gateway (TR3) have seen debt margins bid below 150 basis points. This shows, in our view, the power of a contestable approach and the learning effect for investors of the risks in the sector.

## Cost of debt – EIB lending

As noted above, EIB lending has also been an important part of a number of OFTO projects' capital structures (typically 50% of total project debt).

However, the terms of EIB debt have varied between OFTO tender rounds. Both London Array and Lincs projects in TR2 raised EIB debt at a credit margin over LIBOR in the range of 80-90 basis points; whereas the credit margins that have been achieved more recently for TR3 projects, have been closer to 30 basis points.

In pricing its debt to OFTO projects, EIB has to take into account its own prevailing wholesale borrowing costs, which reflect the required returns of investors in its own financing. Thus, as shown in Figure 4.4, an explanation for these differences were that a number of the TR2 projects were tendered in a period of relatively high EIB borrowing costs, during the Eurozone crisis which was ongoing at the time.

---

<sup>19</sup> OFTO debt is amortizing therefore although the maturity of the debt may be 18-19 years to match the 20-year revenue stream,

<sup>20</sup> NAO (2012): 'Offshore electricity transmission: a new model for delivering infrastructure'

Figure 4.4: EIB borrowing costs vs. GBP floating to fixed swap



Source: CEPA analysis of Bloomberg data

Once the Euro crisis abated and EIB could once again borrow more efficiently, this will have contributed to reductions in financing costs between the two tender rounds. This is why TR3 projects would be expected to perform relatively better compared to a fixed counterfactual cost of debt which could applied to both TR2 and TR3 projects (as discussed in detail as part of subsequent sections of the report).

### Cost of equity

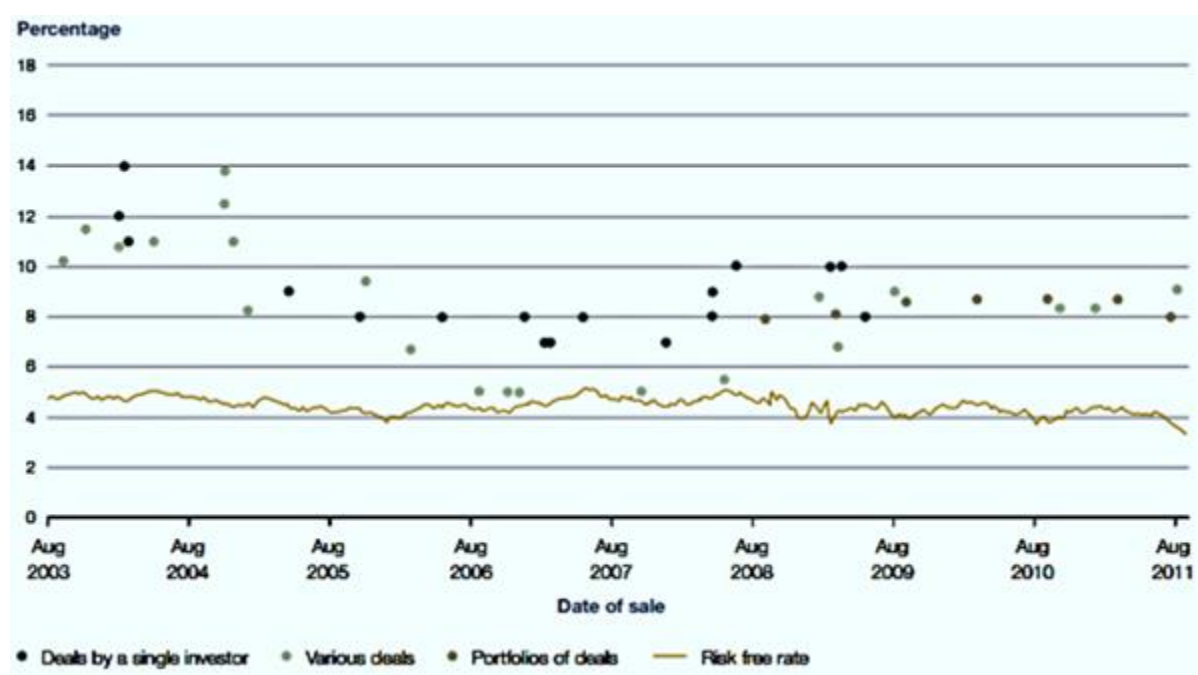
The only published evidence on the cost of equity in OFTO projects is the NAO review of TR1 from 2012.<sup>21</sup> The NAO quoted OFTOs as bidding equity IRR's (nominal, post-tax) during TR1 in the range of 9-11%. We understand that in subsequent tender rounds (i.e. TR2 and TR3) OFTOs required equity returns have not increased, and in many cases have fallen closer to reported secondary market rates of return in PFI projects.

Figure 4.5 below compares reported secondary market rates of return by the NAO<sup>22</sup> with a risk-free rate estimate from UK government bonds.

<sup>21</sup> NAO (2012): 'Offshore electricity transmission: a new model for delivering infrastructure'

<sup>22</sup> NAO (2012): 'Equity investment in privately financed projects'

Figure 4.5: Reported secondary market returns in UK PFI



Source: NAO<sup>23</sup>

This shows that the annualised rates of return that secondary investors have required in PFI fell from around 12 per cent in 2003 to just above 7 per cent in 2005. The NAO noted that this “fall reflected wider market changes, secondary market competition and growing investor understanding of PFI operating risks. Returns fell further in 2006-07 to just above 5 per cent, reflecting a period of intense competition by secondary investors ... However, low interest loan finance became unavailable during the financial crisis and the reported rates then moved back to earlier levels of around 8 per cent.”<sup>24</sup>

The secondary PFI market is a particularly important benchmark for OFTOs given they are competed as operational projects and the commercial framework is also similar to OFTOs – i.e. long term fixed revenue stream with a strong payment counterparty. Our understanding is the secondary PFI equity returns have tightened in recent years, which is consistent with the recent experience of OFTO bidding.

Another important benchmark for OFTOs is the regulated rates of equity returns that have been allowed by UK regulators in recent price controls.

The offshore transmission investor guide<sup>25</sup> notes that the rate of return requested by bidders for OFTO assets in TR1 was broadly in line with the 10-11% equity IRRs that might be targeted by equity investors in traditional regulated utility businesses.

<sup>23</sup> NAO (2012): ‘Equity investment in privately financed projects’, p. 31

<sup>24</sup> Ibid., p. 31

<sup>25</sup> KPMG (2014): ‘Offshore Transmission: An Investor Perspective – Update Report’, p. 24

However, regulators in more recent price determinations have been reducing their allowed equity returns, partly triggered by recent referrals to the CMA as shown in Table 4.2.

*Table 4.2: Regulatory Precedent on the Cost of Equity*

Determination	Risk-free rate	MRP	Equity beta	Cost of equity, post-tax
Ofwat PR14 (2015-20)	1.25%	5.50%	0.80	5.65%
Ofgem RIIO ED1 (2015-23)	Not provided			6.00%
CMA NIE (2012-17)	1.50%	5.00%	0.75	4.81%
CAA Q6 Heathrow (2014-19)	0.50%	5.75%	1.10	6.80%
CAA Q6 Gatwick (2014-21)	0.50%	5.75%	1.12	7.00%
ORR PR13 (2014-19)	1.75%	5.00%	0.95	6.50%
Ofgem RIIO GD1 (2013-21)	2.00%	5.25%	0.90	6.70%
Ofgem RIIO T1, NGGT (2013-21)	2.00%	5.25%	0.91 *	6.80%
Ofgem RIIO T1, ScotTOs (2013-21)	2.00%	5.25%	0.95 *	7.00%

*Source: CEPA and various regulatory publications*

*\* implied*

A fall in required equity IRR's in the OFTO sector would be consistent with this trend in regulated utility price controls.<sup>26</sup> However, recent OFTO project tenders indicate that while part of the reduction in OFTO's required equity returns could be due to a general decline in the cost of equity, other factors could also be at play.

Investors for example, may be willing to offer pricing benefits (compared to price regulated utilities) due to the fixed nature of OFTO revenue streams. As investors have become more comfortable with the risks in the sector, the competition for the projects may also be driving bidders away from long term values that have typically been used by regulators. It seems likely a number of factors have played a role, but the more recent downward trend in equity returns in particular highlights the benefits of the contestable approach followed.

#### **4.4. Operating costs**

OFTO operating costs, which for the purposes of this report include a range of costs associated with operating the OFTO SPV, including O&M costs but also insurance, SPV management and other running costs, are other key components of the TRS.

---

<sup>26</sup> Which has been due to a reduction in the total market rate of return. The CMA for example, has assumed 6.5% rather 7% as its upward bound for the total market rate of return in recent determinations.

#### **4.4.1. Operating cost bid proportions as a percentage of FTV**

Annual operating costs<sup>27</sup> have been changing over tender rounds. We assessed the data and the analysis highlighted a number of key points:

- the bids of required operating costs were much closer together for the TR2 and TR3 projects compared to TR1;
- the bids on a percentage of FTV basis were lower at TR2 than at TR1 but higher in monetary (i.e. £m) terms; and
- incumbent operators in the transmission sector, were also much closer to the preferred bidder than was the case in TR1.

The trends in pricing of the bids between tender rounds may have been caused by a number of factors, potentially including the following:

- differences in project size between tender rounds, which may have impacted on operating costs of projects (see discussion below);
- as with financing, the reductions between tender rounds may be a function of the maturity of the bidding market; and
- evidence of more focused competition around an established sector operating cost benchmark.

We consider evidence that incumbent operators in the transmission sector reduced their bids on operating costs in TR2 compared to TR1 to be a particularly important finding.

Arguably this is the most direct example of the beneficial impact of the contestable OFTO programme, *in which successive bidding rounds support increasingly refined price discovery*. This compares favourably to a regulatory negotiation (see Section 5) where pressures to bring down pricing to a market benchmark would not have existed.

#### **4.4.2. Operating cost bids in monetary terms**

In addition to the percentage-based analysis, we also considered the operating costs benchmarks (TRS proportions) of OFTO bidders in monetary terms.

TR2 projects are much larger than the majority of projects in TR1 and TR3, but the operating costs of the projects are not significantly higher, indicating potential economies of scale.

We reviewed unit costs for OFTO operating costs (derived from data of annual operating cost proportions of the TRS) based on the kilometre (km) length of the fifteen projects tendered to date. This showed that the unit costs decrease with size.

---

<sup>27</sup> Note that this includes a number of cost components, including O&M, insurance, SPV / business management costs and decommissioning.

This could be an indication of largely fixed operating costs, which reduce per OFTO as they are divided by longer cable lengths (or another measure of the size of the offshore transmission project), and a decreasing average cost curve for the sector.

However, total operating costs have tended to be similar for the “larger” TR1 and TR2 transmission projects, which also indicates the possibility of step changes in costs depending on the size of a project.

#### 4.4.3. Implications

What can be drawn from a comparison of the TR2 and TR3 operating cost outcomes to all three tender rounds generally?

We would highlight the following points which also have implications for the counterfactuals to the OFTO regime:

- **Outcomes are consistent with what would be anticipated from a contestable process.** TR1 outcomes may have provided a benchmark for future tender rounds and therefore the competitive process may have driven the sector as a whole – all bidders – closer to the required efficiency frontier. This is an outcome consistent with a competitive market.
- **Step changes in operating costs by project size.** The comparative project analysis indicates that there are step changes in operating costs as project size increases – i.e. some fixed costs step up with different sizes of project. However fixed network costs also mean that the average cost curve is downward sloping.
- **Competitive pressure on incumbents to improve the terms of the bids.** Competition between tender rounds required incumbent operators and other bidders to reduce their bids – see TR1 vs. TR2 vs. TR3. This competitive pressure would not have been applied under alternative counterfactual policies (see Section 5).
- **Incumbent cost benchmarks.** Incumbent operators also bid in the second round of competition in the sector. Looking forward to the next stage of our analysis, are the incumbent bids at TR2 a reasonable reflection of the outcome that would have been achieved under a regulated price control counterfactual?

The last two points are important ones, particularly when considering what may have been counterfactual operating costs in the absence of competition.

The *actual* outcomes of the TR2 and TR3 tenders – practical evidence of competition “for the market”, not theory – indicates increasingly tighter pricing amongst the OFTO bidders between the OFTO tender rounds, a trend observed for both new entrants to the transmission sector *and* incumbent operators.



#### **4.5. Summary**

This section has presented evidence of falling costs, increasingly competitive tender rounds and the industry “price” benchmarks competed around between each OFTO tender round. The observed reduction in costs between tender rounds may be due to a number of factors including: efficiency, innovation, fall in market rates of return and potentially economies of scale from partially fixed operating costs.

There is also evidence both bank and bond finance was raised by OFTOs at competitive rates, both compared to other project finance deals tendered at similar timescales to OFTO projects, and “fair value” comparators such as GB Sterling corporate yield curves.

Looking within the context of the tender rounds themselves, the evidence would, suggest that Ofgem has achieved value for money and other indirect benefits through the contestable approach that has been applied to the TR2 and TR3 projects.

In the section which follows, we set out the counterfactuals against which we compare these outcomes for the TR2 and TR3 projects.

## 5. THE COUNTERFACTUALS

In this section we set out the counterfactuals to the OFTO regime that could in practice have been applied to the TR2 and TR3 projects. These form the basis for our comparative analysis against the outcomes under the OFTO regime.

Using the same approach as for our TR1 analysis, our counterfactuals start from two central alternatives to the OFTO regime:

- licensed merchant generation solutions; and
- alternative licensed price control based approaches.

