



NATIONAL GRID GAS TRANSMISSION'S CONSTRAINT COST MANAGEMENT INCENTIVE SCHEME

A report to Ofgem

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Contact details

Name	Email	Telephone
Angus Paxton	angus.paxton@afry.com	+447766824716
Stephen Clegg	stephen.clegg@afry.com	+447771230110

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	6
Scope	6
Sources	7
Structure of this document	7
2. BACKGROUND TO THE INCENTIVE	9
3. REVIEW OF RIIO-1 SCHEME AND PERFORMANCE	11
3.1 The RIIO-1 scheme	11
3.2 RIIO-1 performance	14
4. ANALYSIS INTO HISTORICAL CONSTRAINT DAYS AND CONSTRAINT AVOIDANCE	21
4.1 Conclusions	22
5. REVIEW OF THE EVALUATION OF THE CONSUMER BENEFITS ASSOCIATED THE SCHEME	24
5.1 [REDACTED]	24
5.2 [REDACTED]	25
5.3 [REDACTED]	26
5.4 [REDACTED]	Error! Bookmark not defined.
6. ANALYSIS ASSOCIATED WITH THE DEVELOPMENT OF THE INCENTIVE FOR RIIO-2	27
6.1 Assessment of the target	27
6.2 Proposal to remove scale back revenues	30
6.3 Features of the proposed scheme	32
7. ALTERNATIVE CONSTRAINT COST MANAGEMENT INCENTIVE FRAMEWORKS	35
7.1 'Upside only' incentive regime	35
7.2 'Fixed cost allowance with re-opener'	38
7.3 Ex-post adjustment	39
8. CONCLUSIONS	41
8.1 RIIO-1	41
8.2 NGGT's RIIO-2 proposal	41
8.3 Potential alternatives	41
ANNEX A –[REDACTED]	43
QUALITY AND DOCUMENT CONTROL	45



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NATIONAL GRID GAS TRANSMISSION'S CONSTRAINT COST MANAGEMENT INCENTIVE SCHEME



EXECUTIVE SUMMARY

Ofgem commissioned a partnership of CEPA, AFRY Management Consulting¹ (AFRY) and Economic Consulting Associates (ECA) to provide economic advice for RIIO-2. This report has been prepared by AFRY under this Economic Strategic Partner contract for RIIO-2. The report presents our review of National Grid Gas Transmission's (NGGT) performance under the RIIO-1 Constraint Cost Management (CCM) incentive, and its proposal for a similar incentive under RIIO-2.

Background

The National Transmission System (NTS) transports gas from supply points to customers in Britain. System users purchase capacity which allows them to flow gas onto and off the network at specific points. The quantity of gas which may be transported is limited by the network's physical capability (e.g. pipe sizes, number of compressor units, etc.) and when the gas network cannot meet users' requirements, NGGT, as the system operator, must limit the rate of flow. Network constraints can lead to gas price rises and under normal operation it is usually beneficial to consumers for the availability of capability to be maximised and for constraints to be avoided. Where a constraint materialises, any direct costs of managing the constraint through commercial actions by NGGT are ultimately passed through to consumers.

Our scope

We have been asked to assess three areas associated with the CCM incentive:

- Scrutinise NGGT's final BP proposal, and opine on whether it is robust enough, well-justified and sensible, including reviewing:
 - the actual performance data shown and assumptions made for RIIO-GT1 and whether these have been incorporated in NGGT's key considerations for the RIIO2 period;
 - the target-setting methodology for the RIIO2 as presented in the BP including the forecasted number of constraints, and justification behind their proposals. Verify that the proposed target-setting methodology robust enough and that its magnitude is well justified and reasonable; and
 - NGGT's proposal to remove the revenue stream from the short-term products when they scale back and the likely impact this will have on the CCM incentive itself.
- Advise on the RIIO2 CCM incentive scheme design that would incentivise NGGT to improve their performance in the CCM-related activities and provide most value to consumers.
- Review the report on consumer value of the CCM incentive in RIIO1 and RIIO2, the assumptions, calculations made, as well as the robustness of

¹ Pöyry Management Consulting (UK) Ltd., trading as AFRY Management Consulting, part of ÅF Pöyry AB, trading as AFRY.



the conclusions the independent consultancy company came to. Advise whether there is sufficient evidence that the CCM incentive delivered value to consumers and how much that value was.

During the course of the assignment, we have been asked some additional, specific questions, relating to details of the RIIO-1 and RIIO-2 scheme. These are identified and discussed within the report below.

As part of a separate mandate, AFRY has also been engaged by Ofgem to review the Network Capability process and its underlying models. That review is detailed in the AFRY report, "Audit of Network Capability Assessment", and complements the review detailed herein.

RIIO-1 CCM incentive and performance

The CCM incentive under RIIO-1 has been designed to encourage the sale of capacity while minimising the cost of constraints in the gas network. A target net cost (i.e. relevant costs minus relevant revenues) of £22m (2009 prices) was set for each year, with NGGT being rewarded a proportion of the difference between actual net costs and the target net costs, subject to a cap and collar. The net cost target was set on the expectation that relevant constraint costs would exceed the relevant revenues.

For each year in RIIO-1 to date, the relevant revenues received by NGGT have exceeded the relevant costs – i.e. the actual net costs are negative in every year. This has led to rewards to NGGT of £79.7m over RIIO-1 to date. NGGT consistently and overwhelmingly outperforms: in each year, the performance measure exceeds the target by over £28m. Figures for the RIIO-1 period are shown in Table 1.

Table 1 – [REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

Whilst there are actions taken by NGGT to manage the number and magnitude of constraints, these are few, and the costs are dominated by a single contract.

Our primary observation in respect of RIIO-1 is that the forecasted costs associated with constraints have been much higher than the actual costs of constraint alleviation through buybacks or locational trades. There is little evidence presented by NGGT in its submitted business plan to explain this difference.



RIIO-2 proposals

As part of their December 2019 Business Plan (December BP) for RIIO-2, NGGT proposes an updated version of the incentive alongside a process (the "Network Capability" process) to forecast the number and magnitude of network constraints and the associated system costs.

NGGT also set out its proposals for the CCM incentive in RIIO-2 in a Stakeholder Consultation on RIIO-2 incentives published in December 2019².

The proposal includes:

- a revised target based on the forecasted costs of network constraints;
- a lower cap and collar;
- removing, from the performance measure, some specific revenues associated with non-firm capacity products; and
- an additional scheme reopener in the event of hitting either the cap or the collar.

The Network Capability process produces raw forecasts of constraint costs averaging £47.6m per annum (2018 prices). The raw forecasts are modified to account for 'business as usual' management activities, resulting in a proposed target for each year of RIIO-2, which averages £22.1m (2018 prices³) over RIIO-2. These forecasts and proposed targets are shown in Table 2.

Table 2 – [REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

The RIIO-2 proposals are supported by a document from FTI Consulting, "Evaluation of Consumer Benefits arising from the application of the capacity constraint management incentive for National Grid Gas", which estimates the consumer value of the proposals.

Our findings on RIIO-2 proposals

In respect of our assessment of the CCM incentive, we find:

- The forecasted CCM incentive cost target is based on assumptions which do not reflect typical operating conditions and therefore overestimate the number and magnitude of constraints as well as the associated costs.
- There is insufficient justification behind the subsequent adjustments which are used to derive the proposed CCM cost target. We suggest it would be

² <https://www.nationalgrid.com/uk/gas-transmission/document/129251/download>

³ Equivalent to ~£16.7m in 2009 prices, which compares to the RIIO-1 target of £22m (2009 prices).



reasonable to use alternative assumptions that better reflect typical operation and business as usual operation.

- There is insufficient justification or supporting evidence presented to support other changes to the regime, such as the revised caps and collars.
- [REDACTED]
- [REDACTED]

Alternative designs

We suggest that it would be reasonable to use alternative assumptions that better reflect typical operating conditions and business as usual practice, in order to produce forecasts which would be more reliable for setting scheme parameters. Alternatively, significantly lowering the sharing factor proposed by NGGT would reduce the risks of NGGT receiving windfall gains whilst maintaining an incentive on CCM.

As well as these suggestions, we outline three potential alternative incentive structures for further consideration by Ofgem. Briefly, these are:

1. implement an 'upside only' incentive design, which continues to provide an incentive on NGGT to release additional capacity and in managing smaller constraint management costs;
2. remove the incentive and provide a small, ex-ante, fixed cost allowance with a scheme reopener – this effectively replicates the scheme within the totex incentive mechanism; and
3. remove the incentive and provide ex-post adjustments to allowed revenues on a pass-through basis where satisfied that NGGT has acted efficiently.

These alternatives would require significant further consideration and design to ensure they are fully understood, however, if well-designed (which would take considerable time and resource), they may present less risk of unintended consequences and/or windfall gains. We note that even with considerable time and resource a 'well-designed' outcome may prove elusive given the information imperfections and asymmetries present. An alternative, of lowering the sharing factor, would reduce the risks of NGGT receiving windfall gains.

Our conclusion

We conclude that, as proposed by NGGT, the proposed RIIO-2 incentive is not robust and is not well-justified.

NGGT's outperformance over RIIO-1 has not been adequately explained and it is not clear that it has delivered value for consumers. Whilst there appears to be some logic in retaining an incentive to release additional capacity to the market and to manage network constraints, it is not clear that NGGT's proposed incentive mechanism – which is similar to the RIIO-1 mechanism – will drive consumer benefits, particularly given the target and sharing factors that are proposed.



It might be possible using more appropriate underlying assumptions which reflect typical operational circumstances, to produce a better forecast of the costs of constraint management for populating the scheme metrics. Alternatively, other incentive mechanism designs might provide a simpler mechanism for incentivising NGGT, with less risk of unintended consequences such as windfall gains.



