

JULY 2011

**National Grid Gas (NTS)  
System Operator Incentives  
for 1 April 2012  
Initial Consultation**

Responses requested by 4<sup>th</sup> August 2011

A photograph of a male worker in profile, facing right, working on a large piece of industrial machinery. He is wearing a white hard hat, yellow safety glasses, a dark blue long-sleeved jacket, and a bright yellow high-visibility safety vest with reflective silver stripes. He is using a long-handled tool to work on a large, white, cylindrical component of the machinery. The background shows more of the industrial equipment, including pipes and structural frames.

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# Executive Summary

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National Grid Gas (National Grid), in its capacity of National Transmission System (NTS) System Operator, is currently subject to seven individual System Operator (SO) Incentive Schemes. Five of the seven schemes are due to expire on 31 March 2012 and via an open letter issued on 17 May 2011, Ofgem has asked National Grid to develop initial proposals which, as far as possible, represent a 'roll over' of existing schemes for one year until 31 March 2013.

It is expected that the replacement schemes to be effective from 1 April 2012 will as far as possible represent a roll over of current arrangements. However, to ensure that the incentives remain fit for purpose, National Grid believes there are a number of topics which merit review. In addition, Ofgem has highlighted a number of key areas it expects National Grid to consider within the Initial Proposals. In summary these combined are:

In respect of the NTS Shrinkage incentive:

- the swing allowance ('Gas Cost Reference Price Uplift' in the NTS Licence) in respect of the Gas Cost Reference Price
- the retail uplift to the Electricity Cost Reference Price,
- the factors influencing the forecasting of Shrinkage volumes including compressor fuel usage, and
- the current exclusions regarding CV Shrinkage volumes.

In respect of the NTS Unaccounted for Gas (UAG) Incentive:

- consider whether it remains appropriate to incentivise National Grid in this area or whether to instead introduce a new Special Licence condition requiring National Grid to undertake certain work relating to UAG.

In respect of the Demand Forecasting Incentive:

- the forecasting error target.

In respect of the Residual Balancing Incentive:

- the target Price Performance Measure.

This document explains a range of issues and asks a number of related questions. The responses to this document will help us in the development of Initial Proposals for these incentives.

On 31 March 2013, all seven incentive schemes will expire. Accordingly, the format of all SO Incentives applicable from 1 April 2013 will be subject to a separate industry consultation process.

**Responses to this consultation should be sent to**  
**[soincentives@uk.ngrid.com](mailto:soincentives@uk.ngrid.com)**

**by 5pm on 4<sup>th</sup> August 2011**

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# Section 1

## Introduction

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### 1.1 Background

1. National Grid Gas (National Grid) operates the high pressure Gas Transmission System (NTS) in Great Britain. This System Operator (SO) function is subject to Licence<sup>1</sup> obligations and a number of financial incentive arrangements which encourage National Grid to minimise the overall cost of system operation to consumers, to consider environmental impacts and to support the efficient operation of the wholesale gas market. Five of the current incentives expire at the end of March 2012.
2. These incentives are designed to deliver benefits to the industry and consumers including direct financial benefit from reductions in the costs associated with operating the gas transmission network. Additionally there may be other benefits from meeting key performance measures (such as through improved information provision to the market).
3. The various incentive schemes encourage a focus on key areas where National Grid is able to create value for the industry and consumers and in turn National Grid is able to retain a share of any value created (or to be penalised should targets not be met).
4. National Grid has led the last four consultation processes on the development of Initial Proposals for Gas SO Incentives. Via an open letter, published on 17 May 2011<sup>2</sup>, Ofgem has asked National Grid to lead on the development of Initial Proposals for those SO incentives due to expire in March 2012. The open letter summarises Ofgem's views on the objectives, process and expected timetable for this year's process and areas for review for this year's consultation.
5. As such, National Grid has developed this Initial Consultation document to seek initial views from interested parties in order to better inform the Initial Proposals for schemes due to commence in April 2012. Accordingly, those schemes which are the subject of this consultation document are:
  - Shrinkage;
  - Unaccounted for Gas (UAG);
  - Demand Forecasting;
  - Data Publication; and
  - Residual Gas Balancing
6. Arrangements for the remaining schemes (Operating Margins and Greenhouse Gas Emissions from Compressors) were determined in March

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<sup>1</sup> The National Grid Gas plc Gas Transporter Licence in respect of the NTS

<sup>2</sup> National Grid Gas System Operator Incentives from April 2012, an open letter published by Ofgem on 17 May 2011:

<http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=238&refer=Markets/WhlMkts/EffSystemOps/SystOpIncent>

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2011. These schemes do not expire until March 2013 and are thus not included within this consultation process.