### 5.1. Licensed merchant counterfactuals

We develop two counterfactuals for the merchant generation solution, one involving the generator owning the assets (Counterfactual 1), the other involving a sale and lease-back style arrangement (Counterfactual 2). In the case of:

- **Counterfactual 1**, the offshore generator is assumed to responsible for design, build, finance and operation of the assets with financing arrangements an entirely commercial relationship internal to the wind farm project; and
- **Counterfactual 2**, the generation developer designs and constructs the assets, but a sale and leaseback arrangement is introduced for the ownership and operation of the transmission assets.

The key commercial regime assumptions that we make in developing the merchant counterfactuals are summarised in Table 5.1.

*Table 5.1: Merchant counterfactual assumptions*

Element	Counterfactual 1	Counterfactual 2
Price controls?	No	No
Price reviews?	No	Potentially
Cost recovery	Through wind farm	Via lease back contract
Form of regulation	Not applicable	Not applicable
Form of regime	Part of wind farm	Lease back terms
Contestability	Potentially	Yes

*Source: CEPA*

Counterfactual 2 has a similar commercial effect as the OFTO regime of allowing the offshore wind generator to divest the transmission asset component of its offshore wind project.

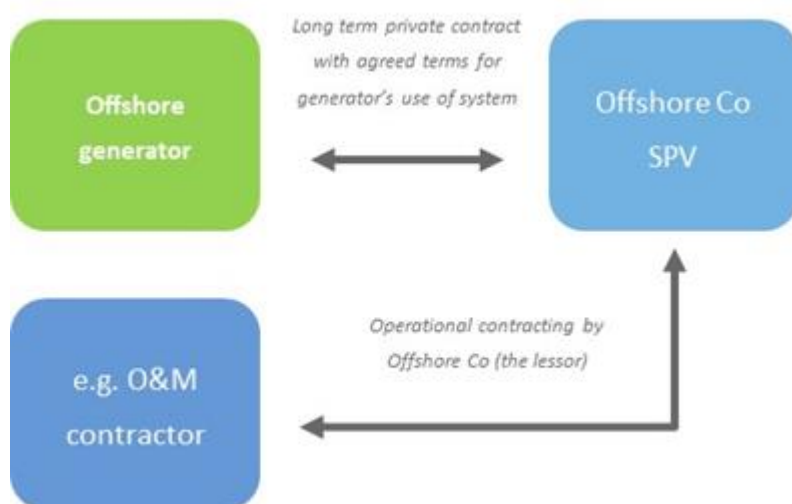
However, unlike the OFTO regime, the financing of the assets is not supported by a regulated revenue stream, backed by the GB energy consumer.

As a consequence, under both of the merchant led counterfactuals, the performance of the offshore transmission investment is much more closely linked to the underlying performance of the offshore wind farm than with the OFTO regime. With:

- **Counterfactual 1**, the performance of the investment in the transmission assets is directly linked to the performance of the offshore wind farm; and
- **Counterfactual 2**, while the lessor's revenues may not have necessarily been directly linked to the wind farm<sup>28</sup>, payment/counterparty risk is higher as the wind farm is the lessor's counterparty.

The terms of the contract under Counterfactual 2 would need to have been enforced by contract law rather than under a regulatory driven licensing process (see Figure 5.1).

Figure 5.1: Possible sale and lease back “merchant” contracting model



Source: CEPA

## 5.2. Regulated price control counterfactuals

We develop three counterfactuals under a price control based approach, two of which involve a scenario of extending existing TO licences to include offshore transmission and one involving a “zonal” offshore licensing approach to offshore transmission:

- **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

<sup>28</sup> A pure “merchant” (rather than fully contracted) led transmission arrangement might expose the investor (to a degree) to volume risks arising from a generator’s usage of the transmission asset.

for longer periods than standard price control cycles) is applied to the offshore assets and offshore services; and

- **Counterfactual 5**, a counterfactual of exclusive multi-zone licences where the TO is licensed (potentially through a competitive tender) for an entire offshore zone and obligated to develop any future connections to shore.

The key regulatory regime assumptions that we make in developing the regulated price control counterfactuals are summarised in Table 5.2.

*Table 5.2: Regulated price control counterfactual assumptions*

Element	Counterfactual 3	Counterfactual 4	Counterfactual 5
Price controls?	Yes	Yes	Yes
Price reviews?	Yes	Yes <sup>1</sup>	Yes
Cost recovery	TNUoS charges	TNUoS charges	TNUoS charges
Form of regulation	Ex-ante	Ex-ante	Ex-ante
Form of regime	Revenue cap	Revenue cap	Revenue cap
Contestability	No	No	Potentially
Price review cycle	Single price review process for the electricity transmission sector	Separate price review processes for onshore and offshore transmission sectors	Separate price review processes for offshore and onshore transmissions sectors
RAB <sup>29</sup> policy	Singe RAB with other transmission owner activities	Separate RAB for the offshore transmission assets	Separate RAB for the offshore transmission assets
Cost of debt	Set using a 10-year trailing average index as in RIIO-T1	A fixed allowance based on the assumed marginal cost of debt for the TO	A fixed allowance based on the assumed marginal cost of debt for the TO

Source: CEPA

*Note 1 – our assumptions is price reviews apply to price control building blocks such as operating costs and equity returns but elements such as the cost of debt are fixed for a longer period*

Under all three of the *regulated* (monopoly) counterfactuals, we assume that the owner of the offshore transmission assets has no exposure to the connecting wind farm and receives its revenues from the GB NETSO, as do OFTOs.

As a consequence:

- there would have been regulatory underpinning of the investment in the transmission assets, as the activities would have formed part of price controlled activities regulated by Ofgem; and

---

<sup>29</sup> Regulatory Asset Base

- similar to onshore electricity transmission, the investors in the projects may have, to an extent, been protected from stranding risks, through the enforcement of regulated licence terms.

As was the case with our TR1 analysis, we have also made the simplifying assumption that the availability incentive mechanism that applies under Counterfactuals 3 – 5 would have been similar in structure to the financial availability incentive which applies to the TR2 and TR3 projects. This means that the financial penalties under the availability incentive are capped at a percentage of regulated revenues and are not directly linked to the consequential loss of the wind generator should the assets fail.

The key differences between the regulated counterfactuals are, therefore, the form of licensing policy and approach to price regulation that is applied. With:

- **Counterfactual 3**, the price controls are assumed to be set as part of a wide ranging price review of onshore and offshore electricity transmission activities. This means a *single allowed* cost of capital would apply to the TO RAB including both offshore and onshore electricity transmission assets;
- **Counterfactual 4**, the separate price controls for each offshore transmission project allows a separate cost of capital to apply to the offshore RAB. The cost of capital can therefore, reflect the risk profile and specific financing costs of individual offshore transmission projects, rather than a portfolio of activities undertaken by the TO.
- **Counterfactual 5**, the owner of the transmission assets and licence would be investing in the most complex business undertaking (current and future operation and development of an offshore zone) of all the regulated counterfactuals, and compared to the asset-specific OFTO regime.

### 5.3. Quantifying the counterfactuals

Quantification of the outcomes under each of the developed counterfactuals needs to take into account what would have been most likely observed at the time, together with what had happened to date and what might happen in the future. Based on these principles, the assumptions used as our starting point for quantifying each of the counterfactuals are summarised in the subsections below.

A more detailed explanation of the assumptions, and the analysis and evidence which underpins these assumptions, is provided in Annex B.

#### 5.3.1. Merchant counterfactuals

The quantified costs of the merchant generation counterfactuals developed have been determined through the following key assumptions:

- Operating costs which are consistent with preferred OFTO bidders operating costs as revealed through TR2 and TR3. We would have expected the transmission service

provider (e.g. in Counterfactual 2) to have taken advantage of competitive generator O&M packages, where available, and the generation developer to have developed and procured a relatively low operating cost package.

- Cost of capital consistent with UK offshore wind generation operating under the Renewables Obligation, in the case of Counterfactual 1, and a cost of capital in the case of Counterfactual 2, which reflects the higher payment risks and exposure to the performance of the offshore wind farm when compared to the OFTO regime and regulated price controlled counterfactuals.

### 5.3.2. Regulated counterfactuals

Similarly, the costs of the regulated price controlled counterfactuals have been determined through the following key assumptions:

- The *allowed* cost of capital used to determine allowed revenues. This is based on what Ofgem could reasonably have expected to have achieved at the time and subsequently over the life of the assets. It is not the actual cost of capital being faced, but rather what could have been *granted* by Ofgem at the time (without the benefit of hindsight) and used to set the regulated prices.<sup>30</sup>
- Operating costs of existing transmission operators and other unsuccessful bidders (compared to OFTO preferred bidders) as revealed through previous tender round bids and price reviews driving down costs over the licence term. There may be reasons as to why such amounts were bid<sup>31</sup>, but it is difficult to suggest alternative assumptions given the revealed prices reflect the specific context of the projects.

### 5.4. Cost of capital assumptions

Having developed the counterfactual regimes, we have applied relative risk analysis, evidence of financial market data at the time and current / past regulatory precedent, to develop possible assumptions for the cost of capital for each of the counterfactuals. Table 5.3 below summarises the components of the real, post-tax, WACCs used in the modelling for TR2 and TR3 respectively. For all the counterfactuals – with the exception of Counterfactual 3 – the cost of debt is modelled as a spread to the underlying gilt rate on the day at which either the project reached financial close (TR2 projects) or the day the ITT was issued to bidders (TR3 projects).<sup>32</sup> This ensures a like for like comparison with the OFTO bids but also means the counterfactual cost of debt varies by individual project.

---

<sup>30</sup> A difference between the allowed and actual cost of capital would involve a transfer of value from those parties that pay for the offshore transmission services to the investors in the transmission provider.

<sup>31</sup> For example, individual operators may have made particular operational and maintenance decisions as part of decisions on the more general commercial structure of their bids, including to address any perceived legal restrictions on particular operating solutions.

<sup>32</sup> A high and a low scenario was assumed for the spread. The all-in cost derived was also checked against the iBoxx index on the same date, which consistently fell within the range modelled.

Table 5.3: Cost of capital assumptions for TR2 (real)

	Counterfactual 1		Counterfactual 2		Counterfactual 3		Counterfactual 4		Counterfactual 5	
	Merchant generator project		Merchant sale and lease back		Regulated network – RIIO-T1		Regulated network – specific control		Regulated network – offshore zone licence	
	Low	High	Low	High	Low	High	Low	High	Low	High
Gearing	60%	70%	70%	80%	60%	60%	50%	60%	50%	60%
CoE	11.5%	16.5%	9.0%	14.0%	6.3%	6.5%	4.5%	6.5%	5.5%	7.8%
CoD *	1.54% - 3.20%		2.04% - 3.70%		Indexed		0.54% - 2.20%		1.04% - 2.70%	

\* range reflects differences in the timing of when individual TR2 projects reached financial close

Table 5.4: Cost of capital assumptions for TR3 (real)

	Counterfactual 1		Counterfactual 2		Counterfactual 3		Counterfactual 4		Counterfactual 5	
	Merchant generator project		Merchant sale and lease back		Regulated network – RIIO-T1		Regulated network – separate control		Regulated network – offshore zone licence	
	Low	High	Low	High	Low	High	Low	High	Low	High
Gearing	60%	70%	70%	80%	60%	60%	50%	60%	50%	60%
CoE	11.5%	16.5%	9.0%	14.0%	6.3%	6.5%	4.5%	6.5%	5.5%	7.8%
CoD*	2.03% - 3.01%		2.53% - 3.51%		Indexed		1.03% - 2.01%		1.53 % - 2.51%	

\* range reflects differences in the timings of when individual TR3 projects received ITT documentation

## **5.5. Operating cost assumptions**

As well as financing costs, we also need to make an assumption of what the operating costs of the offshore transmission services would have been if supplied by an alternative service provider to the appointed OFTOs.

For our price control regulated counterfactuals – Counterfactual 3, 4 and 5 – the question essentially is: what would the efficient operating cost be set at in a regulatory negotiation / price control based regime? Specifically, could this match or even better, what was achieved through a competitive process?

This question essentially involves taking a view as to whether a regulator could match a competitive dynamic in placing downward pressure on a regulated entity's costs, with the regulatory tools at its disposal.

Ultimately, views on the ability of the regulator to achieve this will differ which is reflected in several Cost Pathway scenarios that we have developed to quantify what might happen under the price control counterfactuals. We begin, however, by setting out our own perspective on the challenges faced by regulators and, therefore, their ability to match the competitive pressure achieved through competition in and for the market.

### **5.5.1. Competition versus regulation**

Economic theory suggests that competition is typically better than regulation at controlling the negative outcomes of monopoly power. Price reviews are essentially negotiation processes between regulator and regulated. Arguably, this is an unequal one in which the regulator has least information on a regulated entity's true costs – particularly challenging in the case of transmission where there is a limited ability to benchmark – and in which the regulator is constrained by the need to ensure the financeability of the regulated entity, which is likely to imbue a sense of caution on its part. In comparison, a new entrant competitor would have few qualms about undercutting an incumbent and putting it out of business. Moreover, in the absence of real competition, there is for instance, little pressure for monopolists to bear down on the costs of their own suppliers – in fact, they may not know how they could become more efficient and whether their own suppliers are providing them competitive prices as the regulatory incentive to do so is less strong than in a truly competitive context.

As such, we do not believe that even incentive-based regulation can match the power of competition in creating efficiencies and innovation. We would, however, expect that over time through successive price reviews, regulatory pressure can move regulated entities towards the efficiency frontier, although the speed at which this happens is difficult to predict. There is, of course, an alternative perspective that prices may not come down at all, if, for instance, Ofgem were unable to exert the requisite amount of regulatory pressure as a result of one or more of the reasons set out above.