1. INTRODUCTION

The Constraint Cost Management (CCM) incentive scheme plays an important role in the top-down approach to capacity release and constraint management. Under license obligations, NGGT is obliged to release (offer for sale) capacity at a level which may be above the physical capability of the network. The limits to the physical capability of the National Transmission System (NTS) mean that NGGT may have to take commercial action to influence gas flows on or off the network through, for example, capacity buybacks, capacity scale-backs and locational trades. The goal of the CCM incentive is to minimise the costs associated with constraints while maximising the release of capacity.

The incentive exists under RIIO-1 and a similar scheme has been proposed in NGGT's December 2019 Business Plan (December BP) for consideration under the RIIO-2 scheme.

Scope

This project has been undertaken by AFRY Management Consulting under the CEPA/AFRY RIIO-2 support contract, "Strategic Partner to provide Econometrics and Economic Analysis for Ofgem's RIIO-2 Price Control Preparation and Implementation".

We have been asked to assess three areas associated with the CCM incentive:

- Scrutinise NGGT's final BP proposal, and opine on whether it is robust enough, well-justified and sensible, including reviewing:
 - the actual performance data shown and assumptions made for RIIO-GT1 and whether these have been incorporated in NGGT's key considerations for the RIIO2 period;
 - the target-setting methodology for the RIIO2 as presented in the BP including the forecasted number of constraints, and justification behind their proposals. Verify that the proposed target-setting methodology robust enough and that its magnitude is well justified and reasonable; and
 - NGGT's proposal to remove the revenue stream from the short-term products when they scale back and the likely impact this will have on the CCM incentive itself.
- Advise on the RIIO2 CCM incentive scheme design that would incentivise NGGT to improve their performance in the CCM-related activities and provide most value to consumers.
- Review the report on consumer value of the CCM incentive in RIIO1 and RIIO2, the assumptions, calculations made, as well as the robustness of the conclusions the independent consultancy company came to. Advise whether there is sufficient evidence that the CCM incentive delivered value to consumers and how much that value was.

During the course of the assignment, we have been asked some additional, specific questions, relating to details of the RIIO-1 and RIIO-2 scheme. These are identified and discussed within the report below.



As part of a separate mandate, AFRY has also been engaged by Ofgem to review the Network Capability process and its underlying models. That review is detailed in the AFRY report, "Audit of Network Capability Assessment", and complements the review detailed herein.

Sources

This note has been prepared to comment on the proposed incentive – alongside the accompanying analysis – as well as the historical role and performance of the scheme. The review is based on the following documents published by NGGT, provided by Ofgem or which are publicly available:

1. The December BP.
2. Annex A3.03 Output Delivery Incentives, December 2019.
3. The report "Evaluation of Consumer Benefits arising from the application of the capacity constraint management incentive of National Grid Gas", by FTI consulting, dated 19 September 2019 and included as Appendix 4 to Annex A3.03.
4. National Grid Gas Transmission's annex for the RIIO-1 submission "Annex A – Buybacks/Constraint Management", May 2012.
5. National Grid Gas Plc (NTS) Gas Transporter Licence Special Conditions.
6. Spreadsheets provided by Ofgem: (i) CCM-related costs and revenues in RIIO-1 (describing the revenues and cost in each stream for the RIIO-1 years); and (ii) a summary including NGGT's incentive performance in RIIO-1.
7. Supplementary questions (SQs) submitted by Ofgem to NGGT concerning the CCM incentive.
8. Publicly available data from the NGGT website including Market Information Provision Initiative (MIPI) data and daily operational report summaries.

This note has been produced as a report to Ofgem under the CEPA/AFRY RIIO-2 support contract, "Strategic Partner to provide Econometrics and Economic Analysis for Ofgem's RIIO-2 Price Control Preparation and Implementation".

Structure of this document

This report is structured as follows:

- Sections 2 and 3 present background to the incentive and the RIIO-1 scheme and performance.
- Section 4 discusses historical constraint alleviation and avoidance measures.
- Section 5 reviews the report "Evaluation of Consumer Benefits arising from the application of the capacity constraint management incentive of National Grid Gas".
- A discussion and review of the proposed RIIO-2 incentive is presented in Sections 6 and 7.



- In Section 8, a number of alternative incentive scheme structures are considered.
- Discussion and conclusions are presented in Section 9.



2. BACKGROUND TO THE INCENTIVE

Network users are required to purchase entry and exit capacity to the NTS so that they may flow gas on and off allowing it to be transported from source to customers. The entry and exit capacity purchased by users is available for distinct locations around the network and acquired on occasions both leading up to and on the day of delivery. Figure 1 presents a summary of the alternative auctions where users can purchase this capacity.

Figure 1 – Summary of Entry/Exit capacity auctions

		Name	Type	Product period	Auction time	Auction type
Entry	Long term auctions	Quarterly system entry capacity (QSEC)	Firm	Quarterly	Y-16 to Y-2	Demand driven [pay as cleared]
		Annual monthly system entry capacity (AMSEC)	Firm	Monthly	Y-1 to Y	Pay as bid – no lower than reserve price
		Rolling monthly trade and transfer (RMTnTSEC) and rolling monthly trade initiation surrender (RMTISSEC)	Firm	Monthly	M-1	Pay as bid – no lower than reserve price
	Short-term auctions	Day ahead daily system entry capacity (DADSEC)	Firm	Daily	D-1	Pay as bid – [reserve price is set at] 33 percent discount to AMSEC reserve price
		Within day daily system entry capacity (WDDSEC)	Firm	Daily	D	Zero reserve price [pay as bid]
		Daily interruptible system entry capacity (DISEC)	Interruptible	Daily	D-1	Zero reserve price [pay as bid]

		Name	Type	Product period	Auction time	Auction type
Exit	Long term auctions	Enduring annual exit (flat) capacity increase (EAFLEC)	Firm	Enduring	Y-6 to Y-4	Fixed price [application & pro-rata]
		Enduring annual exit (flat) capacity decrease (EAFLEC)	Firm	Enduring	Oct Y+2 to Y	Fixed price [application]
		Annual NTS (flat) exit capacity (AFLEC)	Firm	Annual	Y-3 to Y-1	Fixed price [application & pro-rata]
	Short-term auctions	Day-ahead daily exit capacity (DADNEX)	Firm	Daily	D-1	Pay-as-bid. Reserve price = firm price [1]
		Within-day daily exit capacity (WDDNEX)	Firm	Daily	D	Pay-as-bid. Reserve price = firm price [1]
		Daily off-peak exit capacity (DONEX)	Off-peak	Daily	D-1	Pay-as-bid. Zero reserve price

Source: National Grid Gas Transmission website; AFRY clarifications in brackets.

Note [1] "firm price" refers to a published fixed price.

It may be that parties acquire capacity which, ultimately, they choose not to use. To avoid this impacting other parties' ability to flow gas and to maximise



the utilisation of the assets, NGGT is required to release firm capacity up to an obligated baseline capacity, and are encouraged to release firm capacity above this level (non-obligated capacity). Firm capacity sold can be in excess of the physical capability of the network.

This means that there may be occasions when firm capacity is sold to network users and the users wish to use this capacity but NGGT is unable to meet these needs due to constraints. On these occasions, NGGT alleviates the constraint using capacity buyback actions, or locational trades to give effect to a reduction in capacity use. The costs of these actions are, subject to the CCM incentive mechanism, shared with or passed-through to users.

In addition to the firm capacity, NGGT may sell interruptible (at entry) and off-peak (at exit) capacity, the revenues of which pass through the CCM incentive. Again, this may lead to occasions where users have purchased capacity which the network is unable to accommodate. On such occasions, NGGT may choose to scale-back the relevant capacity holdings. The right for NGGT to do so is integral to the product, so any such actions do not result in additional costs for NGGT.

The goal of the CCM incentive is therefore to encourage the sale of capacity and, at the same time, limit the cost of constraints.



3. REVIEW OF RIIO-1 SCHEME AND PERFORMANCE

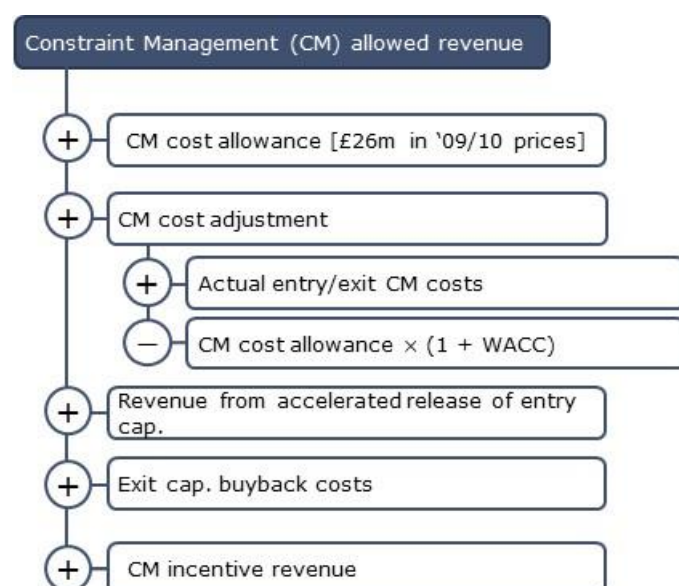
The scheme for RIIO-2 proposed by NGGT has evolved from the RIIO-1 scheme. This section presents an overview of the RIIO-1 scheme, a review of NGGT's performance over RIIO-1 and a comparison between the methods used to develop the RIIO-1 and RIIO-2 schemes.

3.1 The RIIO-1 scheme

3.1.1 Scheme structure

The RIIO-1 scheme is defined in the National Grid Gas Plc (NTS) Gas Transporter Licence Special Conditions (Sp.C 3B). It has a number of components and Figure 2 presents a schematic of how alternative streams are integrated to form the constraint cost management revenue.

Figure 2 – Schematic of CM revenue component algebra



Source: AFRY, adapted from Ofgem, "Special Conditions to National Grid Gas Plc's (NTS) Gas Transporter Licence – 10 December 2019".

