REGULATORY INCENTIVES FOR COMPETITIVELY APPOINTED TRANSMISSION OWNERS (CATOS)

OFFICE OF GAS AND ELECTRICITY MARKETS

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FINAL REPORT

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Executive Summary

Competitively Appointed Transmission Owners (CATOs)

Ofgem intends to apply competitive tendering to new, high value onshore electricity transmission assets that can be easily identified as discrete construction projects and are, therefore, separable from the rest of the network. It is also considering an 'early' and 'late' tender model for determining the Competitively Appointed Transmission Owner (CATO) who would be responsible for undertaking the activities and obligations that would be associated with the awarded onshore electricity transmission licence. The two tender models would apply different principles for when, during an onshore electricity transmission project's development, a tender should be run to identify a CATO. Many features of the underpinning legal and regulatory framework for CATOs are then expected to share common features with other network companies, including Offshore Transmission Owners (OFTOs) and onshore Transmission Owners (TOs). For example, CATOs are expected to be licensed by Ofgem and will be expected to accede to a number of industry codes and agreements. CATOs will also receive their revenues from the System Operator (SO) an investment grade rated business with a low risk profile and ring-fence conditions under its licence. This means a CATO will have a solid counterparty and low risk of non-receipt of regulated revenues. It is also expected that CATOs will perform similar functions to onshore TOs. However, the focus will be on the delivery and management of a defined set of transmission assets, rather than planning the reinforcement and operation of a wider transmission network area.

Options for the commercial and regulatory market offer for CATOs

Cambridge Economic Policy Associates (CEPA), Lions Head Global Partners (LHGP) and TNEI have been commissioned to advise Ofgem on the commercial and regulatory construct and market offering for CATOs. This includes the composition of the regulated revenue stream (e.g. the duration and profile of regulated revenues) and the financial incentives which could apply to a CATO over the life-cycle of an electricity transmission project. The primary objective of the framework which is used to set a CATO's regulated revenue stream should be to allow all, or components of, the regulated revenue stream to be fixed at the time of the competitive tender. This will ensure that competitive pressure is applied to the pricing of bids and that the benefits of competition are maximised for consumers through the tender process. This could be achieved using the Regulatory Asset Base (RAB) 'building block' based pricing methodology applied to other onshore network operators, where tender applicants would be asked to bid elements such as their required rate of return on regulatory capital value. However, an alternative model where bidders are asked to bid the full revenue stream for the duration of the revenue term could help to make the tender opportunities more attractive to a range of financing solutions, by creating a very well-defined cash flow profile for investors, that also provides the most flexibility for competition between bidders at the tender stage. We believe this second approach is likely to be best for CATOs.

As regards the length of the revenue term, our view is this should be focused around 25 years, as this is likely to facilitate greatest competition in project financing. However, under the existing onshore electricity transmission price controls, RIIO-T1, Ofgem has introduced arrangements to transition to a 45-year asset life (depreciation) assumption. This will mean that if CATO investments were to be repaid to investors over the proposed 25-year revenue term, a different consumer cost recovery principle would be being applied to some, but not all, onshore electricity transmission assets. One approach to address this inconsistency would be for Ofgem to apply an explicit residual value policy for CATOs, as part of a 25-year revenue term policy. Rather than leaving the question of residual value unspecified at the tender, Ofgem would instead choose to explicitly fix the residual value that it would use for regulatory purposes at the conclusion of the revenue term. For example, a residual value for the transmission assets could be fixed ex-ante to the completion of the revenue term, on the assumption the remaining book value of the assets would be recovered from future consumers following the end of the CATO's revenue term.

For both the early and late tender models, we also propose that the regulated revenue stream should be indexed to a measure of inflation. However, tender applicants should have the flexibility to choose the proportion of the revenue stream they require to be indexed and which proportion they would prefer to remain fixed over the revenue term. This will mean that the CATO will be able to match the inflation indexed revenues to the elements of the project company's underlying cost base which are actually exposed to inflation – a "natural hedge" for the company. This policy of "biddable inflation indexation" would align with the indexation policy which Ofgem has adopted in the most recent offshore electricity transmission competitions. There are then a range of inflation indices that could be used for the purposes of CATO revenue indexation and we would suggest Ofgem consult on what investors and stakeholders in CATO tenders consider the appropriate inflation measure.

Delivery and performance incentives

Although both the early and later tender models include the construction and operational phases of projects undertaken by a CATO, they will involve different risk profiles for investors, as under the early model, the tender would need to occur prior to a project obtaining planning consents. Whilst the overall framework for setting the regulated revenue stream of a CATO will be able to follow similar principles for both tender models, the range of delivery and performance incentives, in particular the firmness of the regulated revenue stream bid by the CATO at the tender stage, may need to vary to reflect the point at which a CATO takes responsibility for delivery of a project. We have summarised overleaf a range of issues which the incentive package applied to CATOs could need to cover. The package of incentives would need to impose strong cost efficiency, timely delivery and operational performance incentives on CATOs. There may also need to be some flexibility to vary the revenue stream either where there are changes in network outputs, or where allowing variations could achieve a more efficient risk allocation with better value for money for the consumer.

Adjustments to the regulated revenue stream for changes in outputs

There are scenarios that could require a change in the CATO's network outputs over the project life-cycle and, as a consequence, an adjustment to the CATO's regulated revenue stream. There are a range of options for how to provide both flexibility to fund these scenarios, and incentivise economic and efficient delivery by the CATO, for example, in responding to incremental capacity increases.

Incentives for delivery during preconstruction – early tender model

A separate development (preconstruction) revenue control period, where a CATO would receive revenues before energisation of the transmission assets, could be used to incentivise the CATO to deliver the project to the point of planning consent. This would include having the incentive to deliver according to the costs and design scope proposed by the CATO at the time of the tender (cost and design fidelity) as far as is reasonably practical.

Incentives for cost efficiency and effective project management during the construction period

There is a need to impose strong cost efficiency incentives on the CATO to ensure that it will manage the construction programme and its supply chain effectively. This could be achieved by requesting a largely fixed regulated revenue stream from the CATO, or by targeted cost sharing arrangements. Different approaches will impact on the degree of construction risk that is transferred from consumers to the CATO.

Incentives for timely delivery during the construction period

Timely delivery of the construction of the transmission assets could be strongly incentivised by Ofgem by the regulated revenue stream for the construction & operation period of a CATO project only starting to be paid once the project is commissioned and the transmission assets are energised.

Incentives for delivery during operation – performance incentives

There is a range of incentive mechanisms that could be built into the regulatory framework to provide CATOs with rewards and penalties depending on their performance. These include reliability and availability incentives modelled on schemes that apply to onshore TOs and OFTOs, or alternative incentives designed specifically for CATO activities.

Incentives for delivery during operation – refinancing

A refinancing gain share mechanism – to allow the CATO revenue stream to be adjusted in the event of project refinancing – would be a way of sharing refinancing gains with consumers and is a regime feature brought into PFI contracts and recent offshore competitions run by Ofgem for OFTOs.

The CATO opportunity

CATOs will provide an opportunity to design, build, own and operate onshore transmission assets, with a well-defined cash flow profile created by a stable regulatory regime. The focus of a CATO's activities offers the opportunity for investors to compete for assets with exposure to both constrained construction and operation risks and to add value by bringing together a commercial offering that reflects a long term view of full-life project costing and innovative approaches to project financing and management of performance obligations.

As set out in this report, there are a range of financial incentives and performance obligations that can be built into the regulatory framework to set and adjust the regulated revenue stream to ensure this opportunity delivers value for money for the electricity consumer, together with a risk profile for the sector that will be attractive to a range of debt and equity investors so as to maximise the potential for new entrants and existing participants in GB transmission to participate in the CATO licence competitions.

We believe this opportunity to be an important evolution in the regulation and delivery of electricity transmission services in GB. We look forward to seeing how the options which we have set out and considered in this report will be developed by Ofgem in delivering the first competitive tender for GB onshore electricity transmission services.

1. INTRODUCTION

Cambridge Economic Policy Associates (CEPA), Lions Head Global Partners (LHGP) and TNEI have been commissioned by Ofgem to advise on the commercial and regulatory construct for Competitively Appointed Transmission Owners (CATOs).

Ofgem intends to apply competitive tendering to new, high value onshore electricity transmission assets that can be easily identified as discrete construction projects and are, therefore, separable from the rest of the network.

It is also considering an 'early' and 'late' tender model for determining the CATO who would be responsible for undertaking the activities and obligations associated with the awarded onshore electricity transmission licence.

This report outlines potential policy options and key issues related to the commercial and regulatory regime for CATOs including:

- the composition of the regulated revenue stream (e.g. the duration and profile of regulated revenues); and
- the financial incentives which could apply to a CATO during the preconstruction, construction and operational periods of a transmission project.

1.1. Objectives

Ofgem has stated a preference to develop a single regulatory incentive and funding model to apply to CATOs, wherever possible.

There are however differences between the proposed early and late *tender* models that Ofgem are currently evaluating. Under the:

- **early model**, the tender would occur prior to the transmission project obtaining planning consents; and
- **late model**, the CATO is appointed post-consent, but prior to construction of the transmission assets.

Whilst both early and late models include the construction and operational phase of projects undertaken by a CATO, they will involve different risk profiles for investors, although the ultimate risk for capital providers will also depend on the design of regulatory regime.

The two tender models also tap different potential sources of benefits from applying a competitive tendering approach:

- the **early model** – by involving a CATO earlier in the project development process – offers more opportunity for innovative design as well as consideration of whole life costing by CATOs; and

- the **late model** should help ensure efficient construction and operational delivery from the CATO, ensuring a long term view and efficient trade-off of capex[1] and opex[2] from the CATO, as well as competitive financing terms.

A key objective for the regulatory and commercial construct should be to support rather than hinder these potential sources of benefit. This means in practice that Ofgem must identify a regulatory regime that:

- delivers an efficient risk allocation to CATOs and, therefore, value for money pricing for consumers; and
- is as simple, stable and transparent a commercial package as possible for investors to understand and participate in tenders.

The last point is an important one. By introducing competitive tendering into onshore electricity transmission – building on the offshore experience with OFTOs[3] – Ofgem is seeking to build a new opportunity which will be attractive to a range of debt and equity investors and will maximise the potential for new entrants and existing participants in GB transmission to participate in the CATO licence competitions.

Experience in other sectors has demonstrated that where there is clarity of risk allocation, and a stable long term regulatory framework which investors understand, regulated infrastructure is very attractive, and low cost of funds and new sources of finance, skills and experience, can be attracted into a new sector and a set of opportunities. This can deliver better outcomes and long term benefits for consumers.

1.2. Report structure

In this report we set out initial options for the regulatory and commercial framework that could be applied to CATOs.

Our development of possible models for the regulatory and commercial construct for CATOs – under both early and late tender models – has been informed by:

- analysis of the characteristics of CATOs as project tendering opportunities and the expected economic use of the infrastructure;
- the technical characteristics of onshore transmission assets and the performance obligations that are likely to be appropriate for CATOs;
- initial engagement with debt and equity investors and financing institutions on the CATO opportunity; and

[1] Capital expenditure.
[2] Operating expenditure.
[3] Offshore Transmission Owners (OFTOs)

- lessons that can be learned from other sectors, in particular regulation of existing onshore Transmission Owners (TOs) and OFTOs.

The rest of the report is structured as follows:

- Section 2 asks the simple question, what is a CATO and the potential tendering opportunities;
- Section 3 discusses high-level options for the overall framework of setting the revenue stream of the CATO;
- Section 4 considers policy options associated with the length of the revenue term, cost recovery periods and residual value;
- Section 5 considers adjustments to the regulated revenue stream in response to changes in network outputs;
- Section 6 focuses on inflation indexation policy including how the proportion of revenues that are indexed is set;
- Sections 7 evaluates options for CATO delivery and performance incentives during the development/pre-construction period under the early tender model;
- Section 8 considers options for delivery and performance incentives during the construction period;
- Section 9 discusses options for CATO delivery and performance incentives during the operational period; and
- finally, Section 10 provides brief conclusions.

Two annexes provide additional financial and modelling information.

2. WHAT IS A CATO?

2.1. Introduction

In May 2015 Ofgem published an Open Letter[4] seeking views on the criteria for competitive tendering in onshore electricity transmission. This provides more detail compared to its final Integrated Transmission Planning and Regulation (ITPR) project conclusions.

During RIIO-T1[5] (the electricity transmission price control for the period 2013-21), onshore tendering will be limited to Strategic Wider Works (SWW)[6] projects where they meet the criteria for competitive tendering. For the next price control period, RIIO-T2, any project that meets the criteria could be tendered to a CATO.

The first tender under the CATO regime is expected to take place in 2016 or 2017, with the projects being high value, new and separable:

- **High value:** This is taken to mean projects with £100m+ in capital expenditure. Our discussions with investors would suggest this threshold is appropriate given anything up to £300m was considered to still be a relatively small investment opportunity.
- **New and separable**: These are projects where transmission assets do not currently exist (greenfield) or will completely replace existing ones, and ownership boundaries can be clearly delineated.

The criteria however do not preclude: projects which re-use land and route corridors where electrical equipment is new; where the TO upgrades its own network following a CATO asset connecting; projects where not all assets are directly and physically connected to one another (contiguity); and projects where there is not electrical separability.

2.2. CATO project pipeline

Based on publically available information and expectations around the application of the criteria set out in Ofgem's open letter, our estimate is that a pipeline of approximately twenty projects could *potentially* be tendered to CATOs, as they meet the requirement laid out above (i.e. high value, new and separable):

- **High value**: Although an estimate of cost is only available for about half of this pipeline at present, there is already a wide range of potential project sizes, from £120m to over £2bn, with the combined pipeline potentially as great as £15bn.

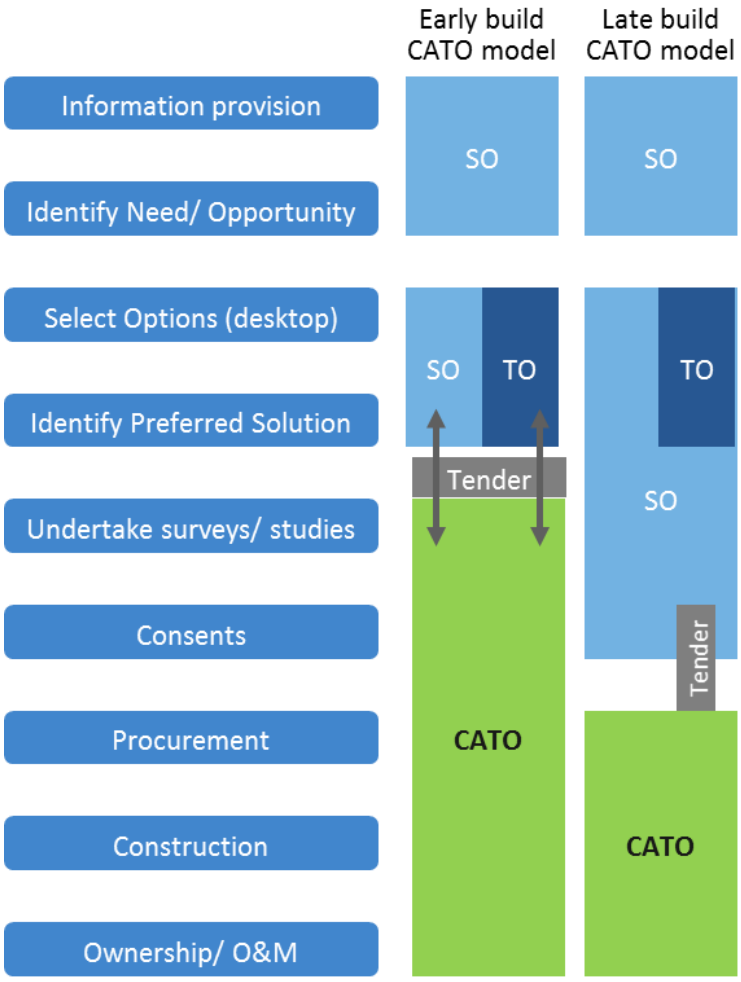
[4] https://www.ofgem.gov.uk/ofgem-publications/95004/criteriaopenletter-pdf
[5] https://www.ofgem.gov.uk/network-regulation-riio-model/riio-t1-price-control
[6] At RIIO-T1 several large transmission projects were not agreed at the price review as the timings and costs were uncertain at the time of the settlement. The SWW arrangements provide flexibility by allowing (incumbent) Transmission Owners (TO) to bring forward projects when more information is available, helping to ensure that infrastructure development occurs at the appropriate time.

- **New and separable**: Although new and separable, the projects are not necessarily point-to-point projects, with the types of infrastructure available including overhead lines, substations, subsea links, and pylon replacement.

2.3. Activities under the early and late CATO models

Figure 2.1 below outlines which party would undertake the main activities under the early and late CATO tender models, based on Ofgem's current published thinking.

Figure 2-1: Activities under early and late CATO models



Source: Ofgem

In both tender models, the System Operator (SO), will identify the need for the project, and identify a preferred solution alongside the incumbent TO in that part of the country. Once a preferred solution has been identified the two models diverge:

- under the early tender model the project would be put to tender such that the CATO undertakes surveys, studies and seeks project consents; and
- whereas under the late tender model, these pre-construction activities would be undertaken by the SO.

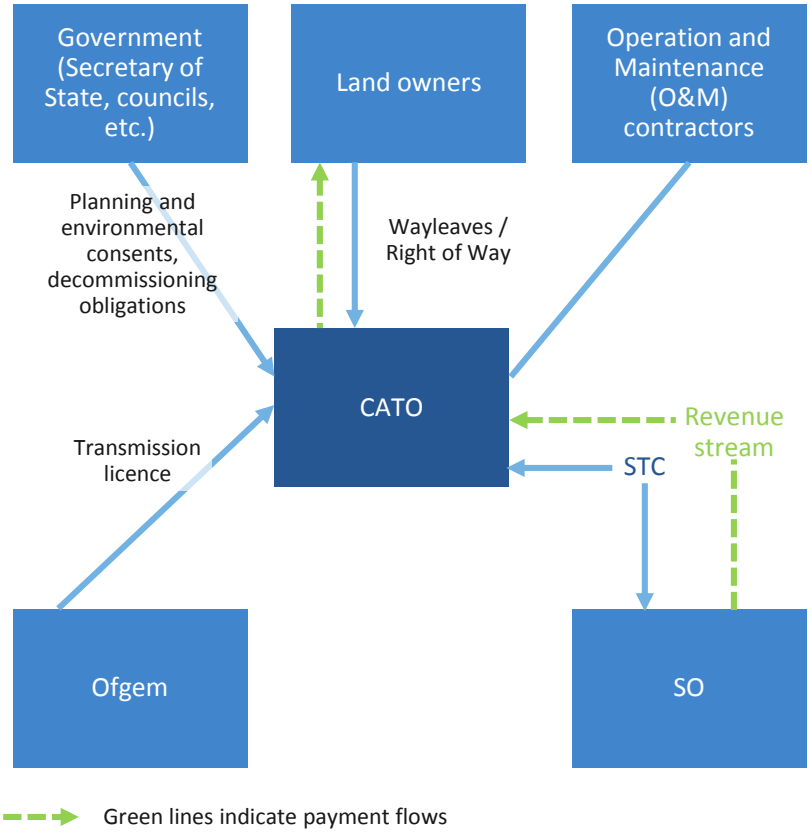
Once a consent application is made, a project under the late tender model would be put to tender, such that the CATO undertakes procurement, construction and operation and maintenance (O&M) activities under both tender models. Therefore, the SO has a greater involvement under the late model as they would undertake all of the pre-construction / preliminary works activities, including consenting application.

Consequently the CATO would have less certainty at the point of ITT in the early model than in the late model, as in the late model, they would be bidding on a project which is more developed (with a clearer scope and likely potential costs), and most importantly consenting risk will have passed, with less risk of design changes or delays to the project.

2.4. Licensing and regulatory framework

CATOs are expected to be licensed and will be expected to accede to a number of industry codes and agreements, including the System Operator Transmission Owner Code (STC) that is already in place for TOs and OFTOs – see Figure 2.2 below.

Figure 2-2: Licensing and regulatory framework



Source: CEPA, TNEI and LHGP

This framework in itself has implications for the regulatory and commercial construct that will apply to CATOs: a CATO would be regulated by licence by the Gas and Electricity Markets Authority (GEMA) as is the case with other network companies; the CATO will face similar code and regulatory obligations as the other GB TOs (e.g. as part of the STC – see below); and

like with OFTOs, CATOs will receive their revenues from the SO, a role currently held by National Grid Electricity Transmission (NGET).

The SO is an Ofgem regulated, investment grate rated business with a low risk profile and ring-fence conditions under its licence. This means that a CATO will have a solid counterparty and very low risk of non-receipt of regulated revenues. The strength of the SO as a counterparty and the stability of cash flows under the regulated revenue stream that is awarded to OFTOs offshore, is also one of the factors which ratings agencies have emphasised is a positive feature of OFTO business risk profile.[7]

2.5. CATO responsibilities

Electricity TOs currently perform a range of activities under their operating licences and the outputs and financial incentives defined as part of their price controls. These activities range from planning and development of the transmission network, O&M activities, policy and regulation work and managing the environmental impacts of their businesses. It is expected that CATOs will perform broadly similar functions. However, the focus will be on the delivery and management of a defined set of transmission network assets, rather than planning the reinforcement and operation of a wider transmission network area.

A CATO will be responsible for procuring equipment efficiently and the delivery and construction of a specific project. It will also need to replace and refurbish its existing assets over the revenue term period, to ensure that asset life expectancy is achieved. There may also be a need to increase the network's capacity, for example, in response to new connections. However, it is not expected that a CATO would be involved as extensively in network planning as a TO given the need for a reinforcement will be established before going out to tender to select a CATO, and whether a CATO would be involved in the consenting process will depend on the tender model (early or late) which is followed by Ofgem.

Like TOs, outage planning will be an important day to day responsibility of a CATO, including compliance with the STC and its procedures. A CATO will also need to comply with all applicable safety legislation and maintain asset health through a maintenance plan. Given the focus of the licensee on a single project, it is expected that compared to a TO, a CATO could be less engaged in some activities, as environmental management and innovation in transmission system management. However, some of these activities, although not an ongoing focus for the company, would still be expected to be considered as part of the competitive tendering process (e.g. approach to visual impact mitigation).

The table below provides a summary comparison of the expected role of a CATO compared to existing onshore TOs.

[7] See Moody's (2013): 'Operational UK Transmission Owners: Solid Strength Comparable to that of UK Regulated Onshore Networks'

Table 2.1: Comparison of TO and CATO responsibilities

Category	TO activity	Application to CATO
Policy and Regulatory	Understand the implications of government and regulatory announcements and engage in forums and working groups.	A CATO will need to engage on various regulatory issues that affect their roles. However, we expect this engagement to be focused and proportionate to the resources and scale of CATO operations and business activities.
Network planning	Engage with SO and TOs to plan network requirements up to 8 years in the future, taking into account increasing predicted network load.	A CATO will need to be involved in network planning where this affects their assets, including provision of information to the SO and TOs.
Outage planning	Engage with SO and TOs to put together outage plans. Requires negotiation between parties, taking into account differences in cost.	CATOs will need to be involved in these negotiations, and in forming their bids will need to allocate appropriate resources given their expected roles and responsibilities in forming outage plans.
Operation and maintenance	TOs and the SO coordinate to ensure safe and efficient operation of the networks and to agree outage and maintenance plans. This interaction is defined in the STC and its procedures and through the Network Access Policy (NAP).	Will need to comply with the STC and its procedures. Some of the STC-Ps may need to be enhanced. May be beneficial for CATOs to engage on some aspects of the NAP.
Reliability and availability	TOs maintain asset health and prioritise asset replacement to meet the "Energy Not Supplied" target.	It will be important to ensure that CATOs are incentivised to maintain availability and maintain asset health and prioritise asset replacement.
Project delivery	There are RIIO incentives to encourage timely delivery of assets.	The CATO process should incentivise timely delivery of the asset. Due to the tender process, equipment should be procured efficiently.
Environmental management - SF_6 leakage	New assets have a best practice target leakage rate of 0.5% per annum. It can be difficult for existing assets to meet target leakage rates.	A best practice target leakage rate could be applied to the CATO assets, and CATOs would ensure that this is met at the tendering stage.
Environmental management – visual mitigation	TOs must consider engineering design, and incorporate stakeholder engagement, in order to mitigate environmental issues.	The tender process should enable visual mitigation to be considered. CATOs will be incentivised to meet delivery timeframes and suitable visual mitigation will be required to

Category	TO activity	Application to CATO
		obtain planning in a timely manner (for the early model).
Environmental management – transmission losses	TOs are required to publish an overall strategy for losses and annual progress in implementation and impact on transmission losses. This is a reputational rather than direct financial incentive.	A CATO would be expected to consider management of losses (e.g. choices of equipment procured that will minimise full life cycle costs) as part of the tender process. Additional transmission loss financial incentives could also be applied to the CATO.
Connections	A financial incentive is applied by RIIO for delivery of customer connections in a timely manner.	A similar incentive could be applied to CATOs. However, a CATO would be providing connections to a defined asset base, whilst TOs manage connections across a wide transmission service area.
Customer / stakeholder satisfaction	RIIO applies financial incentives for customer satisfaction, for example through the results of customer surveys.	A similar incentive could be applied, but development of customer surveys may be less relevant for CATOs with limited ongoing customer interaction. Stakeholder satisfaction (e.g. in discharging consent conditions) is expected to be relevant to CATOs.
Innovation	Maximise the performance of existing assets using the Network Innovation Allowance (NIA). Benefits are obtained through greater utilisation of assets, minimising network constraints, lower cost alternatives to traditional investment and facilitating a competitive market for generator connections.	Innovation could be expected if this leads to direct cost reductions. A CATO could also look to participate in a network innovation competition(NIC)[8]. Innovation in transmission asset design and delivery should also be incentivised through the tendering process for the CATO.
Safety - legislation	Comply with all applicable safety legislation regarding operation of the transmission network.	A CATO will need to comply with all applicable safety legislation.
Safety – network risk	Maintain the level of network risk (Network Output Measures – NOMs) through maintenance and replacement.	NOMs are secondary RIIO deliverables that enable network performance to be monitored by Ofgem. This incentive could be applied to CATOs.

Source: CEPA, TNEI and LHGP

[8] The Electricity NIC is an annual opportunity for electricity network companies to compete for funding for the development and demonstration of new technologies, operating and commercial arrangements.

2.6. Conclusions

There is a potential pipeline of opportunities for CATOs to perform similar functions as incumbent TOs today for new, high value and separable transmission projects. Many features of the underpinning licensing and regulatory framework for CATOs is also expected to share common features with other network companies, including OFTOs and TOs.

The rest of this report focuses on how the regulated revenue stream could be set for CATOs and what performance obligations and accompanying financial incentives might apply to the licensee to ensure that the new transmission infrastructure is delivered effectively, and that the assets are operated and managed in an economic and efficient manner.

3. FRAMEWORK FOR SETTING THE REVENUE STREAM

3.1. Introduction

In developing a regulatory and commercial construct for CATOs, we first consider a series of options for the overall regulatory framework Ofgem could use to set the regulated revenue stream for a CATO. Subsequent sections of the report then focus on the period of the revenue stream, indexation policy and allowed adjustments to the revenue stream.

3.2. What are the issues?

The framework that is used to set a CATO's allowed revenue stream should allow all, or some, components of the allowed revenue stream to be set through the competitive tender process. This will ensure that competitive pressure is applied to the pricing of bids.

In contrast, in standard regulated utility sectors, regulators have used pricing models that are based on cost submissions by the regulated company and cost assessment by the regulator to build-up an allowed revenue stream that allows the company to recover its efficiently incurred costs, including an allowed rate of return. Rules and a developed regulatory regime/contract are used to determine how the cost submissions and cost assessment by the regulator are then translated in revenues and prices for use of the infrastructure.[9]

The main elements in the revenue calculation undertaken in a typical price control – we discuss some of the recent developments of this basic model in the energy sector below – are set out in Figure 3.1.