### **Tender Round 1 counterfactual benchmark**

In our TR1 analysis, we assumed a regulated operating cost path which reflected an estimate of incumbent operator costs and reduced these over time to the *average* TR1 bidder costs reflecting the ability of successive price reviews to bear down on costs.

The starting level of the counterfactual was based on analysis of the bids that an incumbent operator had made for two projects in TR1 and published benchmarks of O&M as a percentage of the capital costs of equipment (see discussion in Annex B). This is an interesting assumption in itself as the starting point of the cost pathway was derived from a level of costs determined in a *competitive* context. It is more than arguable that in the absence of this, the level of operating cost offered would have been even higher.

The counterfactual was modelled as an operating cost as a percentage of FTV benchmark, to allow the information that was contained in the incumbent's bid on two projects, to be normalised and applied to develop a counterfactual benchmark of what the costs could have been if the incumbent had delivered all nine projects that were tendered in TR1.

### **Tender Round 2 and 3 counterfactual benchmark**

For our TR1 analysis, we noted the uncertainty of what in practice operating costs would have been in the absence of the factual case, although noting that the benchmarks that were developed were based on actual bid data for TR1 projects.

There still remains significant uncertainty of what in practice allowed operating costs would have been for offshore transmission operating costs if delivered under a regulatory negotiation-based regime, including what impact regular price reviews (with associated efficiency testing) may have had on the path of allowed operating costs over the life of the project (equal to 20-years, consistent with the OFTO regime).

It is important to note, that in the absence of competition there would have been no evidence in the form of revealed pricing by either bidders or incumbent on which to make assumptions for any cost pathway. In other words, the degree of uncertainty remains as it was at the time of the initial TR1 analysis.

We therefore considered a range of scenarios for both TR2 and TR3 Counterfactuals 3 and 4 operating costs using the limited data available to us.

### **Consistent cost assumptions (as percentage of FTV) as in TR1**

One set of scenarios (regulated operating cost paths) that we considered was where the operating costs as a percentage of FTV for TR2 and TR3 projects under the counterfactuals, would follow a similar cost path as was adopted in the TR1 analysis.

We considered three scenarios in this case:

- **Cost Path 1**, where for the year in which the regulated revenue stream for the offshore transmission projects starts, the operating cost benchmark (as a percentage of FTV) is assumed equal to the benchmark that applied in the TR1 counterfactual in that same year. So for example, assuming the third year of the TR1 project revenue stream is equal to the first year of the TR2 project revenue stream, the starting level of the TR2 operating cost path is equal to the TR1 operating cost path in its third year. This is to ensure an internally consistent, sector counterfactual benchmark at any given time. The TR2 and TR3 operating cost path then follows the TR1 path to the end of the regulated revenue stream.
- **Cost Path 2**, where the starting level of the operating cost benchmark is the same as in Path 1, but the counterfactuals for TR2 and TR3 are driven to a much lower level than Path 1, equal to preferred bidder operating costs (as a percentage of FTV) for the applicable tender round. This path takes a far more optimistic view of the efficiency savings that could have been driven out through incentive regulation and price control reviews. The assumption that the counterfactual operating cost path falls below the TR1 benchmark, might also be justified by a single operator being responsible for a large portfolio of projects and, therefore, some coordination/portfolio benefits are achieved through running a number of projects.
- Finally **Cost Path 3**, was based on a most pessimistic review of the savings that would have been achieved through incentive regulation and price reviews. In this path, the starting level of the operating costs are assumed to be equal to Paths 1 and 2, but then there is no decline in the operator's allowed costs over the duration of the revenue stream. It should be noted that even in this most pessimistic scenario, the starting point of the path has been established under competitive pressure. However, this is difficult to model in the absence of any observed data points to develop a pure regulated monopoly scenario.

### Counterfactual as a premium to the preferred bidder

We also considered a series of scenarios, where the incumbent is assumed to be a premium to the preferred bidder operating costs under the tender rounds to capture the differences of project characteristics between TR1, TR2 and TR3.

Under these cost paths, the counterfactual operating costs starts at the same *premium* to the preferred bidder level (costs as a percentage of FTV) as in the TR1 analysis. Given that preferred bidder operating costs are much lower in TR2 and TR3 than in TR1, this means that starting operating costs of the counterfactual are lower compared to the three operating cost paths described above.

What might justify these scenarios?

The benchmarks we use are of course derived from TR1 which are a separate set of transmission projects than in TR2 and TR3. If there are specific features of the TR2 and TR3

offshore transmission projects which meant that competing bidders were able to offer lower costs for these projects than in TR1 (for example, if elements of the operating cost base were fixed, then as project size increases, it would be expected that the benchmark (costs as a percentage of FTV) would reduce) then it might be reasonable to have expected that a similar reduction in cost would have been observed in the counterfactual, even if the total service cost is still at a premium to the OFTO (factual) case.

We considered three further operating cost paths using this premium to preferred bidder modelling assumption:

- **Cost Path 4** assumed that the counterfactual operating cost benchmark (cost as a percentage of FTV) starts at the same premium to preferred bidder as in the TR1 analysis and maintains the same premium over the life of the regulated revenue stream as in the TR1 benchmark.
- The starting level of **Cost Path 5** is the same as Cost Path 4; however, in this case we drive the counterfactual operating cost down to the preferred bidder level by the end of the regulated revenue stream. As with Cost Path 2, this takes a relatively optimistic view of the savings that could have been achieved from incentive regulation and price reviews.
- Finally, **Cost Path 6** takes the most pessimistic review of the savings that would have been achieved through incentive regulation and price reviews. In this case, the starting level of the operating costs are assumed to be equal to Cost Paths 4 and 5, but then there is no decline in the operator's allowed costs over the duration of the revenue stream. This means that the counterfactual remains as a fixed premium to the preferred bidder level.

### Modelled assumptions

We therefore considered six operating cost paths that could be used to model a range for the potential savings that may have been achieved by the OFTO regime under both the TR2 and TR3 tenders.

However, given the comparative analysis of bids in TR1, TR2 and TR3 as presented in Section 4, our preferred paths, which are applied in the modelling and savings analysis presented in the next section of the report, are Cost Paths 4 – 6. This is because they allow for the impact that specific project characteristics may have had on the benchmark operating cost under the counterfactual.

Figure 5.2 below illustrates the operating cost paths that have been modelled for Cost Path 4, 5 and 6 for Counterfactuals 3 and 4. Our TR1 analysis developed high and low scenarios for counterfactual operating costs, with the mid-point of the two values used as the basis for the savings analysis in the main report. Figure 5.2 therefore shows mid-point values of the counterfactual (modelled as a premium to the preferred bidder) for each of the three cost

paths, which again have been used as the basis for the primary savings analysis presented in the next section of the report. The example shown is for TR3.

*Figure 5.2: Counterfactual 3 & 4 operating cost paths (premium to preferred bidder methodology)*



Source: CEPA

The same modelling approach has been used to develop operating cost paths for Counterfactual 5. However, consistent with our TR1 analysis, this has a lower starting operating cost assumption than Counterfactuals 3 and 4 to reflect that all, or potentially aspects of, the operational cost base of the zonal licensee could have been subject to competitive pressure through the licence application process (the modelled paths for Counterfactual 5 are illustrated in Annex B).

## 5.6. Bid costs

Our cost benefit analysis also includes the transaction costs that were incurred in the factual case (the bid costs associated with running the TR2 and TR3 tenders that were recovered by Ofgem) and the bid costs that were recovered by the successful bidders as part of their final TRS bids for each of the projects. For our counterfactuals, we assume there would have been no bid costs associated with the tender process, except for Counterfactual 5 where a more contestable process could potentially have been held.

Under the counterfactuals where bid costs are not included, this results in a net cost (rather than benefit) from the contestable TR2 and TR3 process. This is, however, a relatively conservative assumption as other counterfactuals may still have incurred some form of transaction related costs associated with developing the regulated and commercial arrangements for the offshore transmission operator. For example, under Counterfactuals 3

and 4, there would have been some (albeit relatively small) costs associated with Ofgem running price review processes for offshore transmission assets.

## **5.7. Summary**

In this section we have set out our counterfactuals to the OFTO regime and the key assumptions that underpin the costing of each. These form the basis for our comparative analysis against the outcomes under the OFTO regime as presented in the next section of the report.

## 6. FINDINGS

In this section we present the results of comparing our quantified counterfactuals to the observed (factual) outcomes of the OFTO regime applied to the TR2 and TR3 projects.

From this we are able to estimate the cost savings that have been realised from applying the OFTO regime to the offshore transmission assets tendered in TR2 and TR3, when compared to the counterfactuals. At this stage we do not consider the distribution of those savings, which is the focus of Section 7.

### 6.1. Results by tender round

#### 6.1.1. Tender Round 2

The savings derived from the TR2 process compared to our range of merchant and regulated counterfactuals, are in NPV terms, estimated to be in the range of **£326m-£595m (2014/15 price base)**.

The OFTO regime, therefore, exhibits cost benefits over all the counterfactuals. We have sought to identify the sources of the savings through comparing the component financing costs, operating costs and bid costs for each counterfactual, to the outcomes observed under the competitive process for TR2.

As Table 6.1 below shows, the source of the savings differ depending on which counterfactual to the OFTO regime is chosen.

*Table 6.1: Estimated TR2 savings relative to each counterfactual (£m NPV)*

Source of saving	Counterfactual	Counterfactual	Counterfactual	Counterfactual	Counterfactual
	1	2	3	4	5
	Merchant generator project	Merchant sale and lease back	Regulated network – RIIO-T1	Regulated network – specific control	Regulated network – offshore zone licence
Financing costs	501	347	225	145	232
Operating costs	-	-	201-391	201-391	152-295
Bid costs	-21	-21	-21	-21	-
<b>Total (EXC tax)</b>	<b>480</b>	<b>326</b>	<b>406-595</b>	<b>326-515</b>	<b>384-527</b>

*Source: CEPA analysis*

*Note: 2014/15 price base*

Although the merchant counterfactual cost of capital assumptions have been reduced compared to the TR1 analysis (to reflect the fall in underlying rates in the UK economy<sup>33</sup>), the counterfactuals continue to assume that a merchant risk differential would have existed compared to the OFTO regime and our regulated counterfactuals. This assumption drives the financing cost savings in the merchant counterfactual analysis.

The analysis shows no operating cost savings under merchant counterfactuals. This is a change from the TR1 analysis, where some savings were assumed, derived from the gap between the average and preferred bidder. As the average and preferred bids in TR2 were very close, making the same assumptions as for TR1 results in no savings from operating costs. This is a conservative estimate given that merchants may not have been able to incentivise developers as successfully as the contestable OFTO regime does and some savings may have in practice occurred. However, we have not attempted to estimate what the operating costs negotiated between the merchant and service providers, e.g. developers, would be in the absence of competition, as there is limited information available.

In the case of the regulated counterfactuals, the source of the savings are both financing and operating cost based. We provide our explanation of the potential sources of the savings as part of the more general interpretation of the results below.

### **6.1.2. Tender Round 3**

The service cost savings derived from the TR3 process compared to a range of merchant and regulated counterfactuals, are estimated to be in NPV terms, in the range of **£102m-£154m (2014/15 price base)**.

As Table 6.2 shows, the source of the savings again differs, depending on which counterfactual to the OFTO regime is chosen.

---

<sup>33</sup> See discussion in Annex B.

Table 6.2: Estimated TR3 savings relative to each counterfactual (£m NPV)

Source of saving	Counterfactual	Counterfactual	Counterfactual	Counterfactual	Counterfactual
	1	2	3	4	5
	Merchant generator project	Merchant sale and lease back	Regulated network – RIIIO-T1	Regulated network – specific control	Regulated network – offshore zone licence
Financing costs	149	113	82	64	85
Operating costs	-	-	45-79	45-79	34-59
Bid costs	-7	-7	-7	-7	-
<b>Total (EXC tax)</b>	<b>143</b>	<b>106</b>	<b>120-154</b>	<b>102-136</b>	<b>119-144</b>

Source: CEPA analysis

Note: 2014/15 price base

The observations about operating cost savings for the merchant scenarios also translate to our TR3 analysis.

## 6.2. Comparison of tender rounds

### 6.2.1. Trends in total savings

To account for differences in the size and the number of offshore transmission projects in each tender round (i.e. TR1<sup>34</sup>, TR2 and TR3), we have compared the results on a percentage of the FTV and OFTO TRS basis.