The *Constraint Management allowed revenue* is the sum of the following components:

- The *CM cost allowance* and *CM cost adjustment* components provide NGGT with allowed revenue for managing the system constraints. *CM cost allowance* provides an ex-ante allowance – £26m (2009 prices) for 2013/14 – to reflect all anticipated CM costs, with *CM cost adjustment* being applied to correct for actual costs on an ex-post basis (i.e. if actual CM costs are zero, the previously allowed *CM cost allowance* is clawed back accounting also for the cost of capital received on it).
- NGGT is allowed to retain all the revenues associated with the accelerated release of incremental obligated capacity - where NGG make incremental



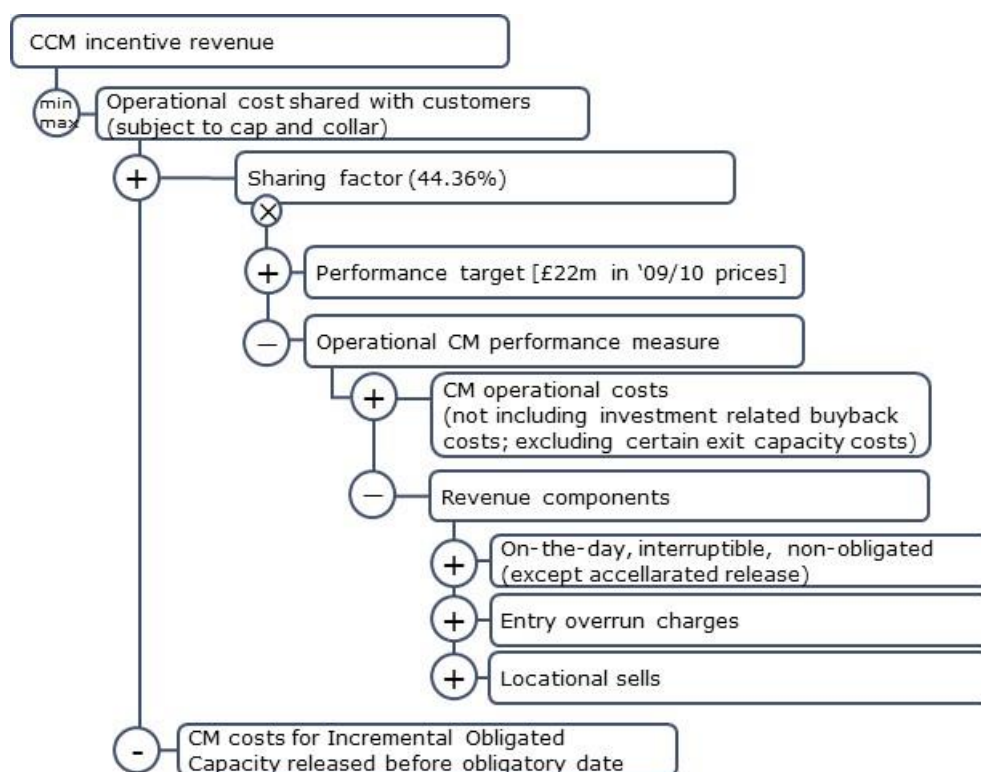
capacity available, and sell it, before they are obliged to make it available).

- Some specific types of exit capacity buyback costs incurred by NGG are allowed to be fully recovered through revenues - these are typically related to network users exceeding their rights).
- The revenues/costs associated with the CCM incentive scheme. This is the primary focus of this note and the remainder of the section and described in detail below.

3.1.2 Constraint management incentive revenue

The CCM incentive revenue distinguishes between costs associated with funded incremental capacity (i.e. capacity sold which has triggered an investment allowance), which are not subject to a sharing factor, and 'operational' buyback costs (which has the target of £22m in 2009 prices). Together, these are subject to a cap and collar. The components included in the incentive scheme are shown in Figure 3 below.

Figure 3 – CCM incentive mechanism components

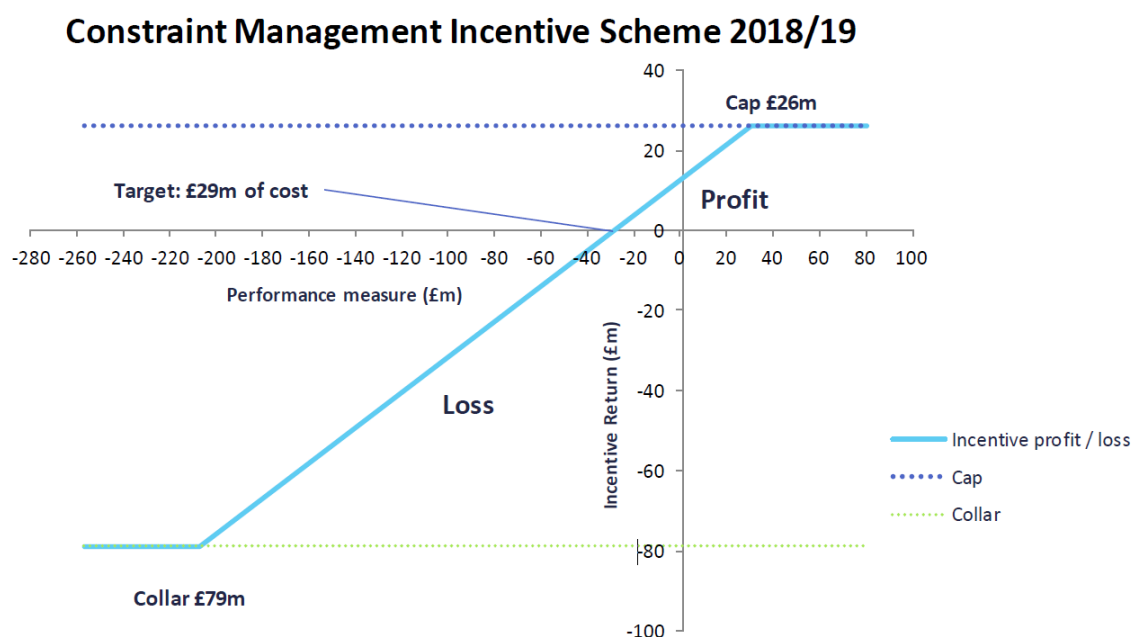


Source: AFRY, adapted from Ofgem, "Special Conditions to National Grid Gas Plc's (NTS) Gas Transporter Licence – 10 December 2019".



Figure 4, taken from the December BP, shows the relationship between the operational *performance measure* and the CCM *incentive revenue*⁴. It presents the scheme's target, cap and collar (presented in 2018/19 prices)⁵. The *performance measure* comprises constraint management operational costs net of certain system operator revenue components: short-term sales of entry/exit capacity, over-run charges and locational sell actions (Figure 2). This is then multiplied by the sharing factor of 44.36%.

Figure 4 – CCM performance measure and incentive return



Source: National Grid Gas Plc (NTS) Annex A3.03 Output Delivery Incentives to the BP, December 2019. 2018/19 prices.

3.1.3 Development of the incentive performance targets for RIIO-1

As part of NGGT's RIIO-1 submission, analysis was presented to determine the expected costs, net of revenues, associated with constraint management. These are presented in Table 3 (along with the out-turn costs net of revenue). NGGT's expected buyback costs, net of revenues, were a key factor in determining the RIIO-1 target of £22m per annum (2009 prices).

⁴ i.e. the additional revenues retained by NGG under the incentive mechanism. Note that the depiction assumes that there are no CCM costs associated with funded incremental capacity.

⁵ The performance measure presented graphically and discussed in the BP submissions is the negative of that presented in the Licence. In this note, the performance measure has followed the description in the BP.



Table 3 – [REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]

3.2 RIIO-1 performance

Over the RIIO-1 period, there have been constraint costs in four out of the six years between 2013/14-2018/19. The sum of the constraint management costs over RIIO-1 is £1.3m while the sum of the revenues contributing to the performance measure is £17.5m. This gives a total revenue, net of costs, associated with the performance measure of £13.3m leading to a CCM incentive return of £79.7m. (Table 4 presents a breakdown of these factors for RIIO-1 years).

Table 4 – Summary of the CCM incentive performance and return for RIIO-1 years

Performance, revenue, target and profit (£m, nominal)	13/14	14/15	15/16	16/17	17/18	18/19
Target (calculated)	-26.1	-26.5	-27.0	-27.1	-28.0	-29.0
Cap	22.6	23.3	24.1	24.5	24.7	25.4
Collar	67.8	-69.8	-72.3	-73.6	-74.0	-76.3
Performance measure revenues	3.0	2.4	2.0	3.5	4.5	2.1
Performance measure costs	0.2	0.1	0.0	0.6	0.4	0.0
Performance measure CM incentive return	2.8	2.3	2.0	3.0	4.0	2.1
	12.8	12.8	12.8	13.3	14.2	13.8