Under this standard regulatory framework, investors are remunerated for the capital employed in the provision of the service through two separate charges:

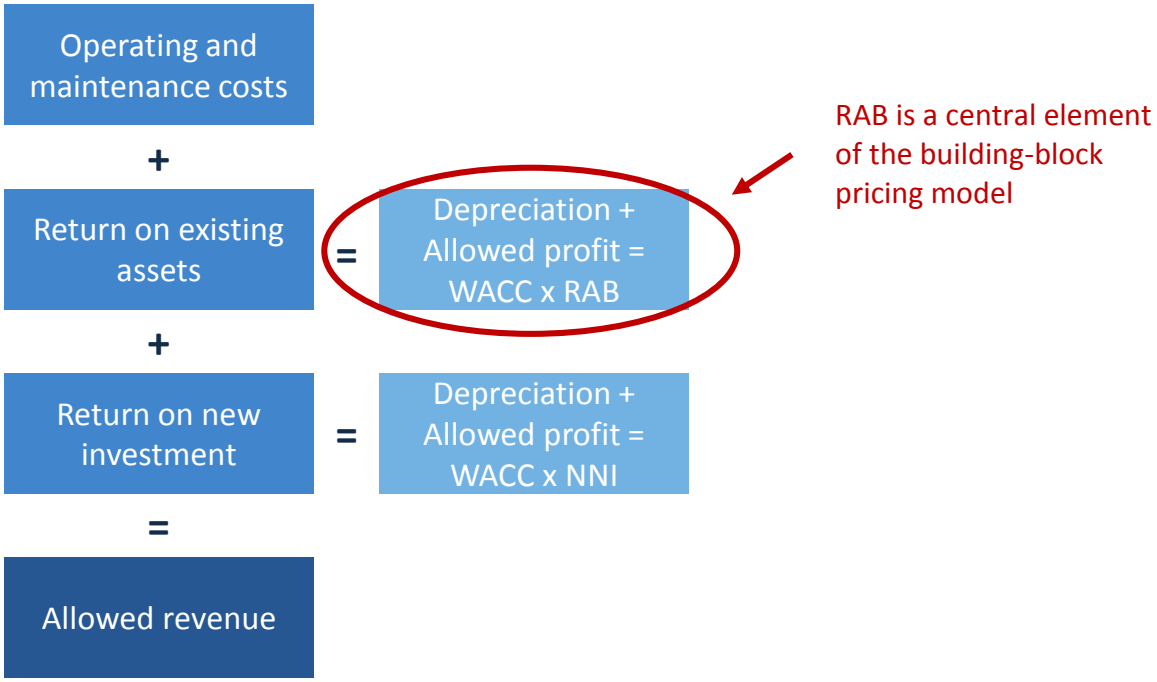
- the opportunity cost of the capital employed which is proxied by the allowed rate of return, which reflects the cost of both debt and equity finance; and
- the consumption of the existing asset to provide the service, proxied by the depreciation charge.

As a consequence under this framework:

- the *allowed* Regulatory Asset Base (RAB) and weighted average cost of capital (WACC) – together with assumptions on depreciation policy – are central building blocks used to set the regulated revenue stream; and
- regulatory commitment to the capital (debt and equity) invested by the infrastructure provider into a company or project is provided through the licensing framework and the RAB of the licensee.

[9] See for example Alexander et al. (2005): 'The Regulation of Investment in Utilities'

Figure 3.1 – Elements of allowed revenue under standard regulated utility 'building-block' framework



NNI = net new investment

Source: CEPA, LHGP and TNEI

This regulatory approach is typically associated with application of price control reviews of a sector and/or single regulated network company.

In contrast, other infrastructure sectors which have – and in many cases continue to – apply competitive tendering, have tended to adopt an alternative approach:

- the bidder is typically asked at the time of the tender to provide its *required* revenue stream (sometimes in real, sometimes in nominal terms); and
- therefore, the revenue stream is derived by the bidder from the *projected cash-flows* in the bid model of the tender applicant.

Standard practice – in OFTOs and PFI contracts – under this Tender Revenue Stream (TRS) approach has been that:

- the bidder requests a starting TRS / unitary charge figure that is kept level over the revenue term, before the application of inflation indexation; and
- then either all, or a proportion of, the flat TRS / unitary charge is indexed to a measure of price inflation.

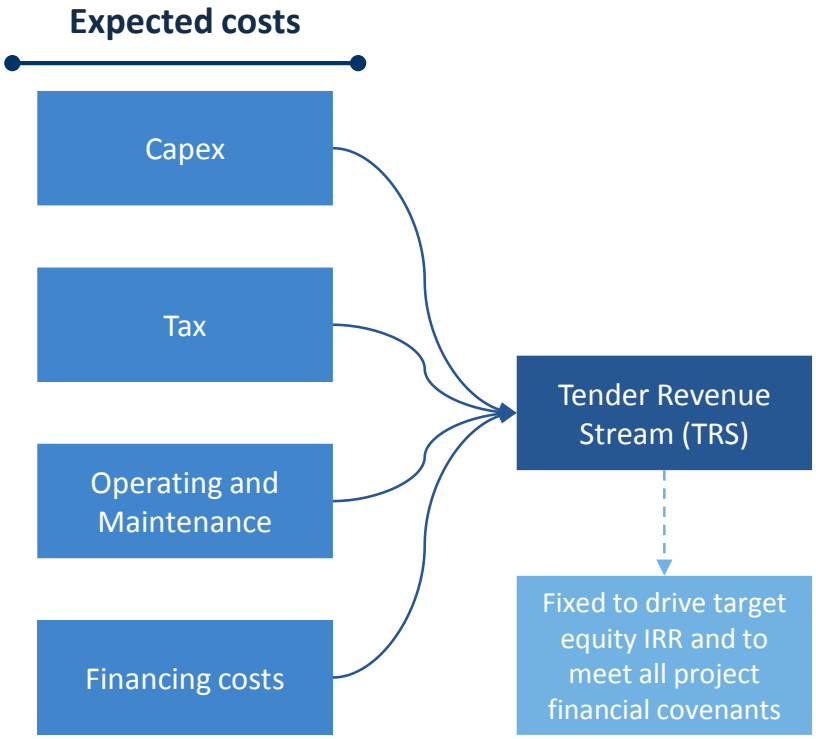
Rather than a regulatory pricing model – with regulatory determined building blocks – being used to set the revenue stream, in this case:

- it is each bidder's responsibility to request what they think they need to undertake the activities and obligations associated with the contract or licence; and

- the starting level of TRS will be heavily influenced by the financing of the project, in particular, the debt repayment profile.

As illustrated in the figure below, this is a project/concession based framework for setting prices, where long term certainty of recovery of costs – to support project cash-flow based lending – is provided through certainty of the TRS over the revenue term. Unlike a RAB model, the TRS is fixed at the tender for the full concession period, with limited subsequent regulatory intervention through price control reviews.

Figure 3.2 – Elements of a tender revenue stream based regulatory framework



Source: CEPA, LHGP and TNEI

3.3. What are the options?

Based on the above, there are two basic regulatory and commercial constructs that could potentially be applied by Ofgem to support either or both its early and late CATO tendering models. The two basic models are:

- ***a TRS model:*** under this model it would be expected that the tender applicant would bid its required revenue stream (TRS) and this would be fixed in the CATO licence (similar to OFTO Build or PFI contracts). The required TRS would be the key price parameter bid by the CATO built up from a tender applicant's bid model; and
- ***a building block model:*** whereby certain parameters that will set the revenue stream are bid by the tender applicant at Invitation to Tender (ITT), whilst others are set by the regulator and potentially revised at period review periods – the revenue stream in this case would be set using 'building blocks'.

In practice there are various hybrids of these two basic models. For example, one hybrid model would be to use:

- a TRS model for determining the regulated revenues associated with construction costs (capital expenditure (capex)); and
- then a building block model for elements of the operational phase (e.g. O&M costs or the allowed rate of return).

Another hybrid would be to combine principles of standard network price regulation – e.g. application and depreciation of a RAB and an allowed return in setting an allowed revenue stream – with competitive tendering. In this case:

- bidders might be asked to bid elements of the regulatory framework – e.g. the allowed rate of equity return that would apply over the life of the project; whilst
- other parameters, such as capex, or elements of capex, would be set through a regulatory cost assessment process.

Although as discussed above, the building block / RAB model is typically associated with price reviews, this doesn't necessarily need to be the case. As indicated above, certain building blocks could be fixed at the time of the tender to provide the long term certainty and absence of regulatory intervention that would apply under the TRS model.

The Thames Tideway Tunnel (TTT) project is a recent example of this type of model being applied in the UK infrastructure space. The revenues for the project will in this case be determined by a building block approach, but the allowed rate of return on the RAB which is applied during the construction period of the project has been competed – and then fixed by the regulator – at the time of the tender.

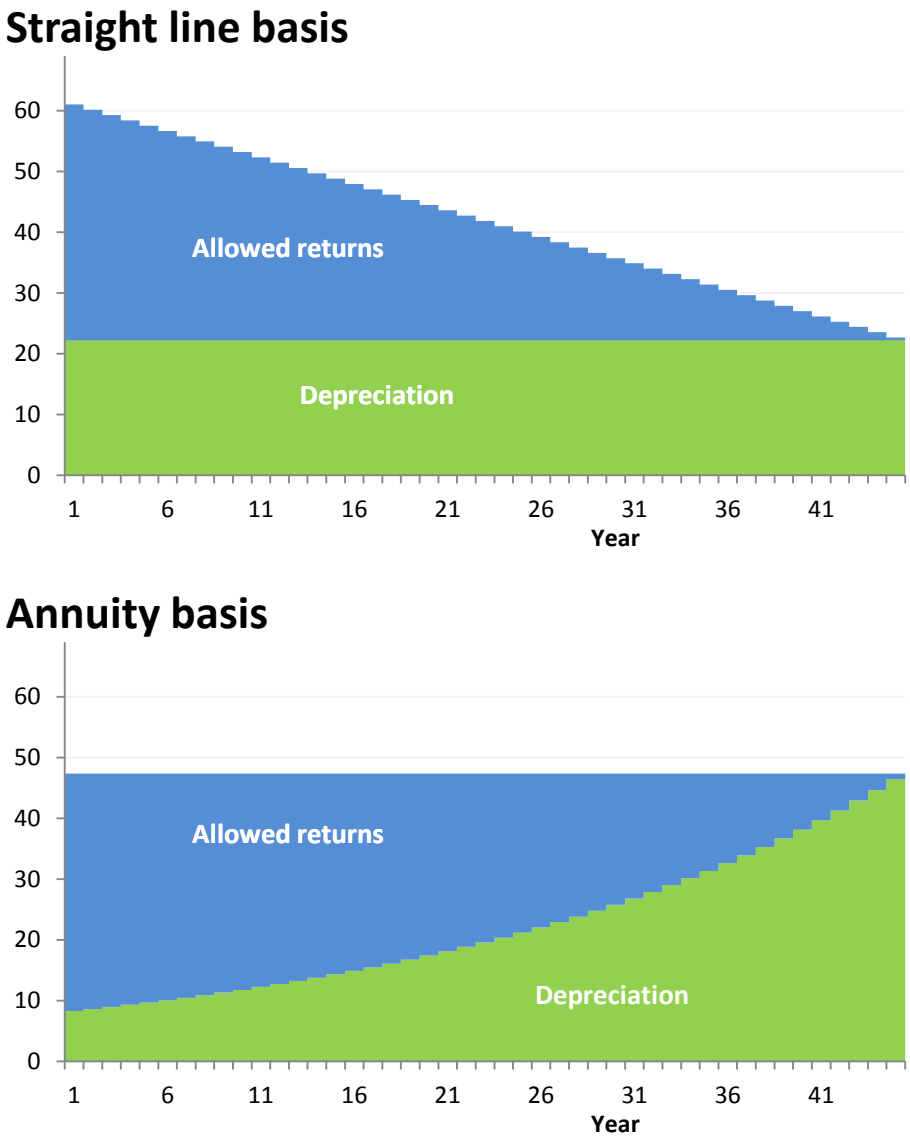
In applying a building block regulatory pricing model, there would also be a range of choices that could be made in how the revenue stream is profiled for the CATO using the concept of a starting RAB and allowed WACC for the CATO. For example:

- the allowed revenue stream could be set using a straight-line depreciation profile, based on an agreed opening RAB value and allowed cost of capital; or
- alternatively the revenue stream could be set using an annuity depreciation method, with a flat "mortgage" style revenue stream.

Both revenue profiles – straight-line and annuity depreciation method – are illustrated in Figure 3.3 below. The straight-line depreciation revenue profile is the approach that currently applies to new transmission assets under RIIO-T1.[10] We understand an annuity method has been used by Ofgem in setting cap and floor levels for electricity interconnectors.

[10] Figure 3.3 assumes a 45-year asset life consistent with the asset life policy that will apply for new transmission assets by the end of RIIO-T1. Over the course of RIIO-T1 the asset life is transitioning from a 20-year assumption.

Figure 3.3 – Alternative depreciation methods under a building block pricing methodology



Source: CEPA, LHPG and TNEI

As Figure 3.3 shows, under the straight-line method, the revenue stream – depreciation and allowed returns – is front-end loaded, whilst an annuity method means that the allowed revenue stream is level (before application of indexation).

Both methods however, would still rely on the principles of a building-block regulatory pricing methodology in setting a CATO's revenue stream. In contrast, under a TRS model, the flat unitary charge/revenue profile (before inflation indexation is applied) is bid by a tender applicant, given their projected cash flows for the project.

3.4. Discussion of options

Both of the models set out above are able to provide a stable and defined cash flow profile for investors in CATOs.

However, the TRS model is perhaps the simpler model of the two if the aim is to provide long-term certainty of revenues for investors and a level playing field for a range of financing approaches – e.g. project / cash flow based lending vs. corporate financing. Although the RAB model provides confidence in the regulatory contract and has a track record of attracting significant levels of investment into network industries, experience with OFTOs demonstrates this outcome can equally be achieved through a long-term TRS, largely absent of regulatory discretion and a regulatory contract between price review periods.

The TRS model also has attraction in a competitive tendering environment as it provides a framework for setting the allowed revenue stream which is tied specifically to bidders projected cash flows for the project in question:

- the starting level of the TRS and the revenues investors can expect to receive over the revenue term can be set to reflect the structuring of the project financing;
- use of cash resources and project financing can be optimised over the concession period and priced into the TRS at the time of the tender process; and
- consequently the competitive application process could have greater flexibility to drive an efficient outcome for consumers.

In marketing CATOs as a new opportunity in the infrastructure sector, another attraction of the TRS model is that it would align with the standard revenue stream framework investors in PFI contracts and OFTOs are already familiar with.

However, the building block model – organised around the concept of a RAB and an allowed return on the RAB – would also be a concept which international investors in *utility companies* are very familiar with, although the model is not specifically used in tendered infrastructure such as PFI in the UK. This model also potentially offers a well-established and mechanistic regulatory framework for CATOs where there is a need:

- for flexibility to choose the depreciation / cost recovery profile of the investment from consumers (see discussion in Section 4);
- to manage and incentivise incremental capex by the company as the RAB is rolled forward from one price control period to another;
- for clear "rules based" framework for structuring cost and delivery incentives over the service delivery period of the CATO; and
- significant reopeners of the revenue stream, due for example to uncertainty of costs and outputs.

However, as discussed in later sections of the report, a clear framework for cost sharing and delivery incentives can also be created through the TRS model by:

- submission of a project bid model which contains the CATO's commercial assumptions on costs and output delivery;

- defined contractual mechanisms and processes that allow for the TRS to be reopened over the course of revenue term; and
- adjustments to the TRS subsequent to the tender, according to agreed rules on performance and cost sharing.

As an illustration, a good example of how the two approaches may differ is in the potential treatment of refinancing. There are a number of circumstances where the CATO project company could seek to refinance following the award of the licence.

For example, this may be due to a:

- change in risk perception for the project;
- change in risk perception for the asset class; or
- change in market conditions.

In particular, given the risks around construction, the cost of finance is likely to carry a premium compared to an operational asset and consequently there may be opportunities for refinancing benefits to be gained over the life cycle of the transmission project.

Under the building block model, in order for the benefits of project refinancing to be shared between consumers and investors, either the *expectation* of refinancing benefit would need to be priced into the bid rate of return that is applied to the RAB – effectively the allowed return over the revenue term would be an "average" cost of capital for the different phases of the service delivery period. Alternatively the regulatory framework would need to be flexible for the allowed rate of return to be varied over the revenue term, perhaps following an initial period where the allowed return was fixed.

In contrast, under a TRS model, refinancing could be captured by a refinancing gain share mechanism included in the CATO licences, as Ofgem has adopted for OFTOs in the most recent round of offshore licence competitions.[11] In this case there would be agreed rules and principles, triggered by a refinancing event, which would lead to a reopening of the CATO TRS. There would be defined rules for how refinancing benefits are shared between the CATO and consumers through allowed TRS adjustments.

3.5. Conclusions

As set out, there are advantages with both of the high-level frameworks considered for setting CATO allowed revenues. Both models have a track record and would be able to provide a stable and defined cash flow profile for investors.

We believe on balance that the TRS model is the best approach for CATOs. Particularly for the late tender model. The starting level of the TRS would be tender process driven, with long-term certainty of regulated revenues provided for investors and a level playing field for a

[11] A refinancing gain sharing mechanism was introduced for OFTOs for Tender Round 3.

range of financing approaches – e.g. project / cash flow based lending vs. corporate financing. From a tender evaluation perspective, it is also a relatively simple method, with the TRS the primary price element evaluated at the tender stage.

The building block model could be attractive in circumstances where greater flexibility and adjustment of the revenue stream is needed and is, therefore, more likely to be suitable for the early tender model. However, there would also be attraction in maintaining a consistent revenue framework between both tender models, to support investor understanding and familiarity with the regime, together with consistent application of regulatory principles.

As a consequence, we suggest CATOs should be asked under both the early and late tender models to bid a TRS – with supporting assumptions – at the tender stage. The need to apply adjustments to the revenue stream, both in relation to changes in network outputs and outturn costs, is discussed in subsequent sections of the report. In the next section, however, we focus on options for the period of the revenue stream and residual value policy.

4. PERIOD OF THE REGULATED REVENUE STREAM

4.1. Introduction

Following from the options discussed in the previous section, in this section we focus on choices for the period of the regulated revenue stream.

Choices on the period of the regulated revenue stream may also impact residual value questions, given the expected economic life of onshore transmission assets. Therefore we also discuss options for residual value policy in this section.

4.2. What are the issues?

The are a range of relevant factors that need to be considered in determining the optimal length for fixing a CATO's revenue term. These include the nature of the assets that are being regulated (e.g. their expected technical and economic life), consistency with existing arrangements of recovering the costs of onshore transmission infrastructure, financing, cost certainty and Ofgem's duty to protect current and future consumers' interests.

Fixing a CATO's revenue term for a long time period would provide stability and a well-defined cash flow profile for investors. However, where there is uncertainty of future costs, the longer the time period the revenue stream is fixed, the higher the risks the CATO could be exposed to in the event costs (e.g. O&M) can only be fixed through outsourcing arrangements for a period less than the revenue term period. As a consequence, regulatory policy needs to balance a range of factors to serve the best interest of consumers.

4.2.1. Cost recovery considerations

A key starting question, is over what period the CATO investment would *ideally* be recovered from consumers, including whether the cost recovery period should be aligned with the expected operational/economic life of the assets?

As part of the RIIO-T1 process[12], Ofgem concluded that for electricity TOs the average expected economic life and depreciation period for new transmission assets should be 45-years. Using realistic assumptions for the economic asset lives for depreciation purposes was seen as an important element in "*providing a more stable, sustainable and predictable basis for financeability over the long term. In addition, it will ensure that companies and consumers face the appropriate price signals and will provide, over the longer term, a* ***fairer spread of the cost of investment between existing and future consumers****."*[13]

CEPA emphasis added.

[12] Ofgem (2011): 'Decision on the strategy for the next transmission price control – RIIO-T1'
[13] Ofgem (2011): 'Decision on the strategy for the next transmission price control – RIIO-T1'

For RIIO-T1, depreciation is also based on a straight line basis as a well as a 45-year asset life assumption (for new assets). This means that in real terms, the depreciation charge for the new investment is spread equally over the 45-year asset life, although as discussed in the previous section, the return *of and on* investment[14] results in a front-loaded revenue profile.

If the length of the CATO's revenue stream were aligned with the RIIO-T1 asset life assumption – i.e. the term of the CATO allowed revenue stream was set to 45 years – and the investment expected to be repaid by consumers over this period, the policy would be aligned with the principles which Ofgem has set more generally for balancing the recovery of onshore transmission infrastructure costs from current and future consumers.

From this perspective, a relatively longer-term (e.g. 40-50 year) revenue term period – potentially with the need for reopeners on costs that are uncertain for the CATO beyond a certain time period (e.g. O&M) – could be appealing. In the absence of risk of asset stranding, the costs of investment could be stated to be more equitably recovered from current and future users of the transmission assets, with the defined regulatory period closer to the expected longer term technical and economic lives.

Of course, an alternative policy that could achieve similar objectives, would be to apply a residual value policy that allows the revenue term period for the CATO to be shorter than 40-50 years, but encourages the CATO's investment to be depreciated over a longer time period. The complexity of the regulatory framework would be expected to increase in this case, as setting the revenue term – and therefore, period of cost recovery – over a longer time period raises residual value questions. We discuss this option in further detail below.

4.2.2. Financing considerations

A longer-term fixed TRS – similar to the objectives that are typically being sought under a RAB model – would also provide a well-defined revenue stream for the CATO with the absence of regulatory intervention through price control reviews.

However, a consequence of this policy is that the CATO may need to *either*:

- raise debt for a similar length of duration as the allowed revenue stream to ensure a full financial package is in place at the tender stage; or
- refinance the project and, therefore adjustments made to the balance sheet over the course of the project's operational life.

Based on our engagement with investors and financial institutions – see Annex A – financing on such a long duration basis is clearly possible.

However, the question for Ofgem is whether this represents best value for money for the consumer. Initial feedback from investors is that:

[14] Allowed returns plus depreciation charge.

- banks' lending to infrastructure projects typically fund up to 25 years with step up margins to incentivise the refinancing of projects;
- a debt tenor greater than 30 years is likely to be too long for the European Investment Bank (EIB) to participate in projects; although
- the institutions / capital (bond) market would be keen on longer term lending and index linked to match long term liabilities.

Maturities which allow potentially both bank and institutional debt financing in CATO competitions would offer the most competition and are, as a consequence, likely to deliver the best value for money deal for the consumer.

Given the feedback we received from the market (see Annex A), maturities of no more than 25 years would therefore appear to maximise debt financing competition, which would not match with a revenue stream term that was set to broadly match the expected the economic asset life assumption used under RIIO for new transmission assets.

Of course projects could look to refinance part of the way through the revenue term. However, in bidding for infrastructure opportunities, we understand procuring authorities, and indeed project sponsors, are often keen to put in place a firm financial package for the duration of the revenue term. Increasing the likelihood of the *need for* project refinancing increases performance risk for the operator, and, if refinancing gain or pain share mechanisms were included as part of the licensing framework, also the consumer.

4.2.3. Cost certainty considerations

Where the revenue stream is fixed and there are limited opportunities for a CATO to adjust / reopen the revenue stream, the CATO will need to be confident it can provide a firm price for all elements of service delivery at the time of the tender process. Where tender applicants are asked to bid a firm price, but cannot achieve this (e.g. through outsourcing contracts) for its underlying cost base, they would be expected to include risk premiums in their bids which are unlikely to represent value for money for the consumer.[15]

Therefore, the optimal period of the revenue term – in a sector where there is the capacity to apply competitive pressure to costs – may also be influenced by the period over which a CATO can realistically obtain a firm (contracted) estimate of costs. In addition to financing costs, the operation of transmission assets will require ongoing O&M expenditure, spanning the life of the asset. Experience with OFTOs has demonstrated that bidders have been willing to provide fixed prices for 20-year O&M packages for transmission assets.

If the revenue term for a CATO was fixed for a longer time period (e.g. the 40-50 year periods discussed above) either experience would suggest this will require a reopener on costs, or bidders may need to make very conservative assumptions of how underlying costs may

[15] We discuss issues of contingency and the firmness of the regulated revenue stream in Section 8.

change over this long-term time period. Neither approach may maximise the benefits from competition and risk transfer to the CATO. This might, as a consequence, support a shorter regulated revenue term for CATOs, perhaps closer to 20-25 years.

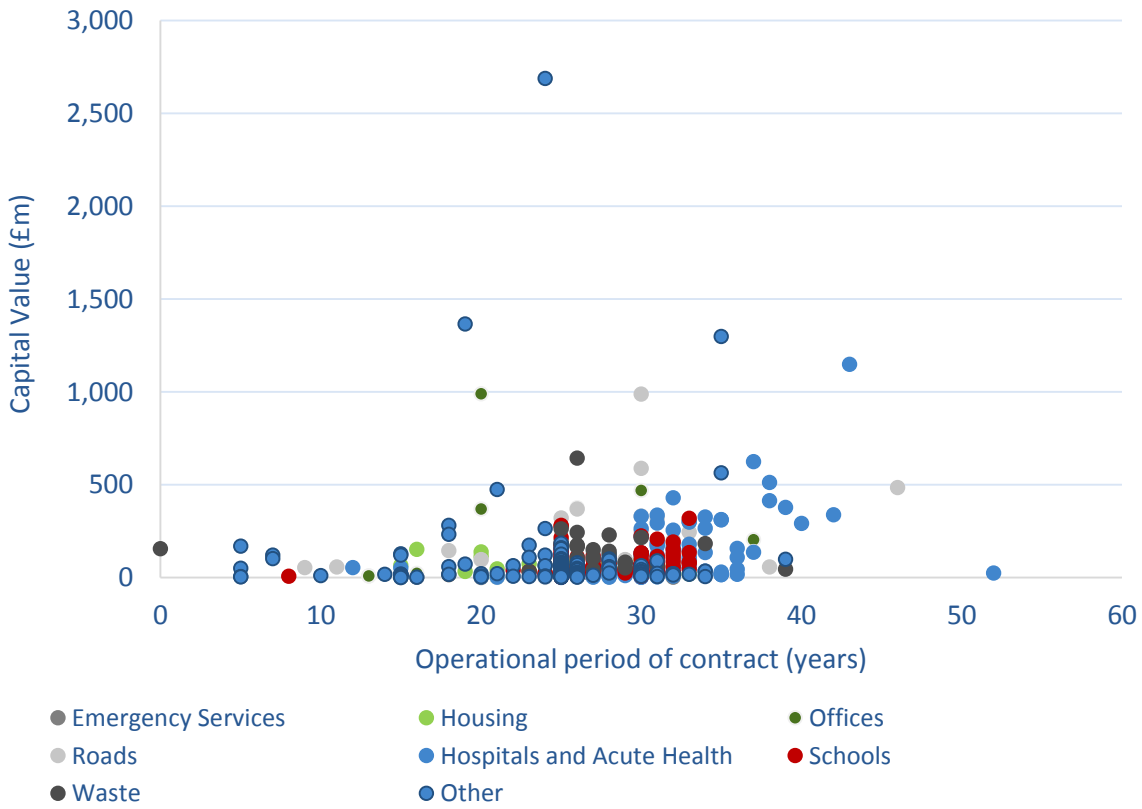
4.2.4. Precedent in other sectors

Precedent in other sectors is informative for CATOs by highlighting the factors which have influenced the period of the revenue stream in other tender models.

OFTOs for example have a 20 year initial revenue term period influenced by the nature of offshore assets, at least for the foreseeable future, being single use, serving either one or a small proximity group of offshore generators. In this case the expected life of the generation assets has been an important consideration. At the time of developing the OFTO regime, financing was also a relevant factor, with the financing structure of offshore networks expected to be different to larger and more complex onshore networks.

PFI projects (either in development or operational) typically have adopted contract durations in the range 20-35 years, as illustrated in Figure 4.1 below.

Figure 4.1: Value and Operational Period of PFI Contracts in operation – March 2014



Source: CEPA, LHGP and TNEI analysis[16]

[16] Data sourced from HM Treasury and Infrastructure UK (2014), PFI projects: 2014 summary data

Figure 4.1 shows that a range of operational periods for PFI contracts have been adopted across different sectors. Similar to OFTOs, our expectation is this has been influenced by the nature of the assets, their expected useful life and financing arrangements.

4.2.5. Summary

A shorter term period for CATOs than 40-50 years would, therefore, be more aligned with other sectors and the financing/cost certainty considerations that have typically influenced the length of revenue period in other tendered infrastructure sectors.