7. The nature and scope of longer term SO incentive schemes to apply from April 2013 are being debated within a separate and distinct industry consultation process. On 14<sup>th</sup> June 2011 Ofgem issued a consultation document<sup>3</sup> setting out its initial views on the principles that it considers should underpin longer term gas and electricity System Operator incentive schemes to apply from April 2013.

## 1.2 Consultation Process

8. As described in paragraph 4 above, Ofgem, in its open letter, stated its aspiration for the existing schemes to 'roll over' (as far as possible) and has highlighted a number of initial views which it expects to be considered in the roll over arrangements. These matters are described within this consultation document.
9. National Grid recognises the benefits of seeking engagement from all interested parties and therefore National Grid is planning to host an industry Workshop<sup>4</sup> on 13 July 2011 where the relevant issues discussed within this document will be presented and industry views will be invited. In addition, if you would like meet with National Grid on a bi-lateral basis to discuss this year's consultation, then please contact us using the contact details in section 10 of this document.
10. This document will have a four week consultation period and invites industry views on a range of issues that may drive the form and structure of the relevant incentive schemes. However, this document does not contain detailed proposals for SO Incentive schemes to apply from 1 April 2012.
11. The responses to this consultation document, along with the feedback provided at the industry and bilateral meetings, will be used to aid our understanding of industry views regarding the value adding activities that National Grid undertakes as SO.
12. National Grid believes that the engagement sought via this document will enable it to understand the issues which, from the perspective of stakeholders, should be afforded priority and focus. For example, this focus may be warranted due to the risk of the relevant issue resulting in windfall gains or losses under the relevant scheme and consideration is required of how such risk could be mitigated.
13. The feedback obtained from this consultation will highlight to National Grid the areas where analysis is required which will then feed into its development of Initial Proposals for incentives to apply from April 2012. National Grid's aim is to issue an SO Incentives Initial Proposals consultation document in October 2011.

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<sup>3</sup><http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=244&refer=Markets/WhlMkts/EffSystemOps/SystOpIncent>

<sup>4</sup> Details and materials for the workshop are available at:  
<http://www.nationalgrid.com/uk/Gas/soincentives/IndustryWork/>

14. Upon conclusion of the Initial Proposals consultation, National Grid will issue a consultation report incorporating the non-confidential responses received from interested parties which will be published on our website. The report, and all responses, will be sent in full to Ofgem in late 2011 following which Ofgem will develop and consult on its Final Proposals for the relevant SO Incentive schemes. The overall timetable is expected<sup>5</sup> to be as follows:

7 <sup>th</sup> July 2011	Initial industry consultation issued
13 <sup>th</sup> July 2011	Industry Workshop
4 <sup>th</sup> August 2011	Deadline for responses to initial industry consultation
Early October 2011	Initial Proposals consultation issued
End of October 2011	Deadline for responses to Initial Proposals consultation
November 2011	Report of Initial Proposal consultation issued
Spring 2012	Ofgem consultation on Final Proposals
1 <sup>st</sup> April 2012	Incentive schemes commence

**Table 1.1: 2012/13 SO Incentives Development Timetable**

15. Throughout the process, the SO Incentives area of the National Grid website will be kept updated with all relevant documents. A link to this part of our website is included in the contact details in Section 10 of this document.
16. **Responses to this consultation are requested by 4<sup>th</sup> August 2011.**

### 1.3 Structure of this Document

17. This initial consultation document describes each incentive in turn and identifies how it operates and any dependencies. Consideration is also given to the suitability of the arrangements (or elements of the arrangements) to 'roll over' for the period 2012/13.
18. Thereafter, the document highlights a number of issues relevant to each scheme which National Grid will consider when compiling its Initial Proposals. Views are sought as to whether the issues identified are appropriate for consideration and whether there are any additional factors which should be taken into account.
19. The remainder of the document is structured as follows:
- Section 2: Shrinkage
  - Section 3: Unaccounted for Gas (UAG)
  - Section 4: Demand Forecasting

<sup>5</sup> Please note that these timings are subject to change, dependent on the implementation of the EU Third Package. Further details are available at [http://www.decc.gov.uk/en/content/cms/consultations/imp\\_eu\\_third/imp\\_eu\\_third.aspx](http://www.decc.gov.uk/en/content/cms/consultations/imp_eu_third/imp_eu_third.aspx)

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- Section 5: NTS Data Publication
  - Section 6: Residual Balancing
  - Section 7: Information on Incentive Performance published by National Grid
  - Section 8: Summary of Consultation Questions.
  - Section 9: Glossary
  - Section 10: Our Contact Details for any party that wishes to contact us to discuss any aspect of this consultation, or arrange a bilateral meeting.