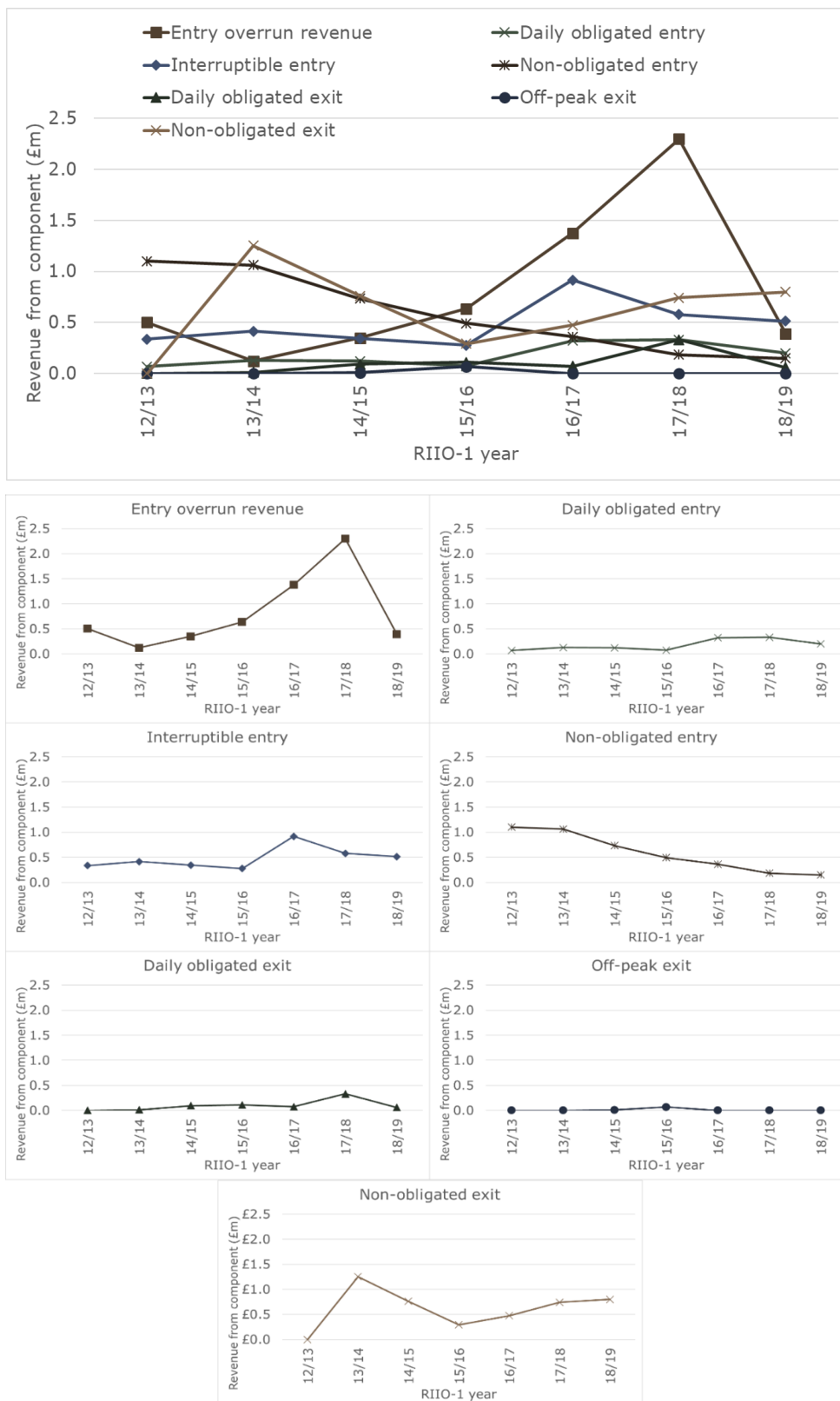
Source: AFRY calculations, National Grid Business Plan and Appendices, Ofgem performance data.

3.2.1 Revenues

The revenue component of the incentive scheme has a number of input streams. Figure 5 presents the revenue for each stream for RIIO-1 years.



Figure 5 – Input streams for revenue component of performance measure



Source: Annex A3.03 Output Delivery Incentives, As part of the NGGT Business Plan Submission, December 2019.



Ofgem asked us specifically to consider:

- the year-to-year variation and peaks of each revenue stream including:
 - any factors, including shipper actions, which lead to the variation; and
 - the impact of the variation on the applicability of each revenue stream to the scheme;
- the reasons behind the reduction in off-peak exit capacity sales from [REDACTED] in 2015/2016 to [REDACTED] in the following three years combined; and
- the role of the System Overrun Charges.

For each stream, the ratio between the minimum and maximum value is greater than 2.5. There is a high degree of year-to-year variation. We understand that the variation is explained by both shipper actions and year on year supply and demand changes. It is therefore difficult to predict and/or to measure improvements across the years. These remain outside of NGGT's explicit control though could affect the incentive's impact on other streams (e.g., if the cap were to be reached).

NGGT states that the incentive allows them to release an additional ~2000mcm of capacity per year. This corresponds to 1-2% (per year) of the off-peak, interruptible and non-obligated capacity sold in 2017/18 and 2018/19. On a system-wide basis, the role of the CCM incentive in increasing capacity sales appears to have a small effect on the total capacity available. We understand however that there may be certain entry and exit points where the sale of additional capacity is beneficial to users, as inferred in the stakeholder feedback provided as part of the December BP. This again leads to a benefit which is difficult to measure and assess the improvement of.

In 2014/15 and 2015/16 there was an increase in the revenue from the sales of off-peak exit capacity. Most of this was generated from sales at Bacton Interconnector. NGGT state that this "could be driven by several factors (e.g. individual company commercial strategies, contractual arrangements and risk perception/appetite)". In recent years, there has been a reduction in the revenue from off-peak exit capacity sales, however, the volume of off-peak exit capacity has shown an increasing trend. NGGT has not provided detailed analysis of these trends.

The performance measure is dominated by System Entry Overrun charges which has the greatest contribution to the yearly revenues⁶. System Entry Overrun Charges occur when shippers flow gas at a level above the capacity they have acquired, which can include situations where initial capacity rights have been withdrawn or transferred (e.g. scale-back, interruption, buyback) but where gas continues to flow. Its inclusion in the scheme is motivated by the understanding that shippers overrunning could increase the likelihood of constraints (and hence constraint management actions). NGGT provide additional rationale for its inclusion. Firstly, "overruns mean that users are not

⁶ This remains true after the removal of the years 2016/17 and 2017/18 which NGG suggest are anomalous.



accurately signalling requirements, potentially resulting in less efficient running of the NTS⁷, and secondly “overruns can be thought of as implicit release of within-day capacity, the revenues of which also fed into the [CCM] incentive”. Finally, NGGT state that its inclusion in the incentive encourages users to book capacity and not to overrun.

Considering the above, while the revenue component of scheme plays a role in the performance measure, there is no clear evidence to show that the incentive has been successful in encouraging the release of additional capacity, or that NGGT has taken specific action to maximise these revenues.

3.2.2 Costs

Costs have been significantly lower (near zero) than forecast at the commencement of RIIO-1, as shown in Table 3. There is also a disconnect between the number of constraint days forecast at the beginning of RIIO-1 (of which there were ~12 per annum) and the actual number of days where some form of constraint was experienced (~4 per annum). The differences are considered by NGGT as due to “business as usual” activity⁸. These differences are also discussed in Section 6.1.1 below.

Constraint avoidance costs (not included as costs in the incentive algebra) include [REDACTED] for the adjustment of three compressors to avoid constraints on Scotland, and “[REDACTED] of contract cost incurred for additional flexibility to carry out Bacton maintenance”. The impact of these non-incentive mechanism costs is not clear: there is no clear linkage between the level of these costs and the difference between forecast and actual RIIO-1 constraint costs. Moreover, they are dominated by the [REDACTED] cost item which is associated with a specific outage which presumably wasn’t included in the RIIO-1 constraint cost forecast. The treatment of these costs – i.e. whether they have been otherwise recovered from consumers through Totex allowances – is also not clear.

These costs are also considered in Section 4 below.

3.2.3 Comparison of the methods used to design the RIIO-1 scheme compared to the RIIO-2 scheme

The business plan accompanying the RIIO-1 proposals contains discussion of the development of the incentive. This includes the original incentive proposals (and their refinement following stakeholder feedback) and a numeric evaluation of the associated forecast performance measure, revenue, cost and risk premium.

⁷ There can be many reasons for overruns. Whilst shippers are individually and therefore collectively responsible for capacity procurement and nomination, there can be discrepancies between intent and actuality due to issues that are outside of shippers’ direct control (e.g. upstream).

⁸ See pp 38-39 of Annex A3.03, Output Delivery Incentives to the BP, December 2019.



The RIIO-1 constraint cost assessment was based on the “Entry capacity constraint forecasting” methodology which developed to become part of the Network Capability assessment performed for RIIO-2 evaluations. However, there are key elements which were included in the development of the RIIO-1 costs, which continue to be part of the scheme proposed for RIIO-2, but for which few details are presented in the RIIO-2 proposals. These are highlighted here.

3.2.3.1 The relation between risk and expected return

As part of the RIIO-1 proposal, NGGT define the target with consideration of level of equity return associated with the risk of operating the network in line with the incentive. In particular, “We have proposed a 7.5% equity return for our NGGT TO business, the SO as a standalone business is substantially more risky and thus would command a greater risk of return. The expected range of annual premium will range from £4.1m and £7.2m depending on the [proposed RIIO-1] scheme parameters”. As part of the RIIO-1 scheme proposal, analysis was performed to evaluate the risk reduction associated with the cap and collar as well as a risk premium. This analysis relies on the underlying constraint cost forecasts, but considers different confidence intervals (i.e. worse than forecasted average costs).

While the proposed RIIO-2 scheme retains the cap and collar structure as a means of risk management, the proposed collar limit has been significantly reduced, so we would expect a material reduction in the associated risk. The reduction is not is not presented in the proposed scheme’s description.

3.2.3.2 Considerations of operational and investment constraints

The RIIO-1 proposals considered two approaches to constraint management available to NGGT:

- the term “Operational Constraints” was used for constraint cost management occurring as a result of changing supply and demand conditions as well as unplanned maintenance; and
- the term “Investment Constraints” was used for constraint cost management “driven by constraint and commissioning activities [...] related to investments proposed in our TO [Transmission Owner] investment plan”⁹.