If however a shorter revenue term is considered, the question of whether the full investment cost of the project would be recovered over this period becomes important:

- if yes, i.e. the investment is fully depreciated over the initial revenue term, then this would mean a different cost recovery principle would be being applied to some but not all onshore transmission assets; and
- if no, then the regulatory framework for CATOs will need be clear on the principles of how residual value of the assets is treated.[17]

4.3. What are the options?

Informed by the above discussion, we have considered a range of options for combining the duration of the revenue term for the CATO with regulatory policies for investment cost recovery (depreciation) and residual value.

Under the TRS model that was described in the previous section, this has covered different options for the length of the flat (real) TRS payments which would be made (before the application of inflation indexation) and whether Ofgem would establish a clear residual value for the CATO assets at the end of the revenue term – see Table 4.1 below.

Table 4.1: Options for revenue term duration, cost recovery and residual value policy

#	Revenue term	Cost recovery period	Residual value (RV) policy
1	45 years	45 years	Investment written off (fully depreciated) over the 45yr revenue term
2	30 years	30 years	Investment written off (fully depreciated) over the 30yr revenue term
3	25 years	25 years	Investment written off (fully depreciated) over the 25yr revenue term
4	25 years	Targeted 45 years	Partial depreciation - RV payment to the CATO at the end of the revenue term

Source: CEPA, LHGP and TNEI analysis

[17] Under this approach it may be possible to retender the assets or for the assets to transfer into the onshore TOs RAB. There are a range of possible options.

Under the building-block model, the principle choices of revenue stream length and residual value are generally the same as with the TRS model, but the same policy questions are specified slightly differently in terms of the:

- profile of depreciation– e.g. the straight-line vs. annuity methods discussed and illustrated in the previous section; and
- appropriate depreciation asset life assumption for the onshore transmission project in question.

45-year revenue term

The first option, as already described above, would be to set the length of the CATO revenue term to match the asset life assumption used for new electricity transmission assets under RIIO – i.e. 45-years – and have an expectation that the project's initial funding requirement (debt and equity) would be fully repaid over the course of the revenue term. In this case, there would be no regulatory assumption made on residual value, although tender applicants could be allowed to assume a residual value at the end of the revenue term.

25-30 year revenue terms

The alternatives would be to set a shorter length for the revenue term (e.g. 25-30 years) to facilitate greater competition in the debt finance that could be attracted into the project without creating the need for project refinancing.

Under this approach, the initial funding requirement of the project could either be fully repaid over the revenue term – in regulatory terms, the capex will be expected to be fully "depreciated" / repaid by the completion of the revenue term – or in addition to the flat TRS payment, a residual value for the assets could be fixed at the completion of the revenue term, on the assumption the remaining value of the assets would be recovered from future consumers following the end of the CATO's revenue term.

Where a residual value is specified as *part of the regulatory regime*, this could be set using basic regulatory finance concepts to fix the regulatory residual value of the assets at the end of the revenue period. For example, the initial investment could be depreciated on a straight-line basis using a depreciation asset life assumption (e.g. 45-years) as follows:

- fix the desired depreciation asset life for the CATO project (i.e. this assumption could be varied on a project by project basis);[18]
- fix the Opening Balance (OB) for the assets using a forecast capex value – e.g. as bid through the tender process; finally

[18] For example, if the CATO project was a generation connection and, therefore, as with OFTOs, the assets expected to be use, a more accelerated depreciation profile than the 45-year assumption used for RIIO-T1 could be adopted, to match with the expected economic life of the generation plant, and justified on a beneficiary pays principle.

- straight-line depreciate the opening balance to the end of the revenue term to establish the Closing Balance (CB) and residual value payment.

In forming its policy, Ofgem would also need to consider the treatment of inflation in fixing this residual value. Depending on the principles applied, this will impact on the path of the revenue stream over the useful life of the transmission assets (see discussion in Annex B).

The calculation of residual value would already be embedded within the regulatory framework if a building block methodology was applied to set a CATO's revenue. The RAB could in this case set the residual value at the end of the revenue term, where the revenue term period is less than the applied depreciation asset live for the CATO.

Quantitative analysis

In Annex B we have provided illustrative financial modelling of each of the policy options in Table 4.1 using stylised financing packages and modelling assumptions.

The modelling has been completed using a TRS approach, as for the reasons that were discussed in the previous section, we consider this to be the most appropriate framework for setting the regulated revenue stream of the CATO, both for the early and late tender models. We have excluded operating costs and taxation considerations from the modelling to focus on the primary influence – from a quantitative / modelling perspective – of the debt and equity financing package on the choice of revenue term period.

As a consequence the financial modelling is stylised and based on simplified assumptions, with the objective to the show the possible profile of regulated revenues and financing cash-flows under alternative revenue terms. The modelling should *not* be viewed as a cost-benefit analysis of the options, but rather an illustration of the types of issues which would need to be considered in project financing under different regulatory approaches.

In Figure 4.2 overleaf, we have summarised some of the key outputs of the financial modelling. At a basic level this shows how:

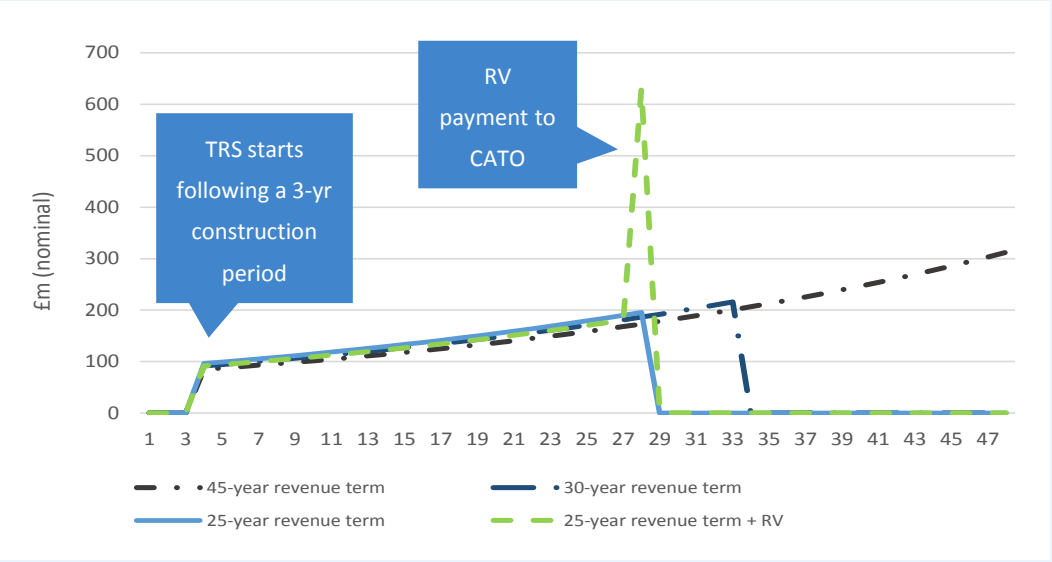
- different policies on the revenue term period will impact on the NPV TRS that will need to be paid by consumers. Under our illustrative modelling assumptions, this is driven by differences in total NPV financing costs for consumers;
- different regulatory policies on the period of CATO revenue term and treatment of residual value also drive differences in the profile of capital repayment of debt and equity distributions; and
- a policy of tying part of the capital repayment of the CATO to a residual value would, in particular, result in a very different profile of cash flows for both debt and equity investors in a CATO project.

Figure 4.2 – Selection of policy option financial modelling outputs

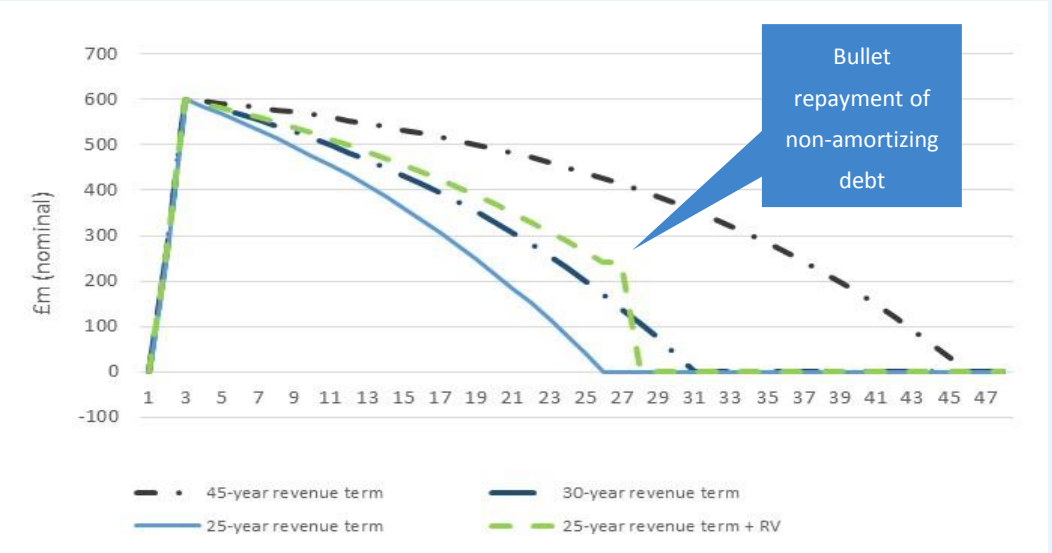
Comparison of NPV TRS (financing package in place for the full concession period)

TRS (nominal)	45-year term	30-year term	25-year term	25-year term + RV
Starting TRS (£m)	85	92	96	91
Total NPV TRS (£m) *	1,532	1,351	1,271	1,282

CATO revenue



Closing debt balance



Source: CEPA, TNEI and LHGP analysis

** NPV TRS includes the RV payment which in practice will not be paid as a lump sum by the consumer*

The NPV of the TRS under alternative revenue term polices, as defined by the starting TRS and the future indexation of the revenue stream (see Section 6), will in practice depend on the pricing of the different elements of the financing package and how a CATO would choose to optimise its cash-flows to formulate an efficient capital structure.

For example, whether it would be value for money for the electricity consumer to apply a policy where part of investor capital is repaid to the *CATO* through a residual value payment, will depend on the deliverability and cost of obtaining investment to support financing of this specific profile of cash flows. Our modelling adopts stylised assumptions of the cost of debt for this scenario assuming the financing package as a whole is investment grade and that a mix of amortizing *and* non-amortizing debt is used to finance the project under the 25-year revenue term and policy of targeted (c. 45-year) depreciation and residual value.

These assumptions would need to be tested with market participants, to reach a more definitive view of whether this policy is both definitively financeable (we discuss financial deliverability considerations further as part of the qualitative discussion of the policy options below) and would have the potential to provide long term value for money for the consumer, given that there are alternative policies available which Ofgem could look apply.

4.4. Discussion of the options

As discussed above, the advantage with the first option (i.e. the 45-year revenue term) is there would be:

- clearer alignment between the duration of the revenue stream and the expected economic life of the assets;
- consistency with the regulatory funding principles for new transmission infrastructure under RIIO-T1; and
- a simpler regulatory policy on residual value, given that the investment would be expected to be fully recovered over the revenue term by the CATO under this option.

However, Ofgem may not always be able to achieve the best value for money offer in terms of debt financing with this approach:

- If the CATO were to raise debt to broadly match the full length of the revenue term period, the market offering would, we understand, primarily be targeting the institutional market.
- In the current market, we understand there may also be price disadvantages of the licence competitions looking to target very long debt maturities, which may be the case with a 45-year term.

The second option – with a 30-year revenue term – is a middle ground between the options, however, the market offer in this case would still be on the edge of tenor length that we understand the bank market and EIB say they operate in.

The third and fourth options introduce a shorter revenue duration period for the CATO with the advantage that the maturity of the project debt financing – in the absence of the need for refinancing – could be targeted on a deeper part of the market:

- From a deliverability perspective, the 25-year revenue term with an expected fully amortized debt package and depreciated capital value (Option 3) is the "vanilla" policy that targets both bank and institutional markets.
- However, as illustrated by the financial modelling, the fourth option could *potentially* provide a broadly consistent 45-year cost recovery policy as applied for new transmission assets from the end of RIIO-T1[19] and still target debt maturities which maximise competition across potential funding sources.

However, if part of the value of the licensee is locked up in the residual value payment, then bidders will either have to:

- pay down all the project debt and back-date equity distributions to compensate for front-loaded cost recovery; or
- put in place debt that doesn't amortize or only partly amortizes over the initial revenue term.

The former approach could compress the ability of the project to have a running equity yield over the course of the revenue term, whilst the deliverability of the second approach would depend on whether a project bond/credit without amortization (i.e. bullet repayment) would be acceptable (at an efficient price) to the market.

Whilst bullet style capital repayment on bonds are standard for corporates raising finance in the capital markets, debt is secured against the balance sheet of the company. Consequently investors are concerned about the financial strength of the company, rather than performance of a single project. A project bond/credit with bullet repayment would be different, given the possibility of a standalone project financing and that repayment of the principal would in this case be tied up in the residual value payment of the project.

Therefore, we expect that security and regulatory commitment to the residual value payment at the end of the initial revenue term period would need to be firmly established (e.g. as part of the licence) in order for debt providers to lend against this payment, or equity providers willing to back end returns to the end of the revenue term.

4.5. Conclusions

Given the market feedback received, our view is the length of the CATO revenue term should be focused around 25 years, although we suggest Ofgem consult on this point.

[19] The asset life assumption will be less than 45-years over the 8-year price control as there are transition arrangements to the new asset life assumption under the current price control.

The choice between the partial or fully depreciated scenarios depends on the expected impact of setting a clear residual value policy on the access to and pricing of debt and equity finance under the competitions.

Provided finance could be attracted at relatively keen rates, we believe Ofgem should explore the option of a 25-year revenue term, with an explicit residual value policy potentially focused on a 45-year cost recovery assumption. This policy could provide consistency of the period over which consumers pay for onshore transmission assets, which we expect will be an important consideration for Ofgem. We have discussed in this section how this policy might be implemented, through regulatory principles and project financing structures. Whilst the revenue stream structure we have proposed for both late and early models does not approximate the cost recovery principles and cash flow profile applied under RIIO exactly, by explicitly fixing how the residual value will be set, one of the benefits is Ofgem could have greater influence over how costs are recovered from current and future consumers. The combined policy of using a level base TRS and residual value policy could be used to achieve a more consistent match between the benefit of when users will receive the transmission services (given expected technical/economic life) and payment for the services. However, the feasibility of such an approach will need to be tested through further consultation, to ensure that it is financeable and capable of delivering value for money.

A clear residual value policy would also provide a means of managing incremental capital expenditure over the initial revenue term, as discussed in the next section of the report.

5. ADJUSTMENTS TO THE REVENUE STREAM FOR CHANGES IN NETWORK OUTPUTS

5.1. Introduction

Over the course of a CATO's project life-cycle, there may be a need to change the design of the assets or incur additional capex as the requirements of the network change.

In this section we discuss potential policy options for how these changes in outputs, in particular incremental capacity increases, could be managed by allowing adjustments to a CATO's regulated revenue stream, subsequent to the tender.

The need for and options of adjusting a CATO's regulated revenue stream in response to changes in costs and the performance of the CATO in meeting its operating obligations (delivery and performance incentives) are discussed in Sections 7, 8 and 9.

5.2. What are the issues?

The electricity environment is constantly changing and dynamic. The need for a network reinforcement may change and consequently its design may need to change, even where pre-construction or construction of the project has already started.

As an illustration, we understand that the South West Scotland transmission upgrade has needed to change in scope on a number of occasions due to onshore wind generators dropping out and new generators wishing to connect. Although not all electricity transmission projects may be as complex as the South West Scotland upgrade, under *both* the early and late tender models, but particularly the early tender model, there may need to be a way to modify project capacity and design *subsequent* to the tender process to appoint the CATO. This could lead to changes in the CATO's costs and so the way in which this would be treated through the regulatory framework needs be made clear.

There may also be a need for incremental capacity increases and consequently capex increases once the assets associated with the initial scope of the project are energised. A request for a new generation connection could, for example, trigger works for a CATO, either because the generator is looking to directly connect to its asset, or because the additional capacity may trigger the need for wider reinforcement works that impact on the CATO.

In the offshore transmission sector, where additional capex is required to deliver additional capacity at the request of a generator, the TRS is adjusted to reflect these additional costs. The OFTO also has the right to refuse to undertake additional capex that exceeds 20% of the Final Transfer Value (FTV) of the OFTO.[20] The OFTO is required to offer terms for the incremental capacity increase, with Ofgem expected to adjust the regulated revenue stream to reflect the economic and efficient costs of the incremental investment.

[20] See KPMG (2014): 'Offshore Transmission: An Investor Perspective – Update Report'

5.3. What are the options?

Under all cases, there is the initial question of whether the CATO should have the *obligation* to undertake the additional capex / design change, as this could require investors in the project company to invest additional capital and/or assume new risks with the opportunity.

There is then the subsequent question of how funding terms, either for a change in initial scope or an incremental capacity increase would be agreed, where the CATO is obligated to make the change or has stated it is willing to do so.

To answer both questions, we distinguish between the scenarios where an adjustment to the revenue stream could be required, subsequent to the tender.

5.3.1. Changes in design / scope during pre-construction

Under the early tender model, there are a range of scenarios where the scope of work required from the project could need to change during preconstruction.

Following the examples above, the need for the reinforcement may change (e.g. due to changes in the generation background) and the SO may wish to vary the design of a CATO's project to meet the changing need for reinforcement of the transmission system. A route or site change could also be required either due to changes in design, the results of detailed environmental and social constraint mapping analysis (following the tender process), or because of imposed consent conditions following planning submissions.

Both of these events would, to an extent, be outside of the CATO's control, and provided the SO has the contractual right to make such amendments to the network outputs required of the CATO – we would presume this would need to be handled through arrangements similar to a Transmission Owner Construction Agreement (TOCA) – would also sensibly qualify for an adjustment to the regulated revenue stream.

Similar events have been handled in international electricity transmission tenders and price controls through reopener mechanisms:

- A recent transmission tender in Alberta, Canada, included a reopener for route changes including changes in quantity and price. In this case, a pre-determined formula was used to adjust the revenue stream (see text box below).
- An alternative, less mechanistic approach, would be to run a review process in response to such events. In this case, the CATO would make a submission to justify the terms of its required revenue stream adjustment which would then be subject to a regulatory cost assessment by Ofgem and the standard appeal processes that apply under the CATO's operating licence.
- Another alternative would be to allow all proposed changes in costs as a full cost pass-through for the CATO.

Box 1 – Route change pricing mechanism – Fort McMurray

The Fort McMurray transmission tender run by the Alberta Electric System Operator (AESO) in Alberta included a mechanism that allowed adjustments to agreed payments to be made in the event there were route changes as part of the approvals process for the project. AESO is responsible for the Alberta Interconnected Electric System (AIES).

The project information brief states that these adjustments would be in accordance with pre-determined formulas, based on changes to the quantity of major project components and the unit prices for such components, subject to a cap which limits the overall price adjustment to encourage route fidelity.

Source: CEPA

5.3.2. Changes in design / scope during construction

This is an event that could occur under both the late and early tender models. Following the circumstances set out during pre-construction, we expect these changes to primarily relate to directed changes by the SO following a change in the need / scope of the reinforcement which will be provided by the CATO's project.

This would again sensibly qualify for a revenue adjustment with similar options as for preconstruction changes for how funding terms could be agreed. However, we would not envisage this scenario occurring too often, as in order to trigger the tender, or the start of construction under the early model, we would expect that a relatively firm needs case will have been established for the majority of CATO projects.

5.3.3. Incremental capacity increases during operation

Potential options for the regulatory treatment of an additional capex requirement, following a request for incremental capacity, include:

- Obligate the CATO to undertake any required incremental capacity and require the CATO to offer terms for providing that additional capacity.
- Obligate the CATO to undertake any required incremental capacity *up to* an agreed threshold, with the CATO required to offer terms for providing this additional capacity.[21]
- Provide the CATO the *option*, but not the *obligation*, to undertake any required incremental capacity (perhaps for anything above a minimum threshold) and in the event the CATO chooses not to undertake the work, the works would pass to the TO in the service area where the CATO is located.

[21] This could be defined in terms of capital value or alternatively by technical potential. For example could the existing tower design be operated at a higher voltage, or be strung with higher capacity cable?

- Obligate the CATO to undertake incremental capacity (either with a threshold or not) with Ofgem setting the revenue adjustment using a building block regime as applied to other onshore TOs (see Section 3).
- Retender the additional work as a new phase of the project.

Although some of these options may appear simple, there would in many cases be a series of implementation complexities to consider.

Under the first two options, it would be expected that a CATO would need to submit a plan/notice to Ofgem setting out (with supporting evidence) a required change to its revenue term, which it considers necessary to remunerate the costs it will incur in providing the additional capacity. This would include:

- the additional capacity that is being provided;
- the capital cost of making the investment;
- any corresponding increase in O&M costs; and
- the cost of financing the additional investment.

The approach that provides the option but not the obligation for the CATO to deliver the work would create interface issues between the CATO and the TO. For example:

- which party (CATO or TO) would be responsible for maintaining the transmission assets going forward; and
- commercial complexities of the TO potentially needing to work on the sites/assets associated with the initial scope of the project.

5.4. Discussion of the options

5.4.1. Changes in design / scope during preconstruction

Both a more formulaic adjustment mechanism, or regulatory cost assessment process, could be used to manage changes in design and scope during preconstruction. However, the options are likely to provide different risk profiles for bidders:

- a more formulaic approach – following the principles of the Fort McMurray tender – could create basis risk for the developer if changes in its cost base do not perfectly reflect the terms of the revenue adjustment formula;
- the regulatory cost assessment process allows adjustments to be less mechanistic and, therefore, more responsive to the actual changes in scope and output, but create regulatory risk for the CATO whether full cost recovery will be allowed; whilst
- a full cost pass through limits risk for the developer – which may be reflected in required returns on the project – but has weak incentives for design / route fidelity and cost control during the pre-construction period.

In providing the opportunity for adjustments to the revenue stream to occur, it would be expected that, as far as possible, Ofgem would also wish to encourage design and route fidelity from the CATO, given a central objective of the early tender model is for bidders to compete on design and full life costing of projects.

Therefore, alongside any reopener mechanism:

- we expect there will need to be financial incentives to help encourage a CATO to deliver, as far as possible, what it said it would deliver. We discuss options for how this might be achieved in Section 7; however
- overall, we could envisage any of the options above working, the key consideration being which approach is likely to provide best value for money given the risk allocation implied by the design / principles of the revenue stream reopener.

5.4.2. Changes in design / scope during construction

The need for a change in design/scope during the construction period, could be addressed through all of the mechanisms discussed for the preconstruction period. However, given the change in design/scope is more likely to relate to unexpected events, an approach closer to a regulatory cost assessment would appear to us to be most appropriate.

5.4.3. Incremental capacity increases during operation

The option of retendering the work associated with an incremental capacity increase would only be possible if the project meets Ofgem's criteria for a competitive tender (high value, new and separable). Whilst this delivery route might be investigated on a case by case basis, we would expect it could only by applied in relatively limited circumstances. For example, the preferred solution to deliver incremental capacity may be a higher capacity overhead line.

The option of being able to direct the local TO as well as the CATO to complete the work has attraction, as it provides the greatest flexibility for delivery of the incremental capex. However, we would envisage this route could raise commercial and legal complexities – as a TO would have to undertake works on another transmission company's assets – which may not facilitate the most timely and efficient delivery of the infrastructure upgrade.

Of the other options, we expect the following considerations to impact on which approach is the preferred regulatory treatment:

- the impact the potential size of obligation – which will vary by project – could have on bidders willingness to compete in individual project competitions;
- the ability for a preferred regulatory policy to provide consistency in treatment between individual projects;
- the impact that that the incremental capacity increase could have on the scale of capital required by the CATO; and

- the extent of regulatory certainty that is provided to CATOs under different approaches (e.g. limiting regulatory risk).

Given the expected role of many CATO projects – a part of the wider "backbone" transmission system rather than sole use assets – we would expect:

- the CATO to have some form of obligation to undertake incremental investment to provide incremental capacity;
- this obligation to be more prevalent than is the case with OFTOs, which would perhaps suggest a higher obligated threshold than the 20% level applied offshore; and
- given the wider expected use of this adjustment mechanism, Ofgem would need to provide regulatory guidance on the principles it would use to set the terms of any adjustment to the TRS.

There is also the issue of how an incremental capacity increase would be treated in the context of the initial period of the revenue term. Where an incremental capacity increase results in an allowed adjustment to the revenue stream, what would be the policy on cost depreciation and residual value at the end of the initial revenue term?

As discussed in Section 4, one of the advantages of an explicit residual value policy for a project's initial capex – potentially following the principles set out in Section 4 – is it can also be used to support incremental capex over the initial revenue term. If any incremental capex did need to be incurred by the CATO due to a capacity increase, this could enter the asset register and be depreciated using the same principles as for the initial capex, to vary the residual value of the CATO assets at the end of the initial revenue term period.

The principles that would be used to set the residual value for incremental capex, we expect would need to be part of the regulatory guidance provided on how terms for economic and efficient funding on capacity increases would be treated.

5.5. Conclusions

This section has set out a range of scenarios that could require a change in the CATO's network outputs and as a consequence, an adjustment to the regulated revenue stream.

Such adjustments and their regulatory treatment will of course need to be considered alongside the broader package of delivery incentives during the project life-cycle, which is discussed as part of subsequent sections of the report.

As we expect that this will be important element of the regime for all stakeholders, we suggest Ofgem consult on the various scenarios and options as set out. In particular, this may include the scale of *obligation* that should apply to a CATO in the event of a requirement to vary the

scope of a project during pre-construction[22] (e.g. in response to an SO request), or an incremental capacity increase once the initial project has already been energised.

[22] An event that would only apply under the early tender model.

6. INDEXATION POLICY

6.1. Introduction

In this section we consider options for indexing the CATO's revenue to a measure of inflation and how this may affect the value for money of the CATOs to consumers.

6.2. What are the issues?

Both regulated utility price controls and PFI contracts tend to include an inflation indexation mechanism as it is unlikely that passing all inflation risks to the licensee or contractor will be value for money for the consumer or purchaser.

HM Treasury (HMT) guidance on inflation risk issues in PFI Contracts states that the form indexation takes should be assessed from the perspective of value for money and that the proportion of indexation should be matched to the underlying inflation exposure of the contractor costs during the service delivery period of the PFI contract: "*insofar as the contractor's costs are subject to long-term inflation, it is likely to prove better value for money to index the element of the Unitary Charge which covers these costs against inflation, rather than require the Contractor to build in long-term contingencies into its pricing.*"[23]

Regulated revenue streams – including the existing RIIO price controls and OFTO licences awarded under the offshore competitive appointment process – also include inflation indexation mechanisms. In the case of the RIIO controls, allowed revenues are indexed to RPI inflation (as is the case with most UK price regulated sectors), whilst in the case of OFTOs (since the launch of Tender Round 3) bidders have had the flexibility to choose the proportion of the TRS that is indexed to RPI to match with the underlying exposure of the OFTO's costs. This is based on the premise that OFTOs costs will be a blend of fixed costs – e.g. debt service repayments – and those subject to price inflation.

Commenting on the proportion of the unitary charge that should be indexed under PFI contracts, HMT have noted that:

> "*If the Unitary is "over-indexed" – i.e. the indexed proportion is larger than the indexed element of the Contractor's costs – this mismatch may enable the Contractor to offer a lower initial Unitary Charge, because the extra Unitary Charge revenue from a higher level of inflation indexation in later years enables there to be a relative 'back-ending' of debt service payments and equity return."*

HMT also note that over-indexation of the Unitary Charge can mean that:

- through the Unitary Charge a longer average-life loan is being paid for, which is more expensive over the life of the PFI Contract (as more interest is paid overall);

[23] HM Treasury – 'Application note – interest-rate and inflation risks in PFI contracts'

- termination liabilities (compensation for outstanding debt) may be higher because of the higher loan outstanding at any point in time; and
- there may be pressure to enter into inflation hedging.

Therefore, it concludes that that the value for money baseline should be a matching of the unitary charge for PFI contracts, to the underlying inflation exposure of the contractor's costs during the service delivery period of the contract.

Similar considerations apply to CATOs.