## Section 2 Shrinkage

*This section describes the existing Shrinkage Incentive. Views are invited in respect of the issues that should be considered when developing an effective scheme for April 2012 to March 2013.*

### 2.1 Background and Context

20. In its Open Letter of 17 May 2011, Ofgem has highlighted a number of areas related to the Shrinkage Incentive which it believes merit consideration in the context of a roll over of the existing scheme. Further, National Grid has identified a number of additional issues which we believe are also worthy of review and debate. All of these points and issues are described below.

### Shrinkage Background

21. NTS Shrinkage covers the gas and electrical energy which is used in operating NTS compressors and gas that cannot be accounted for and billed in the measurement and allocation process. The components that comprise Shrinkage are summarised in the following table:

Element	Description
Compressor Fuel Use (CFU)	The energy used to run compressors to transport gas through the NTS. For gas driven compressors this is Own Use Gas (OUG), for electric driven compressors this is Electric Compressor Energy (ECE).
Calorific Value (CV) shrinkage	The energy which cannot be billed due to CV capping under application of the Gas (Calculation of Thermal Energy) Regulations 1996 (amended in 1997).
Unaccounted for Gas (UAG)	The quantity of gas which remains after taking into account all measured inputs and outputs from the system, own use gas consumption, CV Shrinkage and the daily change in NTS linepack.

**Table 2.1: Shrinkage Components**

22. National Grid NTS undertakes the role of NTS Shrinkage Provider on behalf of the gas shipper community and procures wholesale gas and retail electricity for this purpose.

### Current Shrinkage Incentive

23. The Shrinkage Incentive in its current form was introduced on 1 April 2009 and is due to expire on 31 March 2012. Although typically prior to 2009 Shrinkage incentive schemes were one year in duration, for the current period, Ofgem concluded that a three year scheme would provide National Grid with the opportunity to consider ways to improve its operation of its

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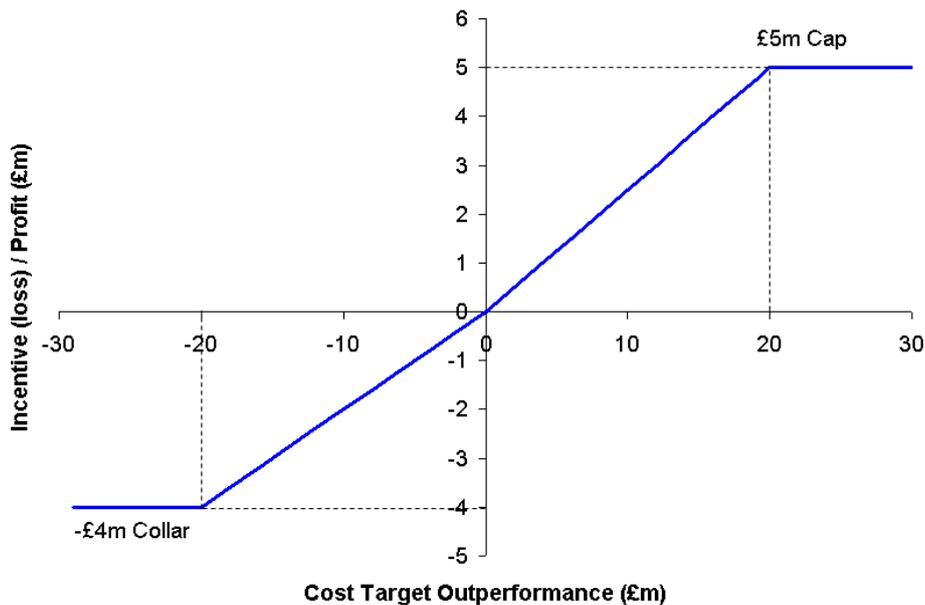
compressors and the way in which it purchases gas and electricity over a longer period<sup>6</sup>.