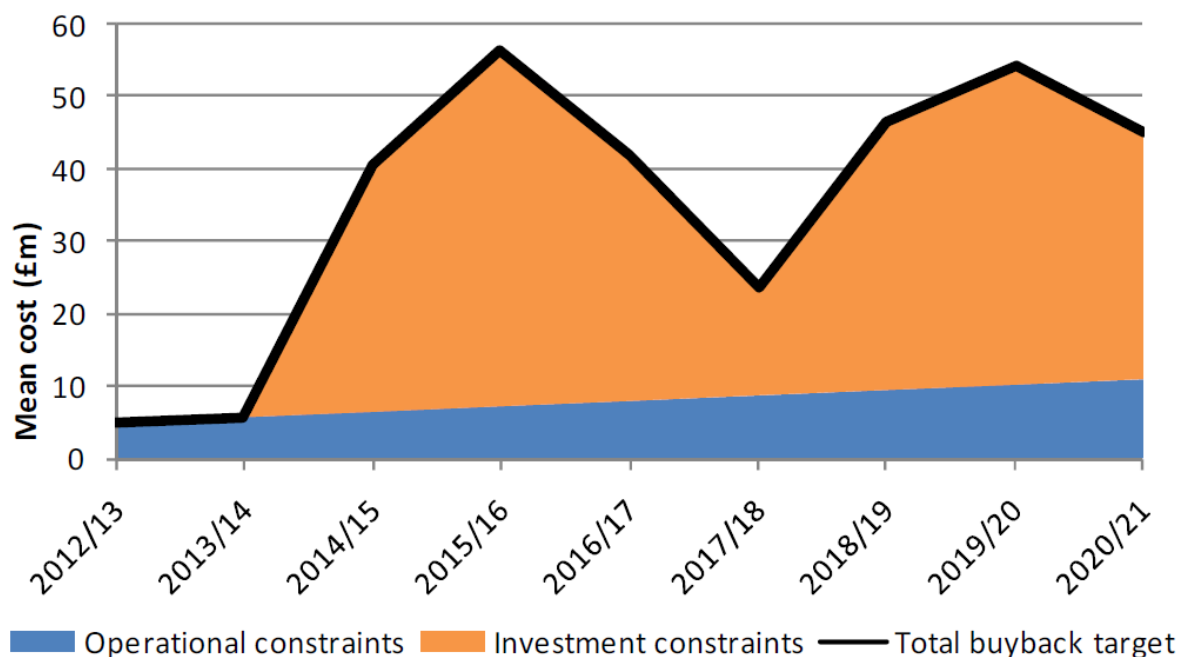
NGGT stated that they “believe that [these] categories of constraint management costs [...] need to be factored into the relevant year’s target”. The accompanying figure (repeated in Figure 6) presents projected mean costs for each category over the RIIO-1 period. It can be seen that beyond 2013/14 the costs associated with Investment Constraints are significantly higher than

⁹ This includes for planned network access requirements, and is therefore a different definition to the distinction in the RIIO-1 Licence algebra which, in order to apply the appropriate sharing factor, separates revenues associated with accelerated capacity release and costs associated with funded incremental capacity constraints.



those associated the Operational Constraints, reflecting the level of planned activity requiring network access.

Figure 6 – Preliminary forecast constraint costs and buyback targets presented as part of RIIO-1 proposals



Source: "Addendum 1 – March 2012 RIIO-1 Business Plan submission" in Annex A – Buybacks/Constraint Management, NGGT, May 2012, presented to stakeholders for the RIIO-1 incentive proposals. The aggregate cost forecasts were subsequently refined in May 2012 submission, as presented in Table 3 above.

Ofgem asked us specifically to consider:

- whether unifying the incentive (operational and investment) has worked;
- whether it is possible to separate the incentive results and/or view them as separate;
- whether investment constraints distort the performance measure; and
- to provide discussion on the unified scheme.

Given the very low number of instances of material constraint action, and the associated low costs, these questions are difficult to provide opinion on. There are two historical situations that are helpful to consider (both of which are discussed further in Section 4):

- locational actions at Milford Haven on 20 January 2020, triggered by a combination of high flows and compressor outage; and
- a 26-week period in summer 2016 where high flows from St. Fergus coincided with planned compressor station maintenance, which led to increased operational (maintenance) costs to avoid buyback costs.



Both situations highlight the possibility that a constraint management action may be triggered by both operational – e.g. unforeseen supply or demand levels – and investment – e.g. planned outage events. Whilst we would therefore expect some constraint management costs to require allocation to different elements of the scheme, the only two material instances¹⁰ are both associated with the operational part of the mechanism. There are no events from history captured in the CCM incentive performance measure which relate to the investment part of the mechanism.

The summer 2016 events highlight that due to operational reasons, activity/costs have been incurred to avoid investment-related constraint management costs. Had the planned maintenance gone on as planned, any resultant CCM costs would have required allocation.

It is therefore difficult to conclude whether the unified scheme has been successful or if it introduces distorted incentives.

¹⁰ Milford Haven events: 05 September 2016 & 20 January 2020.



4. ANALYSIS INTO HISTORICAL CONSTRAINT DAYS AND CONSTRAINT AVOIDANCE

In this chapter we briefly consider the historical occasions where constraints have been alleviated or avoided through management actions, to consider the impact of the incentive on NGGT's activity. Listed in Annex A are details of the known historical occasions of capacity buyback, withholding of capacity and locational trades. This table is based on information provided by NGGT.

Key inferences from the data are as follows:

- The constraints are sometimes episodic in nature. In particular two circumstances (the scale-backs at Didcot power station and the scale-backs on 1 March 2018) led to a large number of constraint occasions. Each of these was treated as one occasion each for the calculation of the average number of scale-backs in each RIIO-1 year.
- The constraint occasions are concentrated to certain regions. Entry constraints are limited to Milford Haven, Bacton and St. Fergus. Other than the nationwide occasion on 1 March 2018, exit constraints are limited to the South West/Didcot.
- On the occasion of 5 Sep 2016, NGGT took locational sell actions at Pembroke Power Station so that the power station increased its demand allowing for increased capability at Milford Haven. [REDACTED].
- On the occasion of 20 Jan 2020, the alleviation of the Milford Haven (South Wales entry) constraint using locational actions cost [REDACTED]. (This is based on the price differential between the buy price and SAP and the quantity traded).

Longer-term contracts have been sought to alleviate the potential for a constraint. These are turn-up or turn-down contracts and are included as costs in the incentive measure. There are two occasions to note:

- Over a 9 day period in September 2014, NTS maintenance constrained the [REDACTED] power station's ability to offtake gas. A turn down contract costing [REDACTED]k was agreed with [REDACTED] to reduce offtake flows.
- In 2013/14 NTS maintenance led to turn down contracts were agreed with power stations at the following localities: [REDACTED] (South Wales), [REDACTED] (Isle of Grain), [REDACTED] Power Station (South West). These contracts cost [REDACTED].

There were a further two occasions where turn-down option contracts were sought but not exercised:

- In 2016/17 a 12 month turn down option contract was agreed at Milford Haven due to forecast of entry constraints. This was for [REDACTED].
- In 2019 a 4 month turn down option contract was agreed at Milford Haven due to forecast of entry constraints. This was for [REDACTED].

On occasions, NGGT have incurred incremental costs as part of measures to avoid constraint costs. These actions have been described as 'shorter-term



optimisation of the asset base' and do not appear as costs in the incentive measure. Three specific examples of this have been presented:

- Over a 26 week period in summer 2016 high flows from St. Fergus coincided with planned compressor station maintenance. To avoid commercial buybacks, NGGT incurred the following costs to adjust compressor units: deferring a compressor overhaul ([REDACTED]), short outages ([REDACTED]) and maintenance ([REDACTED]). The associated costs totalled [REDACTED]. It is difficult to know if all these costs can be directly attributed to the change in gas flows in Scotland (for example, the associated maintenance may have been required at a later stage), however, we would expect that this was the cheapest option available to NGGT.
- In 2017 there was a maintenance programme scheduled at Bacton which would impact both its entry and exit capability. To avoid the potential for constraints, NGGT requested that the contractor did not fix the work to specific days and, instead, allowed the work to be scheduled to align with days of low Bacton flows. The cost of including this flexibility into the contract has been estimated to be [REDACTED], part of a "multi-year Asset Health programme at Bacton"¹¹. NGGT contemporaneously estimated that the constraint costs avoided could be "up to [REDACTED]/day"; we have not been provided with information regarding the total expected value of the avoided cost.
- As discussed above, on 20 Jan 2020, NGGT utilised locational actions to alleviate a constraint caused by high Milford Haven flows and compressor unit issues. Further additional costs may have been incurred by NGGT as they attempted to restore the compressor functionality quickly, although these costs have yet to be fully assessed.

Some of these actions are also considered in an analysis performed by FTI Consulting, which we discuss in Section 5 below.

4.1 Conclusions

From this analysis we conclude that NGGT has been taking some actions to seek to ameliorate the costs of constraint. These actions are correctly not directly captured in the constraint cost measurement as the actions reflect the additional efforts of NGGT in managing the network, but even if they were to be included, there would still be substantial outperformance relative to the initial target costs set. There is little evidence presented by NGGT to explain why this is the case, and the actions are orders of magnitude smaller than the incentive rewards earned by NGGT.

The NTS therefore appears largely unconstrained, and the costs of avoiding foreseeable constraints should therefore be modest. With hindsight, it also appears that the RIIO-1 cost forecasts were overestimated resulting in what has turned out to be generous incentive mechanism parameters.

¹¹ NGGT_SQ_POL_62. It is unclear if this cost has been allowed for elsewhere in NGG's allowed revenues.



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NATIONAL GRID GAS TRANSMISSION'S CONSTRAINT COST MANAGEMENT INCENTIVE SCHEME



5. REVIEW OF THE EVALUATION OF THE CONSUMER BENEFITS ASSOCIATED THE SCHEME

This section discusses the analysis into the consumer benefits of the scheme. This analysis was undertaken by FTI Consulting and is included in the report "Evaluation of consumer benefits arising from application of the capacity constraint management incentive for National Grid Gas" (dated 19 September 2019) and included as Appendix 4 to the Business Plan, December 2019.

[REDACTED]

5.1 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Table 5 – [REDACTED]

[REDACTED]

[REDACTED]

5.1.1 [REDACTED]

[REDACTED]

5.1.2 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]¹²

[REDACTED]

[REDACTED]

[REDACTED]

5.1.3 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

¹² [REDACTED].



[REDACTED]

[REDACTED].