Financing of capex will represent a significant element of the cost base of a CATO project company, and so in addressing the question of indexation, there should be consideration given to the financing strategy that could *potentially* be adopted by CATOs and the implications for inflation exposure.

From a debt financing perspective:

- If all or part of the project debt financing can be provided as an index-linked loan (in which the principal and interest payments are indexed against inflation) then revenue indexation would provide a natural hedge between the debt service costs of the project company and allowed revenues.
- However, the nominal debt market is much larger and more liquid than the index-linked debt market and therefore more likely to be used as the funding source for projects. For larger transmission projects (over £300m), in particular, the index linked debt market is less likely to provide a competitive financing.
- Therefore, in a majority of tenders, it might be expected that the CATO's debt services costs are fixed. As a consequence, a significant proportion of the revenue stream may not need to be tied to inflation and indeed may create pressures for a CATO to enter into inflation hedging arrangements.[24]

Equity investors, in contrast are very attracted by long-term inflation-linked returns. Inflation linked returns can help to match investor liabilities and consequently they may be willing to trade higher rates of return for a more defined inflation linked cash flow. Inflation indexation also provides a natural hedge for O&M costs.

As a consequence, the right proportion of the revenue stream to be indexed to inflation may differ by project and by the financing package adopted by the bidder.

In addition to the proportion of the revenues that are indexed, there are a variety of different measures of inflation which can be used for indexation purposes. Again, HMT Guidance for PFI states that: "*the measure of inflation used in the PFI Contract payment mechanism may*

[24] HMT guidance notes if the revenue stream is over-indexed – creating a "*mismatch between costs and revenues" – this may create "pressure from lenders (or shareholders) to enter into a hedging arrangement to cover the risk that if inflation runs below the level assumed in their financial model (e.g. 2.5%), it would endanger debt-cover ratios (and equity returns).*"

impact on affordability and value for money." The two most common indices used for inflation indexation in PFI contracts are RPI and RPIx, with regulated network sectors in the UK historically applying RPI indexation.

6.3. What are the options?

In terms of setting the proportion of the revenue stream that is indexed to a measure of inflation, options for CATOs include:

- Apply no inflation indexation, in which case bidders will need to build in full allowance for cost inflation in their bids.
- CATO would have a fully indexed revenue stream, similar to the approach followed onshore for the RIIO price controls and existing OFTO tenders.
- Ofgem undertaking an assessment of the proportion of allowed revenues that should be indexed to a measure of inflation.
- The CATO would be asked to bid the proportion of revenues that are indexed to a measure of inflation.

In terms of the inflation measures, a CATO's revenues could be indexed to indices of final goods and services prices – consumer price indices - including:

- RPI;
- RPIx;
- CPI; or
- CPIH[25].

An alternative, which has been considered in other infrastructure contexts[26], would be to link revenues to a basket of producer price indices. In this case:

- producer cost indices that capture the input costs of the CATO during construction and operation would need to be identified;
- weights would then be established for each of the individual indices to combine in the single basket index; and
- finally the producer price indices would be combined to obtain an overall estimate of cost escalation.

[25] CPIH was introduced in 2013. It includes a measure of owner occupiers' housing costs using a rental equivalence method. It is otherwise identical to the CPI.

[26] A basket index approach was considered, although never adopted, for Tube Lines London Underground PPP Agreement. Producer basket indices have been applied or considered in other regulated sectors as an alternative to differential inflation or real price effect (RPE) adjustment allowances alongside RPI revenue indexation.

6.4. Discussion of the options

6.4.1. Indexation methodology

We believe a biddable indexation mechanism approach is likely to be the preferred option, whereby tender applicants would have the ability to request a revenue stream that matches the inflation exposure of its cost and revenue base. This approach has the greatest flexibility and should avoid over-indexation of the revenue stream.

Allowing a variable proportion of revenues to be indexed to inflation would also be consistent with HMT guidance and does not preclude bidders from adopting any approach, which means the best solution can be selected in response to changes to underlying financing and O&M packages which can be obtained from the market.

A biddable indexation mechanism also has the advantage that the market – rather than Ofgem as the expected tendering authority for CATOs – will undertake the value for money assessment through the competitive application process of matching indexation of the revenue stream to the underlying inflation exposure of the CATO's costs. However, as has been the case for the TR3 OFTO tenders:

- allowing bidders to determine the percentage of the revenue stream that is indexed will mean that the price evaluation for tenders will need to be undertaken on a total revenue term NPV basis; and
- consequently when evaluating bids for the purpose of establishing value for money, Ofgem will need to specify values – such as its assumption of future inflation – used to inform the NPV evaluation.[27]

A more simple policy of providing full revenue indexation (i.e. no flexibility for varying the indexation amount) would in contrast carry potential risks/issues for consumers:

- given the likely blend of fixed and variable costs of the CATO's underlying cost base, this could lead to over indexation of the regulated revenue stream (with the draw-backs already discussed above); and
- in particular, could create a pressure to enter into inflation hedging instruments that may impose additional costs on projects (as swap providers charge a credit spread for providing these financing instruments).

However, these conclusions assume a TRS style model for setting a CATO's regulated revenue stream. If in contrast, Ofgem applied a building block methodology using a RAB based model – see discussion in Section 3 – then full inflation indexation is more likely to be required, if the allowed rate of return is expressed in real terms.[28] In this case, full inflation indexation could

[27] HMT again provide guidance on how this should be undertaken for PFI contracts, noting that great care is required to ensure that comparisons are done on a like-for-like basis.
[28] As is the case in the majority of UK price regulated network sectors.

be needed to provide for capital maintenance, a key concept behind the original development of RABs as a regulatory concept.[29]

Finally a policy of applying no inflation indexation to a CATO's revenues would in our view carry significant risks for the consumer:

- firstly, it is unlikely to be value for money to pass all inflation risks to the CATO, as the policy requires bidders to build in long-term contingencies / inflation assumptions into their pricing at the tender stage; and
- secondly, many other UK infrastructure sectors benefit from some form of indexation to. Not applying indexation for CATOs could make the sector less appealing to investors, limiting competition.

6.4.2. Inflation measure for indexation

As discussed above, different choices of inflation measure for the indexation mechanism will also impact on the value for money consumers receive from the competitive appointment process for CATOs. RPI is currently the most commonly used basis for price indexation in UK infrastructure sectors (as discussed above) and therefore the index that investors in CATOs will be most familiar with. As an inflation measure:

- the RPI also is the most commonly used index in the financial markets (e.g. for index linked gilts) and commercial (e.g. wage) negotiations; and
- there is also a deep market for RPI inflation swaps to help CATO's potentially manage their inflation exposure.

Initial feedback from investors – see Annex A – was therefore that RPI cashflows were strongly preferred, linked to RPI being the most commonly used index in financial markets.

There has however been significant recent discussion on the use of alternative consumer price indices in the UK, both generally as a measure of inflation and as an element in benefit and regulatory systems, such as network price controls. A review undertaken by Paul Johnson for the Office of National Statistics[30] highlighted a number of issues with the RPI as an inflation index, and while it was noted that the RPI is still used in large numbers of commercial contracts, including in £470 billion worth of Government index linked gilts, concluded that: "*the RPI is not a credible measure of consumer price change. The RPI should not be used for new contracts. Taxes, benefits and regulated prices should not be linked to RPI.*"

A move away from RPI to an alternative measure of inflation such as CPI or CPIH would have complications for existing network operators, however CATOs (as new licensed entities) potentially make adoption of an alternative index more feasible. We also note that CPI is starting to be used more widely as a measure of inflation in financing. The Greater London

[29] See Jon Stern (2013): 'The role of the regulatory asset base as an instrument of regulatory commitment' – Centre for Competition and Regulatory Policy Working Paper No 22
[30] UK Consumer Price Statistics: A Review – Paul Johnson

Authority (GLA) for example recently issued the first CPI-linked sterling bond to part-finance the extension of the Northern Line on the London Underground, the terms of which are summarised in the text box below.

Box 2 – GLA CPI-linked bond

In May 2015 the GLA launched the first UK CPI linked bond used to part finance a new tube line in London that will link Battersea to the London Underground. The bond will be issued through Community Finance Company, a local authority financing vehicle that allows local authorities to access low cost funding from the Sterling bond market.

The GLA CPI-linked bond raised £200m for 25-years paying a coupon of CPI + 0.34% whereas historically all inflation-linked bonds in the UK have been indexed to RPI.

The bond issue is expected to save the GLA £40m over the next 25-years, using Bank of England forecasts for inflation over the period, with the saving representing the difference between the equivalent fixed rate borrowing the GLA could have taken out compared to the rate actually obtained by the index-linked bond.

Source: CEPA and Lloyds Banking Group

The basket approach might be used if a combination of indices – rather than a headline consumer price index such as RPI – was considered to result in a basket index that matches more closely the cost inflation exposure of the CATO in delivering its services. However, unless there was a need to uplift overall construction costs, a basket of producer indices appears to us to be an unnecessarily complicated approach for CATOs and potentially unsuitable for the purposes of attracting low cost finance into the sector.

6.5. Conclusions

Based on our own analysis and discussions with market participants, we would recommend that Ofgem adopt a similar indexation policy as applied in TR3 for OFTOs, whereby applicants for CATO tenders would bid back their required proportion of the revenue stream that would be subject to inflation indexation. This approach is likely to provide the best value for money for the consumer by allowing the market to match the inflation exposure of costs and revenues. As a policy it would be consistent with recent HMT guidance for PFI contracts, OFTOs in TR3 and the recommendations made by the National Audit Office (NAO)[31] in relation to the initial offshore transmission competitions run by Ofgem.

As discussed above, there are advantages and disadvantages with a range of different inflation indices that could be used for the purposes of CATO revenue indexation. We would suggest that Ofgem consult on what investors and stakeholders in CATO tenders consider the appropriate measure of inflation for indexation.

[31] National Audit Office (2012): 'Offshore electricity transmission: a new model for delivering infrastructure'

7. PRECONSTRUCTION DELIVERY AND PERFORMANCE INCENTIVES

7.1. Introduction

Having looked at options for the overall structure of the revenue stream for a CATO, we now focus on the options for cost and performance incentives spanning the project life cycle.

In this section we consider how under the early model, cost reopeners and incentives could be created for the CATO during the pre-construction/development period.

In Sections 8 and 9 we then consider how delivery and performance incentives for the construction and operational periods of competitively tendered transmission projects could be structured, whether delivered under an early or late tender model.

7.2. What are the issues?

Under the early tender model, during the preconstruction period, the CATO will begin to incur costs, but there may be a significant time period before the project commences construction or the assets reach energisation. Whilst this development period could be funded by the equity provider(s) to the project, the long carry period for the investment could justify pre-funding the CATO whilst the project is still in development.

The principle under Ofgem's OFTO Build model is that revenues are only provided when the asset is operational. This provides a strong timely delivery incentive and also from a consumer perspective, avoids payment prior to use of the asset. However, the late OFTO Build model, which has been the focus of Ofgem's policy work to date, does not involve the development phase of a project, which is the responsibility of the generation developer.

As discussed in Section 5, given the uncertainty of costs and outputs during the development period, an incentive regime will also be required during preconstruction that achieves a sensible and efficient risk allocation between the CATO and consumers, both in relation to cost change and consenting risk. However, Ofgem will also want to incentivise, as far as possible, cost and design fidelity on behalf of the CATO to ensure that the benefits of competition are retained for consumers under the early tender model.

7.3. What are the options?

7.3.1. Funding during preconstruction

There are two main policy options for Ofgem:

- allow pre-funding for the CATO during the pre-construction / development phase of the project; or
- consistent with the principles applied for the OFTO Build model, only allow funding to commence on energisation of the CATO's transmission project.

To achieve the first option, Ofgem could look to split the funding rights and obligations in the CATO's licence into two periods; (1) a development period, and (2) a construction & operation period. This would mean that consistent funding principles could then be applied to early and late tender models under the second (construction & operation) period (see Section 8).

This regime could operate as follows.

The CATO could be required to make a bid at the ITT stage with a proposed project design that must meet the specification for infrastructure build set out in the early tender model ITT. This could be accompanied by a fully costed (but non-firm) commercial proposal for the project and a proposed TRS for the two proposed funding periods of the licence - i.e. the development *and* construction & operation period.

The TRS that is bid for the *development period* could be largely held firm to the expected date of planning submission – i.e. a revenue cap – whereas the TRS for the construction & operation period of the licence would be expected to be adjusted (i.e. non-firm), as design and pricing of the project evolve, subject to the terms of the reopener and incentive mechanisms that apply during the development period (see discussion below).

The pre-funded TRS during the development control period would be a liquidity measure for the project company to cover:

- operating expenses (projected costs for achieving planning consent and acceptance of the project to begin construction); and
- any carry costs associated with procurement and supply chain activities ahead of decision to proceed to construction.

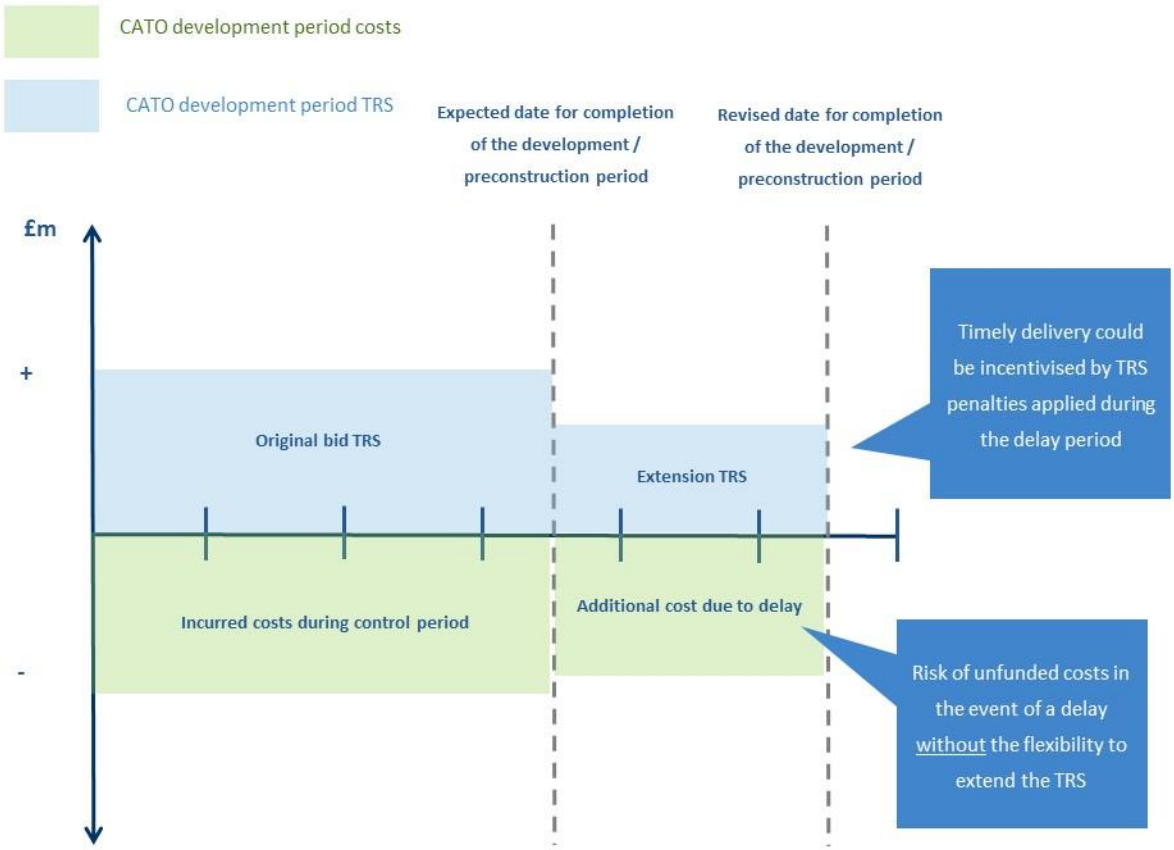
7.3.2. Incentives for timely delivery

Under the option of no prefunding during the development period, there would already be a very strong timely delivery incentive on the CATO to proceed with the project, as it will only be paid on delivery. Any additional incentives would seem to be unnecessary in this case.

Under the prefunding option that is briefly set out above, there would also be strong incentives for the CATO to deliver on time, if the TRS is fixed up to an *expected* date for planning permission.

As illustrated in Figure 7.1 below, this would mean that the CATO would stop receiving revenues after the agreed milestone date as there would be no allowance for such an event under the agreed terms for the TRS in the licence.

Figure 7.1 – Alternative options for incentivising timely delivery where prefunding the CATO



Source: CEPA

However, this approach could expose the CATO to significant funding risk in the event of a delay. Therefore an alternative would be to combine more flexibility on funding and explicit incentives for timely delivery. For example:

- Ofgem could provide flexibility to set an additional TRS allowance for circumstances where the project occurs delays, or needs to revert to an early stage of the planning and development cycle (e.g. fails to achieve consent);[32] however
- in this event of delay, the TRS could be reduced by an agreed incentive rate as the CATO's penalty for the delay, either prior to submission of planning consents, or in the event of a failure of the project company to achieve planning consent.

The incentive rate for the TRS reduction could be set so as:

- to reduce the bidder's expected IRR from the project; but
- without the risk of putting the company in financial distress.

[32] All or elements of previous planning costs would as a consequence be written off.

7.3.3. Incentives for cost efficiency

In terms of incentives for cost efficiency during the development period, we have set out above how the CATO could be asked to make a bid under an early tender ITT with:

- a full (but non-firm) asset specification ('output') of the proposed transmission option solution; and
- unit cost estimates (again, non-firm) that would be used to cost the output specification for the option solution (a non-firm TRS) at ITT.

This blue print specification provided at ITT could then be what the CATO is incentivised to deliver, recognising that costs and outputs are still uncertain.

The incentive for cost efficiency and fidelity to the original designs that were bid by the CATO at the ITT stage, could then be created through one of two approaches:

- applying cost sharing mechanisms, whereby only a proportion of any changes in costs from the point of ITT would be captured in an allowed adjustment to the CATO's construction & operation period TRS; or
- a return on equity (RoE) sharing mechanism, where there will be bonuses and penalties (again applied through adjustments to the construction & operation period TRS) for beating or exceeding the blue-print design cost made at ITT.

In both cases, the design and cost fidelity incentive is given effect through adjustments to the *construction & operation* period TRS that the CATO can expect to receive in the next stage of the project cycle.

In the sub-sections below, we provide further details on how each of these alternative schemes could operate and their precedent of use.

Return on equity sharing mechanism

Under a RoE sharing mechanism, there would be bonuses and penalties applied to the CATO's RoE for beating or exceeding the blue-print cost.

However, all economic and efficient costs for the construction and operation period would still feasibility be allowed as a pass-through in fixing the revenue stream, therefore it would only be the margin (profit) element that is not a feasible full cost pass-through for CATO bridging into the construction and operation period.

Table 7.1 *illustrates* how this incentive for design and cost fidelity could operate around an initial target cost(s) estimate at ITT.

This is a simple illustration of how such an approach *could* work and the detailed design of such a scheme would need further consultation if deemed appropriate for CATOs.

*Table 7.1– RoE sharing incentives - **illustrative***

Development period incentive bands		Incentive rate
Band 1	Updated project cost estimate is below ITT estimate	Allow +1% in target RoE
Band 2	Updated project cost estimate is 100-115% of ITT estimate	No change in allowed target RoE
Band 3	Updated project cost estimate is 116-125% of ITT estimate	0.5% reduction in allowed target RoE
Band 4	Updated project cost estimate is 126-135% of ITT estimate	1.0% reduction in allowed target RoE
Band 5	Updated project cost estimate is 136% or plus of ITT estimate	1.5% reduction in allowed target RoE

To give effect to this incentive, the CATO would be asked to bid a fixed project equity rate of return at the ITT bid stage as the basis for incentivisation under the scheme.

An example of a scheme that has followed similar principles to this approach – i.e. adjustments to the *allowed* rate of return to incentivise cost efficiency and design/route fidelity – has been proposed by one of the bidders in the US Artificial Island electricity transmission tender. This is discussed in the text box below.

Box 3 – Return on equity sharing mechanisms – Artificial Island

Artificial Island is a competitively tendered transmission project in the US being undertaken by the Independent System Operator (ISO) PJM.

This comprises a 500kV transmission network integrating Salem 1 and 2 and Hope Creek Nuclear generation plants to the wider PJM electricity transmission network. In particular, the project is looking to improve stability, operational performance, and remove potential planning criteria violations in the Artificial Island area.

As part of the bidding process, bidders have proposed commercial mechanisms to incentivise cost efficiency and fidelity to estimates made at the time of the tender process. One bidder for example, has proposed that it would be entitled to recover its approved return on equity plus incentives on the costs it incurs for the project up to its revised project estimate of €203m *exclusive of contingency costs*.

However, the bidder would forego fifty percent (50%) of any return on equity incentives approved by the regulator on that portion of the costs incurred for the project that exceed the revised project cost of $203.0 million, but that are less than the revised project cost plus contingency of $255.3 million. It would forego one hundred percent (100%) of return on equity incentives approved by the regulator on that portion of the costs incurred for the project that exceed $255.3 million.

Source: CEPA research

The simplest approach to give effect to this arrangement would be to follow a RAB pricing model (see Section 3), whereby Ofgem would adjust the allowed rate of return that would then apply to the RAB in the construction & operation period.

An alternative arrangement, where applying the TRS model, would be to seek to adjust the equity IRR included in the CATO's bid model, through adjustments to the TRS under a set of base funding assumptions (as sourced from the CATO's original bid model).

Ofgem could also consider allowing the CATO to bid the parameters in Table 7.1 as part of the tender process. However, in this case, the evaluation of 'value for money' may need to assess proposals under a number of outturn scenarios.

Cost sharing mechanism

In this case, the incentive for cost efficiency and cost fidelity would be provided through a more explicit cost sharing mechanism:

- the blue-print cost estimate would act as a baseline target cost against which the CATO will be measured/incentivised against during the development period; and
- only a proportion – see discussion below – of the variation in costs would be expected to result in a TRS adjustment.

Such an incentive could be given effect through an explicit cost sharing incentive rate, as is applied to network expenditure under RIIO, whereby the construction & operation period TRS would be recalculated using only a *proportion* of the revised capex figure.

Alternatively, Ofgem could look to update the construction & operation period TRS to reflect its revised view of economic and efficient costs for the project, following a regulatory cost assessment, then impose a penalty or bonus adjustment to reflect the variations around the initial blue print estimate provided at the tender stage.

In this case, as with the RoE sharing mechanism, the CATO is being incentivised on the TRS that it is allowed to carry forward into the next phase of the project life cycle (i.e. the construction & operation period). How the TRS adjustment is set (the options set out above) will affect the strength of incentive for the CATO.

7.4. Discussion of options

7.4.1. Funding during preconstruction

If applying prefunding the options and arrangements described above would effectively involve the application of a development period price control:

- the output is timely delivery of a fully scoped project successfully through the consenting process; with

- regulatory incentives created through the returns CATO will be able to make in the next period of the project;
- cost efficiency incentivised by asking the CATO to bid a TRS for undertaking the development period obligations[33]; and
- prefunding to recognise that this period of the project cycle could take a number of years to complete successfully.

As an approach, this has a number of attractions, notably the capacity to create consistency between late and early models:

- the development period control covers similar activities as the SO (or TO) is expected to undertake in the later tender model;
- the development period control delivers the project to the same stage as before bidder award under the late model; and
- therefore a similar construction & operation period commercial deal *could* be offered under both early and late models (see Section 8).

Allowing prefunding may also help to facilitate competition, as some bidders may not be able to carry preconstruction costs as long as other bidders.[34]

Overall, we would consider there to be a reasonably strong case for prefunding CATOs during the *development* period of the project under an early tender model.

7.4.2. Timely delivery incentives

The options for how to create timely delivery incentives for the CATO (where prefunding) then present a trade-off between flexibility and complexity:

- the approach of fixing a date for submission of planning consents after which there is further TRS payments creates a simple but strong timely delivery incentive but imposes reasonably significant funding risk in the event of a delay; whilst
- the alternative of a flexible funding regime would limit the risk for the CATO but requires a more complex incentive scheme – e.g. agreed penalties for reducing the TRS in the event of delay would need to be set or agreed with the CATO.

We consider the latter approach is likely to be more appropriate, as there may be events that are outside of the CATO's control which justify (an economic and efficient) delay.

As an illustration of how this could work, the text box below provides an example of a timely delivery incentive that was developed for the North-South electricity interconnector in the Irish all-island electricity market. In this case the incentive was development to apply to

[33] Subject to flexibility for extending the TRS during the development period.
[34] For example, bidders with an existing balance sheet and operating activities may be able to fund the development period through retained cash flows in the wider company.

delivery milestones associated with *both* the development and construction periods of delivering the electricity interconnector.

Box 4 – North-South Interconnector incentives

For the interconnector between Ireland and Northern Ireland, developed by EirGrid and NIE, the CER developed a financial incentive regime to reduce the likelihood of delays.

The incentive gives rewards for achieving two separate milestones by target dates, with a non-delivery penalty applied per quarter of delay. One of these deadlines has a deadband applied for one quarter deviation from the target date.

The financial reward is equal to €3.3m. This compares to an estimated €20m annual cost from a lack of interconnection between the two countries, with the capital cost assessed at the time as being €280m. CER proposed a €3m payment for energisation of the project by a set date (the second project milestone) with EirGrid receiving €300k for lodgement of a planning application by an agreed date. As a consequence, this incentive applied to both the development and construction periods of the project.

Source: CEPA analysis of CER documents[35]

Combined with more flexible arrangements funding arrangements for the development period of a project, a similar incentive scheme for CATOs could mean that:

- the scheme developer has some protection of reopening the development period TRS in the event of delay to a scheme; however
- there would be financial incentives that are triggered and detract from the overall IRR of the project, in an event of delay.

7.4.3. Cost efficiency incentives

We expect the cost efficiency and original design fidelity incentive options outlined above, will need to be developed in close collaboration with the revenue stream reopener mechanisms which were discussed in Section 5.

This would include the need to take account of the following issues and principles in reopener and incentive design:

- where a change of network outputs is clearly beyond the control / influence of the CATO – e.g. imposed consent conditions, or a directed change in scope by the SO – a reopener of the construction & operation period TRS should aim to allow economic and efficient cost recovery by the CATO;
- given the influence that the CATO can have on changes in outputs / costs of the project, it is appropriate that the CATO should face some form of financial incentive

[35] http://www.cer.ie/docs/000727/13149-consultation-paper.pdf

to maintain its designs and control project life-cycle costs during the development period of the project; however

- given there could be significant uncertainty of the project's costs at the point of the ITT stage under the early tender model, the incentive scheme should avoid penalties that could lead the project to no longer being viewed as economic by the developer. The scheme also needs to relatively clear and objective on the basis/rules that financial bonuses and penalties will apply.

The last point is an important one. The incentive rates (RoE write-downs, or cost sharing) during the development period must not carry too great a penalty that the CATO would rather abandon the project than proceed to the construction & operation period.

A development period RoE incentive would drive the right behaviour from the CATO (cost and design fidelity) whilst also passing the clarity, simplicity and proportionality test:

- rather than complex rules and mechanisms for allowed or not allowed cost and output changes, the incentive applies only to future profit margins;
- the CATO continues to have an incentive to maintain development of the project even if costs and outputs vary significantly from what had been planned;
- updated pricing of economic and efficient costs (as the project gains firmer definition) gets addressed in a separate project acceptance process; and
- as this incentive covers the consenting period, there is some (albeit capped) consenting risk passed to the developer.

Cost sharing between the CATO and consumer, such as for an event of a change in route/site of the project, relative to the blue-print design at ITT, could be incentivised following similar principles to the reopener mechanism that was applied in the Fort McMurray tender. However, there are complexities with this approach:

- Would Ofgem need to define a reopener mechanism for every possible scenario / event that could lead to a change in scope, not just route change?
- How would Ofgem distinguish between events that qualify for economic and efficient pass-through, whilst others qualify for cost sharing?

Of course, similar questions still apply under a RoE sharing mechanism, but this could be addressed through a single project acceptance process, where:

- the CATO could make a claim to Ofgem for a rebasing the target cost the RoE incentive is measured against; and
- disagreement on whether a change in scope and / or cost should lead to a RoE penalty, following regulatory cost assessment, could be appealed under standard processes of the licence.