24. The current scheme is a “bundled” cost minimisation annual incentive across all components of Shrinkage, with a financial target derived from a forecast volume target multiplied by gas and electricity reference prices. The three components of Shrinkage have different underlying drivers resulting in different approaches to the forecasting volume requirements, and different degrees of control and influence over outturns.
25. The volume target methodology is set in advance of the year based on separate forecasts for each of the three elements of Shrinkage being a forecast CFU volume (adjusted by outturn St Fergus supplies), a forecast CV Shrinkage volume, and outturn UAG volumes. UAG is also separately incentivised via the UAG incentive (see section 3).
26. In 2009 a Gas Cost Reference Price (GCRP) was agreed until the end of March 2013 and is calculated using a mix of forward and prompt wholesale market prices. This represents the benchmark against which National Grid’s procurement strategy is measured. Until the end of March 2012, the Electricity Cost Reference Price (ECRP) methodology will continue to be set on a quarterly basis using the average forward price during the month prior to the start of the quarter.
27. The objective of the current Shrinkage incentive scheme is for National Grid to seek opportunities to reduce the overall cost of Shrinkage to the community. The aim is to ensure that the scheme is responsive to National Grid’s performance and not unduly influenced by external factors and therefore a number of adjustment mechanisms are in place to mitigate the risk of a windfall profit or loss.
28. Current forecasts for Shrinkage costs in 2011/12 are updated on a quarterly basis and are published on the National Grid website<sup>7</sup>. National Grid can reduce the Shrinkage costs to the community by either reducing the volume of Shrinkage that occurs and subsequently needs to be procured and/or by procuring the energy at a cheaper unit rate than the target GCRP and ECRP price.
29. Sharing factors are 25% upside and 20% downside with a maximum incentive profit for 2011/12 of £5m and a maximum incentive loss of £4m. This incentive structure is illustrated below.

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<sup>6</sup> “National Grid Electricity Transmission and National Grid Gas System Operator incentives from 1 April 2009” (14/09) 27 February 2009 paragraph 3.46

<sup>7</sup> <http://www.nationalgrid.com/uk/Gas/soincentives/QuarterlyReports/>



**Figure 2.1: The Shrinkage Incentive for 2011/12**

30. If total spend against the incentive is below the target (i.e. the cost target out-performance is positive), National Grid receives a payment equivalent to 25% of the under-spend, subject to a limit of £5m. This level of performance would result from a reduction in Shrinkage costs to the shipper community of £20m. Conversely, if total spend against the incentive is above the target, National Grid incurs a penalty of 20% of the over-spend, subject to a limit of £4m. This level of performance would result from an increase in Shrinkage costs to the shipper community of £20m.

### Historic Performance under the Shrinkage Incentive

31. Historic incentive target and performance are shown in the following table:

Incentive Year	Incentive Target	Performance	Out-performance	Incentive Performance	User Net Benefit
2009/10	£246.4m	£139.4m	£107.0m	£5.0m	£102.0m
2010/11 <sup>8</sup>	£139.3m	£114.1m	£25.2m	£5.0m	£20.2m

**Table 2.2: Historic Performance under the Shrinkage Incentive**

32. In both the above years the performance is largely attributable to energy procurement activities as opposed to volume reduction. The Gas Quarterly Forward Price for 2009/10 was set during 2008/09 in a period of high market prices. However, given the time horizon to point of delivery, National Grid identified an opportunity to deliver value in the event of a falling market and executed an appropriate risk management strategy. Additionally, the forward procurement strategy was based on prevailing volume forecasts which did not foresee the unprecedented levels of UAG experienced in 2009/10.

<sup>8</sup> The figures quoted for 2010/11 are subject to final review and reconciliation as part of National Grid's regulatory reporting process and are subject to change.

Consequently significant volumes of UAG were procured close to the point of delivery at favourable prices compared to reference prices. In 2010/11 there were similar drivers for incentive outperformance but not to the same scale as that experienced in 2009/10.

33. The following charts compare NTS Shrinkage costs with target allowances by component for incentive years 2009/10 and 2010/11.