5.1.4 [REDACTED]

[REDACTED]

[REDACTED]

5.2 [REDACTED]

[REDACTED]

5.2.1 [REDACTED]

[REDACTED]

[REDACTED]¹³

[REDACTED]

5.2.2 [REDACTED]

[REDACTED]

[REDACTED]¹⁴, [REDACTED]

[REDACTED]

[REDACTED]

5.2.3 [REDACTED]

[REDACTED]

5.2.4 [REDACTED]

[REDACTED]

[REDACTED]

5.2.5 [REDACTED]

[REDACTED]

[REDACTED]

5.2.6 [REDACTED]

[REDACTED]

¹³ NGG suggest that if, instead, a buyback action had been performed, then the associated costs would have been [REDACTED].

¹⁴ Published in accordance with Special Condition 8A.



5.3 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

5.4 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



6. ANALYSIS ASSOCIATED WITH THE DEVELOPMENT OF THE INCENTIVE FOR RIIO-2

The proposed incentive for RIIO-2 evolves from the RIIO-1 incentive and is developed with the same intent. NGGT has developed a more comprehensive analysis for evaluating the cost target, and proposed the removal of interruptible/off-peak capacity revenue when NGGT scale back associated capacity. NGGT's analysis and proposed incentive mechanism is discussed in this chapter.

6.1 Assessment of the target

As discussed in Section 2, as part of the current regulatory framework, NGGT is required to offer for sale capacity up to the obligated levels. However, this top-down capacity regime presents risks to the operational cost of the network because (as argued by NGGT) it increases the likelihood that there will be a constraint as obligated levels may not reflect operational constraints. In this case, NGGT is required to alleviate the constraint using various physical and commercial tools.

The assessment of the proposed incentive scheme cost target is described on pp. 25-42 of Annex 3.03 of the December BP. The starting point for the assessment is the cost of constraints. This is considered through NGGT's Network Capability process (depicted in Box 1), which quantifies, for the RIIO-2 period:

- the forecast number of constraint days;
- the size of the constraints; and
- the constraint costs.

For application in the CCM incentive target assessment, analysis is limited to South Wales Entry, South East Entry, Southern Exit and Scottish Exit.

Box 1 – [REDACTED]

[REDACTED]	
[REDACTED]	
[REDACTED].	
<hr/>	
[REDACTED]	[REDACTED]

Table 6 presents the constraint costs by NGGT using the Network Capability process. The 'general' figures are generated from analysis based on a combination of scenarios drawing from both historical observation and the



Future Energy Scenarios (FES) scenarios; these are shown alongside the additional values computed for South Wales entry constraints which are based on a uniform distribution for Milford Haven flow probabilities. The latter is introduced to capture an expectation that there could be sustained high flows at Milford Haven that are greater than both historical observation and FES projections.

Table 6 – Constraint costs derived using Network Capability process

£m (2018/19 prices*)	21/22	22/23	23/24	24/25	25/26	Mean
Raw forecast constraint cost	39.7	43.5	46.4	51.8	56.7	47.6
...of which general	14.8	17.6	21.4	26.8	29.0	21.9
..of which South Wales entry specific (additional)	24.9	25.9	25.0	25.0	27.7	25.7

Source: National Grid Gas Plc (NTS) Annex A3.03 Output Delivery Incentives to the BP, December 2019.

The following two conclusions from AFRY's assessment of the Network Capability process help to inform on CCM incentive target evaluation:

1. The Network Capability results are dependent on underlying network analysis assumptions (e.g. relating to pressure and within-day flow patterns) and these may understate actual network capability and overstate the constraint occasions, volumes and costs. Using different assumptions could integrate "business as usual" into the process, negating the requirement to cover it in subsequent evaluation.
2. There are inconsistencies in the constraint cost evaluation between the CCM incentive target and the Network Capability process. The CCM incentive cost target accommodates "business as usual" risk management (discussed below) which are not considered in the Network Capability process.

As suggested by the second conclusion, NGGT do not use the raw CCM cost forecasts into the RIIO-2 proposals. Instead, they modify the forecasts to account for what they consider as "business as usual" risk management. Two modifications are applied: one to the general scenarios and one to the specific (additional) scenario used to forecast South Wales entry constraints.

6.1.1 General scenarios

As noted, historically there has been differences between the forecast number of constraint days and the actual number of constraint days. This fact is used by NGGT to modify the general CCM cost forecasts that feed the proposed CCM cost target.

The RIIO-1 business plan predicted ~12 constraint events per annum each leading to constraint costs, whereas between 2012 and 2018, NGGT state that



there was an average of ~4 scale-back events¹⁵. NGGT state that the difference between these values is due to “business as usual” risk management (i.e. without mitigation NGGT expected ~12 events per annum but retrospectively, factoring in “business as usual” risk management, they expect ~4 events per annum). NGGT propose that therefore 67% of the forecasted constraint periods (and associated costs) can be avoided. This reduction in costs have been included with the target.

We note that NGGT have chosen to examine the number of events, rather than the cost of events, and provide no justification for doing so. We also note that the events being compared are not obviously comparable: the ~12 events forecasts at the start of RIIO-1 lead to direct costs, whereas the ~4 historical events have not triggered constraint costs. In fact, to date, there have been precisely two historical events consistent with the type of events in the forecast number which, assuming the rest of the methodology is sound, suggests the 67% reduction should actually be a 84% reduction.

However, we also note that, alongside the FES-based scenarios, the underlying supply/demand scenarios that feed the calculation of raw constraint costs already include historical information. Therefore applying an additional adjustment based on holistic observation may possibly lead to a double-counting of historical information, increasing the inaccuracy of the proposed target.

6.1.2 South Wales modification

The reduction to the primary scenarios has not been applied to a specific scenario that has been examined to forecast the costs of South Wales entry. South Wales has been treated separately because of an anticipated change in flows over the RIIO-2 period which is thought to increase the potential for constraints. The specific scenario assumes a uniform distribution of terminal flows (which is also above historical average), and leads to higher constraint costs being forecast – increasing forecasted South Wales entry constraint costs by £25.7m on average per annum over RIIO-2.

A reduction to this number is proposed, by assuming that constraints of up to 4mcm/d can be managed as “business as usual”. This increased capability has been used to estimate the reduction in the number of forecast constraint events, and this reduction has been used to scale the forecasted costs. This has the effect of reducing the increase in forecasted constraint costs due to the uniform distribution, by £9.8m to £16.1m. We understand that the application of this alternative methodology for South Wales is based on expert judgement.

In respect of the expert judgement applied to South Wales uniform distribution analysis, we note that a 4 mcm/d increase in capability applied before the forecast of the number of constraint events (i.e. within the Network Capability process) would not only have a very significant impact on the

¹⁵ A scale-back event is an event where NGG use exit capacity scale-back mechanisms, which are free of charge, to reduce capacity holdings.



number of events forecast, but we would also expect this to reduce the average magnitude of each event.

Whilst we acknowledge that there might be a subtle difference between an 'increase in capability', and 'an ability to manage up to 4 mcm/d of a constraint event as business as usual', this subtlety is apparently ignored in the above comparison of ~12 and ~4 events. We therefore remain unconvinced that the approach used to scale the South Wales entry cost forecast is appropriate – it would be far better to accommodate the 4mcm/d within the network analysis assumptions. We also do not understand why the 4 mcm/d-based reduction should only be applied to the uniform distribution case. Moreover, the 4 mcm/d figure may be indicative of the certainty that can be placed on some of the intermediate work encapsulated in the Network Capability process (i.e. the network analysis), and consider that the current set of network analysis assumptions may give rise to equivalent (if not equal) levels of uncertainty at other locations. This supports AFRY's observations on the Network Capability process – i.e. that certain network analysis assumptions are not appropriate for forecasting the average cost of constraints under typical operation and under business as usual, to be used as a target for the CCM incentive mechanism.

6.1.3 Conclusions

Informed by our work on reviewing the Network Capability process, we are not convinced that the raw CCM cost forecast produced by the process is robust, because of various detailed assumptions underlying the process. Further details of this are recorded in our Network Capability report.

For the purposes of this report, it is important to note that different underlying assumptions, which reflect typical operational practice and 'business as usual' and which are reasonable and justifiable, would be expected to significantly reduce the forecast. This would reduce the number of constraint events forecast, as well as reduce their magnitude and hence the resultant forecast of costs.

NGGT appear also to have significant concerns with the raw forecasts produced because of the two reductions to the raw forecast costs – one based on historical holistic RIIO-1 performance, and one based on expert judgement. As discussed above, we are not convinced by either of their approaches.

We therefore conclude that the proposed CCM incentive target is unreliable and unjustified.

6.2 Proposal to remove scale back revenues

Amongst the capacity rights provided by NGGT are off-peak and interruptible capacity. NGGT can remove this capacity if they are in the belief that this could alleviate a potential forecast constraint (the process of 'scaling back'). Under RIIO-1, the revenue from interruptible/off-peak capacity sales were included in the performance measure, even when this capacity was consequently scaled-back. NGGT is proposing to remove the revenue from scaled-back interruptible/off-peak capacity from the performance measure.



6.2.1 Observations and discussion

The following observations have been made with respect to this proposal:

- For the years 2012/13-2018/19, sales of off-peak exit capacity have contributed [REDACTED] or less to the CM revenue component and in the years 2017/18-18/19 [REDACTED] was scaled back. Its impact on the scheme is small.
- For the years 2012/13-2018/19, sales of interruptible entry capacity have contributed [REDACTED] of the CM revenue component and in the years 2017/18-18/19 [REDACTED] was scaled back.
- As NGGT state, the proposal would “encourage balancing risk in our decisions to scale back and restore interruptible / off-peak rights at the earliest opportunity [...]”. Therefore, in the near-term operational perspective, it would encourage NGGT to optimise system operation, reduce scale-back/interruption, and trade-off scale-backs/interruption with other CM actions.
- Due to NGGT’s ability to scale-back this capacity with exposure only related to the revenue associated with the initial sale of the capacity, it is expected to have little impact on the cost of constraints.