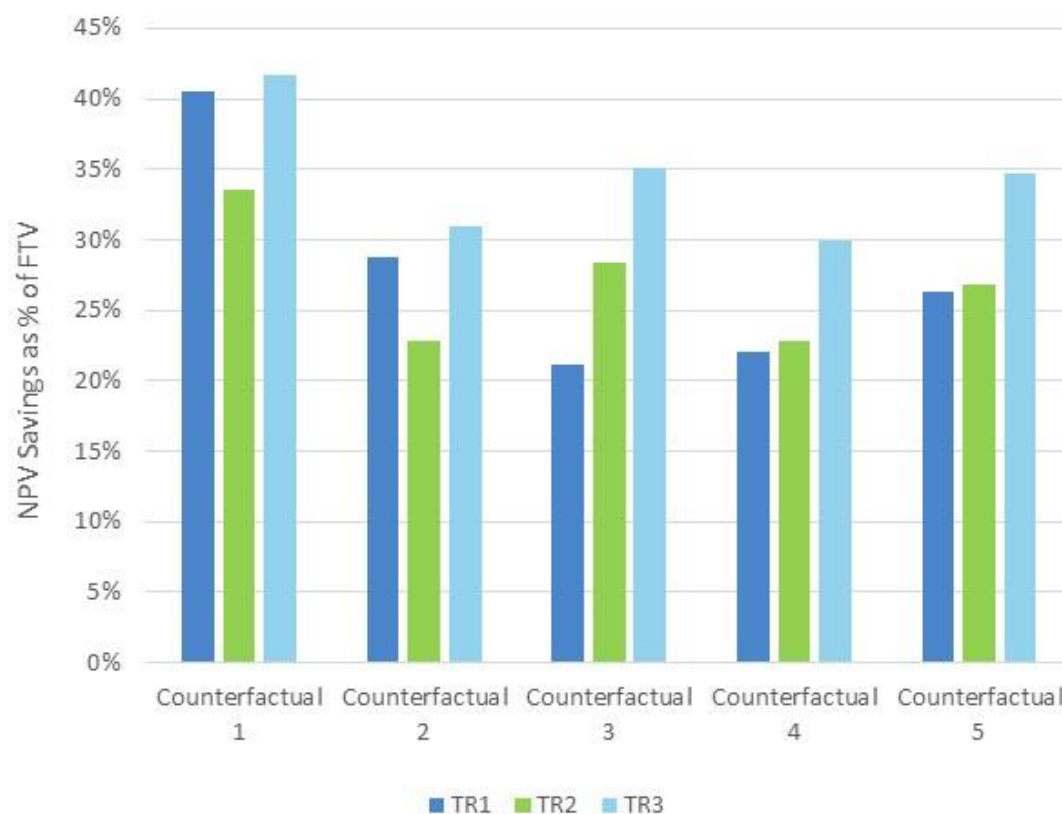
This analysis suggests that the savings for TR3 are higher savings than TR2. In the regulated counterfactuals both TR2 and TR3 are higher than TR1 savings although the source of the savings differs.

Figure 6.1 below illustrates the total NPV savings (as a percentage of FTV) for the bottom-end of the ranges as presented in Table 6.1 and 6.2. This suggests that the savings from the OFTO regime have increased by tender round.

<sup>34</sup> TR1 findings (in 2014/15 prices) are summarised in ANNEX C.



Figure 6.1: Trends in total savings by tender round as a percentage of FTV

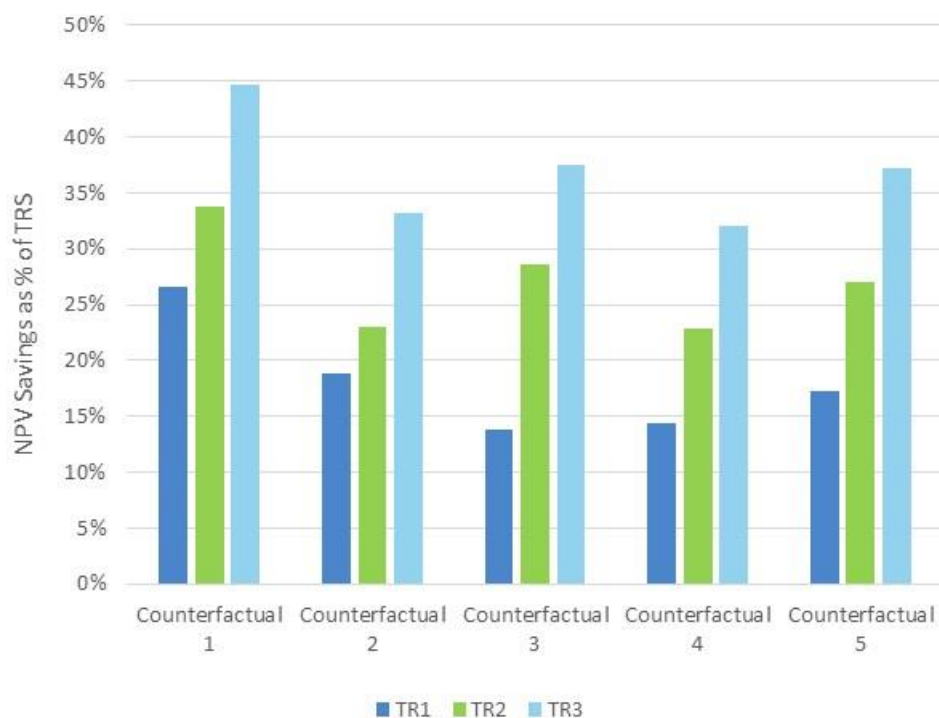


Source: CEPA analysis

A steady increase in savings across all counterfactuals is also observed when comparing on a TRS basis<sup>35</sup>, shown in Figure 6.2 below. This is both a factor of increasing overall savings per project and lower TRS bids as tender rounds have progressed.

<sup>35</sup> NPV savings as a percentage of the (factual) NPV TRS over the life of the OFTO projects. We include only the financing and operating cost components of the TRS for this analysis for a like for like comparison.

Figure 6.2: Trends in total savings by tender round as a percentage of the NPV TRS



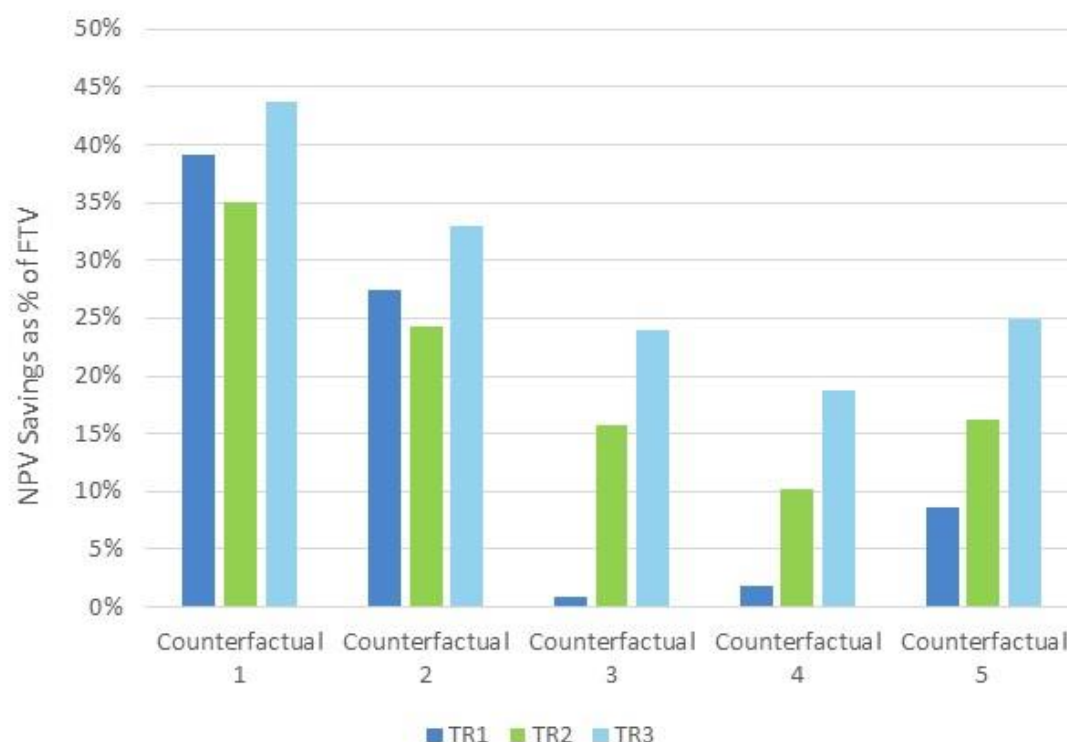
Source: CEPA analysis

### 6.2.2. Trends in the source of savings

The sources of the estimated savings from the OFTO approach have also changed between the tender rounds.

Figure 6.3 below illustrates the estimated financing savings by tender round, again on a percentage of FTV basis.

Figure 6.3: Trends in financing cost savings by tender round as a percentage of FTV



Source: CEPA analysis

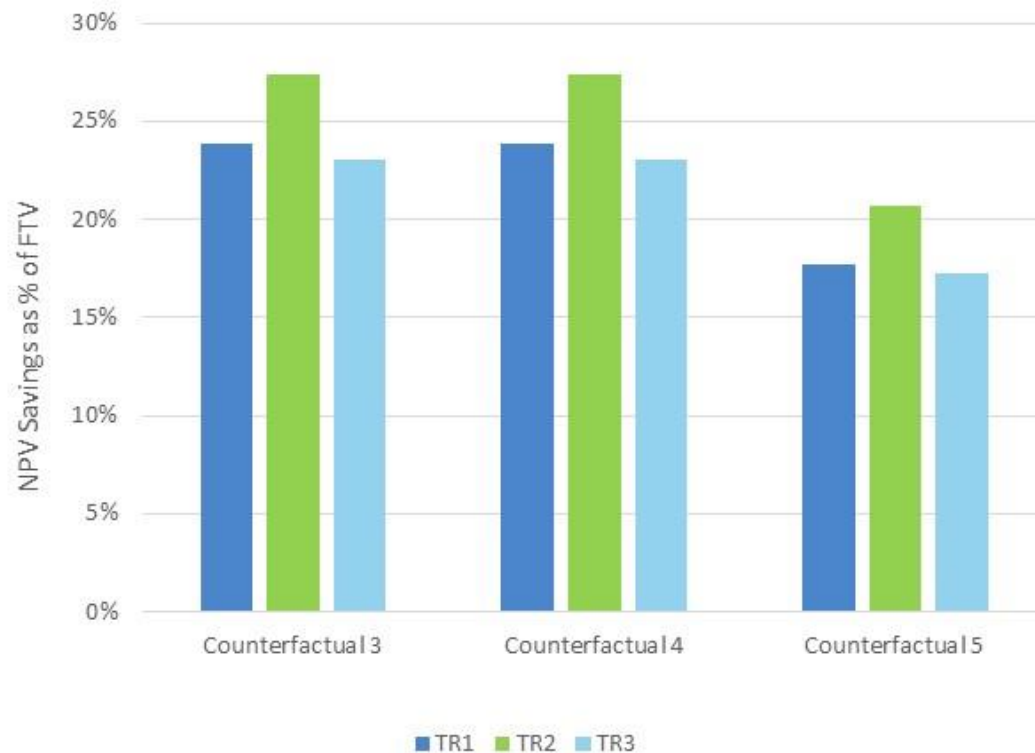
Figure 6.2 shows how for the:

- **merchant counterfactuals** – financing savings on a percentage of FTV basis have reduced slightly for TR2 compared to TR1 (this reflects our reduction of the merchant risk premium in the cost of capital assumptions, based on our view that investors would have over time become more comfortable with the investment as an asset class) but have increased for TR3; and
- **regulated counterfactuals** – the estimated financing cost savings have increased for both TR2 and TR3 compared to our TR1 findings. As with the merchant counterfactuals, the financing cost savings have increased under TR3 both compared to TR2 and TR1.

We have presented a range for the operating cost savings under the regulated counterfactuals.

Figure 6.4 below illustrates that on a percentage of FTV basis, the top end of the ranges for both TR2 and TR3 are broadly consistent with the findings from the TR1 analysis. TR2 has slightly higher savings estimates than TR3. In this case, we only illustrate the results for Counterfactuals 3-5, as we assume no operating cost savings compared the merchant counterfactuals, for the reasons detailed in Section 6.1.1 above.

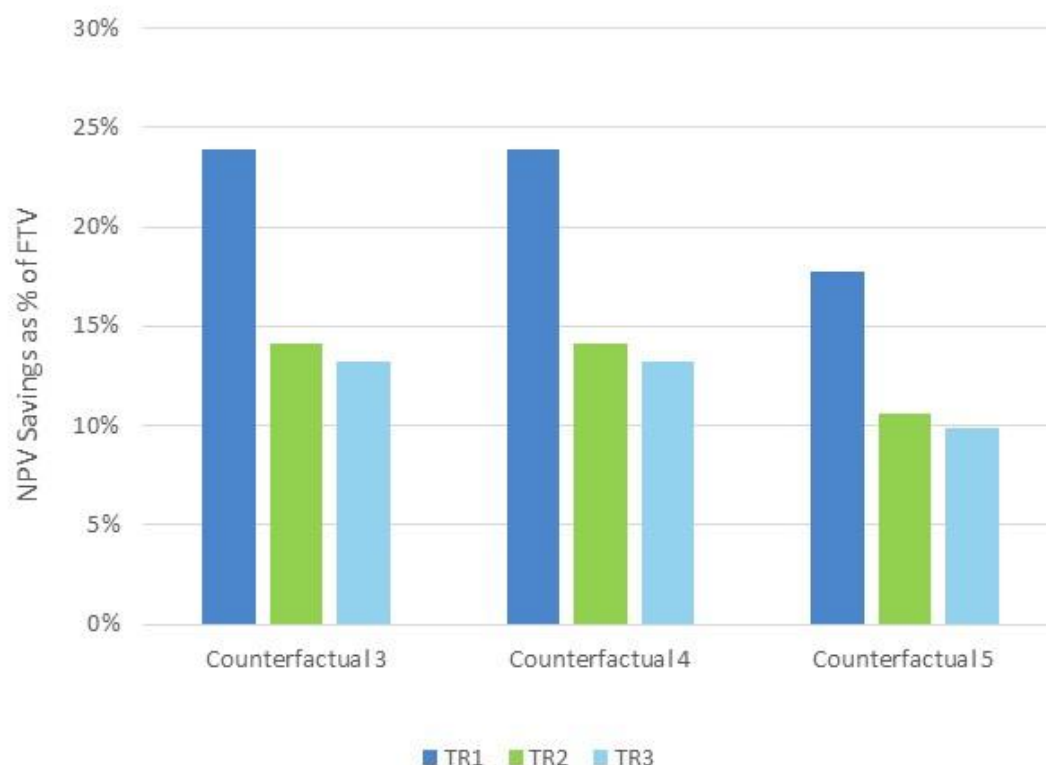
Figure 6.4: Operating cost savings by tender round as a percentage of FTV – top end of range



Source: CEPA analysis

Figure 6.5 below illustrates the operating cost savings on a percentage of FTV basis at the bottom end of the range for both TR2 and TR3. In this case, the savings estimates have reduced from our TR1 findings. This reflects the operating cost path in the counterfactuals which drives the regulated counterfactual operating cost to the preferred bidder level towards the end of the 20-year project life rather than the average bidder level (as was the case in our TR1 analysis).