7.5. Conclusions

There would appear a strong case for adopting the development and construction & operation period funding split we have proposed to give effect to the options for incentives set out above and prefunding a CATO during the *development period*.

We suggest Ofgem consult with stakeholders on the principles and options for creating a development period control – influenced by parameters bid as part of the tender process – that supports design fidelity and cost efficiency from a CATO.

8. CONSTRUCTION PERIOD DELIVERY AND PERFORMANCE INCENTIVES

8.1. Introduction

In this section we discuss options for delivery and performance incentives for the CATO during the construction phase of the project.

There are three basic questions on incentives related to the construction of the transmission asset that need to be considered: when should the CATO start to receive the TRS and how does this incentivise timely delivery; what efficiency incentives should apply to construction costs; and, under the early model, how are indicative ex ante costs made firm ex ante costs?

Following a similar approach to previous sections of the report, we address each of these questions in turn, analysing: why these are key issues and what they might mean for the design of the CATO regulatory regime; what are the available policy options for Ofgem; and our views on what could be the best approach for CATOs.

8.2. When would the CATO start to receive the TRS?

What are the options?

As with the development period of CATO projects, there is the option to pre-fund the CATO during construction or, following the principle Ofgem has proposed for its OFTO Build model, only to begin payment of the TRS following energisation of the transmission assets.

There is precedent of both approaches being applied in delivering regulated and non-regulated infrastructure projects in the UK:

- the Infrastructure Provider for the TTT will start to receive its revenues ahead of acceptance of the completed infrastructure;
- many PFI DBFO based contracts are based on the project only receiving revenues once the assets are operational; and
- Heathrow Terminal 5 adopted triggers for pre-funding payments once individual elements of the work were completed.

Discussion of options

Pre-funding would strongly limit the incentive of the CATO to complete the construction programme, as it limits, in the absence of an additional timely delivery incentive, the impact on returns in the event of a delay. Although there are examples of pre-funding major privately

financed infrastructure projects, post-funding is generally the norm, with returns beginning on delivery of completed project when it is used. There is also unlikely to be a problem with the availability of capital to support the construction period of CATO projects in the absence of pre-funding, with as much as $100bn of "dry powder" (equity, before project gearing) available internationally to invest in infrastructure.

There would, therefore, need to be an expectation, in the absence of pre-funding, that bidders could face prohibitive liquidity problems to justify commencement of the revenue stream ahead of energisation of the transmission assets from a value for money perspective. These *potential* circumstances could be where: a transmission project has a significantly long construction period following award of ITT (under the late model) or acceptance of completion of the development period (under the early model); and/or the size of the investment programme would be significant for a single project company.

For example, the TTT has an expected construction period of 7-10 years and a capex programme of £2.8bn. The need for prefunding has also been discussed as part of the development of new runway capacity in the south east of England. However again, the scale of the scheme is expected to run into multiple billions of pounds. Given the expected pipeline of CATO tender opportunities only a small number of schemes (if any) would be expected to come close to the scale of construction programme under each of these examples.

Therefore, our expectation is that the TRS for the construction & operation period of the licence should only commence following energisation of the transmission assets. This will also provide clear financial incentives for the CATO to get the project completed and also limits the need for complex mechanisms, such as penalties applied to the TRS in the event of a construction delay, to maintain incentives on the operator. Ofgem may however wish to consult with stakeholders on the need and value for money of pre-funding.

8.3. Cost efficiency arrangements

What are the issues?

A key issue for the regulatory and commercial framework design is the extent to which it would provide better value for money for the electricity consumer to request firm fixed pricing (through a fixed TRS) from the CATO for construction, or allow more flexibility on pricing through application of outturn cost sharing mechanisms.

Ofgem is looking for effective supply chain management and procurement from CATOs and the firmness of the regulated revenue stream – and the incentives this would create for the network operator – are a way to influence the efficiency and effectiveness of the CATO's delivery of the overall construction programme.

At the time of the tender under the late model, and the completion of the development period under the early model, there should be greater certainty over the specification of the project compared to the point of the tender under the early model. Consequently it should

be possible to request firmer pricing from the CATO for constructing the project. This has the advantage for the consumer that it transfers cost risk to the CATO, protecting them in the event that the cost of delivering the project overruns an ex-ante estimate.

However, at ITT under the late model, and completion of the development period under the early model, the CATO will still need to make an assessment of the costs of delivering the scheme. In setting an ex-ante cost estimate, they are likely to consider the probabilities of the costs coming in against a central forecast (e.g. P80 rather than P50[36]) and if required to provide a fixed price, are likely to look to include contingency in their cost estimates.

Given that bidders will always be expected to make some contingency allowance in their construction cost estimates, particularly where there is limited opportunity provided to reopen the TRS (see further discussion below), consumers would in this case not be able to benefit if the project was delivered by the CATO at a lower constructed cost than projected, once cost contingencies have been allowed for.

In fixing the TRS for the delivery of the construction of the project, there is therefore a trade-off to be considered in respect that:

- the firmer the pricing requested from bidders at the tender stage, the greater the extent of risk transfer to the CATO; however
- this will be at the expense of less flexibility in the pricing arrangements for overall delivery of the construction programme of a project.

What are the options for CATOs?

One option would be to request as firm a TRS from the CATO as possible, therefore limiting the need for cost reopeners as far as possible.

In this case, the regime could be very similar for the early and late tender models:

- under the early model, the TRS for the construction & operational period would be largely fixed at the completion/acceptance stage of the development period[37]; and
- under the late model, the TRS for the construction and operational period would be largely fixed at the ITT stage.

This would broadly follow the principles we understand Ofgem would follow under its OFTO Build tender model.

An alternative option would be to apply cost sharing incentives that would allow the TRS to adjust in response to variations of outturn construction costs, around a central cost forecast estimate. These arrangements could apply to the CATO's capex programme as a whole, or

[36] P50 and P80 are alternative percentile cost estimates. For example, the 80th percentile cost (known as the P80) is such that the probability of the final cost being less than P80 is 80%. P50 is also known as the median. See HMT Green Book guidance on cost estimates for infrastructure programmes.

[37] As discussed in the previous section, this could be tied to the initial bid of the CATO as far as possible.

alternatively to a single defined project cost item. Again, similar cost sharing principles could apply under both the early and late models by separating the development and construction & operational periods of the licence and the associated TRS rights.

An approach of cost sharing around a total cost estimate would be broadly consistent with the cost incentive regime that applies to network operators under RIIO. Target cost contracts, with sharing principles between client and contractor, are also a standard mechanism used in other infrastructure and construction sectors.

Box 5 – Target cost contracts

Target cost contracts were originally developed in the infrastructure sector to deal with complex projects that had a high degree of risk around items, such as ground conditions. The use of target cost and cost reimbursable contracts has continued to grow, particularly in the UK, where many major programmes of infrastructure work are now undertaken on a target cost basis.[38] The basic principle is that a target cost is agreed and then the contractor is paid for the work undertaken on a reimbursable basis, with payments and reporting of costs often undertaken on an "open book" fashion. If the actual cost is lower than the target the cost, a saving has been made which is then shared between the parties on a pre-agreed percentage basis. This share of the saving is referred to as gain share.[39] Similar principles are applied under RIIO using target costs and incentive sharing factors.

Source: CEPA research of referenced documents

Other alternatives include: following a similar approach to interconnectors under the cap and floor, whereby rather than an ex ante capex estimate being logged up ex post under the incentive sharing rules, Ofgem would assess economic and efficient costs ex post; or instead of using cost sharing mechanisms, the RoE sharing mechanism that was considered for the development period under the early model could be extended more generally to incentivise efficiency under both the early and late models.

With the exception of the first option – requiring the CATO to provide a largely fixed TRS – all of these options would reduce the firmness of the revenue stream and result in different degrees of cost sharing between CATOs and consumers. As discussed above, requiring either a firm TRS or alternatively introducing more flexible sharing arrangements might be expected to impact on the incentives of the CATO and its investors, particularly with regards its contracting and management with the supply chain.

[38] Ian Heaphy (2011): 'Do target cost contracts deliver value for money?'
[39] Contract Solutions – 'How to make target cost and cost reimbursable contracts work'

Discussion of options

From a relatively theoretical view point, the table below summarises some of the advantages and disadvantages of requesting fixed price proposals from a CATO vs. the sharing mechanism options discussed above.

Table 8.1: Potential advantages and disadvantages of cost efficiency incentive options

	Advantages	Disadvantages
Use of a fixed price TRS	Incentivises CATO to reduce costs during construction Does not require analysis of actual spend Costs faced match bid – reason why CATO was awarded project CATO potentially less able to game system Consumers do not face upside or downside risk – transfer of construction cost risk	High likelihood of built in risk premiums and contingency within bids If do not track actual spend, not useful for benchmarking Increasingly difficult as length of construction increases Less innovative models may be proposed
Use of sharing mechanisms through adjustments to the TRS	Can help mitigate risk for the CATO which may reduce the required cost of capital May reduce the need for risk premiums (contingency) Requires sharing of cost data that can be used for future benchmarking purposes Clear rules based regulatory framework for managing price uncertainty and cost performance risk	Reduced strength of the incentive to manage costs during construction efficiently Consumers face upside and downside risk Results in further detailed regime design choices – e.g. incentive strength May reduce the incentive for CATOs to manage their supply chain effectively

Source: CEPA, LHGP and TNEI

From the perspective of the late tender model:

- Construction costs will be subject to competitive tension at the bid stage, so except for standard contingency allowances, the incentive to game up construction cost estimates should be reduced, provided there is effective competition. Having a largely fixed TRS would, therefore, create strong delivery incentives for the CATO - given the financial consequences of delivering above budget - and construction risk transfer to the CATO. However, the financial risk of cost overruns will mean that cost

contingencies will need to be built into a CATO's TRS bid. The fixed TRS is likely to affect how CATOs approach their own contracting.[40]

- Furthermore, even at the time of the tender process under the late model, there may also still be uncertainty of certain cost items that will need to be incurred during construction. A possible risk, for example, could result from insufficient survey work having been undertaken ahead of the ITT (e.g. survey work, for justifiable efficiency purposes, may only have been completed on a km rather than more detailed basis) which mean that the ground conditions of the project are not known with certainty at the ITT. As a consequence, there may be a number of risks that the CATO will not be able to pass to its contractors at the ITT and its ability to provide a fully firm cost estimate at the tender may be reduced.[41]

As a consequence, even with a generally fixed TRS model, limited reopeners may still be needed for items that cannot be fixed with any certainty at the start of the construction period. From a regulatory treatment perspective, either:

- these could be treated as a simple economic and efficient cost-pass through, with the CATO required to submit a request to Ofgem for a TRS adjustment to account for the change in costs; or
- alternatively changes in cost items could be an economic and efficient cost pass-through up to an agreed threshold, but the CATO would need to provide a not-to-exceed estimate.

Cost sharing arrangements would protect consumers against paying for contingency allowances that do not turn out to be required by the CATO, whilst providing incentives for the CATO to be as cost efficient as possible and control costs. However, for the early model, by having an incentive for making cost efficiency savings in the construction & operation period, this potentially creates a risk the CATO (appointed under the early tender model) seeks to pad the capex figures in its final development period cost submission which is then used to update the TRS. Whilst this incentive (under the early model) certainty exists, we believe a number of measures should act to mitigate or at least cap the incentive:

- a RoE incentive in the development period (see Section 7) could be used to mitigate the incentive somewhat as future cost savings must be traded off against target RoE reductions from increasing the cost estimate relative to the original ITT estimate;
- whilst capex and opex may vary, competitive pressure will have been applied to the cost of capital element (as this is fixed at ITT in the case of equity and through a funding competition in the case of the debt – see below); and

[40] For example, by seeking back to back pricing arrangements with their suppliers.

[41] Examples of this include uncertainty of costs due to unknown ground conditions which mean there is a risk of more substantive road alterations being required than expected or increased costs due to the ground conditions for a substation site (e.g. a peat area).

- the CATO could be expected to operate in an 'open book' fashion in the costs of its construction programme (e.g. draft contracts should be provided as part of the development period acceptance submission).

One other issue to consider is whether cost sharing arrangements should apply to all or part of the CATO's cost base. In our view, if cost sharing arrangements are applied, then they should apply to the full construction cost base of the CATO. The alternative, of having specific incentive arrangements for specific cost items, may simply create complexity for the tender delivery process and, perhaps more importantly, the incentive for the CATO to game the allocation of reporting of costs between different cost items, given their relative treatments under the regulatory regime.

This means that if cost sharing arrangements were preferred over the alternative of requesting a largely fixed TRS from the CATO, we would expect this arrangement to apply to the full forecast capex for the project.

Conclusions

In general the discussion of options above demonstrates there are both advantages and disadvantages of the different approaches from a consumer perspective:

- although a firm (fixed price) TRS provides clear construction risk transfer for the consumer, the uncertainty of outturn costs is likely to materialise in the TRS for consumers as added contingency allowances; and
- whilst sharing arrangements, may in contrast mean that the revenue stream varies from the bids made at the tender and consumers share in both upside and downside risks, this model achieves less risk transfer for the consumer and Ofgem.

It is ultimately best value for money that Ofgem is seeking for the consumer through the competitive tender and delivery process.

We note that given a primary objective of introducing competitive tendering is to apply competitive pressure to the TRS, a regime which encourages pricing to be fixed as far as possible at the tender stage would align with Ofgem's policy objectives for the sector.

This would tender to imply Ofgem should look to adopt the TRS being fixed at the tender or project acceptance stage (early model) to:

- provide strong incentives for the CATO to manage its supply chain / contracting effectively over the construction period;
- ensure that pricing that is proposed at the time of the tender process sets the TRS wherever possible; and
- ensure clear risk transfer and incentives for construction cost efficiency from the process of the CATO assuming responsibility for delivery of the project.

However, competitive pressure can still be applied under the target cost / sharing arrangements that are applied in other infrastructure contexts:

- the competitive tender process should ensure that the target cost estimates are as efficient as possible; and
- therefore, the choice of fixed vs. gain share arrangement is primarily dependent on which would deliver a more efficient risk allocation that benefits the consumer.

8.4. Financing costs under the early model

What are the issues?

One key component of price that will it will not be possible to fully fix under the early model at the tender process is debt financing costs.

The *quantity* of finance required may not be not known, and the potential providers of debt to the project are also unlikely to be able to fix the debt margins (price) that would apply. There is therefore an issue of how to fix financing costs under the early model, subsequent to the tender, and how Ofgem can then be confident that the competition has achieved the best value for money for consumers.

What are the options?

To maintain pressure on financing costs at the tender stage, one option would be to request bidders state their cost of equity, but not lock down debt financing (as discussed in the previous section).

The CATO could then be required – ahead of financial close – to propose an updated debt financing package for review by Ofgem. This might include the need to run a funding competition to determine the most efficient debt financing package at the time.

In the absence of a funding competition, the CATO could be required to make an estimate of financing costs either at the time of the bid or when a proposal made on the preferred debt financing package. This is likely to involve an estimate as to future movements in debt markets and as such may not provide best value for money.

Discussion of options

Funding competitions have in past been used to determine the debt financing packages in many PFI deals – i.e. they are not a novel concept.[42]

The use of a funding competition to bridge the time period between the tender stage, start of construction and desire for competition pressure on costs, was also used in the Alberta,

[42] See for example HMT (2006): 'Preferred bidder debt funding competitions'

Canada, Fort McMurray transmission tender, in the event the financing package of the bidder needed to vary from that bid at the time of the tender (see text box below).

Box 6 – Fort McMurray transmission tender – treatment of financing

The tender documents for the Fort McMurray tender run by AESO in Alberta states that the successful applicant to the tender process would be responsible for arranging and delivering all financing to develop and complete the project.

In responding to the RFP, financial proposals were expected to be based on financial markets at the time of the RFP submission, detailing the rate of return required by the bidder and financing structure (include debt/equity ratio).

There was, however, also a mechanism in the tender documentation that allowed AESO, once the project's costs had been updated following completion of pre-construction/development of the project, to require the designated bidder to run a funding competition to obtain committed financing and updated debt financing costs, prior to execution of the project agreement. The updated financing costs will then be used to adjust the allowed pricing of the project debt to reflect current market conditions.

For the funding competition, the designated bidder was responsible for maintaining the credit quality of the project and no changes appear to have been permitted to the financial *structure* and equity rate of return for the project. Changes in the debt financing *structure* was only permitted if:

- the bidder could demonstrate to AESO that its debt financing structure was unacceptable to financing sources because of market condition changes; or
- an alternative debt financing structure will result in a reduction in the updated financing costs and correspondingly, a reduction in the payments to be made by the AESO.

Under this proposed mechanism, AESO was also entitled to share in the benefit of the financing cost reduction.[43]

Source: CEPA

Conclusions

Under the early model, we propose that there is a requirement (or right for Ofgem to require) a funding competition when the CATO makes its updated TRS submission to Ofgem, including the revised project debt financing package.

Both at the tender stage and the cost submission subsequent to planning consents being obtained, for evaluation purposes, it may be beneficial to have letters of support to

[43] http://www.aeso.ca/downloads/Project_Information_Brief_May_9_2013.pdf

demonstrate that work has been undertaken on potential debt financing solution and to have assurance that the project is bankable.

8.5. Conclusions

This section has considered options for incentivising efficient and timely delivery from the CATO during the construction period of the transmission project. As has been set out, there are a range of possible options for imposing strong cost efficiency incentives on the CATO to ensure that it will manage the construction programme and its supply chain effectively. Timely delivery of the construction of the transmission assets could be strongly incentivised by the regulated revenue stream for the construction & operation period of a CATO project (under both early and late tend models) only starting to be paid once the project is commissioned and the transmission assets are energised.

9. Operation period delivery and performance incentives

9.1. Introduction

In this section we discuss options for the delivery and performance incentives that could apply to the operational period of CATO projects.

As in the previous section, we first consider the key issues and what they might mean for the design of the CATO regulatory regime. We then set out options and discuss their potential application under the early and late tender models.

9.2. Performance incentives

What are the issues?

As with other network companies, Ofgem will want to incentivise CATOs to deliver network outputs that meet required performance levels.

Experience of onshore transmission in GB and elsewhere in Europe, together with experience of tendering in offshore and onshore transmission internationally, shows there are a range of options that might be considered for CATOs.

RIIO-T1, for example, incentivises TOs to ensure that customers are supplied with electricity through a collection of incentives and obligations. These include:

- a reliability financial incentive based on energy not supplied (ENS);
- Network Output Measures (NOMs) requiring TOs to report annually on measures relating to criticality, replacement priorities, system unavailability, average circuit unreliability, faults and failures; and
- an availability/network access policy (reputational incentive).

The reliability incentive that is applicable for the RIIO-T1 period:

- uses an incentive rate of £16,000/MWh which is based on an estimate of the value of lost load (VoLL) and a target of 316MWh;
- where the TOs can incur a penalty for each MWh worse than the 316 MWh target and gain a reward for a lower level of ENS; and
- there is a collar on the penalties under the incentive of 3% of allowed revenues and a natural cap as ENS cannot be reduced below zero.

However, whilst reliability is a key component of the RIIO-T1 incentive framework, there are also a set of other broader measures which encourage TOs to deliver across a range of both primary output categories and secondary deliverables under their current price controls (see discussion of TO roles and responsibilities in Section 2). These have associated (financial and reputational) incentive mechanisms, as illustrated in Table 9.1.

Table 9.1 – TO incentives under RIIO-T1

Category	Incentives	Parameters
Cost Incentives	Outturn versus targets	47% sharing factor for NGET 50% sharing factor for SHETL & SPETL
Safety	Asset condition and health	+/- 2.5% of over/under delivery
Reliability	ENS Licence condition on minimum performance standards	Incentive is based on the TO performance against an ENS target There is a collar of financial penalties limiting the maximum penalty of the TO to 3% of allowed revenue
Availability	Network Access Policy	Reputational
Customer satisfaction	Stakeholder survey	+/- 1% of allowed revenue
	Effective engagement	+ 0.5% of allowed revenue
Connections	Requirement to meet existing legal requirements	- 0.5% of allowed revenue for failure to meet timing requirements
Environmental	Losses strategy	Reputational
	Business Carbon Footprint	Reputational
	SF6 emissions	+/- based on non-traded carbon dioxide emission price
	EDR scheme	+ if demonstrate leadership
	Visual amenity	Reputational, with allowance
Wider Works	SWW deliverables	Standards as per RIIO T1
Innovation	Network Innovation Allowance (NIA)	NGET & SHETL: 0.7% of revenue to be spent on innovation projects; 90% recovered through incentive mechanism SPTL: has an allowance of 0.5% of allowed revenue

Source: Ofgem and CEPA

In addition to the TO incentives listed above, NOMs are secondary deliverables of the RIIO framework[44]. These enable Ofgem to monitor and assess TO's network renewal performance. These NOMs are designed to enable the evaluation of:

[44] From "Network Output Measures Methodology", National Grid, SP Transmission and SHE-T, December 2013

- network asset condition;
- network risk;
- network performance;
- network capability; and
- network replacement outputs.

NOMs are required for all TOs. However, Ofgem states that they are currently working with TOs to further develop the NOM methodology[45]. NOMs may also be suitable deliverables for CATOs, however Ofgem will need to explore with affected stakeholders whether this is sensible given the more narrow scope of CATO activities.

The key question is whether a broad set of network output measures and incentives, as are currently applied to the TOs, or a more focused set of obligations/incentives would be most appropriate for the CATOs?

As discussed in Section 2, a CATO will have a more focused service area and set of network assets compared to a TO. Therefore, a more focused set of incentives would align with the business activities of the company. However, maintaining a robust (planned and unplanned) outage schedule – and developing this schedule in coordination with the SO and TOs – would appear a particularly critical output of a CATO given that once the transmission assets are operational they will form part of the wider transmission system's operation.

In contrast, unless specifically asked to perform an activity (so that costs to perform that role are bid into the TRS at the time of the tender), we do not believe that a CATO should be expected to have the resources to undertake and face incentives related to a broader range of network activities, such as environmental management and innovation. Indeed, it may not represent value for money to require a CATO to incur costs to deliver such a much broad range of output measures. Furthermore, as discussed in Section 2, certain activities, such as losses strategy[46] and consideration of visual amenity should also be addressed for CATO projects as part of earlier project development and tender processes that fix the design and management policies for the project. For example, how to mitigate the visual (environmental and social) impact of new transmission infrastructure should either have been considered by the CATO during the development period (early tender model) or by the SO (late tender model). CATOs will be naturally incentivised to address these issues in order to ensure that their project is developed on time (e.g. obtains the required planning permissions).

There would appear, therefore, to be a rationale for adopting a more focused set of financial incentives and obligations for CATOs primarily concentrated on the reliability of the network assets and the CATO's management of outages and availability. However, given the business focus of CATOs and their expected roles and responsibilities in the electricity industry are still

[45] RIIO Transmission Annual Report 2013-14, Ofgem, March 2015
[46] Through choice of transmission technology.

to be confirmed, we have considered a range of *potential* measures for incentivising the CATO during the operational period of a project.

What are the options?

We discuss options for CATO performance obligations and incentives according to the following output categories:

- reliability and availability;
- environment; and
- connections.

Reliability and availability

The STC defines the high-level relationship between the GB SO and the TOs. It is supported by a number of procedures (STC-Ps) that provide greater detail on the roles, responsibilities, obligations and rights for specific activities or requirements.

Some relevant examples include:

- STCP01-1 Operational Switching;
- STCP09-1 Coordination between Parties;
- STCP09-2 Public and Site Safety; and
- STCP11-1 Outage Planning.

It is expected that CATOs, like TOs, will all be obliged to comply with the STC and its procedures. Therefore, in theory, there is no reason why the CATOs should not operate the network in the same way that the TOs currently operate the network. However, in practice there may be some differences and points to bear in mind.

In particular, the following should be noted regarding the way in which outage planning is currently agreed between the TOs and the SO:

- an outage programme is put together by the TO, which has substantial interaction with the maintenance programme;
- the SO reviews the outage programme of the TO and will then formally agree the programme;
- as part of the discussions, the SO will advise on the consequences of the programme on costs. Depending on the level of cost/ TO requirement, the TO may make a change to the programme;
- if the TO wishes to make a change to the programme, the NAP applies; and

- the SO is incentivised to minimise constraint costs through its Balancing Incentive, whereas a TO is incentivised through a general licence requirement to be economic and efficient.

As discussed above, the difference for a CATO will be that its outage planning and management will be focused on specific network assets rather than a wider network service area. Whilst it appears to us that with CATOs more reliance will in future need to be placed on the contractual arrangements of, and detail behind, the STC (to ensure transmission assets are managed effectively), the question is what additional obligations and financial incentives would be needed to further promote efficient behaviour in managing the reliability and availability of the network through planned and unplanned outages.

Potential options for CATOs could include:

- **Extending the reliability incentive**. In this case a target of MWh lost would need to be established each year for a CATO.
- **Introduce a form of availability incentive**. This could take a similar form as the approach applied to OFTOs, or an alternative design more suited to onshore assets.
- **Obligations for maintaining network access policies**. Including extending the reputational and reporting incentives introduced for TOs as part of RIIO-T1.

Of course, these options are not mutually exclusive, and indeed Ofgem could consider a package of measures to incentivise the desired outcomes.

Within the context of an availability incentive, international precedent shows that a range of approaches could be considered. For example:

- the electricity ISO in Victoria, Australia, has applied a mechanism based on a calculation of grid constraints, and as such the availability incentive is dependent on location and is complicated to calculate; in contrast
- an incentive model similar to the existing availability incentive that applies to UK OFTOs would be a more capacity weighted mechanism (with parameters within the incentive design to facilitate desired outcomes).

The aim of all these mechanisms would be to encourage the CATO to demonstrate desirable behaviour, for example with regard to:

- undertaking repairs and maintenance; and
- minimising outage periods, without passing on unmanageable risk.

The issues / criteria to be considered for selecting an availability / reliability financial incentive for a CATO include the following

- **Unplanned repairs:** Does the incentive mechanism encourage the CATO to undertake **appropriate maintenance** during the life of the assets, therefore avoiding unplanned maintenance?

- **Prompt repairs/ maintenance:** Does the incentive mechanism encourage **rapid repair of unplanned failures?**
- **Planned maintenance:** Does the incentive mechanism encourage planned maintenance to be undertaken in a manner which reduces lost electricity transmission, such as lower capacity outages and maintenance at **times of low cost** to the consumer?
- **Appropriate risk transfer:** Does the incentive mechanism transfer risks to the CATO that are **manageable**?
- **Clarity of mechanism:** How **complicated/ clear** is the mechanism? Will it lead to confusion amongst investors and stakeholders?
- **Practicality of incentive:** Are the **data requirements** of the mechanism practical? Can they be independently verified? Will the mechanism be robust?

An incentive based on the RIIO-T1 ENS model would be a relatively broad measure of transmission network reliability and would be able to address a number of the objectives set out above. It would create the incentive:

- to address unplanned repairs in a prompt and efficient way to avoid an extended period of ENS; and
- to plan maintenance in the broader context of expected use (energy supplied) by the transmission system.

However, the issues with this incentive model are as follows:

- there would need to be an established methodology for setting the ENS target for each CATO project – to avoid risk premiums at the tender stage, bidders would need to have confidence that established targets are achievable;
- creating a clear and objective measure of ENS for a defined set of transmission assets may not be a simple task;
- where ENS is the result of actions / events not directly related to CATO assets, it may be unreasonable to penalise the company for these circumstances. As a consequence, there could need to be defined procedures for addressing such events; and
- assuming the same incentive value was used for CATOs as for TOs (set equal to VoLL) Ofgem would need to be confident that the power of incentive would not create financial difficulties for the company, e.g. in meeting debt obligations.

However, one of the advantages of a broad reliability incentive is that it would provide incentive alignment between the TO and CATO with all transmission owners therefore responding to the same *marginal* financial incentive rates.

An availability incentive would, in contrast, be likely to result in alternative marginal incentives for CATOs and TOs. However, an availability incentive would also be a mechanism

that is well understood by investors (see discussion in Annex A). If modelled on the approach used for OFTOs, there is also a clear precedent of how this can be designed to cap the financial liability of the CATO to ensure that the incentive does not expose the company to risk of financial distress. An availability incentive would therefore:

- provide a simple incentive that is well understood by the industry and investors; and
- encourage good behaviour, for example in terms of minimising large capacity outages, provided that the overall level of the incentive is sufficient and that the detail behind the incentive is revisited in the context of CATO assets.