With the role of the CCM scheme in encouraging the sale of capacity, this change appears beneficial. However, these benefits rely on the off-peak/interruptible capacity being made available. An unintended consequence of the proposal might be to limit the capacity being made available, because NGGT are not incentivised to take risks in releasing capacity. Any limitation to this may restrict the benefit of the changes.

Two alternative methodologies are considered for the revenue reduction associated with the proposal: a nodal model and a national model. The nodal model bases its revenue reduction on the cost of capacity sold at each entry/exit point and the volume scaled-back and restored at that point, while the national model considers the nationwide capacity sales and scale-back/restoration volumes. Advantages and disadvantages are considered for each option and NGGT propose using the national model. The principal reason stated is that the national model should be used to avoid bias in deciding on the locality of the action. We note that the outcome of UNC Mod 0678 may also influence the selection of model.

6.2.2 Conclusions

Whilst the proposal (to remove a proportion of off-peak/interruptible revenues from the calculation of incentive reward) appears as if it might encourage NGGT to unwind scale-back/interruption sooner, an unintended consequence might be to lower the incentive to release the capacity in the first place. It is therefore not clear whether the change would be beneficial or not. Furthermore, the choice of revenue reduction model is also not clear.

We note that whilst there appears to have been some stakeholder consultation, it is not clear whether stakeholders are in aggregate supportive of the proposal, nor whether there is a strong preference of revenue reduction model. We would expect that more a detailed interaction with interested



stakeholders might yield additional insights which may provide greater certainty of the benefits or disbenefits and any unintended consequences of this particular proposal.

6.3 Features of the proposed scheme

The features of the RIIO-2 incentive have been listed in Table 7, highlighting where there are changes from the RIIO-1 scheme and, for each, a discussion on its implication is included. Following from the discussion we provide an opinion on whether we believe the proposed feature should be retained (approved) or rejected in an amended CCM incentive scheme.

Table 7 – Proposed incentive details and comments

	Proposals for RIIO-2 CCM incentive	Comments	Treatment
1.	Retaining the cap, collar and target as principles of the operational buy back scheme.	<p>Given the experience under RIIO-1 we believe that the cap and collar are unlikely to be invoked. However, they continue to reduce risk for NGGT and consumers, should there be exceptional years for costs or revenues.</p> <p>The intent of the scheme appears justifiable, although the excessive returns to NGGT do not reflect risky or costly activity and highlight that is challenging to set appropriate parameters.</p> <p>The RIIO-1 target is understood to be connected with the obligation on NGGT to provide the current levels of obligated capacity, although this connection is not transparent.</p>	Retain
2.	A reduced and symmetrical cap and collar.	<p>In RIIO-1 the scheme had a cap of £26m and a collar of £79m (in terms of revenue, 2018 prices). In RIIO-2, the proposed scheme is symmetric with a profit cap of £20m and a loss collar of £20m (2018 prices).</p> <p>Reductions in risk should be balanced with adjustments to costs of capital.</p> <p>The proposed cap and collar are unlikely to be invoked. For the cap to be reached, a given years' revenue would have to increase over four-fold on the maximum revenue year from the RIIO-1 period (also noting that NGGT state that the maximum revenue year from RIIO-1 is anomalous as large revenues resulting from shipper errors were unlikely to be repeated).</p> <p>For the collar to be reached there needs to be significant number and/or</p>	Reject, esp. without corresponding adjustments to costs of capital



		<p>magnitude of capacity management actions taken which, whilst indicated by NGGT's underlying analysis, does not appear credible. Decreases to the magnitude of the collar will lead to less exposure to National Grid, however, it is unlikely to lead to any change in how the scheme is managed.</p>	
3.	Remove the applicable proportion of interruptible / off-peak capacity revenue from the scheme where NGGT scale back.	<p>As discussed in above this is likely to lead to quicker restoration of capacity. However, the benefits will be difficult to evaluate. We are also concerned that there might be unintended consequences, e.g. stemming from the choice of model for calculating adjustments.</p>	Approve, subject to further analysis on unintended consequences
4.	"Removing risk from the cost target that we expect to manage as BAU."	<p>The process of "removing risk from the cost target" is part of the re-alignment of the results from constraint forecasting methodology with the number of historical constraints.</p> <p>Alternative ways of accounting for clearly defined business as usual activity should be considered, including the use of less extreme assumptions in network analysis models underpinning the Network Capability process.</p>	Reject
5.	Incorporating Network Capability outputs to inform constraint risk.	<p>The Network Capability outputs are helpful to inform on constraint risk. However, it needs to be better understood why there are discrepancies between the number of constraint days forecast and the actual number that have arisen.</p>	Approve, subject to revised forecasts
6.	Reopening scheme if NGGT cap out in two incentive years or collar out in one incentive year.	<p>As mentioned in points 1 and 2, the cap and collar are unlikely to be invoked.</p> <p>This proposal will lead to an additional reduction in risk to NGGT for exceptional years, which should be reflected in costs of capital.</p> <p>There is little further detail proposed on how this would work. For example, there is: no justification for the asymmetrical proposal, no identification of the elements and/or events that may trigger a reopening; and no definition of how it would operate in practice, e.g. adjusted target.</p>	Reject



7.	Reserving the right for NGGT to reopen the scheme as in RIIO-1 based on any significant changes to the operating or market environment.	Some potential changes to the operating and market environment have been incorporated into the assessment of the target. (e.g., increased gas demand volatility has been considered in the Network Capability methodology.) A methodology utilising only the prevailing system operation would likely lead to an alternative target. We do not believe the methods used to derive the RIIO-1 scheme remain applicable. Nonetheless, there could still be significant changes to mean the approach to managing constraints could not be followed, which may constitute a reasonable case for re-opening. The issue is to be precise on the circumstances under which it would be applicable.	Reject or amend
8.	Targets, caps and collars should be subject to RPI.	We would suggest a wider discussion on the inclusion of inflation/indexation in incentives in the energy industry. We note the intent to move the wider control to CPIH.	Approve
9.	Retaining the incremental buy back element of the scheme as-is.	The entry capacity incremental buyback is important as it encourages the release of entry capacity to shippers in a timely manner. We believe that it should remain for RIIO-2.	Approve
10.	Retaining the existing cost and revenue components of the scheme.	The current cost and revenue components of the scheme seem sensible. There are some elements to the capacity/capability regimes (like GDN flow-swaps and other operational actions such as within-day restrictions, pressure constraint relief, etc.) which perhaps should be considered, but these might be better accommodated in a lowered cost target, not as modifiers to the incentive algebra (as it is very difficult to associate revenues or costs to them, as they aren't priced).	Approve, noting amendment of target
11.	Retaining the sharing factor as-is.	The sharing factor is proposed to be consistent with RIIO-1, i.e. 44.36% of performance is retained by NGGT. Given the uncertainty in the proposed target (see above), lowering the sharing factor may mitigate the potential for windfall gains.	Possibly amend, to mitigate risk of windfall gain



7. ALTERNATIVE CONSTRAINT COST MANAGEMENT INCENTIVE FRAMEWORKS

We recognise that the current and proposed schemes are heavily reliant on forecasts of constraint costs which are themselves uncertain and dependent on a series of underlying assumptions regarding user and consumer behaviour and marginal costs.

This section proposes alternative constraint management incentive frameworks which may be considered by OFGEM for the RIIO-2 period. Each high-level design attempts to lower or avoid the impact of the uncertainty in the forecasting of CCM costs. Three alternative frameworks are presented to further discussion into alternatives, and no preference is associated with each.

Each scheme is provided with details of the scheme, motivation behind each proposal, and a list of pros and cons.

7.1 'Upside only' incentive regime

7.1.1 Scheme outline

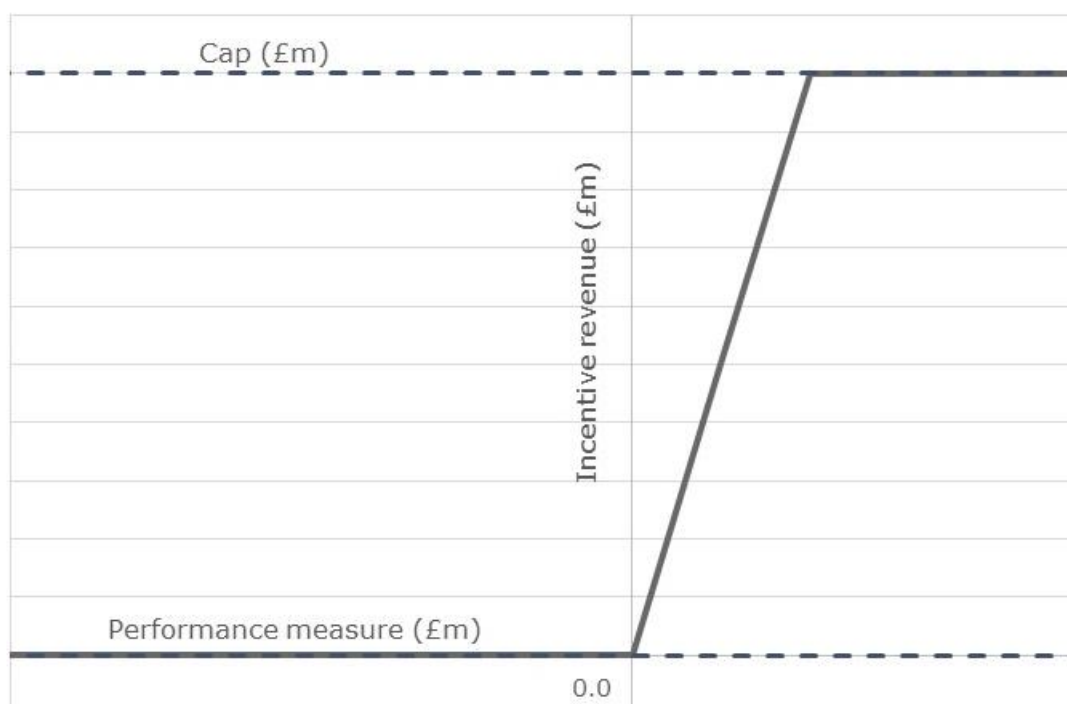
The scheme focusses onto the capacity selling angle of the original incentive mechanism. Any relevant revenues received (i.e. short-term capacity sales, etc.) provide the impetus to NGGT for managing constraint management costs if and when they occur.