Figure 6.5: Operating cost savings by tender round as a percentage of FTV – bottom end of range



Source: CEPA analysis

### 6.3. Interpreting the results

The results of the counterfactual analysis show savings for TR2 and TR3 compared to the range of merchant and regulated counterfactuals, raising the question: what are the sources of the savings, and what has driven the changes in the savings composition between the OFTO tender rounds?

**The savings are highest in TR3 (i.e. relative to TR1 and TR2) because OFTO projects have increasingly benefited from marginal improvements in financing terms.** The cost of capital for OFTO projects has fallen between the tender rounds, due to a reduction in underlying rates over the 2010-2015 period, improvements in debt providers' terms (e.g. the terms of EIB finance and the margins offered by commercial lenders having improved between tender rounds), benefits that OFTOs may be receiving from inflation linked financing (see discussion below) and lower required rates of return by providers of equity to the sector.

For example, Section 3 presented a range of evidence of how financing pricing has tightened in the recent OFTO tenders and how the cost of EIB lending has also fallen (at current expected rates of inflation, proposed EIB lending rates for TR3 projects may be interpreted as negative in real terms. All the counterfactuals in contrast assume a positive real cost of debt). The results of the TR3 tenders – where bidders had the opportunity under the biddable

indexation mechanism to adopt a natural hedge between the costs of fixed rate debt and the indexed proportion of their TRS and chose not to<sup>36</sup> – also suggests OFTOs may be gaining further financial value (compared to fixed rate debt benchmarks) by adopting inflation linked financing arrangements (e.g. by entering into RPI swaps) that help reduce the effective financing cost (and overall NPV efficiency of the TRS) of OFTO projects.

In comparison, in all the counterfactuals, the cost of finance appears less competitive compared to the terms offered by the OFTOs in the two most recent tender rounds. There are a range of reasons why this may be the case.

**In the case of the merchant counterfactuals, higher financing costs arise, in our view, from a less optimal allocation of risks than under the regulated OFTO approach, creating a risk premium between the regimes.** This is specifically as regards:

- lower payment (counterparty) risks under the OFTO approach, as a result of NGET (and ultimately consumers) guaranteeing payments;
- no exposure of the appointed OFTO to the performance of the associated offshore wind farm<sup>37</sup>; and
- the degree of consumer underpinning of regulated investment which exists, relative to a merchant approach.

Whilst we reduce our cost of capital estimates from TR1 for the merchant counterfactuals, to reflect a fall in underlying rates and the assumption investors would have improved their pricing over time as they became more comfortable with the risks of the asset class, our analysis still adopts a risk premium compared to OFTOs.

In the case of the regulated counterfactuals, the cost of finance has not fallen to the same extent as observed in practice for OFTOs *either* because:

- the counterfactuals assume less competitive allowed cost of financing terms, particularly as regards the cost of equity that are based on benchmarks used by regulators to setting recent price controls absent of competitive pressure; and / or
- the regulatory approach followed would not, in our view, have permitted *allowed* financing costs to have fallen to the same extent, as the general fall in underlying rates observed in the UK economy (e.g. under a cost of debt index as used in RIIO-T1).

The OFTO approach has required providers of equity to take a view on what returns were acceptable, whereas debt financing costs have been a straight pass-through. As discussed in Section 4, this has achieved an alignment of prices with true financing costs, which may not have been achievable to the same extent in the regulated counterfactuals. In particular, the

---

<sup>36</sup> Inflation risk between cost and revenues was either hedged by the SPV proposing to enter into an RPI swap or by the OFTO using index-linked debt in their capital structure.

<sup>37</sup> Which may have applied to different degrees under the two merchant counterfactuals investigated (e.g. depending on the terms of the sale and lease back arrangement).

predictable twenty year revenue streams, combined with the transfer of largely controllable risks that characterises the regime, has arguably enabled OFTOs to avail themselves of the considerable interest in operational infrastructure assets by the global investment community that has been a feature of recent years.

This means that the financing savings from the OFTO regime, and the trend of increasingly savings from TR1 to TR2 and TR3, arise, in our view, from a *combination* of:

- the benefits of competition, that help to reduce asymmetry of information and drive lower financing costs (see further discussion below); and
- the regulatory approach followed for OFTOs, e.g. the commitment to a fixed 20-year revenue stream and defined risks under a post-construction opportunity.

**To an extent, however, the benefits from OFTO competition versus the benefits of the OFTO regulatory approach (which helped create a risk allocation between investors and customers that is obviously attractive to investors) cannot be separated.** The benefits of competition are a function of the market offering developed by Ofgem, whilst the value for money of the OFTO market offering is itself a function of attractive features of the regime to investors having had the opportunity to be tested via competition.

To illustrate the point, the extension of the price control period under RIIO from 5-years to the current 8-years and its impact was debated at length as part of all the recent gas and electricity transmission and distribution price control reviews. Many of the network operators, on behalf of their investors, argued Ofgem's extension of the price control period, and the associated regulatory commitment to key parameters of the price controls this implies, including the cost of equity, *increased* rather than *reduced* risks for equity investors, and, therefore, the rate of equity return that they required.

The benefits or dis-benefits of the added regulatory commitment – but also loss of flexibility to reset costs due to longer control periods – in this case has to be agreed in negotiation between the network operators and Ofgem. In contrast with OFTOs, because the sector meets the criteria for a contestable opportunity (in particular, the ease of definition of the parameters and scope of the opportunity), the added regulatory commitment that has been provided to OFTO investors by the fixed regulated revenue stream can be put out to market to test its value for money benefits for investors.

Of course the impact of the length of price controls on required returns from investment in onshore networks versus a fixed TRS deal as provided to OFTOs has some different features. For example, the latter relates to a single asset with only operational performance and maintenance issues to be managed, whilst the former has uncertainty of network investment, growth etc. over the control period).<sup>38</sup> *But in the absence of competition, the true value of the*

---

<sup>38</sup> The debate during the RIIO price controls was also focused on asset beta and certain specific cash-flows risks. The benefits of the regulatory commitment/long term deal as provided to OFTOs are in our view more associated with higher gearing and keener priced long-term debt, since it is not subject to the potential reset of a price review.

*regulatory commitment is unobservable and, therefore, difficult to price by the regulator.* The apparent benefits of the regulatory approach Ofgem has adopted for OFTOs are, in our view, closely interlinked with the offering having been tested through a contestable process that allows different sources of finance to price the well-defined risk profile of the regime.

We note that one other source of the observed savings on financing may be the treatment of terminal value in the modelling.

Our modelling assumes that the asset is fully depreciated over the 20-year revenue term. In contrast, our understanding is that for a number of projects (in all tender rounds) OFTO bidders may have included a terminal value, which for pricing purposes, allows them to reduce their required TRS (other things being equal). We believe it is appropriate to assume that the asset is fully written off in our modelling given Ofgem has not stated that there would be any regulatory terminal value at the end of the OFTO revenue term. Any other assumption of terminal value (e.g. following asset decommissioning) is then at the bidders risk and part of the equity risks and returns of the appointed bidders.

**In the case of operating costs, the source of the savings in the regulated counterfactuals are a direct result of comparing appointed bidders in TR2 and TR3 with the bids of incumbent GB transmission operators in TR1, before any learning from competition took place.** Whilst it is not possible to know with certainty what in practice would have been the allowed cost under price controls, it would again be consistent with economic theory to expect that competition for the market as took place in TR2 and TR3 would:

- encourage innovation and new ideas from new entrants, helping improve delivery and long-term efficiency of operating costs; and
- the bidding process would drive lower operating costs by contestability rather than a regulatory negotiation.

As discussed in Section 5, the level of operating cost savings under the regulated counterfactuals relies on taking a view on the capacity of the regulator to match a competitive dynamic in placing downward pressure on a regulated entity's costs. Our modelled cost paths, which use as a starting basis evidence of incumbent to appointed bidder cost ratios from TR1, show how the OFTO approach as applied in TR2 and TR3 delivers operating cost savings **under a range of scenarios**, including:

- plausible *starting* assumptions for the regulated counterfactual operating costs (based on incumbent bids at TR1<sup>39</sup>); and
- assumptions of the pressure and cost efficiency improvements that could have been drawn out through regulatory negotiation and price reviews.

---

<sup>39</sup> As highlighted in Section 5, the starting point of the counterfactual cost paths could be argued to be conservative having been established under competitive pressure rather than a single operator environment.



## Contestability drives benefits

Our view is that the comparisons of the (factual) outcomes between the tender rounds to our regulated counterfactuals shows that:

- **Contestability (competition for the market) can drive lower costs.** For OFTOs, the bidding process has helped identify the efficiency frontier for operating (and other) costs in the UK offshore transmission sector quicker than relying on a single provider and regulatory negotiation based price review processes. This can be directly observed in practice, rather than in theory, as a consequence of incumbent operator bids into OFTO tender process, and highlighted by the marked reduction in their bid prices (following the first round) in response to competitive pressure.
- **Contestability reduces asymmetry of information.** The finding that a contestable regulatory approach, with an optimal market offering, would deliver cost of service savings is consistent with economic theory that one of the challenges in setting prices through a regulatory negotiation is the asymmetry of information between the service provider and the customer or regulator (acting on behalf of the customer).

As discussed in the previous section, one reason to expect the contestable OFTO process to drive a better outcome than a regulatory negotiation, is because it reduces the need for regulatory judgement to be applied in setting the return expectations of the regulated sector by removing this decision from Ofgem. Instead the financeability question in the case of OFTOs is 'put' to market.

- **Contestability drives innovation.** Introducing contestability to a network industry encourages innovation and new ideas, improving delivery and long-term efficiency. This may be both in financing and operating and maintaining the assets, which OFTOs may have brought to the sector through the contestable tender process. Our understanding is that a good example of this in the OFTO sector has been both the O&M contracting arrangements that some bidders have been put in place, and the insurance costs that have been developed.

The increased savings that are observed between the tender rounds – e.g. driven by reductions in debt margins over time – may also be a result of:

- **Programme benefits.** The OFTO programme which has been taken forward by Ofgem during the second and third tender rounds, building on the success of TR1, has allowed investors to become increasingly comfortable with the risks and the nature of the asset class competed between different tender rounds. The rounds provide the opportunity for investors to dedicate resources to the sector and encourages tighter pricing as the risks are increasingly understood.

## Offsetting (dis) benefits of the contestable approach pursued

Whilst the counterfactual analysis implies that there have been cost savings from the contestable approach pursued, there may have also been offsetting (dis) benefits under the OFTO regime that would not have been present in the case of the counterfactuals:

- **It is possible the OFTO project-by-project tender process may have lost opportunities for coordination.** In the regulated incumbent counterfactuals, a single operator, or group of incumbents, would have owned and operated a portfolio of offshore transmission projects. This approach may have allowed for coordination benefits – e.g. with management of operating costs – that may have been lost under the single project tender approach for OFTOs.<sup>40</sup>
- **Loss of future price flexibility.** Without price reviews, the flexibility to align revenues and costs in the future is lost because of the “one shot” nature of the competitive OFTO tender. The extent to which this could have been an offsetting benefit for the sector and the users of the TR2 and TR3 projects, will depend on whether there will be the potential for costs changes over time.
- **Transaction costs due to the bid process.** While there may have been savings from the contestable process in TR2 and TR3, one of the trade-offs has been the high bid/transaction costs as a percentage of asset value (linked to the tender process) compared to other counterfactuals. However, we have included these transaction costs in our net savings figures presented in the tables and figures above.

---

<sup>40</sup> Although as bidders increasingly own and operate a portfolio of OFTO projects, coordination benefits may still be possible under the OFTO regime, assuming they were also achievable under a single operator model.

## **7. DISTRIBUTION OF BENEFITS**

The counterfactual analysis shows that TR2 and TR3 have produced overall cost benefits arising from the contestable OFTO approach pursued. But who are the ultimate beneficiaries of these cost of service savings, in terms of different groups and specifically final consumers?

It may on first appearances seem that who benefits is a relatively straightforward question to answer: the offshore wind farm uses the offshore transmission assets, consumers benefit from the generation they produce, and consumers (eventually) pay the full costs of offshore transmission. Therefore, any costs savings derived from a particular approach to the delivery of offshore transmission should ultimately benefit consumers.

However, as was discussed in detail in our previous TR1 report, in practice the question is much more complicated due to the charging arrangements for offshore transmission and the market and subsidy support arrangements for offshore wind in the UK. As all of these aspects are interlinked, it is important to ensure that the counterfactuals reflect this.

We begin with a brief review of the economic characteristics of offshore wind (costs and revenues) before setting out our understanding of how TNUoS charging arrangements work in practice in GB and, given the economics of offshore wind, the implications this has for who might in practice benefit from any cost savings.

### **7.1. The economics of UK offshore wind**

An offshore wind generator (OWG) is an intermittent form of renewable electricity generation with high variability and low predictability (day ahead). Estimates of expected load factors range from 35% to 40% (taking into account existing energy generation and future efficiency increases associated with technological advances).