However, there are some issues relating to a simple availability incentive:

- onshore assets vary significantly with regard to their technical parameters such as criticality for network integrity, contribution to constraints if the assets is unavailable etc. For this reason, a simple availability incentive could be less efficient in terms of incentivising good behaviour than a more complex incentive; and
- one of the SO's roles is to minimise network constraints, and if the availability incentive is too simple, it may not be possible to ensure that CATOs are managing their assets sufficiently to enable constraints to be minimised.

In order to keep the benefits of a simple incentive, but to mitigate the issue that such a simple incentive might not incentivise good behaviour, or be proportionate to the risk of loss, the level of availability incentive applied or the detailed parameters could be varied. One possibility would be to consider the boundary (or boundaries) spanned by the new asset. The CATO availability incentive could then be varied depending on the boundary characteristics, such as level of constraint experienced across the boundary. This could enable transmission constraints to be broadly taken into account, but would not require a detailed and complex constraint analysis to be carried out for each reinforcement.

In terms of existing planning processes within the industry, the NAP is a process that has been established between the SO and the TOs to ensure that there is an effective planning and management process regarding the availability of the electricity transmission network. The NAP covers areas such as:

- outage timing and planning;
- network planning up to eight years ahead;
- working with other stakeholders such as generators;
- innovative solutions to network issues; and
- consultation regarding cost and the impact on consumers.

The NAP is developed in the context of consumer impact and penalty mechanisms, in particular constraint costs. The NAP identifies short term issues (i.e. those experienced in the current year) which include real time issues such as faults and emergencies, which may be

caused by severe weather, asset deterioration or third party damage. Long term issues are more related to long term planning, i.e. long term scheduling of works, for example to ensure that projects on the network do not clash. The CATOs should be incentivised to participate in the NAP processes, in order to meet their availability or reliability incentive. However, this will require the incentive to be of sufficient strength to encourage participation.

The table below summarises the high-level options for the financial incentive and their key advantages and disadvantages.

Table 9.2 – Reliability and availability incentive options

Option	RIIO based reliability (ENS) based incentive mechanism	Project Dependent - Constraint Cost Mechanism	Uniform Availability Mechanism, e.g. Capacity Weighting	Availability Mechanism – Boundary Dependent
Description	A common incentive rate is applied to all TOs based on £/MWh of ENS.	Constraint costs are modelled on a project by project basis and at different times of the day or year. The incentive would be calculated based on the reduction in market costs due to removal of the constraint.	Considers the MWh of unavailability and gives a proportionally higher penalty for higher capacity outages.	As per the uniform availability mechanism, but the level of incentive and parameters could be varied depending on system boundaries.
Advantages	This would provide a consistent mechanism across the TOs and CATOs. It may be easier for CATOs and TOs to engage and work together if they are incentivised on a similar basis.	The incentive is linked to the cost of constraints. Therefore the incentive should drive good behaviour, i.e. minimising outages (particularly in constrained areas), timing outages at times of least cost to the market.	Simple and would allow all CATOs to be treated the same. No requirement for complex constraint modelling. No locational differences due to different network constraints. GB regulatory precedent.	Brings in differences in network constraints (locational), but in a simplified way compared with a project-dependent calculation. No requirement for complex constraint modelling.
Disadvantages	TOs have extensive networks and are able to plan for network failures – i.e. if a circuit fails	Each project will have a different availability incentive dependent on constraints,	By treating all projects the same, potential for the incentive to not be targeted to the specific	Maybe difficult to calculate a different availability incentive for

Option	RIIO based reliability (ENS) based incentive mechanism	Project Dependent - Constraint Cost Mechanism	Uniform Availability Mechanism, e.g. Capacity Weighting	Availability Mechanism – Boundary Dependent
	they are generally able to route electricity through another circuit. However, a CATO will have a single asset, and in the event of an outage it is likely that electricity will be routed through an adjacent TO's network. The ENS figure would therefore have to be recalculated for CATO assets, taking the above argument into account, and therefore the benefit of a consistent mechanism would be lost. Investors are likely to have had less experience of this type of mechanism.	therefore CATOs treated differently. Constraint modelling required for each project which is complex and time consuming. Performance will be partially dependent on other TOs.	requirements of the project. Incentive not linked to cost of constraints, therefore potentially reduced incentive for good behaviour.	each boundary. Issues may arise where the project spans multiple boundaries etc.

Source: CEPA, TNEI and LHGP

Clearly there are advantages and disadvantages with all the options. However, from a market offering/investor perspective, we would expect investors to focus on the clarity of the incentive mechanism and the extent of risk allocation envisaged by Ofgem.

Of all the options, an availability incentive has advantages in this regard in that the output measure which is used to promote reliability and availability is relatively focused on a simple measure that relates only to the CATO's defined service area. In contrast, we could envisage an ENS incentive providing less clarity for investors.

However, given that reliability and availability is such a central output for the CATO we would suggest that Ofgem, as an initial step, look to consult on the range of possible incentive mechanisms – supported by STC procedures – for supporting the reliability and availability of CATO assets and network service areas.

Given the importance of such a financial incentive in supporting the operational obligations and procedures of the STC – see discussion in Section 2 – the detailed design of the incentive would also need to be given careful attention to ensure it drives the right behaviour from the CATOs given the types of projects and network assets they will be responsible for managing.

This may require a different approach to the method simply followed for OFTOs, and the detail could vary for different asset types, categories or network areas. Using this approach, some of the differences between assets could be brought into the incentive without going through the complex and time consuming process of constraint modelling.

Environment

As illustrated by the existing incentives under RIIO-T1, a CATO's management of environmental impacts could be incentivised through:

- a network losses incentive, either as a financial incentive (see below) or a reputational (e.g. losses reporting) incentive;
- available funds (e.g. bonuses) for demonstration of how the total (social, environmental and economic) impact of transmission developments has been addressed in delivering network outputs; and
- reporting requirements on the measures the project company would take to address environmental issues in delivering network services.

Whilst a financial incentive on losses is currently not applied to TOs (and was phased out for Distribution Network Operators (DNOs) in GB due to a number of difficulties that arose in applying such as scheme in DPCR4), there are a number of examples internationally of transmission losses incentives applying either in:

- tendered transmission infrastructure projects; or
- more standard monopoly network price controls.

As an illustration, the text box below describes an electricity losses incentive that was introduced into a recent transmission tender in Victoria, Australia.

This is an example of a relatively complex mechanism for incentivising consideration of losses as part of a full life costing solution by the tenderer.

Box 7 – Haywood terminal upgrade losses incentive

Australian Energy Market Operator (AEMO), is the independent ISO for the National Electricity Market (NEM), the tradable electricity market comprising the five states in the southern and eastern regions of Australia. AEMO has the responsibility for issuing competitive tenders for particular transmission sector projects in Victoria (competitive tendering is not present in other Australian states).

In a recent tender for the Haywood Terminal Upgrade, the tender documents state that the competitively appointed TO transmission charges will be varied by an incentive relating to transformer losses. The incentive will be based on the loss performance level nominated by the Tenderer. The formula that will be used to calculate the monthly Transformer Loss Incentive is as follows:

(ILA x CIL) + (CLA x CCL)

where:

- ILA kW is the amount, if any, by which the iron losses in the transformer as demonstrated by testing exceed the amount agreed in the PCCD [as nominated by the Successful Tenderer in the Tender] or is nil otherwise;
- CIL ($/kW) is the assigned cost of iron losses of $46 per kW per month adjusted by the CPI Escalator each calendar year from the date of contract execution;
- CLA (kW) is the amount, if any, by which the copper losses in the transformer as demonstrated by testing exceed the amount agreed in the PCCD [as nominated by the Successful Tenderer in the Tender], or is nil otherwise; and
- CCL ($/kW) is the assigned cost of copper losses of $17 per kW per month adjusted by the CPI Escalator each calendar year from the date of contract execution.

Source: CEPA research

More generally, as described above, a lot of the activities which could impact the environmental performance impacts of CATO projects will already be captured either as part of the tender process to appoint the CATO (under both the late, but in particular the early tender model) or the activities of the SO in undertaking preliminary works.

For example, under the late tender model our view is that the risk of not financially incentivising losses is limited given that the ability for the CATO to influence costs will also be limited by this stage of the project cycle. For example, for an HVDC solution there is a choice of manufacturer but the choice will ultimately primarily be based on capital cost, and electrical losses are expected to be similar for all manufacturers. Short term gains by manufacturers due to technology step changes are quickly negated by others' development.

Transmission cable and overhead line selection is also based on the most economical solution for transferring the power. There will therefore be limited incentives for the *CATO* to consider

losses due to the high capital costs involved. In May 2014 an EU Commission Regulation was also published regarding small, medium and large power transformers. This requires transformers to be specified with maximum losses to ensure adequate ecological design. Therefore, it will not be possible to specify low loss transformers[47]. High loss equipment is also more likely to be less reliable, and therefore would impact on availability.

Taken together, this may mean that a specific financial incentive related to losses may not be needed, or indeed be proportionate, given the CATO's limited ability to impact on costs by the point of the project cycle at which it takes ownership of project.

In contrast, there is perhaps more of an argument for an incentive under the early model. In this case, the CATO may have a greater influence over the adopted *technology* for a project and, therefore, expected losses from a project. Part of the objective of the early model is for a CATO to consider full life costing and a specific incentive mechanism in the operational period, designed to promote full-life costing, could lead to better outcomes for the consumer.

The challenge would be that although transmission losses schemes have been applied in other countries internationally (see text box above), it can be relatively challenging to establish clear and objective methodologies for setting the financial incentive targets and then measuring the CATO's performance against the targets. Experience in other contexts, in particular GB electricity distribution, has also demonstrated that the outcomes under losses incentives may not always be fully controllable by the network owner.

Therefore, an alternative – similar to the approach currently adopted for TOs – would be to ask the CATO to report on how it is looking to address losses and other aspects of its environmental footprint – e.g. a sustainability agenda as part of its regular reporting. However, there will be costs of imposing such an obligation, and therefore unless the obligation was expected to lead to benefits for the consumer – as discussed, opportunities are likely to be more limited under the late model – such an obligation may not be justified.

Overall, we believe there is a case for encouraging CATOs to consider the environmental impact of their transmission system. However, rather than an explicit financial incentive, we believe this may be best encouraged by including this as part of the requirements of bids at the ITT stage. For example, a CATO could be asked to provide:

- proposals for measures it would introduce to manage the visual impact of the tender;
- compliance with a requirement to meet a target leakage rate for SF_6 assets; and
- calculations to show carbon dioxide equivalent emissions through the asset lifetime.

[47] Commission Regulation (EU) No 548/2014 of 21 May 2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers

Connections

TOs are currently incentivised through RIIO to meet timing requirements for grid connections. Meeting these targets can be challenging due to changing regulation, changing requirements for connections, challenges of obtaining consents etc. Delivering grid connections may be more challenging for CATOs due to the following issues: although generators apply directly to the SO for transmission connections, there are three-way discussions between the TO, SO and the generator. The CATO would need to take part in these discussions and interact with SO; CATOs will need to develop and implement a grid connection process for new connections; and there may be issues surrounding changing a design in a timely manner to take into account changing connection requirements (this was covered in further detail in Section 5 as part of the discussion of incremental capacity).

Assuming that it is deemed viable for CATOs to deal with new grid connection applications, it would seem sensible and consistent to apply a similar incentive to the timely delivery of grid connections as per the RIIO incentive.

9.3. Refinancing

What are the issues

As discussed in Section 3, there are a number of circumstances where a CATO project company could seek to refinance following the award of the licence. Project refinancing gains can be achieved by some or all of the following:

- extending the tenor of debt;
- release of debt service reserve account;
- reduction in cover ratios; and
- reduction in margins.[48]

A refinancing gain share mechanism would be a way of sharing the resulting refinancing gains with consumers under a TRS regime and is a regime feature that has been brought into PFI contracts and more recently the OFTO competitions during TR3.

In contrast, as indicated in Section 3, if applying a building block approach, then refinancing gains over the course of the project cycle would need to be captured through adjustments to the allowed cost of capital of the CATO. This would be a less mechanistic, regulatory driven, approach of updating the regulated revenue stream in response to project refinancing.

Given we believe a TRS model is likely to be the preferred approach for the purpose of facilitating competitive tendering, the discussion below focuses on the mechanics of a refinancing gain share mechanism under a TRS model. If a building block methodology was

[48] See Ernest and Young (2012): 'Analysis of Policy Options for Enduring Regime'

followed, Ofgem would need to provide guidance to bidders of how it would be expect to treat refinancing where the allowed cost of capital was not fixed for the full revenue term.

What are the options for CATOs?

We believe a form of refinancing gain share mechanism will be appropriate for both the late and early tender models given the CATO is taking on both construction and operation of an asset and, therefore, project refinancing is likely to occur in many projects. As discussed in Section 3, the removal of construction risk over the project lifecycle will, in particular, offer opportunities for project refinancing as new investors are able to be invest into the sector (not all investors are willing / able to bear construction risk) and the project risk profile reduces leading to improved funding terms (e.g. margins and cover ratios). The question then becomes the strength of the gain share between the CATO and the consumer.

The 50% rate applied under the OFTO (TR3) refinancing mechanism is one option for CATOs. However, in 2012 changes to guidance on refinancing mechanisms was introduced for PFI (PF2) contracts with a more refined approach to refinancing gain/pain share proposed than a single incentive sharing rate. This is detailed in the text box.

Box 8 – Changes to PFI refinancing

Historical guidance from HMT for PFI contracts was that procuring authorities should be entitled to receive 50% of any refinancing gain.

However amended refinancing provisions issued by HMT (as part of standardised PFI contracts under PF2) now state that: *"The Authority shall be entitled to receive:*

(a) where there is a reduction in the Margin from the Margin as shown in the Senior Financing Agreements as at Financial Close arising from a Qualifying Refinancing (or, in the case of a second or subsequent Qualifying Refinancing, from the Margin as shown in the immediately preceding Qualifying Refinancing) a 90% share of the Margin Gain arising from the Qualifying Refinancing; and

(b) a share of any further Refinancing Gain (arising otherwise than from a reduction in Margin) from a Qualifying Refinancing, in respect of any Refinancing Gain (when considered in aggregate with all previous Qualifying Refinancings) as follows:

(i) for a Refinancing Gain from £1 to £1 million, a 50% share;

(ii) for a Refinancing Gain of £1 million up to £3 million, a 60% share; and

(iii) *for a Refinancing Gain in excess of £3 million a 70% share."*[49]

HMT guidance sets out the basis on which the refinancing gain should be calculated and agreed between the procuring Authority and Contractor.

[49] HMT (2012): 'Standardisation of PF2 contracts – draft'

This includes the data and information needed from the contractor and alternative options for payment of the Authority's share of refinancing benefits.

Source: HMT

Rather than a simple 50:50 sharing rate, and given the possibility that the scale of refinancing gain could be greater than may be the case with OFTOs to date (where under the Generator Build model, any refinancing gains would apply to already operational assets) Ofgem could therefore consider a tiered approach closer to current PFI guidance.

Discussion of options

Clearly the advantage of a gain share mechanism is any refinancing gains would be shared between CATOs and consumers, reducing transmission costs for consumers. Including such a gain share (the right to reopen the TRS for the construction & operation period) would in this case clearly protect the interests of consumers. However, one implication of this policy is that refinancing benefits are less likely to be embedded in the TRS which is bid by the CATO at the time of the tender. There may as a consequence be less competitive tension applied to refinancing opportunities. In terms of incentive strength, there is also a balance to be struck between ratcheting up of the consumers' share under the gain sharing mechanism – as applied under current PFI guidance – whilst continuing to maintain strong incentives for the CATO to seek to refinance the project in the first place.

In other contexts, there had also been a concern that introducing a refinancing gain share mechanism may disincentivise some bidders from participating in the competitions altogether. We have not seen any evidence to suggest this would be a problem for CATOs particularly given refinancing gain shares are standard mechanisms in PFI and now OFTOs.

Other factors that will need to be considered carefully in developing a refinancing policy for CATOs are as follows:

- what types of refinancing would be included or excluded from the requirements of the CATO to share benefits with consumers;[50]
- legal drafting of the refinancing gain share mechanism under the licence to avoid the risk a CATO avoids the sharing refinancing gains; and
- guidance from Ofgem on how it would expect to calculate the size of the refinancing gain if triggered under the licence terms.[51]

[50] For example, the investor guide for OFTOs which KPMG prepared for Ofgem states that "*Refinancing gain sharing will apply to gains from the refinancing of 'external debt', which includes bank and capital markets debt and excludes elements such as shareholder debt and subordinated loans."*

[51] As discussed above, HMT has provided guidance on the calculation of refinancing gain for procuring authorities under PFI contracts. This involves use of the original base case financial model of contractor, to calculate NPV distributions to equity in a post-refinancing model minus distribution show in the pre-refinancing model.

9.4. Conclusions

This section has considered options for how to incentivise the good performance from the CATO, both in terms of the delivery of its operating obligations and wider business activities and efficient management of its financing.

The are a range financial incentive mechanisms that could be built into the regulatory framework to provide CATOs with the opportunity to earn additional returns for achieving strong performance. A refinancing gain share mechanism – to allow the CATO revenue stream to be adjusted in the event of project refinancing – would be a way of sharing refinancing gains with consumers and is a regime feature brought into PFI contracts and more recently offshore competitions run by Ofgem for OFTOs.

10. CONCLUSIONS

CATOs will provide an opportunity to design, build, own and operate onshore transmission assets, with a well-defined cash flow profile created by a stable regulatory regime. The focus of a CATO's activities offers the opportunity for investors to compete for assets with exposure to both constrained construction and operation risks and to add value by bringing together a commercial offering that reflects a long term view of full-life project costing and innovative approaches to project financing and management of performance obligations.

As set out in this report, there are a range of financial incentives and performance obligations that can be built into the regulatory framework to set and adjust the regulated revenue stream to ensure this opportunity delivers value for money for the electricity consumer, together with a risk profile for the sector that will be attractive to a range of debt and equity investors so as to maximise the potential for new entrants and existing participants in GB transmission to participate in the CATO licence competitions.

We believe this opportunity to be an important evolution in the regulation and delivery of electricity transmission services in GB. We look forward to seeing how the options which we have set out and considered in this report will be developed by Ofgem in delivering the first competitive tender for GB onshore electricity transmission services.

ANNEX A FINANCIAL ISSUES

In this annex we summarise the feedback received from interviews we have undertaken with investors and financing institutions.

Availability of long term finance

Debt market for well-structured infrastructure projects has matured in last two years with re-emergence of long term bank project finance as well as the maturing of a significant institutional market. The banks typically fund up to 25 years with step up margins to incentivise refinancing, whereas the UK pension funds would be keen on longer term lending and index linked to match long term liabilities.

The PFI market has been quieter in the UK over the last two years but the recent schools PFI aggregator transaction closed in April 2015 had a debt maturity of 25 years which allows for a competition between bank and capital market terms. Prior to this, transactions were typically becoming shorter, with the bank market becoming more conservative post the credit crunch. With the public market and the emergence of debt funds from the infrastructure funds/fund managers (e.g. Allianz, IFM, UBS, Blackrock, M+G) as well as separate infrastructure debt teams (with project finance teams) from insurance companies (L+G, Aviva), there is increasingly more competition for lending to infrastructure projects and the project finance skills to assess them and the increased capacity to execute large private placements/club deals by fund managers allows for interesting opportunities for long term debt away from the banking market. Indeed at the moment the bank and institutional market compete actively between markets as well as within markets in the 20-25 year average life maturity. Long maturity for the right risk for these types of funds is an advantage.

The successful development of the OFTO market and the two public market issues Gabbard and Gwynt y Mor has led to a re-rating of the sector by investors, which will benefit the CATO sector, if the structures being proposed are not too dissimilar. The key difference is construction risk. On the late model our feedback is that investors are willing to accept construction risk, or follow the classic PFI bank finance and re-finance into the capital markets post completion. The key variable is going to be the perceived level of construction risk. For more vanilla on-shore transmission (HVAC), we would anticipated more options to lock-in financing upfront. Where there is a more complex project, potentially with less tested technology e.g. HVDC, a bank funding approach is more likely to be required, with a re-financing post completion in the early operational phase of the project.

Considerations to make more attractive to long term debt providers

Shorter construction period, good protections from an EPC contractor on cost overruns etc. during construction, more proven technology, minimal consenting risk, minimal interface risk would all make these types of projects more attractive to getting long term debt finance at the preconstruction phase. Investors will want the CATO financings to look similar to the OFTO

sector and obtaining the equivalent investment grade ratings post construction will be important. It is unlikely that banks will lend for the full length of the licence if it is going to be 40-50 years. We have however received strong indications of theoretical interest for long dated index linked finance from the pension sector as this would perfectly match their liability profile; indeed, they currently view the OFTO bonds as quite short.

In general it becomes harder to execute Index Linked swaps with average lifes of 30+ years compared to those done for OFTO projects However this problem can be overcome by the direct issuance of Index Linked Debt. It should be noted that there is almost no interest in CPI linked cashflows from the Funders. Demand remains solidly locked in the RPI camp.

The length of the CATO's revenue term also has a bearing on the ability to bid a fixed TRS given the ongoing operational costs. Most investors would assume that it would be difficult for bidders to price this accurately beyond 20 years and look for some kind of reopener or price review on the operational costs.

An alternative is to use the bank market for the construction phase and refinance into the institutional market post construction. As for the OFTOs, once operational, these would be extremely attractive assets for these type of investors. The question is whether the sponsors would take this kind of refinancing risk on a fixed TRS (they don't in PFI deals) and so which party takes any reduction in value from potential underperformance or shares in out-performance from the need for project refinancing.

Other considerations for financeability

Sculpting of revenues could be used to shorten the debt term which would allow one to use the bank market for those transactions with more complex construction issues.

Using SO as the counterparty, as for the OFTO regime also does help doing a longer deal because of the track record and credit rating of National Grid.

Reliability and availability incentives need to be set at an appropriate level for these assets, where, once operational, the debt is unlikely to be at risk unless a serious problem emerges.

Detailed stakeholder feedback

The table below summarises the feedback and views of investors and a series of questions and themes that were tested as part of the interview process.

Theme/ question	Feedback from investors	Implication for the design of the CATO regime
Duration of revenue stream	Respondents varied in their response to having a shorter duration of revenue. In this case, the residual value takes on greater importance. Would expect greater cost efficiency in initial period with more natural financing strategy and greater certainty, although for a subsequent phase there may be a very strong incumbent advantage (although one participant did not have concern about any incumbent advantage).	• Fixed 45yr model should be viable. • Alternative model would be to have a shorter time period for the licence/ revenue stream – may lead to more efficient financing regime. • Shorter period does raise the question of the residual value and the approach used to set any residual value.
Residual value	This was raised without prompting by multiple investors, who were keen to avoid the difficulties in not bidding on a level playing field, given the lack of awareness of any residual value for the OFTO regime. One investor stated that they had assumed periodic reviews took place after the duration of the revenue term. Investors noted the condition under standard PFI handback deals, whereby the asset in question should be in full working condition.	• Being in full working condition means that there may be greater opex requirements for the asset compared to assuming a residual value of zero. • The existence of a value may lead to greater cost efficiency from bidders.
Revenue sculpting	A debt investor stated that revenue sculpting could be beneficial – however, another questioned whether this would lead to any benefits.	• Generally there is a sense that the fixed revenue increasing with RPI would be preferred and mirror the OFTO structure which is now well understood.
Benefits from early model	There was general acceptance of the value of the early model in situations where there could be design alternatives and consortium members could add value that would reduce construction costs. Required returns from primary (greenfield) assets seen as being up to 500bps higher than for secondary market assets.	• The early model may be applicable in certain situations. • All parties liked the idea of an adjustment mechanism to the fixed revenue stream to take into account known variables during the development phases of the early model.
Feasibility of early model	There were difference in views regarding the early model. A financial group suggested that the majority of prospective bidders	• This information would indicate that the early model is a viable part of Ofgem's regulatory toolkit for CATOs,

Theme/ question	Feedback from investors	Implication for the design of the CATO regime
	would lack the time, people, patience and skills to be involved. However, there were parties that showed an interest to be involved in this model, and stated that they could see the design benefits. Question of whether you could go to finance committee to get funds if the nature of the design was not yet known.	although it will be a smaller market compared to the late model.
Feasibility of late model	The late model is the most easily understood and closest to the OFTO model and hence of particular appeal to actors already present in the OFTO market. Participants felt that there would be greater competition (albeit on finance mainly). With credit enhancement and a solid credit rating, one participant believes this would create an extremely attractive asset class, especially if a shorter duration than 45yrs.	• Construction risk is assumed to be manageable, but that will depend on the specific projects. • Late model is more attractive than early model for many participants, although would lead to lower returns.
Demand – Equity	Equity investors signalled their preference for index-linked returns. The ideal length of return is seen as being 20yrs+, and there have been some reservations around cashflows over 40yrs being very heavily discounted. Presence of a pipeline over time is key to having a number of bidders, although the idea of an optimal sized field was noted by one set of investors.	• 40-50 year duration of revenues is not an issue to equity investors per se, although this may not lead to cost effectiveness if consumers continue to pay amounts not valued by investors. • Ofgem should publish pipeline of projects and clarify both number and size of these future deals. • Residual value issues need to be addressed as if this is actually de facto a perpetual asset, then shortening operating license periods from theoretical whole life may make sense if value of extension not reflected in equity value today.
Supply - Debt	For bullet payment debt, would see a maximum of 30yrs for bank lending, typically from Japanese banks. Amortising debt may permit slightly longer length, but not beyond 40yrs.	• Debt does not go up to 45yrs without incurring a premium, so likely to need to refinance if this length of revenue duration adopted. • Something around a 30yr maturity for both nominal and IL debt would be cost effective.

Theme/ question	Feedback from investors	Implication for the design of the CATO regime
	Bank market is currently very cheap due to amount of money. Have seen significant re-pricing recently. For nominal debt, 12yr average life for OFTOs is too short to be cost effective. 20yr average life with 30yr maturity is preferable. Most cost effective term for IL debt is seen to be 30-40yrs by one investor, compared to closer to 20yrs according to EIB. EIB loans unlikely to go beyond 30yrs, as see economic life of transmission assets as 25yrs from construction. EIB could do either IL or nominal debt.	• A 30yr profile could also be supported by EIB debt.
Demand – Debt	Investors have signalled strong interest in theoretical CATO debt building off the OFTO benchmarks. Bank and insurance investors have greatest demand in the mid-range of the curve. This tension has led to the strong demand from the capital markets for the OFTO debt, coupled with a swap to hedge out the IL risk. Pension Funds have greatest demand for longer dated assets with the IL link embedded. Anecdotal evidence points to greater demand for indexed linked debt.	• The debt markets offer flexibility for either a mid-term or full term structure. The core investor base will skew towards the UK Pension Funds for the longer dated product. • There was no sense that in the current market a significant amount of long dated debt could not be absorbed. However this sector is more sensitive to external market dynamics and so the mood can change resulting in significant swings in new issue spreads. • The shorter dated markets will be more consistent over a market cycle.
Inflation indexation	Investors raised whether indexation would be CPI or RPI linked. Given obligations, a strong preference for RPI-linked revenues was noted. Most investors stated that biddable indexation would be a good idea, though cautioned that the outcome would depend heavily on how the bids are evaluated.	• RPI cashflows strongly preferred. • Biddable indexation is worthwhile, however care needs to be taken with the evaluation process.
Derivatives	Ability to get swaps of over 20yrs is expected to be difficult. Option might be for consumer to take market risk on swap pricing to facilitate more flexibility in the financing solution for CATOs.	• This need not influence Ofgem's decisions given the availability of direct IL issuance options. • If it does, it may be difficult to get swaps to cover the long-term.