The scheme comprises of the following aspects:

- A performance measure with associated incentive revenue and a cap and collar (see Figure 7).
- Associated reporting requirements to ensure transparency of decision making.
- A target cost set to zero.
- Cost passthrough to consumers on the downside - i.e. where relevant costs outweigh relevant revenues.
- Cost and revenue streams which determine the performance measure remain the same as RIIO-1, and would continue to be reported through regulatory reporting requirements.
- A sharing factor, so that a proportion of the net revenues received by NGGT is retained, providing the incentive to sell capacity, and to consequently manage modest constraint management costs to a minimum. As a yardstick, we note that the current mechanism has a sharing factor of 44.36% on the existing set of potential revenue streams, and this appears to incentivise NGGT to release the capacity.
- A scheme re-opener option if performance worsens and there are an increased number of locational trades and buyback actions (e.g. a number of events in a twelve month period, or where there is aggregate cost above a threshold).



Figure 7 – 'Upside only' graphical representation



7.1.2 Proposals

Table 8 – 'Upside only' propositions and motivations

Proposals	Motivation
A target of zero	Historical evidence suggests operational revenues net of operational costs are generally positive. Upside revenue opportunities will continue to incentivise the selling of additional capacity, and any revenues gained incentivise management of down-side risks.
Reporting requirements	Provides transparency to the outcomes of constraint management actions, forewarning of exposure to cap/collars and any scheme reopener, and allows for forensic examination of events to ensure lessons can be accommodated in any future scheme designs as well as NGGT's business planning activities.
Down-side cost pass-through	There continues to be some potential for low frequency/likelihood, high cost, constraint events. This option removes the major part of the risk from these events from NGGT.



Scheme re-opener	<p>Under the general duties of the Gas Act (1986), NGGT should continue to take action to keep the number and magnitude of operational constraints low.</p> <p>However, if the number of constraints and/or magnitude of constraints begins to rise above a reasonable level (e.g. a number of events in a twelve month period, or where there is aggregate cost above a threshold) then Ofgem should consider reviewing and possibly modifying the schemes design or parameters.</p> <p>This could lead to unintended consequences and incentivise raising constraint costs to reopen the scheme and provide a more attractive set of scheme parameters.</p>
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7.1.3 Pros and cons

Table 9 – 'Upside only' pros and cons

Pros	Cons
Removes NGGT's exposure to low frequency/likelihood, high cost constraint events.	During a significant event, or following it in the remainder of the formula year, NGGT may focus less on reducing constraint management costs as downside is passed-through.
Avoids having to set a target based on uncertain CCM cost forecasts.	Unclear if setting target to zero provides greatest incentive to prevent costs.
NGGT remain incentivised to release capacity, and remain incentivised to manage the number of constraints.	The cost pass-through leads NGGT to put less focus on optimising maintenance (especially where there is a prolonged outage expected), leading to greater constraint risk.
The scheme re-opener avoids performance drop in constraint cost management, and accommodates uncertainty.	There could be unintended consequences of a scheme reopener.
Similar framework to existing scheme.	



7.2 'Fixed cost allowance with re-opener'

7.2.1 Scheme outline

The scheme comprises of the following aspects:

- A guaranteed annual revenue provided to NGGT for managing constraints. This can be based on, for example, the mean cost and revenues over the RIIO-1 period.
- NGGT is exposed to the full costs and revenues associated with constraint management: any sharing is via the totex incentive mechanism.
- Provision for a re-opener which may be triggered by a change in circumstances. Example triggers include:
 - The number of locational trades and buybacks exceeds a given number over one or more consecutive years.
 - Exceptional and unplanned changes to network infrastructure. Note that we would expect NGGT to continue to procure long-term turn-up/turn-down contract options in response prolonged maintenance periods (as conducted in RIIO-1), that these contracts are covered by the cost allowance.
 - Improved forecasting of constraint costs (evidenced through back-testing).

In effect, the scheme reflects the RIIO-1/proposed RIIO-2 schemes, however it migrates the concept into the wider price control mechanism, effectively removing the specific incentive.

7.2.2 Proposals

Table 10 – 'Fixed cost allowance with re-opener' proposals and motivations

Proposals	Motivation
Annual constraint cost management allowance	This allowance will provide NGGT revenue to cover the costs of short-term optimisation, locational trades and buybacks. It will also encourage NGGT to continue to make efforts to reduce the number and cost of constraints. However, it would avoid the uncertainty around defining specific targets.
Scheme re-opener	A scheme re-opener (based on certain criteria being met) would reduce the risk to NGGT of



material changes, e.g. to prevailing market conditions.

7.2.3 Pros and cons

Table 11 – 'Fixed cost allowance with reopener' pros and cons

Pros	Cons
Avoids having to set a target based on uncertain CCM cost forecasts.	The revenue allowance to NGGT would need to be determined ex-ante by Ofgem.
Provides NGGT with revenue to cover constraint management.	Revenue provided to NGGT may not be representative of costs.
NGGT remain incentivised to release further capacity for sale.	NGGT is exposed to low frequency/likelihood, high cost constraint events.
NGGT remain incentivised to reduce the costs associated with constraint.	
Provides NGGT the opportunity to re-open scheme should CCM cost forecasting improve.	

7.3 Ex-post adjustment

7.3.1 Scheme outline

The scheme comprises of the following aspects:

- An ex-post constraint cost recovery process.
- An annual review for the costs associated with constraint management assessing whether NGGT acted rationally and economically.
- Under alternative scheme arrangements, NGGT may retain or share the revenue associated with the sale of capacity.

7.3.2 Proposals

Table 12 – 'Ex-post adjustment' propositions and motivations

Proposals	Motivation
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No upfront allowance for constraint management costs in allowed revenue.	Avoids the need for relying on unreliable CCM cost forecasts when setting targets.
Annual review.	Provides scrutiny and transparency of constraint management actions.
Ex-post cost recovery: cost pass-through with true-up.	NGGT will recover the costs associated with constraint management where it is shown that they acted rationally and economically. So NGGT should still act to minimise the costs.

7.3.3 *Pros and cons*

Table 13 – 'Ex-post adjustment' pros and cons

Pros	Cons
Avoids having to set a target based on uncertain CCM cost forecasts.	The lack of a sharp incentive may mean that NGGT may not act as efficiently to reduce the constraint management costs.
The scheme is simpler.	The scheme is unlikely to lead to year-on-year operational efficiency improvements.
NGGT should be able to recover all of the constraint management costs where they have shown to have acted rationally/economically.	There may be a reduced incentive to release additional capacity for sale.
	There is funding uncertainty for NGGT.



8. CONCLUSIONS

8.1 RIIO-1

NGGT has consistently and overwhelmingly outperformed against the CCM incentive scheme in RIIO-1, because:

1. the level of activity to manage constraint costs has been very low; and
2. the number and costs of actual constraints experienced are very different to that forecast at the start of RIIO-1.

It seems likely that this outperformance is heavily influenced by unrealistic targets, and has not delivered value for consumers. [REDACTED].

There have been few material constraints and there are few tangible actions presented by NGGT to demonstrate their management of potential constraints. This implies that the NTS has been largely unconstrained over the period. As such we would expect the costs of avoiding future constraints should therefore be modest.

8.2 NGGT's RIIO-2 proposal

NGGT's RIIO-2 proposal is to retain the CCM incentive design largely as-is, but with changes to the target cost, cap and collar, and to not include revenues associated with scaled-back capacity.

The forecasted CCM incentive cost target is based on underlying assumptions within the Network Capability process which do not reflect typical operating conditions and therefore overestimate the number and magnitude of constraints as well as the associated costs. Whilst there are subsequent adjustments applied to accommodate 'business as usual' practice, these lack justification and do not appear robust. We believe it would be reasonable to use alternative underlying assumptions that better reflect typical operating conditions and business as usual practice. Alternatively, significantly lowering the sharing factor proposed by NGGT would reduce the risks of windfall gains, whilst maintaining an incentive on CCM.

The proposal to not include revenues associated with scaled-back capacity may have some merit, but may also produce unintended consequences such as a reduction in the incentive to release off-peak and interruptible capacity in the first place.

[REDACTED]

We conclude that, as proposed by NGGT, the proposed RIIO-2 incentive is not robust and is not well-justified.

8.3 Potential alternatives

We suggest that it would be reasonable to use alternative assumptions that better reflect typical operating conditions and business as usual practice, in order to produce forecasts which would be more reliable for setting scheme parameters.



As well as this suggestion, we outline three potential alternative incentive structures for further consideration by Ofgem. Briefly, these are:

1. implement an 'upside only' incentive design, which continues to provide an incentive on NGGT to release additional capacity and in managing smaller constraint management costs;
2. remove the incentive and provide a small, ex-ante, fixed cost allowance with a scheme reopener – this effectively replicates the scheme within the totex incentive mechanism; and
3. remove the incentive and provide ex-post adjustments to allowed revenues.

These alternatives may present less risk of unintended consequences or windfall gains. Alternatively, significantly lowering the sharing factor proposed by NGGT would reduce the risks of windfall gains, whilst maintaining an incentive on CCM.



ANNEX A – [REDACTED]

Table 14 – [REDACTED]

[illegible]



[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
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[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
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[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	



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AFRY Management Consulting

King Charles House
Park End Street
Oxford, OX1 1JD
UK

Tel: +44 (0)1865 722660

Fax: +44 (0)1865 722988

afry.com

E-mail: consulting.energy.uk@poyry.com



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Ä F PÖYRY

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Registered in England No. 2573801
King Charles House, Park End Street, Oxford OX1 1JD, UK