Purely from a cost perspective, offshore wind generation also largely involves fixed rather than variable costs, which must be recovered across this variable production base. Once built, the short run marginal cost of production for a wind farm is effectively zero.

Until the implementation of Electricity Market Reform (EMR), OWG revenue streams were determined by three main elements:

- wholesale electricity prices;
- Renewable Obligation Certificates (ROCs); and
- the output (MWh) of the generator.

One of the consequences of both the cost characteristics and these trading arrangements for offshore wind, is that the OWG is a price taker in the market and, therefore, the wholesale price electricity consumers pay is independent of the (largely fixed) costs of the OWG. It means that if the costs of offshore transmission are (to a first approximation) paid by offshore generators, then reducing these costs leads only to savings to offshore generators. Those

savings could only be passed on to consumers if the offshore generators charged lower prices for their power, but since they are price takers, they cannot do so.

The ROC (subsidy) component of the generation revenue stream is also non-controllable by the OWG as this is fixed by UK Government with the buy-out price acting as the floor price (subject to pricing discounts applied through contracting).

While banding for offshore wind is assessed in relation to OWG costs, the level of subsidy is set at a technology sector level, as an administered price, rather than on an individual project by project basis. Again, this means there is no ability for the OWG to pass-through any reductions in its cost base, through the traded market.

These assumptions may now change with implementation of EMR. The UK Government has introduced new Contract for Difference (CfD) Feed-in-Tariff (FiT) arrangements for future projects, which seek to minimise OWG exposure to wholesale price risk. For the purposes of the counterfactual analysis what is important is that the CfD FiTs will increasingly be awarded under a competitive auction process. This means that if the OWG can anticipate future reductions in its cost base, it would have the incentive to bid those reductions into the auction, to ensure that it receives a CfD contract – see text box below.

#### **Text Box 7.1 – UK auctions for CfDs**

Contract for Difference (CfD) auctions were introduced to the UK renewable energy market in February 2015. These contracts were introduced to reduce the electricity generator's exposure to volatile wholesale energy prices and to protect consumers from paying higher prices for energy in response to changing underlying wholesale rates.

The CfD works by compensating the electricity generator the difference between the "strike price" and the "reference price". The strike price refers to the price for electricity reflecting the cost of investing in low carbon technology and the reference price is a measure of the average price for electricity in the UK wholesale market.

The auction format allows electricity generators to bid for a fair strike price under competitive pressure. Projects must have capacity greater than 300MW as a precondition for participating in the auction. The outcomes of the first auction in February 2015 were a competitive strike price of £115-120/MWh (in 2012 prices) for offshore wind generators across two projects: Neart na Gaoithe and East Anglia.<sup>1</sup>

*Source: CEPA and DECC<sup>41</sup>*

Whilst our understanding is that all of the offshore wind projects that are associated with TR2 and TR3 are supported under the RO, as opposed to the new CfD regime, the new competitive allocation process for contracts potentially has implications for the future distribution of savings from transmission projects tendered as part of future OFTO tender rounds (see further discussion below on the regulated counterfactuals).

---

<sup>41</sup> DECC Contract for Difference Allocation Round One Outcome – available [here](#).

## **7.2. Transmission charging**

The TNUoS charging regime also impacts on who may have benefited from OFTO regime cost savings. As described in Section 2, each OFTO recovers its allowed revenue from National Grid under arrangements described in the SO-TO Code (STC) and OFTOs' Charging Statement.

National Grid then sets TNUoS charges to recover the total allowed revenue of all onshore and offshore transmission owners from transmission users according to the TNUoS charging methodology in the Connection and Use of System Code (CUSC).

Generation "local" charges are used to target a large (c. 70-80%) proportion of the cost of an OFTO on the OWG who uses the transmission assets (thereby applying a "user pays" and "cost reflective" charging principle). These "local" tariffs reflect the cost of the offshore transmission assets from the generator to the main interconnected transmission system.

However, the split of TNUoS revenue which is recovered from generators and demand is fixed in the ratio 27%/73% (Generation /Demand).

The interaction between these charging arrangements, and the economics of offshore wind, impact crucially on who may have benefited from the cost savings identified from the counterfactual analysis.

## **7.3. Distribution of savings**

### **7.3.1. Regulated counterfactuals**

For the regulated price control counterfactuals, we think it is likely the cost allocation approach applied and, therefore, the flow of any cost of service benefits, would have been consistent with the OFTO regime – that is, under the latter, a proportionate share of the socialised cost savings would be likely to flow to consumers, although because of the structure of the transmission charging regime, generators will have received c.70-80% of the benefits through a reduction in their TNUoS charges.

As a result, under this scenario both generators and final consumers will have benefited from the savings derived by the contestable OFTO approach.

For clarity, this means that GB consumers will have benefited directly from the estimated reduction in the socialised share of the offshore transmission cost base associated with the TR2 and TR3 projects, with offshore generators receiving lower TNUoS charges benefitting investors in those specific projects, given fixed subsidy arrangements that apply to the offshore generators associated with TR2 and TR3 projects.

However, as discussed above, one of the consequences of the recent shift in the subsidy / support arrangements for offshore wind in the UK, is that in future, the competitive allocation of CfD contracts may mean that for future tender rounds, the proportion of savings, compared to the counterfactuals that could be assumed to pass through to the GB end-consumer will increase. The price generators are willing offer for the provision of their

generation capacity should, all things being equal, be reduced as a consequence of the lower TNUoS charge faced under the OFTO regime, when compared to the alternative regulatory approaches (counterfactuals) which may have been pursued by the Government and Ofgem.

As a consequence, one of the indirect benefits of the OFTO approach, as applied to TR1, TR2 and TR3, is that it has helped enable price discovery within the sector. With the competitive CfD (auction) mechanism in place for passing these savings through into future subsidy levels for offshore wind, final electricity consumers can expect to share in full in the savings from the adopted OFTO approach for future offshore projects.

### **7.3.2. Comparisons with merchant counterfactuals**

The comparisons with merchant counterfactuals are more challenging as the treatment of transmission costs is different; and assessing the flow of benefits depends upon what is assumed regarding the level of administered subsidy that accounts for transmission costs in the overall offshore generation support regime.

Under the merchant counterfactuals, offshore generators would have directly paid for the full costs of the offshore transmission connection, rather than sharing the costs with customers as in the case of the price control counterfactuals. The key question is whether or not the support regime in the merchant counterfactuals would have compensated them for these additional costs, as the position of the consumer also needs to take into account the level of subsidy provided to the generators, if the two types of regimes are to be compared.

If the merchant counterfactuals were to involve the same subsidy contribution to transmission costs through the same level of ROC support as now, then consumers would not have benefited from the OFTO regime as all cost savings would have flowed to generators.

However, if subsidy levels would have had to be higher in the merchant counterfactuals to reimburse generators for the higher proportion of offshore transmission costs allocated to them under the merchant approaches (and thereby holding generator returns constant between the merchant counterfactuals and the OFTO regime), consumers would be better off in the OFTO regime because of the lower level of overall subsidy required in the OFTO regime as opposed to the merchant regime (even though the cost savings on OFTOs would flow in entirety to the generators). Clearly the extent of any benefits in this trade-off would depend upon the level of ROC support allowed for offshore wind.

In return for this reduced subsidy, however, additional (e.g. stranding related) risks have accrued to consumers under the applied OFTO regime, which must be balanced against the savings in subsidies that may have been achieved due to the OFTO regime, reflecting the trade-offs often faced in creating new contestable investment opportunities.

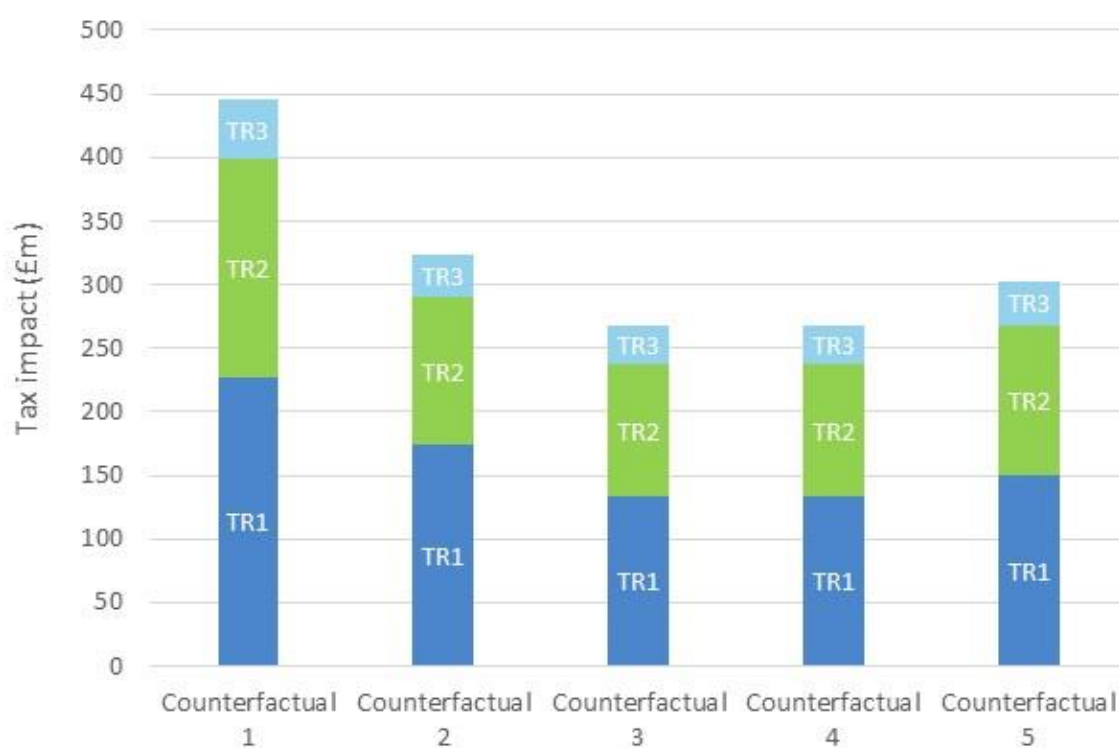
However, at a minimum, cost of service savings achieved by the OFTO regime can be considered to apply downward pressure on the subsidy levels needed in future to achieve offshore wind hurdle rates.

### 7.3.3. Taxation

As discussed in Section 3, taxation was excluded from the savings analysis on the basis that although this may be a saving in the OFTO sector, it is likely to be matched by a corresponding additional cost to taxpayers elsewhere. The incidence of who benefits from any taxation savings in the OFTO sector is then further complicated by the distributional questions already discussed above of who may have benefitted from OFTO cost savings.

For consistency purposes with our TR1 evaluation where we estimated tax savings – although these were presented separately to finance and operating cost savings – we have sought to estimate tax savings for TR2 and TR3 to allow a comparison of the potential tax impact of all three tender rounds and between counterfactuals. Whilst this analysis is sensitive to the assumptions adopted in the modelling (e.g. treatment of capital allowances) the results illustrated in Figure 7.1 indicate that OFTOs have delivered tax savings.

Figure 7.1: Estimated tax impact (£m NPV)



Source: CEPA analysis

These savings would be expected given the higher level of gearing that has been supported by OFTOs (c. 80% and above) which will have allowed the projects to benefit from the tax shield on interest payments compared to the counterfactuals, either with higher projected equity returns or lower levels of gearing.

## 8. CONCLUSIONS

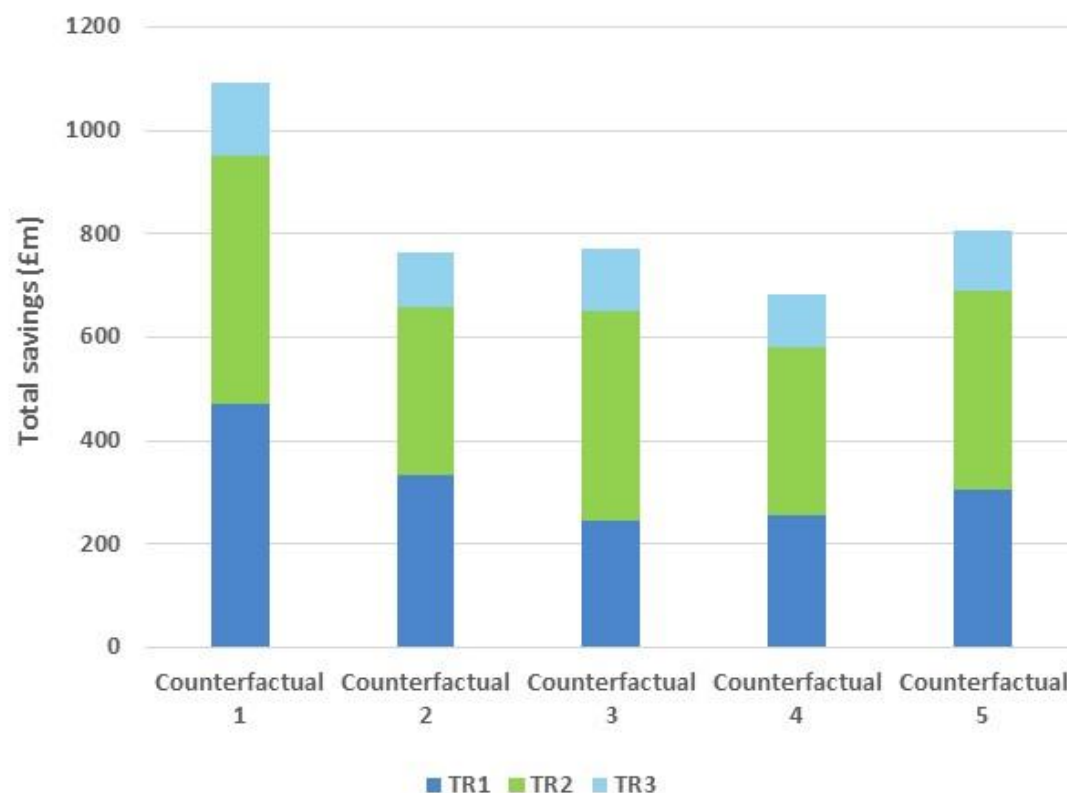
**The OFTO approach as applied to TR1, TR2 and TR3 has resulted in significant cost savings when compared to a range of plausible counterfactuals.**

Our analysis of TR1 concluded that the OFTO approach as applied in GB had delivered significant savings when compared to a range of merchant and regulated counterfactuals.