Theme/ question	Feedback from investors	Implication for the design of the CATO regime
	Amortising nominal debt sits more naturally with swaps. Investors stated that found it difficult to see that nominal debt + swaps is more efficient.	
Project size	General feedback from the equity market has been that projects of £100m or less would be uneconomic to bid for. Debt market is more flexible, but transactions of over £100m will generally appeal to a broader universe due to liquidity concerns. On smaller projects, expect there to be less gains from financing given the size of the issues (with National Grid at L+105bps compared to expected L+175bps for someone like Allianz). Another participant agreed that smaller project sizes are likely to be less cost effective due to presence of fixed costs.	• Ofgem's proposed minimum size is appropriate and if anything at the cusp of economic efficiency. £125-£140m probably represents the point at which transactions become really interesting. • Smaller projects become less attractive as complexity increases.
Length of construction phase	The market does not yet have a good handle on the complexity of construction risk. This is especially the case where technical advisors do not put information in the public domain – creating difficulties for financiers and developers. Shorter construction periods are acceptable. Some participants are comfortable with 5yrs, but not longer. Others expressed more caution at 4-5yr construction period. Larger group of construction companies for onshore assets compared to offshore.	• It will be important to educate investors over time. • Ideally the delivery complexity of early projects would facilitate some positive operating history to develop before more challenging projects are tackled (or seek funding in the external markets). • There are companies able to do construction onshore – longer construction periods create uncertainty and so payment timing and treatment of risk matter more.
O&M	Perception is that O&M is relatively light, but recent experiences in OFTO sector have challenged this view. Key issue is the required state of the asset at termination. O&M being minor means that re-opener may not be required	• If the intention is to have a fully operating asset at termination, O&M requirements will be higher by definition. • Consideration needs to be given as to how to incentivize operators to maintain assets in the late stages of the

Theme/ question	Feedback from investors	Implication for the design of the CATO regime
	(depending on downside risk), but like the idea of a mechanism if a 45yr duration – even if with a materiality threshold or cap. Change to O&M allowance may affect credit rating and financing.	license, when debt is repaid and equity returns have been earned
Payment timing	Costs up to the point of consents may be in excess of £10m, according to one participant.	• Would not want to have payments of materiality delayed, as could create own costs. • Also raises issue of what happens if a project does not proceed.
Availability incentive	Participants raised the 10% limit on penalties as a desirable feature. This means that there is ultimately no risk on debt, but some risk on equity. Credit rating also benefitted from the limit on penalties.	• Having a limit means that can get efficient debt financing. • Setting a downside cap would be a method by which the regime was made attractive.
Overall risk	For long-term IL debt to be possible, an investment grade credit rating is required. Expect there to be a premium of 200bps above equivalent investment grade credit – type of asset doesn't really sit in high yield market. Having a pipeline and portfolio of projects is key to reducing risk.	• Need to consider credit rating and implication this has. • Failure to obtain investment grade leads to large costs. • Investors require a clear pipeline out for a number of years to justify investment in sector and to create a portfolio of CATO assets.
Technology risk	For HVDC projects, there may be expected to be greater risk perceptions, given limited examples.	• There is a wide variety of transmission projects. Risks are perceived differently for each. • May be wise to start off with the tender of HVAC technologies to help understanding of the regime, with HVDC coming when the regime is better understood.
Political and regulatory risk	Participants noted that many of the projects were located in Scotland. One investor noted that there is some political risk to consider (e.g. redenomination into a new currency), though this has lessened following the referendum. If the project is in Scotland, is there different counterparty risk?	• Jurisdictional issues are likely to matter for investors.

Theme/ question	Feedback from investors	Implication for the design of the CATO regime
	This kind of risk can move back projects by several years, leading to an assortment of risks cropping up e.g. inflation risk, funding risk. UK still seen as relatively predictable and stable regime, although examples over last four years means more conscious of this.	
Types of bidder	Could see infrastructure money sitting alongside more technical partner, possibly a TO. Market size that can be sustained by the CATO regime may be three participants – similar to the OFTO regime. Pipeline is a key determinant of this.	• Does not lead to any implications but size of market may depend on size of pipeline.
Requirement for committed finance at tender	One party felt as though a requirement to have committed finance could be too restrictive. Bank debt seen as fairly easy to cancel, but unlikely to get step down if set rates during construction. There is a risk if cannot access bond finance at this point. There is difficulty in holding pricing for any set period – under the OFTO regime, holding a price for a year or more has been difficult.	• Absence of committed finance raises a risk that finance cannot be raised at the time. • Ability to cancel bank debt should mean that committed finance should not be overly restrictive.

ANNEX B FINANCIAL MODELLING

B.1. Introduction

We have undertaken financial modelling to illustrate some of the options and issues associated with CATO regime design choices.

The modelling has been used to test the impact of the revenue term, cost recovery and residual value (RV) policy options on:

- *Deliverability* – What financial packages would match choices in structuring the revenue stream of the CATO? And
- *Pricing* – Under stylised modelling assumptions, how do different policies and financial packages impact on the profile and level of TRS?

Some of the key implications from the financial modelling have been summarised and discussed in the main report.

As also discussed in the main report, the financial modelling is based on stylised, simplified, assumptions, to show the possible revenue and financing cash flows under alternative revenue term policies. Therefore, the results of the modelling should *not* be viewed as a cost-benefit analysis of the options, rather an illustration of the issues which would need to be considered in project financing under alternative approaches.

This annex provides a more detailed description of the modelling assumptions that were used and the results under alternative policy options.

B.2. Modelling assumptions

B.2.1. Project cost and timing assumptions

We use simple stylised project assumptions for the modelling. We model an illustrative onshore transmission project with the following assumptions:

Table B1 – Project cost assumptions

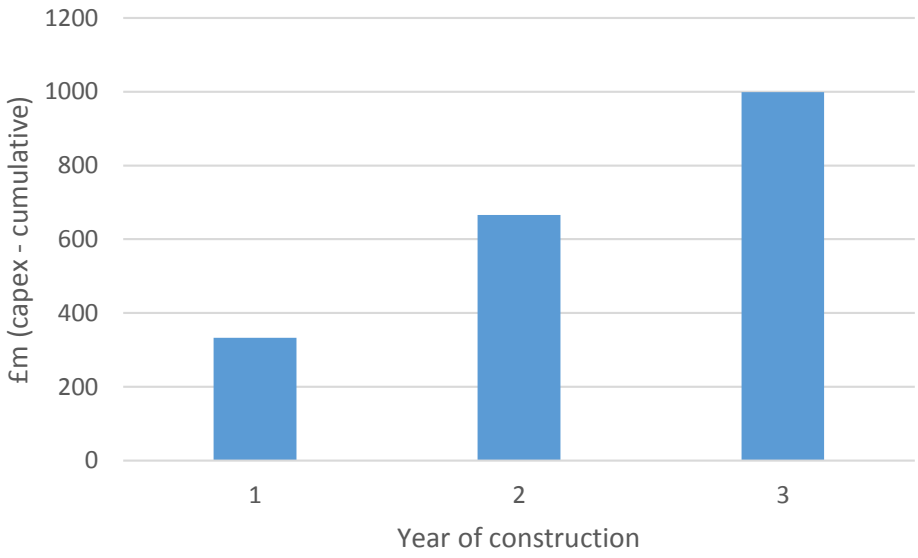
Assumption	Value
Capex	£1,000m
Construction period	3-yrs
Inflation	3%
Useful life	45-years

Source: CEPA, TNEI and LHGP

For simplicity purposes – and to aid comparison between the different policy options in terms of the impact of project financing on choice of revenue term period – we have only modelled capex and financing costs – i.e. we have excluded taxation and operating and maintenance costs from the modelling.

The capex is assumed to be incurred across a three year construction period in equal instalments, as illustrated in Figure B1 below.

Figure B1 – Notional CATO project cumulative capex spend (£m)



Source: CEPA, TNEI and LHGP

B.2.2. Policy scenario assumptions

We have modelled four policy option scenarios, based on the key choices for the revenue stream discussed in Section 4. The policy assumptions that are made in each case, are summarised in the table below.

Table B2 – Project cost assumptions

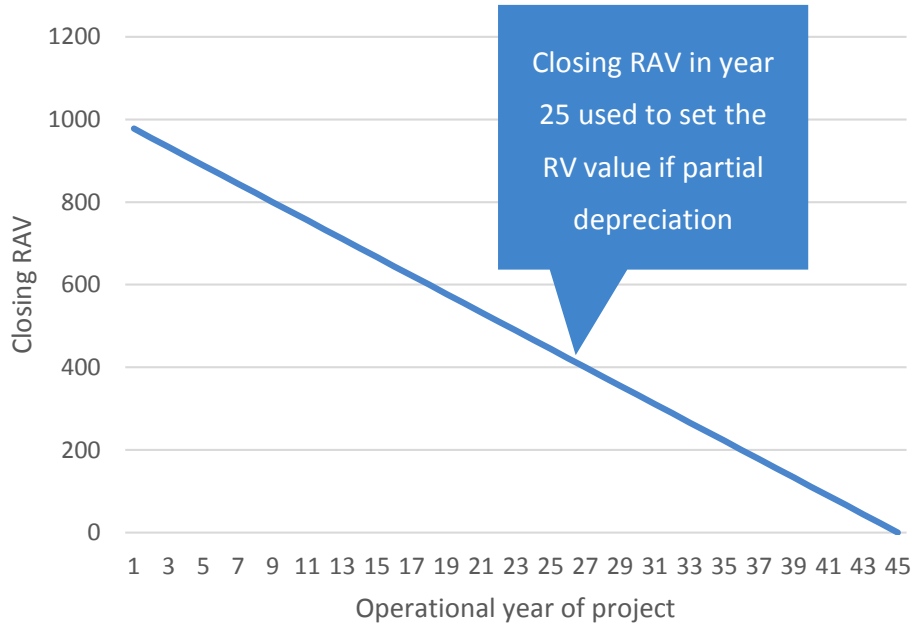
#	Revenue term	Residual Value (RV) policy	Cost recovery period	Implied concession period [1]
1	45 years	Investment written off (fully depreciated) over the 45yr revenue term	45 years	48 years
2	30 years	Investment written off (fully depreciated) over the 30yr revenue term	30 years	33 years
3	25 years	Investment written off (fully depreciated) over the 25yr revenue term	25 years	28 years
4	25 years	Partial depreciation - RV payment to the CATO at the end of the revenue term	Targeted 45 years	28 years

Source: CEPA, TNEI and LHGP

Note 1 - Assuming 3yr construction period.

In case 4, the RV is set equal to a closing asset value at year 25 using a 45 year asset life and straight line depreciation assumption, as illustrated in Figure B2 below.

Figure B2 – Straight-line depreciation method used to set RV payment



Source: CEPA, TNEI and LHGP

As Figure B2 shows, this approach means that the RV is used only to recover the capital invested into the project in year 1 and does not apply any adjustment to asset value (e.g. for inflation). The TRS however is modelled in nominal terms – see discussion below – and therefore both debt and equity receive their target nominal rate of return.

There are alternative policies that could be applied to setting the RV. For example, the RV could be adjusted for cumulative inflation, rather than set at depreciated historic cost. We have adopted the approach in Figure B2 to *illustrate* the impact of applying a fixed RV assumption. The choice of valuation policy, however, impacts on the starting level of the TRS and the profile of the revenue stream over the useful life of the assets (see below).

B.2.3. Illustrative financial packages

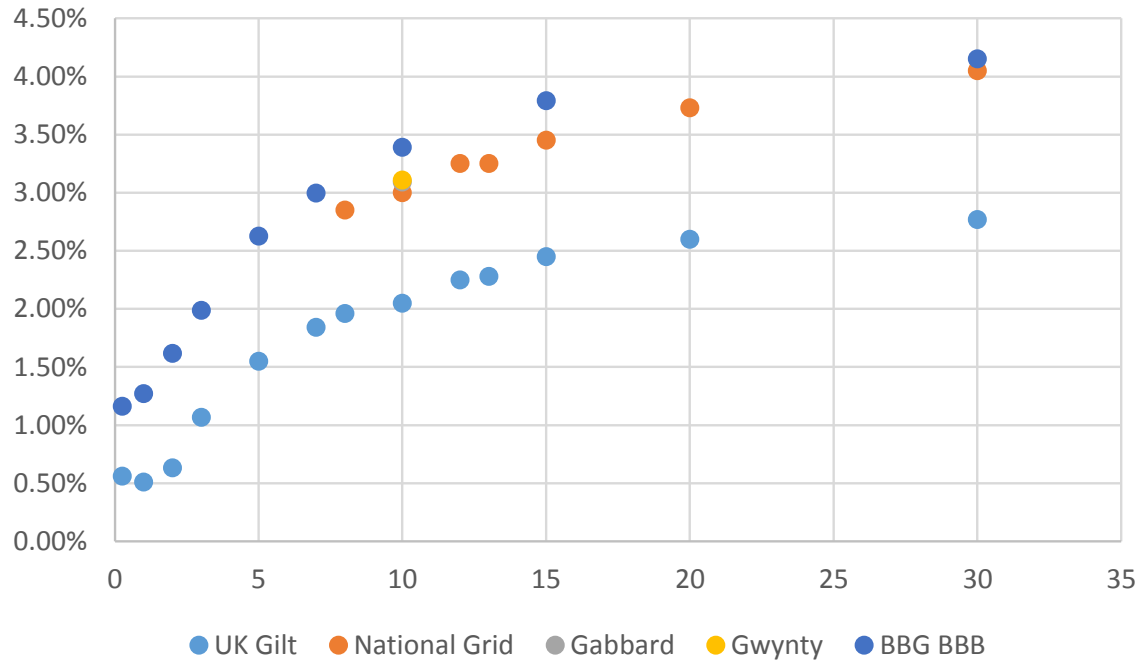
We have developed illustrative financial packages for each of the policy scenarios set out in the previous subsection.

The figure below compares the UK Gilt and Sterling Bloomberg BBB index yield curve with National Grid issues and project bonds issued for Gwynty and Greater Gabbard OFTOs.

This shows that Gwynty and Gabbard trade essentially flat on each other and at a 10 bps premium to the National Grid Curve.

We have used this yield curve as a basis for pricing long-dated project senior debt in our illustrative financial packages.

Figure B3 – Sterling yield curves



Source: CEPA, TNEI and LHGP

We note that:

- currently yields are very low and spreads are relatively flat at the longer end; and therefore
- increasing the maturity of debt (at the very long end of the yield curve) has a relatively limited impact on the absolute yield assumed.

For each policy case, we model two financial structures:

- the first structure, assumes a financial package is put in place for the full concession life from the start of the construction period; and
- the second structure, assumes a bank financing package bridge is used during construction, with the project refinanced for the remaining period of the revenue term in the fourth year of project operations.

The financial package assumptions used in each case, are summarised in Tables B3 and B4 overleaf. Across all packages we assume:

- an target equity IRR of 14%[52]; and
- a debt tail of 2-years before the end of the revenue term.

[52] This is an illustrative assumption and does not necessarily reflect our expectation of a target equity IRR for CATO projects.

Table B3 – Full concession life financial package put in place at start of construction period

	Case 1	Case 2	Case 3	Case 4	
Description	Single Senior Debt placement	Single Senior Debt placement	Single Senior Debt bond k placement	Amortized Senior Debt placement & bullet repayment instrument	
Target Equity IRR	14%	14%	14%	14%	
Gearing	60%	60%	60%	60%	
Form of debt	Amortizing	Amortizing	Amortizing	Amortizing	Bullet repayment[2]
Tenor [1]	46	31	26	26	28
Debt tail	2-years	2-years	2-years	2-years	0 years
Benchmark gilt rate	2.75%	2.75%	2.75%	2.75%	2.75%
Swap / new issue premium	25bps	25bps	25bps	25bps	25bps
Spread to benchmark	200bps	175bps	140bps	140bps	190bps
All-in Yield	5.00%	4.75%	4.40%	4.40%	4.90%

Source: CEPA, TNEI and LHGP

Note 1 - Concession life minus debt tail length (except for bullet repayment instrument where the capital is repaid at the end of the revenue term

Note 2 – Paid in the final year of the debt term

Table B4 – Bank financing bridge during construction, then refinancing in the fourth year of operations

	Case 1	Case 2	Case 3	Case 4	
Description	Single Senior Debt placement	Single Senior Debt placement	Single Senior Debt bond k placement	Amortized Senior Debt placement & bullet repayment instrument	
Target Equity IRR	14%	14%	14%	14%	
Gearing	80%	80%	80%	80%	
Form of debt	Amortizing	Amortizing	Amortizing	Amortizing	Bullet repayment[2]
Tenor [1]	40	25	20	20	22
Debt tail	2-years	2-years	2-years	2-years	0 years
Benchmark gilt rate	2.75%	2.75%	2.75%	2.75%	2.75%
Swap / new issue premium	25bps	25bps	25bps	25bps	25bps
Spread to benchmark	130bps	115bps	100bps	100bps	150bps
All-in Yield	4.30%	4.15%	4.00%	4.00%	4.50%

Source: CEPA, TNEI and LHGP

Note 1 - Concession life minus initial 6-year finance period minus debt tail length

Note 2 – Paid in the final year of the debt term

The financing packages are only illustrative, as they omit certain elements of the financing package which may in practice be adopted by a CATO. For example:

- we have not explicitly modelled application of interest rate or inflation swaps in the financing structure; and
- we assume the use of fixed rate debt in all of the financial packages, rather than alternatives, such as index-linked bonds.

The debt is also modelled in all scenarios using a mortgage style repayment profile. This means that senior debt service (interest and capital repayment) is constant over the loan life. This helps to match the debt repayment to the profile of the TRS.

The only exception to this – as highlighted in Table B3 and B4 – is the case of Scenario 4 where the capital structure includes both amortizing debt and debt where repayment of the capital value is provided through an end period bullet payment.

Our pricing of the bullet repayment debt instrument assumes this financing package is considered broadly investment grade (see discussion in main report), although priced at a premium to the amortizing debt to reflect higher credit risk.

B.2.4. Revenue setting

The model sets a starting year TRS figure (which for simplicity purposes is assumed to be fully indexed to a consumer inflation index over the revenue term) to meet all project debt obligations and deliver the target equity IRR.

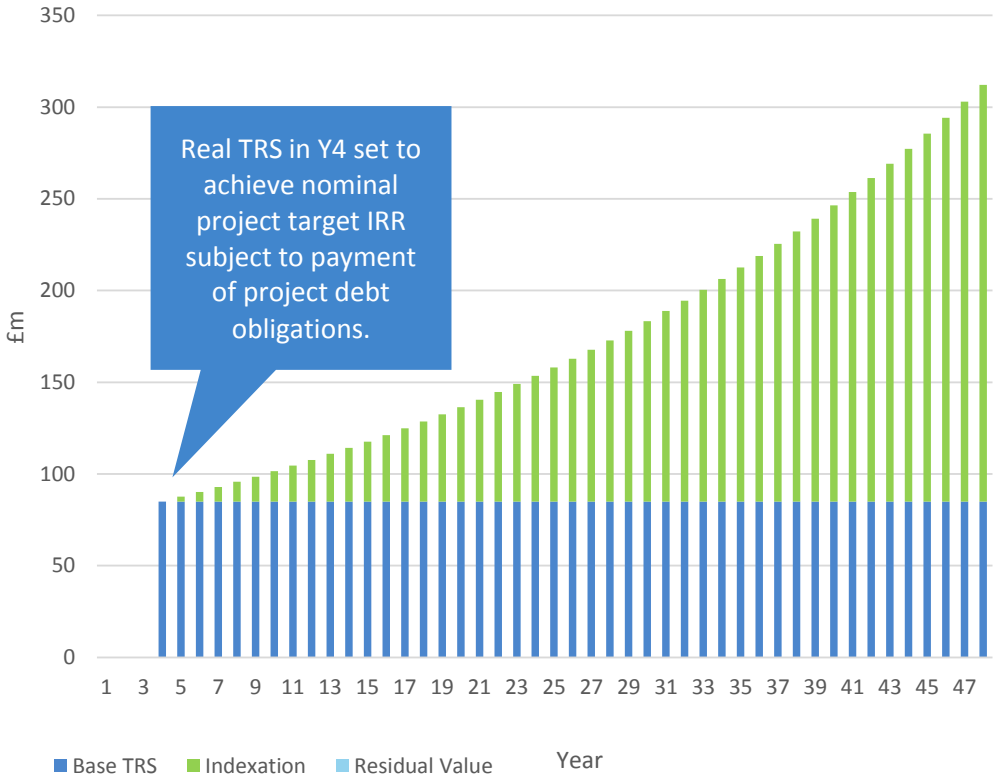
This means that the TRS is derived from the project cash-flows rather than from regulatory pricing assumptions, as would for example apply if a RAB based or annuity pricing model was the adopted as framework for setting the revenue stream – see Figure B4.

Note that for the 25-year revenue term scenario with a RV, we have included the RV payment in the NPV TRS calculations.

However, in practice, this would not be a financial payment that is made by the consumer, but rather if the assets were to transfer to a new operator (one of a number of possible n future regulation scenarios that could occur under this policy approach), the RV payment would be made *between* the new operator and CATO.

The total cost for the GB electricity consumer would in this case be the regulated revenue stream over the CATO's revenue term (initial revenue term), and the regulated stream applied for the new transmission owner (second revenue term), including financing costs. We discuss this scenario further as part of the model outputs below.

Figure B4 – Revenue setting methodology



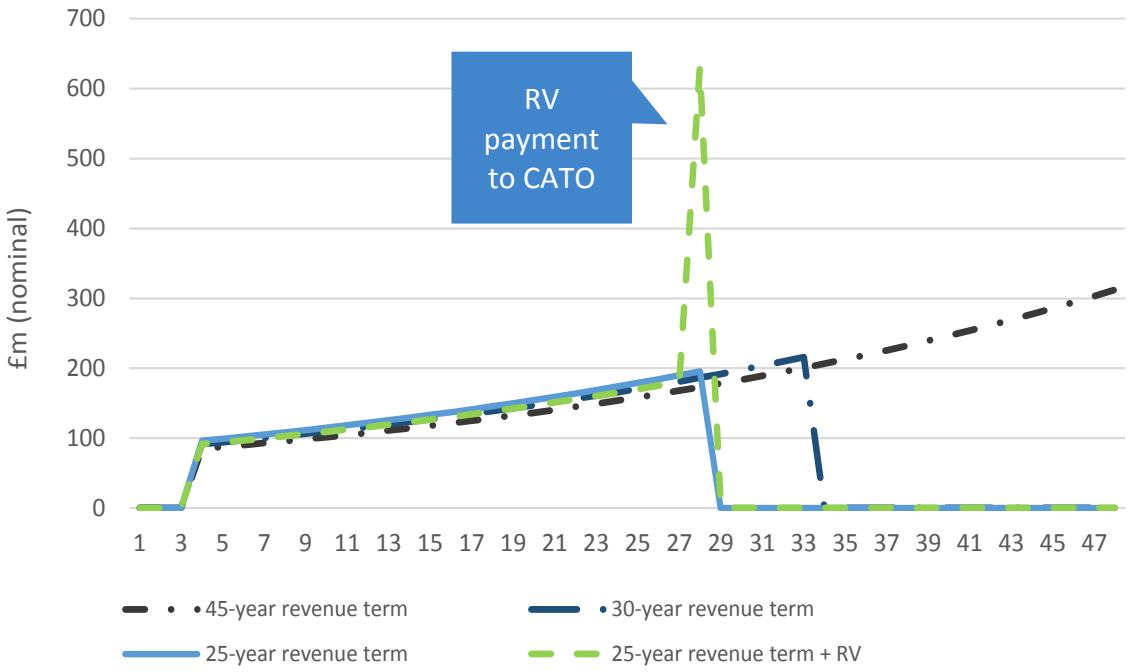
Source: CEPA, TNEI and LHGP

B.2.5. Outputs

In the illustrations below, we summarise some of the outputs from the modelling, including in each scenario, senior debt repayment profiles, shareholder injections/withdrawals and the outturn starting TRS and NPV TRS over the duration of the revenue term.

Figure B6 below reproduces part of the illustration in Section 3, comparing the profile of the TRS under each policy scenario. The RV payment is illustrated in Scenario 4, but as discussed above, would in practice not to be a lump sum payment made by the consumer.

Figure B5 – CATO revenue profiles – TRS + RV payments



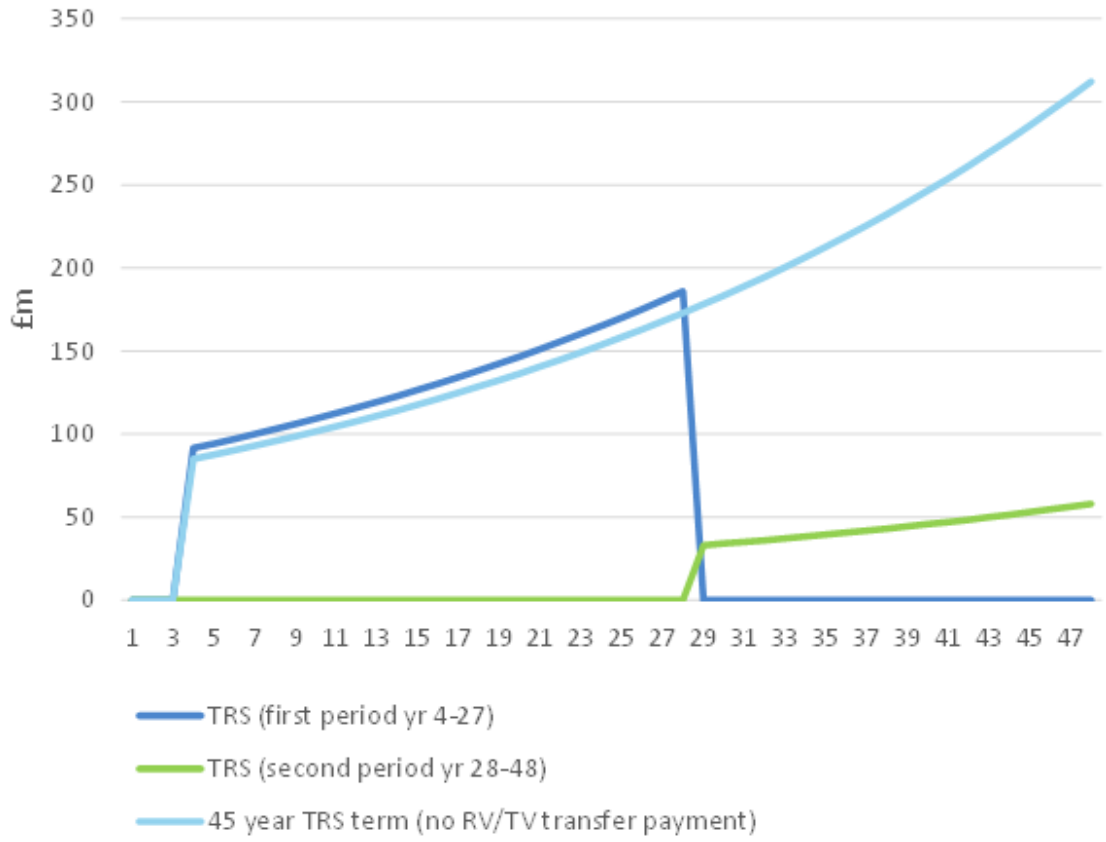
Source: CEPA, TNEI and LHGP

To illustrate the potential full-life impact of Scenario 4, we have also run a scenario where the CATO's assets are retendered at the end of the CATO's 25-year revenue term, under a second 20-yr fixed TRS term. This is one of a number of possible regulatory policies that could be applied at the end of the CATO's revenue term (where there is a fixed regulatory RV) but should not be taken to imply this would in practice be Ofgem's adopted regulatory policy.

For illustration purposes, the RV payment – fixed at the time of setting the CATO's TRS – in this case forms the regulatory *transfer* value between the new operator and the CATO. We model the second 20-year period TRS using the same principles and financing assumptions as Scenario 3, but apply a 20-year TRS as with an OFTO.

Figure B6 illustrates the profile of the regulated revenues in this scenario. As discussed above, there are alternative valuation policies for the RV that could be considered, and in practice the pricing of the finance in the second revenue term period would be expected to differ from market pricing today. For example, the RV could be uplifted by expected cumulative inflation to the transfer date, to apply a smoother price path than illustrated in Figure B4. This would result in a lower starting TRS in the first contract period, but a higher TRS closer to the replacement cost level in the second contract period.