Extending this analysis to TR2 and TR3, suggests that the OFTO programme continues to deliver savings and indeed, on a normalised basis, the savings appear to have increased for TR2 and TR3 compared to TR1.

Figure 8.1 below shows the overall savings across the three rounds to date in NPV terms, taking into account bottom end estimates for operating cost savings in TR2 and TR3. Depending on the counterfactual that is chosen, the savings estimates range from £683m to £1,092m (NPV, 2014/15 prices) in total for all OFTO tender rounds to date.

*Figure 8.1: Total savings by tender round (£m NPV)*



*Source: CEPA analysis*

*Note: 2014/15 prices*



**The analysis indicates that the OFTO approach has achieved *both* financing and operating cost savings when compared to the counterfactuals.**

The analysis suggests that contestability has driven down operating costs and the cost of equity, whilst facilitating a pass-through of historically low debt costs, to a degree that cannot easily be envisaged under any of the counterfactual scenarios. Whilst understanding the distribution of benefits from the tenders is more complex<sup>42</sup>, it is clear that the contestable opportunity and market offering as defined for OFTOs has continued to deliver value for money benefits for customers and other users of the offshore transmission system.

**In comparison to the merchant counterfactuals**, higher financing costs relative to the factual outcomes of TR2 and TR3 arise from a less optimal allocation of risks than under the regulated OFTO approach, creating a risk premium between the regimes.

**In comparison to the regulated counterfactuals**, the financing savings arise from a combination of factors, including:

- Competitive pressure applied to cost of equity as evidenced by falling equity IRRs both between OFTO tender rounds and relative to regulatory benchmarks in other price controlled sectors.
- The *combination* of the contestable process and market offering which encourages OFTO bidders to source the very best debt terms for each project, and has allowed the value to debt providers of the regulatory commitment provided by the long term fixed revenue stream to be market tested.
- In some counterfactuals, the regulatory approach not permitting allowed financing costs to have fallen to the same extent as the general fall in underlying rates observed in the UK economy, or for savings from beneficial financing terms (e.g. from EIB) to be passed through directly into regulated prices.

The level of operating cost savings under the regulated counterfactuals relies on taking a view as to whether a regulator could match a competitive dynamic in placing downward pressure on a regulated entity's costs, with the regulatory tools at its disposal.

**Our modelled cost paths, show how the OFTO approach as applied in TR2 and TR3 delivers operating cost savings under a range of scenarios**, including:

- plausible *starting* assumptions for the regulated counterfactual operating costs (based on incumbent bids at TR1); and
- assumptions of the pressure and cost efficiency improvements which could have been drawn out through regulatory negotiation and price reviews over the revenue term.

---

<sup>42</sup> See discussion in Section 7.

Whilst it is not possible to know with certainty what in practice would have been the allowed cost under price controls, it would be consistent with economic theory to expect that competition for the market as took place in TR2 and TR3 would:

- encourage innovation and new ideas from new entrants, helping improve delivery and long-term efficiency of operating costs; and
- competition rather than regulatory negotiation being likely to drive costs lower.

**The OFTO approach offers lessons for structuring other contestable infrastructure opportunities.**

There may be other instances where such a set of circumstances would allow a similar approach which would similarly deliver benefits – Ofgem, for example, is currently considering the extension of a contestable tender model to apply to onshore electricity transmission assets in of sufficient scale and appropriate scope. The experience to date of applying the OFTO regime to GB offshore networks, helps to demonstrate the types of circumstances and features of a ‘market offer’ which are likely to derive the greatest benefits under a contestable approach, notably the need for:

- large, new and separable assets that can offer the clearest opportunity for competition “for the market”;
- a well-defined structure with a clear risk profile that allows efficient, competitive pricing;
- a transparent tender process undertaken on a level playing field with standardised licensing and tender regulations; and
- a *programme* of opportunities to encourage tighter pricing as investors become increasingly comfortable with the risks and nature of the assets.

## ANNEX A OFTO FINANCING IN TENDER ROUND 2 AND 3

OFTO	Financial Close Date	Owner	Tender Round	Financing details
Lincs	November 2014	Transmission Capital Partners	TR2	<b>Transaction size:</b> GBP308m <b>Debt:</b> GBP168m Provider: EIB Margin: LIBOR + less than 150 bps Tenor: 19 years <b>Equity:</b> GBP171m <b>Debt/Equity:</b> 50:50
London Array	September 2013	Blue Transmission	TR2	<b>Transaction size:</b> GBP485m <b>Debt</b> <b>EIB Facility:</b> GBP208.61m Tenor: 19 years <b>Bank Consortium Facility:</b> GBP210.48m Margin: LIBOR + 220 bps (240bps by end of tenor) Tenor: 19 years <b>Liquidity Facility:</b> GBP9m <b>Equity:</b> GBP80m <b>Debt/Equity:</b> 85:15
West of Duddon Sands	August 2015	Transmission Capital Partners	TR2	<b>Transaction size:</b> GBP300m <b>Debt (bond):</b> GBP254.85m Coupon: 3.446% Spread: 2027 gilts + 145bps Tenor: 19 years <b>Equity:</b> GBP46m <b>Debt/Equity:</b> 85:15
Gwynt y Mor	February 2015	Transmission Capital Partners	TR2	<b>Transaction size:</b> GBP352m <b>Debt (bond):</b> GBP339m Coupon: 2.778% Spread: 2025 gilts + 110bps Tenor: 19 years <b>Equity:</b> GBP46.66m <b>Debt/Equity:</b> 87:13

OFTO	Financial Close Date	Owner	Tender Round	Financing details
Westermost Rough	February 2016	Transmission Capital Partners	TR3	<b>Transaction size:</b> GBP172m <b>Debt:</b> GBP155m Providers: EIB and Aviva Margin: Undisclosed (index linked) Tenor: 19 years <b>Equity:</b> GBP27m <b>Debt/Equity:</b> 83:17
Humber Gateway	Still to reach financial close			

Source: Bloomberg and InfraNews

## **ANNEX B COUNTERFACTUAL ASSUMPTIONS**

In this annex we provide further detail behind the development of the assumptions which are used to quantify the counterfactuals.

### **B.1. Financing costs**

We have derived cost of capital estimates for each of the counterfactuals using the Capital Asset Pricing Model (CAPM).

#### **Gearing**

The range of gearing assumptions for each counterfactual are based on general regulatory precedent and market evidence of gearing levels achieved by infrastructure projects.

For Counterfactual 1, we assigned gearing levels based on evidence from actual gearing levels of UK offshore wind farms. In Counterfactual 2, we assumed that assets would be relatively highly geared compared to Counterfactual 1 to reflect a project finance solution for the individual sale and leaseback projects.

Conversely, Counterfactuals 3, 4 and 5 are based on gearing levels which assume corporate financing given the nature of the licensed activities and the expected owner of the assets. For Counterfactual 3, we use the notional gearing level currently adopted for NGET's RIIO-T1 price control, while Counterfactuals 4 and 5 provide ranges that allow for some uncertainty regarding the price control outcomes.

#### **Cost of debt**

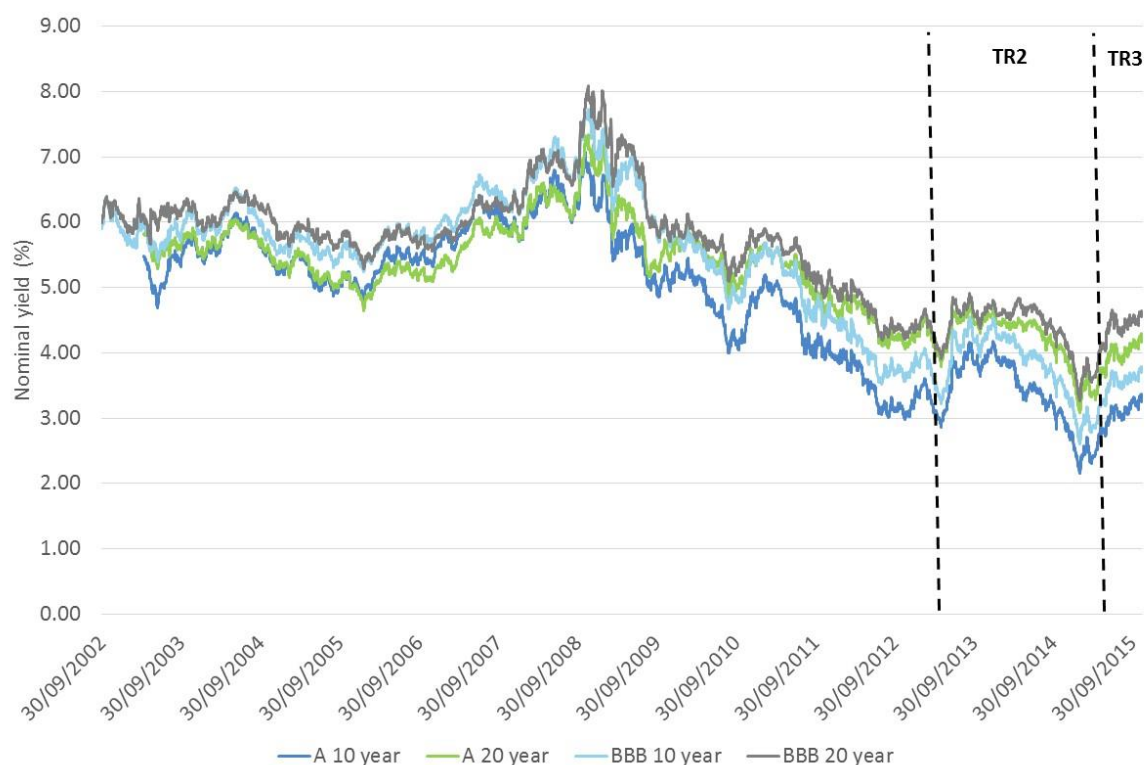
To develop assumptions on the cost of debt, we first made an assessment of the possible credit rating of the counterfactual relative to the OFTO regime. Overall our estimated credit ratings are consistent with those used in the TR1 evaluation.

As outlined in Section 5, for all the counterfactuals – with the exception of Counterfactual 3 (see below) – the cost of debt is modelled as a spread to the underlying gilt rate on the day at which either the project reached financial close (TR2 projects) or date used in the ITT issued to bidders (TR3 projects). This ensures a like for like comparison with the OFTO bids but also means the counterfactual cost of debt varies by individual project.

The unprecedented low interest rate environment means that we have assumed lower cost of debt for TR2 and TR3 than for TR1.

Figure B1 below illustrates the downward trend in nominal yields for investment grade bonds compared to the TR2 and TR3 timeframe.

Figure B1: Investment grade bond yields



Source: Bloomberg and CEPA analysis

As in our TR1 analysis, Counterfactual 3 assumes the regulated network assets would be adopted as part of RIIO-T1 for both TR2 and TR3.

Under this approach, the allowed cost of debt assumption in the WACC is assumed to be based on the simple 10-year trailing average iBoxx index.

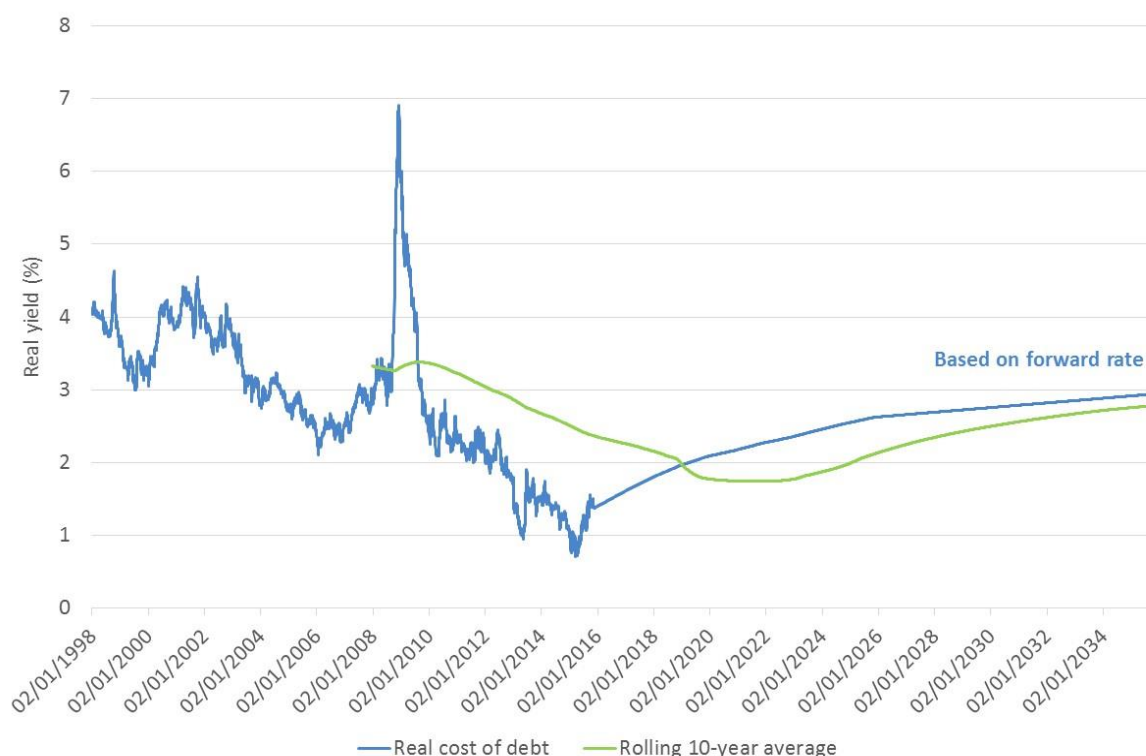
We deflate the iBoxx non-financial corporate 10 year plus indices with broad A and BBB credit ratings in nominal terms by the 10 year breakeven inflation as published by the Bank of England to arrive at a real cost of debt assumption. For future years, we have then derived a forward curve for the all-in cost of debt and based the trailing average on this as well.

To calculate the expected future rates for this index, we utilise forwards on UK ten year gilts and apply these changes in expected gilt yields to our spot cost of debt index. We use the full adjustment of the expected nominal gilt change to apply to the cost of debt index e.g. if the spot gilt yield is 2.0% today, the cost of debt spot rate is 3.5% today and gilts are expected to rise to 3.0% in one years' time, the expected cost of debt is calculated as being 4.5% (i.e. the original rate plus the change in gilt yield expectations).

Another way of thinking of this is that the debt spread and inflation expectations remain constant under this assumption.

Figure B2 shows our assumptions about the development of the iBoxx index and the accompanying ten-year trailing average until 2035.

Figure B2: iBoxx and forward rates



Source: iBoxx, Bloomberg

In the case of Counterfactual 4 and 5, we assumed an individual deal would have been negotiated as part of a dedicated price control for the offshore transmission assets. This approach takes greater account of the spot rates observed during the applicable periods. This fact is reflected by the low cost of debt assumptions for these counterfactuals (for both TR2 and TR3), due to the reduction in interest rates over the past few years. A judgment of what might have been allowed as an embedded cost of debt for the full asset life of the TR2 and TR3 projects however, has to be made based on both the spot rates and the recent historic spreads of the appropriate time frame for each tender round.

For the merchant counterfactuals (1 and 2), we have used data from a recent survey by the European Wind Energy Association (EWEA) of offshore wind financing costs, which indicated a margin rate for offshore wind projects in the UK in the range of 250-300 bps<sup>43</sup>. Based on our relative counterfactual rating assessment, this would suggest a higher cost of debt assumption for the merchant counterfactuals compared to the assumptions that are used in the regulated price controlled counterfactuals.

### Cost of equity

For the cost of equity we assume a 5.00% Equity Risk Premium (ERP) across all of the counterfactuals.

<sup>43</sup> EWEA (2014): 'Where's the money coming from?'

The Competition and Markets Authority (CMA) however, has recently moved away from using a long-term historical market rate of return average of 7.0%. Instead, the CMA currently takes the view that the appropriate upper limit for the total market return is 6.5%.<sup>44</sup> Therefore, for all counterfactuals, we use 6.5% as the total market return.

The only exception to this is Counterfactual 3, where we start the counterfactual with a total market return assumption of 7.00% consistent with the current RIIO-T1 price control determination. For the offshore as well as onshore assets, we then assume that the cost of equity would be locked in at the T1 determination level. However, for the start of the next price control period, RIIO-T2, we revert to the same 6.5% total market return assumption as applied in the other counterfactuals.

Our beta assumptions for the regulated counterfactuals (i.e. Counterfactuals 3, 4 and 5) are largely unchanged from the TR1 analysis. For the regulated counterfactuals, we do not believe there is a rationale to make different assumptions for TR2 and TR3 projects as the regulatory regime and, therefore, risk profile for the investor is unchanged. However, as discussed in the main report, we have reduced the beta for the merchant counterfactuals, as we assume it is likely the “merchant” risk differential would have reduced over time, as the offshore transmission projects and asset class developed an operating record in GB.

### **Cost of capital component break-downs**

Based on the assumptions described above, the tables overleaf set out the ranges and building block components of the cost of capital assumptions used to quantify the counterfactuals to the OFTO regime.

We note that in the case of some of the TR2 and TR3 project counterfactuals, the real cost of debt is below the risk free rate that is used in the cost of equity modelling.

Whilst this may appear counter intuitive (debt would be expected to be priced at a premium to the risk free rate) it is a consequence of the cost of debt assumptions being priced as a spread to underlying gilt rates at the time of financial close (TR2) or ITT launch (TR3) whilst the approach that has been used by regulators to set the cost of equity relies on long term estimates of the risk free rate. Indeed, in the context of the counterfactuals, we are making an assessment of the risk free rate that would apply over a 20-year revenue term.

---

<sup>44</sup> <https://www.gov.uk/cma-cases/northern-ireland-electricity-price-determination>



Table B.1: Detailed cost of capital parameters for TR2

	Counterfactual 1		Counterfactual 2		Counterfactual 3		Counterfactual 4		Counterfactual 5	
	Merchant generator project		Merchant sale and lease back		Regulated network – RIIIO-T1		Regulated network – separate control		Regulated network – offshore zone licence	
	Low	High	Low	High	Low	High	Low	High	Low	High
Gearing	60%	70%	70%	80%	60%	60%	50%	60%	50%	60%
<b>CoD *</b>	1.54% - 3.20%		2.04% - 3.70%		Indexed		0.54% - 2.20%		1.04% - 2.70%	
RFR	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
ERP	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Asset beta	0.80	0.90	0.45	0.50	0.38	0.4	0.30	0.40	0.4	0.5
Equity beta	2.00	3.00	1.50	2.50	0.95	1.00	0.60	1.00	0.80	1.25
<b>CoE</b>	11.5%	16.5%	9.0%	14.0%	6.3%	6.5%	4.5%	6.5%	5.5%	7.8%

\* range reflects differences in the timing of when individual TR2 projects reached financial close

Table B.2: Detailed cost of capital parameters for TR3

	Counterfactual 1		Counterfactual 2		Counterfactual 3		Counterfactual 4		Counterfactual 5	
	Merchant generator project		Merchant sale and lease back		Regulated network – RIIIO-T1		Regulated network – separate control		Regulated network – offshore zone licence	
	Low	High	Low	High	Low	High	Low	High	Low	High
Gearing	60%	70%	70%	80%	60%	60%	50%	60%	50%	60%
<b>CoD*</b>	2.03% - 3.01%		2.53% - 3.51%		Indexed		1.03% - 2.01%		1.53 % - 2.51%	
RFR	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%	1.50%
ERP	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Asset beta	0.80	0.90	0.45	0.50	0.38	0.4	0.30	0.40	0.4	0.5
Equity beta	2.00	3.00	1.50	2.50	0.95	1.00	0.60	1.00	0.80	1.25
<b>CoE</b>	11.5%	16.5%	9.0%	14.0%	6.3%	6.5%	4.5%	6.5%	5.5%	7.8%

\* range reflects differences in the timings of when individual TR3 projects received ITT documentation

## **B.2. Operating costs**

Our approach to modelling regulated counterfactual operating costs is described in detail in Section 5. The starting points of the regulated counterfactuals are however based on the incumbent benchmark which was developed for the TR1 analysis. We therefore briefly summarise below how this benchmark was derived, before presenting illustrations of the cost paths that were described in Section 5 of the main report.

### **B.2.1. Incumbent benchmark**

For the TR1 analysis we developed two methodologies to develop counterfactual operating cost assumptions for the regulated counterfactuals.

The first method compared preferred bidder operating costs across the nine TR1 projects (equivalent to the base case) to: 1) average ITT stage submissions on operating costs across all the short-listed TR1 bidders; and 2) existing transmission providers ITT submissions on operating costs for TR1.

For the existing transmission service provider's costs, this required methodological adjustments as this transmission provider only bid on two projects in TR1, and reached the final stage on just one project. To develop operating cost assumptions that could be applied under counterfactuals for all nine of the TR1 projects, we calculated a ratio of the existing transmission service provider's bid for individual cost items as compared to the preferred bidder at that stage of the tender process. In all cases, the analysis was undertaken on a percentage of FTV basis to allow application across all nine projects.

The second method used was a benchmark from a National Grid / Crown Estate offshore transmission feasibility study<sup>45</sup>. In this case, O&M costs were assumed to be a percentage of the installed capital costs of the TR1 projects. As this focused on O&M only, TR1 data for non-O&M costs (e.g. insurance and SPV / business costs) were combined with this benchmark to develop a total counterfactual operating assumption under the second method.

The two methods were combined to produce a range for operating costs in Counterfactuals 3 – 5.

### **B.2.2. Operating cost paths**

Figure B3 overleaf illustrates the cost paths that we considered for the regulated counterfactual operating costs. For the reasons described in the main report, cost paths 4, 5 and 6 were used for the purpose of the savings analysis.

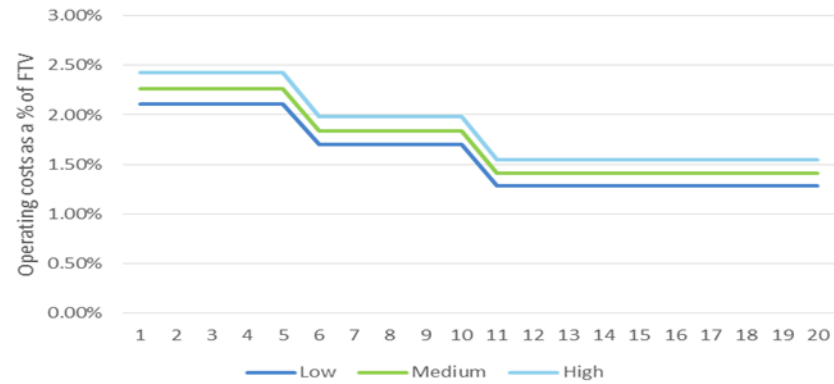
---

<sup>45</sup> National Grid and Crown Estate (2011): 'Offshore Transmission Network Feasibility Study'

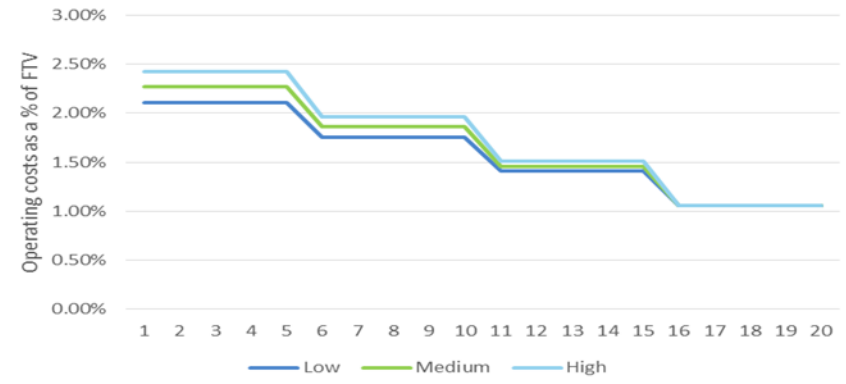
Figure B3: Counterfactual operating cost paths for a TR2 project as an illustration



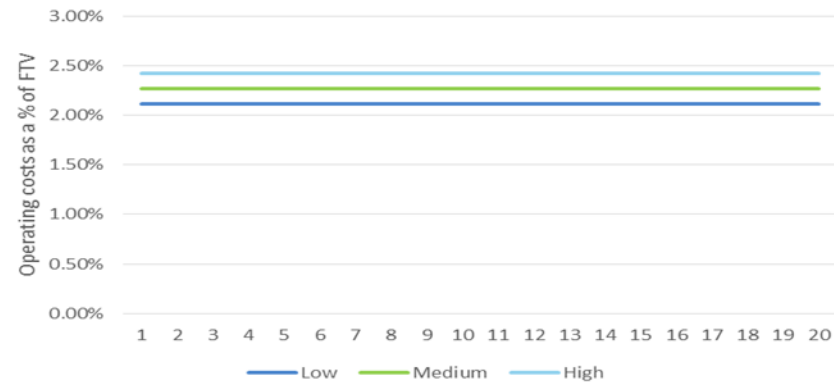
Counterfactual 5 Cost Path 4



Counterfactual 5 Cost Path 5



Counterfactual 5 Cost Path 6



## ANNEX C SUMMARY OF TR1 FINDINGS

In this Annex we provide a summary of our findings for TR1 to ease comparison of TR2 and TR3 savings. TR1 involved nine projects and the figures below are the cumulative benefit across those projects. The figures have been converted to 2014/15 prices (the original analysis was in 2009/10 prices) and can thus be compared to findings in Section 6.

*Table C.1: Estimated cost savings of the OFTO regime relative to each counterfactual (£m NPV)*

Source of saving	Counterfactual	Counterfactual	Counterfactual	Counterfactual	Counterfactual
	1	2	3	4	5
	Merchant generator project	Merchant sale and lease back	Regulated network – RIIO-T1	Regulated network – specific control	Regulated network – offshore zone licence
Financing costs	452	317	10	20	100
Operating costs	58	58	276	276	205
Bid costs	-42	-42	-42	-42	-
<b>Total (EXC tax)</b>	<b>469</b>	<b>333</b>	<b>244</b>	<b>255</b>	<b>305</b>

Source: Ofgem

Note: In 2014/15 prices