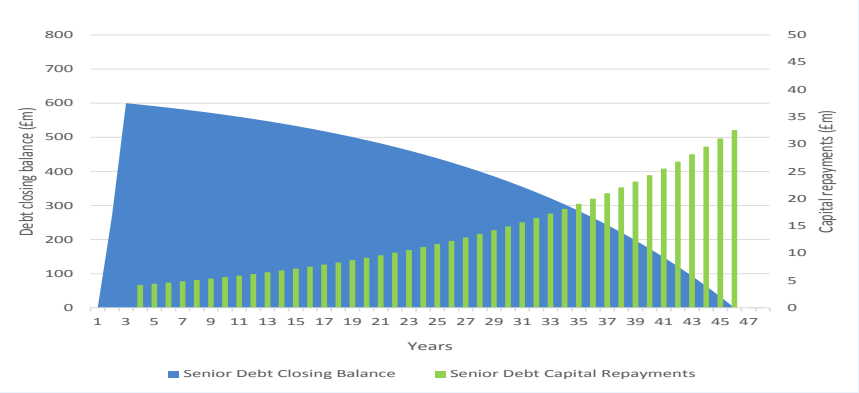
Figure B6 – Illustrative full life regulated revenues applying an RV policy for the initial CATO



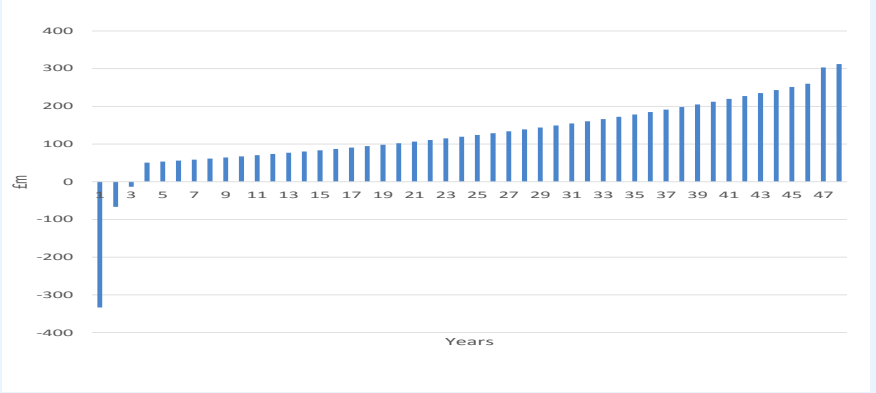
Source: CEPA, TNEI and LHGP

Scenario 1 (45 year revenue term) – Financial Package 1

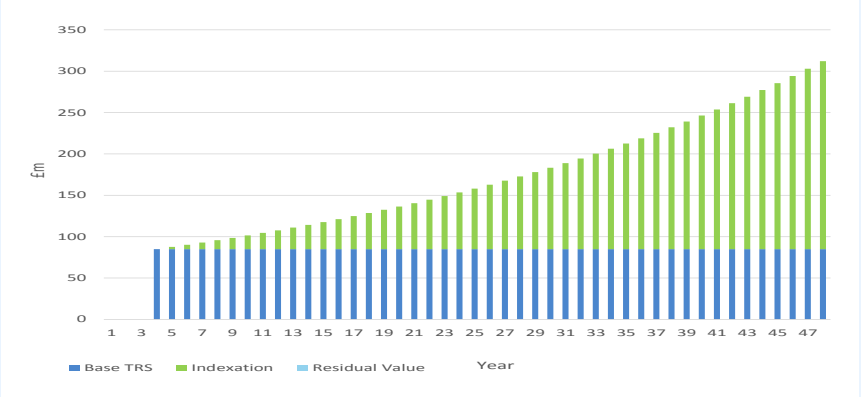
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile

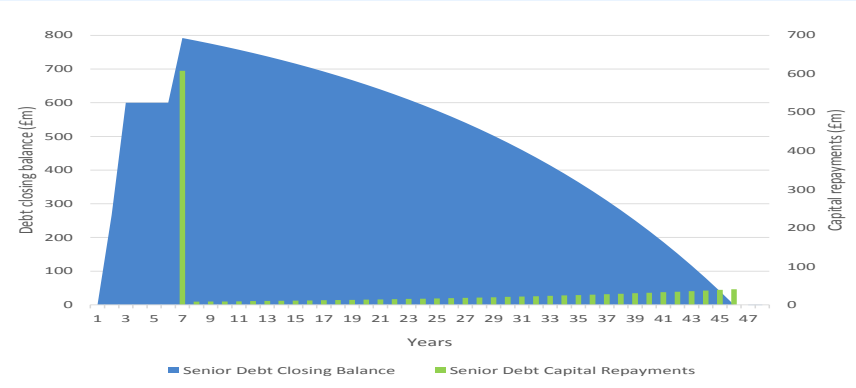


Consumer metrics

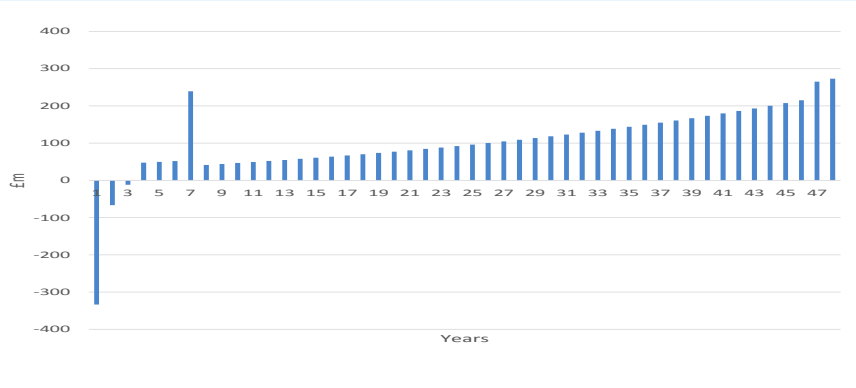
Metric	
Starting TRS	£85m
Total TRS (NPV)	£1,532m
Weighted average loan life	~ 31-years

Scenario 1 (45 year revenue term) – Financial Package 2

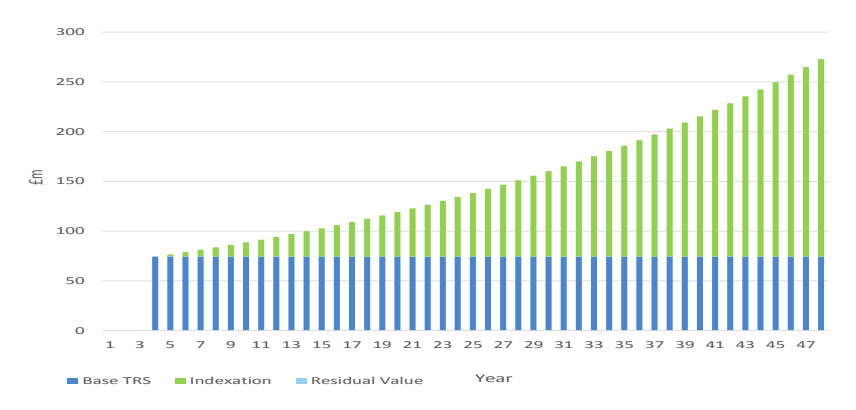
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile

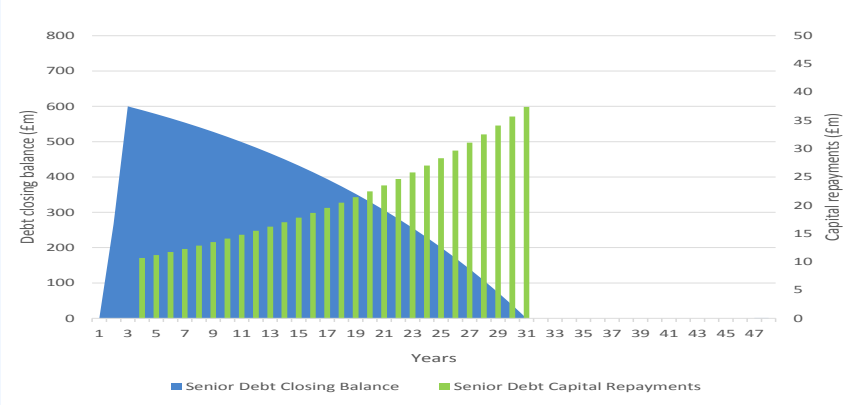


Consumer metrics

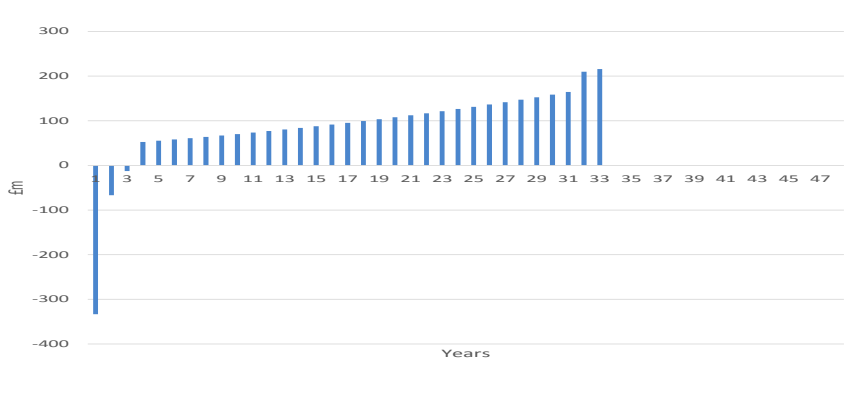
Metric	
Starting TRS	74
Total TRS (NPV)	1,340
Weighted average loan life	~ 25-yrs

Scenario 2 (30 year revenue term) – Financial Package 1

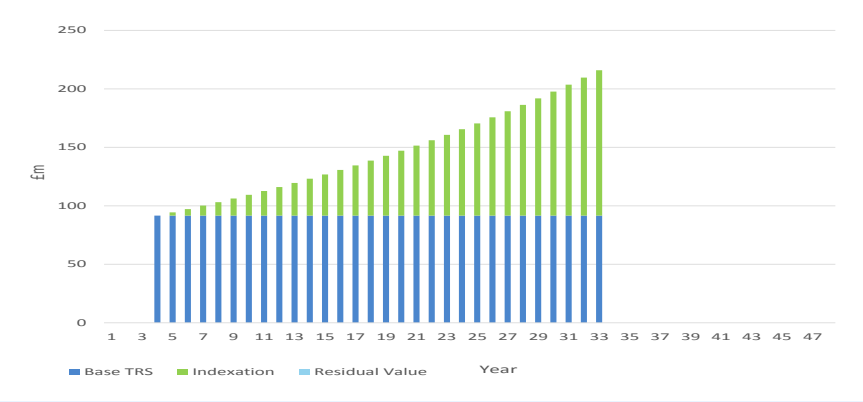
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile

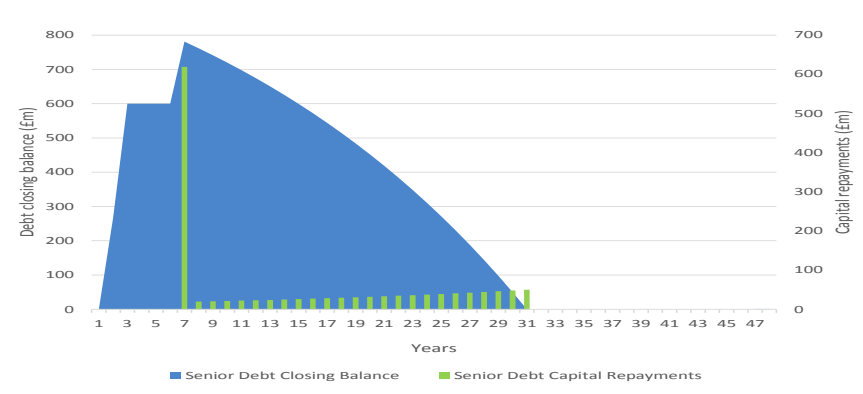


Consumer metrics

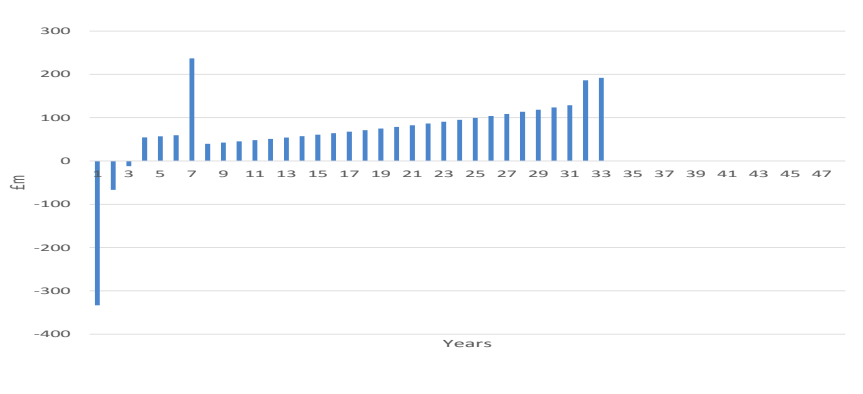
Metric	
Starting TRS	£92m
Total TRS (NPV)	£1,351m
Weighted average loan life	~ 19-yrs

Scenario 2 (30 year revenue term) – Financial Package 2

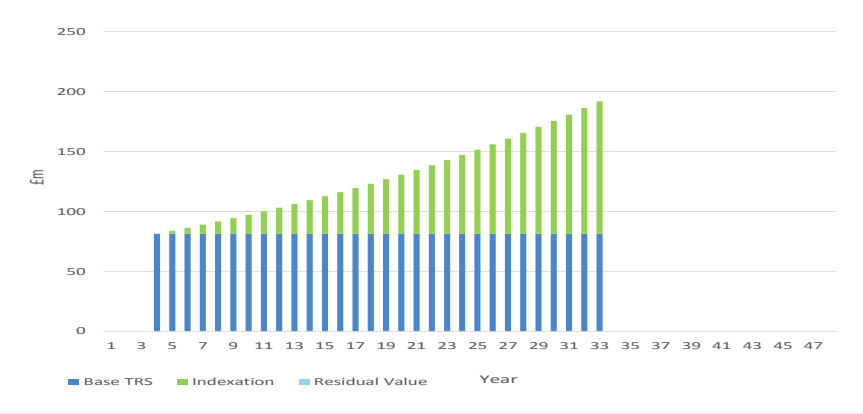
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile

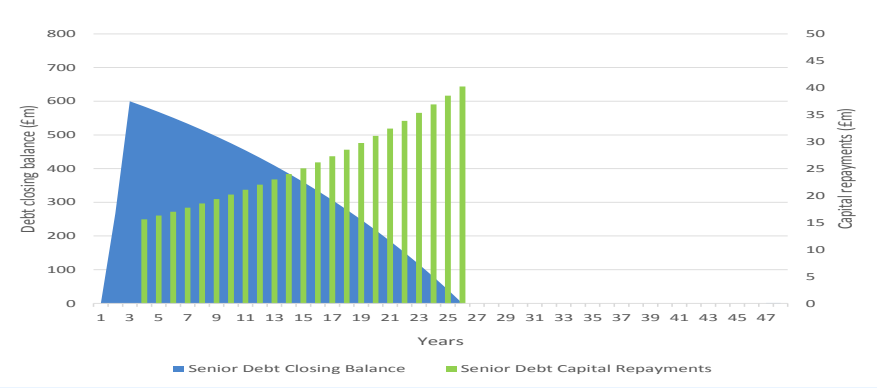


Consumer metrics

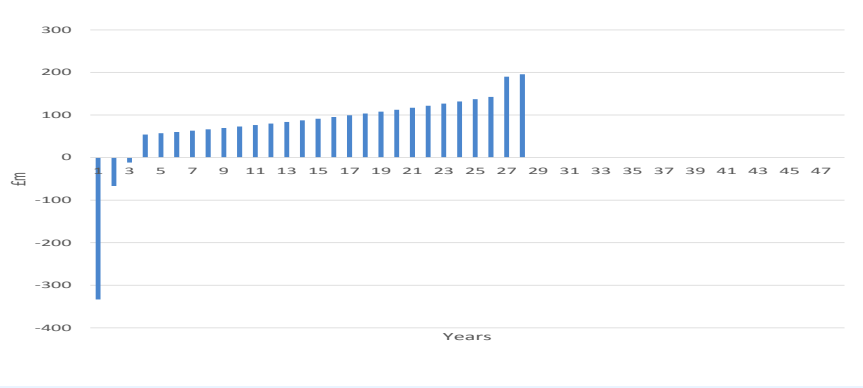
Metric	
Starting TRS	81
Total TRS (NPV)	1,200
Weighted average loan life	~ 15-yrs

Scenario 3 (25 year revenue term with full depreciation) – Financial Package 1

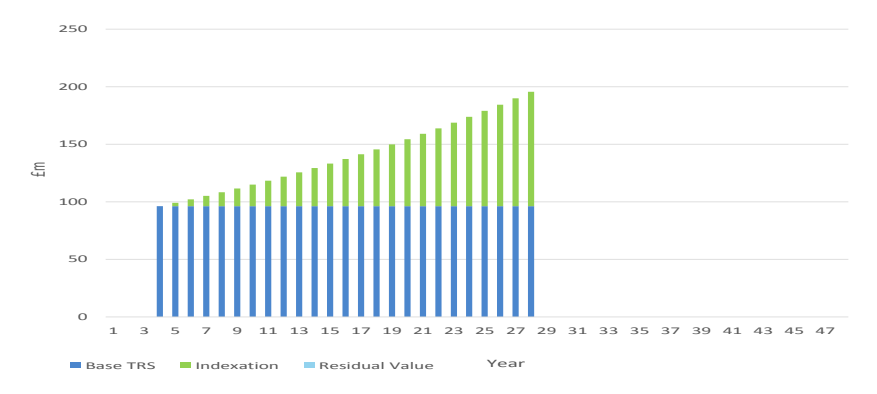
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile

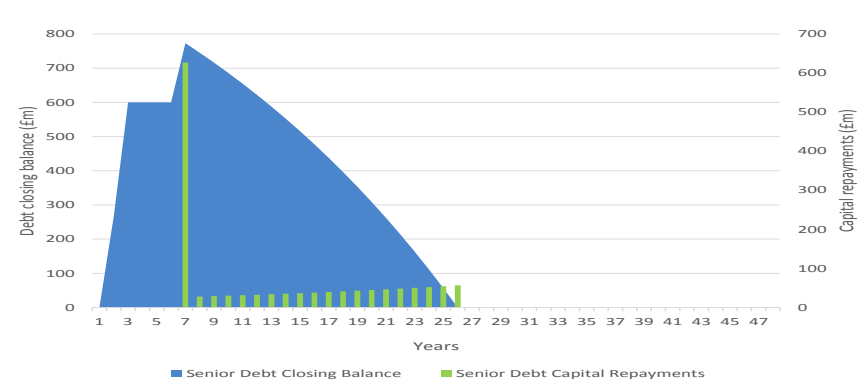


Consumer metrics

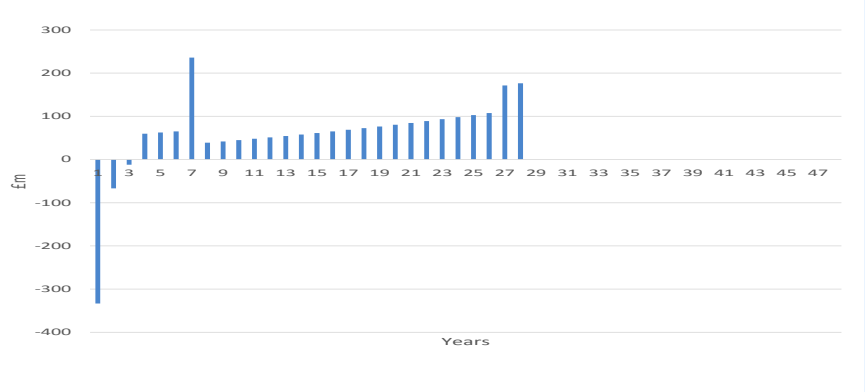
Metric	
Starting TRS	£96m
Total TRS (NPV)	£1,271m
Weighted average loan life	~ 15-yrs

Scenario 3 (25 year revenue term with full depreciation) – Financial Package 2

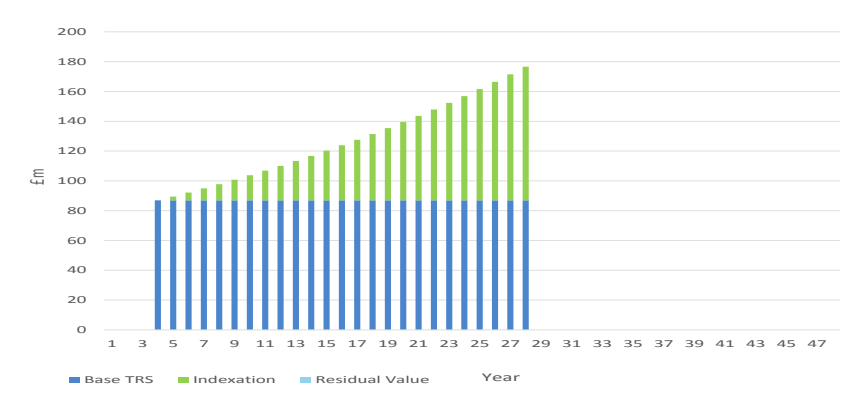
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile

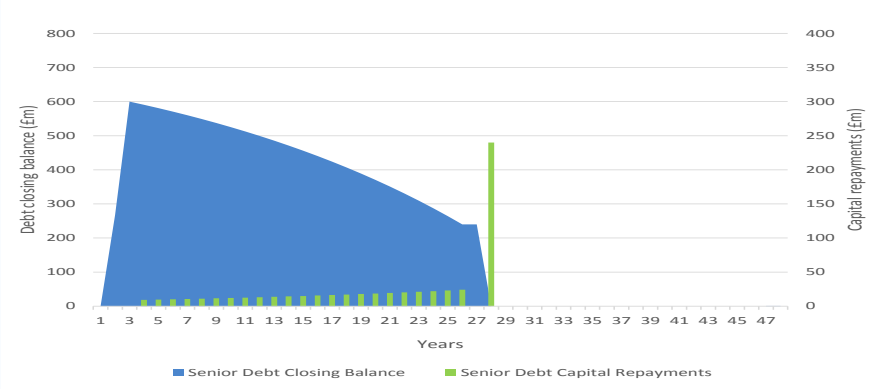


Consumer metrics

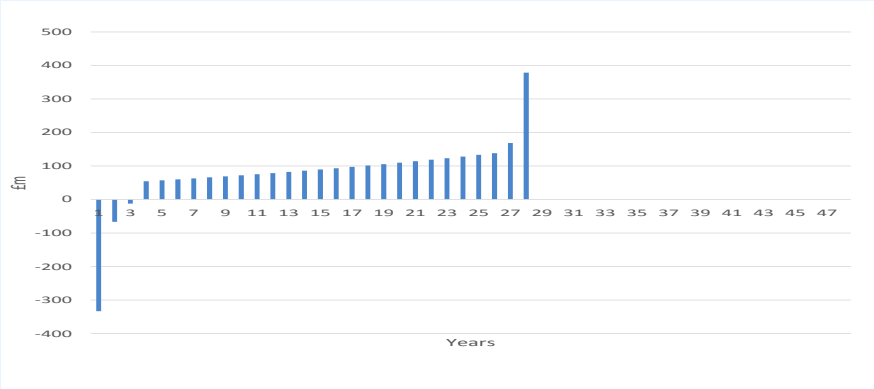
Metric	
Starting TRS	87
Total TRS (NPV)	1,148
Weighted average loan life	~ 11-yrs

Scenario 4 (25 year revenue term with partial depreciation) – Financial Package 1

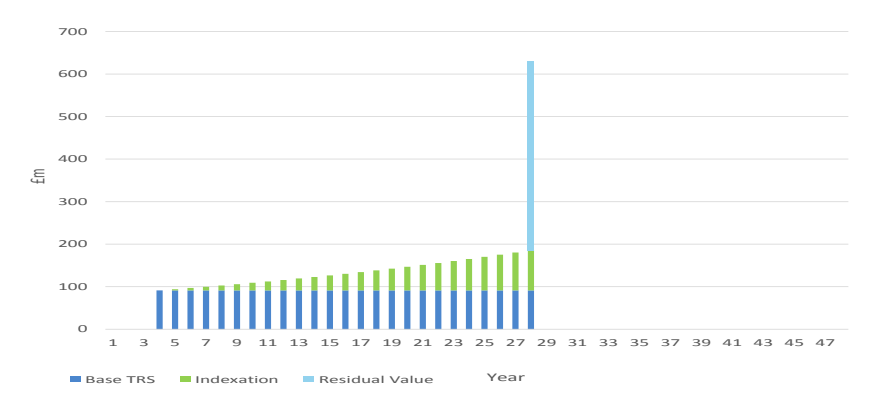
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile



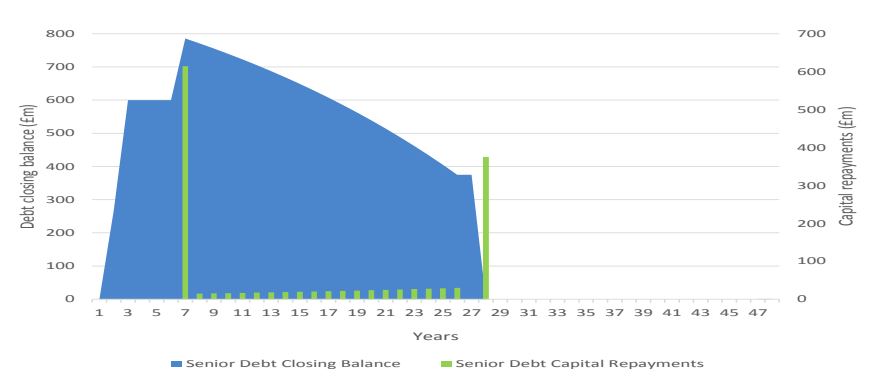
Consumer metrics

Metric	
Starting TRS	£91m
Total TRS (NPV)	£1,282
Weighted average loan life	~ 15-yrs

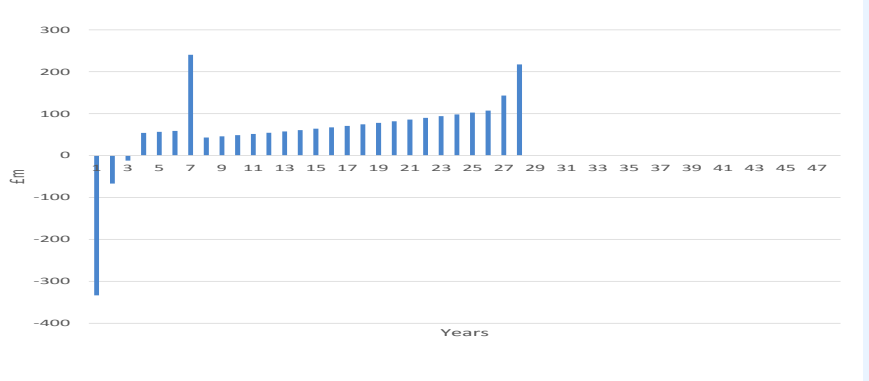
Note – weighted average loan life is for amortizing debt proportion

Scenario 4 (25 year revenue term with partial depreciation) – Financial Package 2

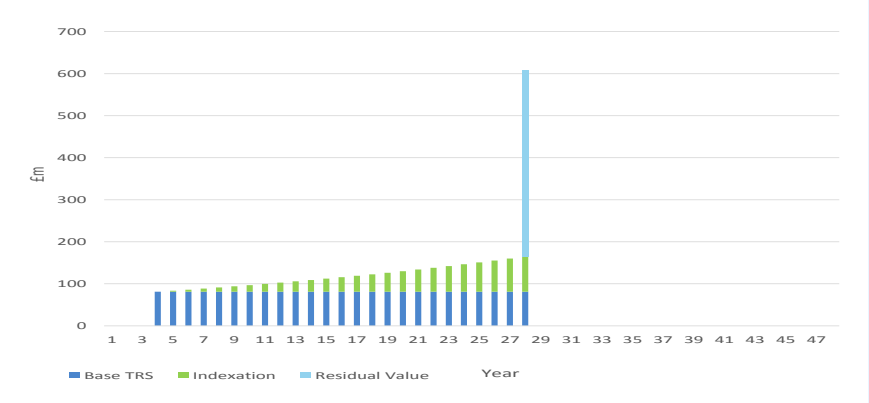
Senior debt repayment (£m)



Shareholder injections/withdrawals



Revenue profile



Consumer metrics

Metric	
Starting TRS	81
Total TRS (NPV)	1,144
Weighted average loan life	~ 11-yrs

Note – weighted average loan life is for amortizing debt proportion