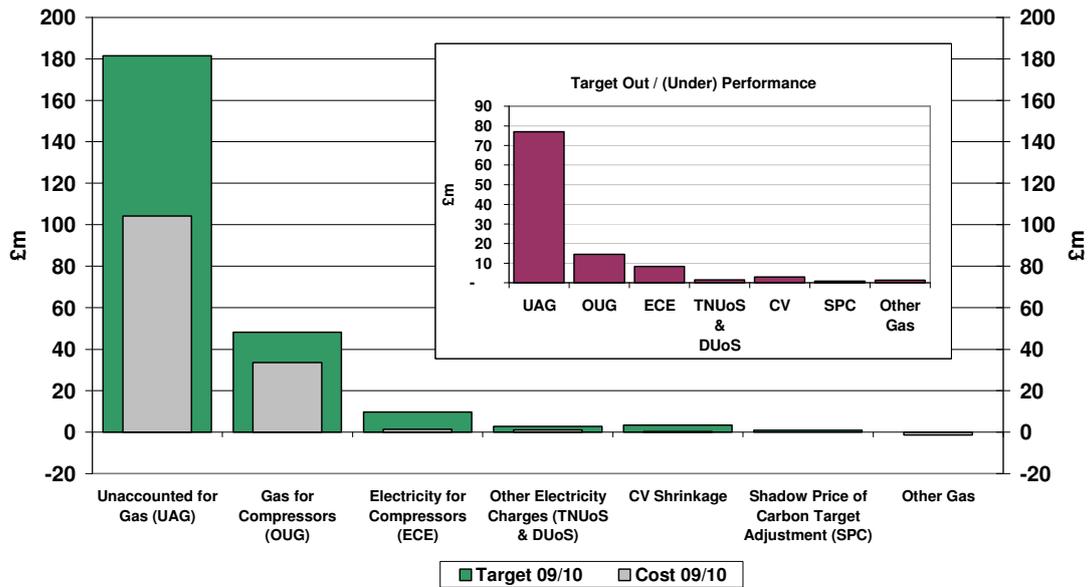


Figure 2.2: NTS Shrinkage, 2009/10 Target vs Costs

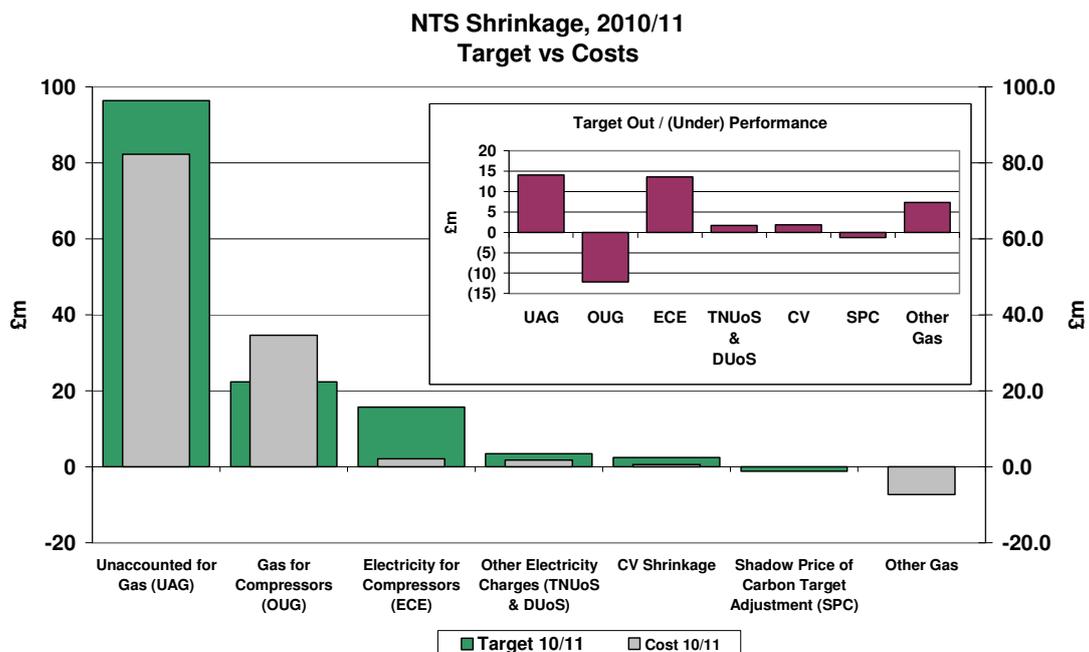


Figure 2.3: NTS Shrinkage, 2010/11 Target vs Costs

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34. The remainder of this section highlights a number of factors relevant to the roll over arrangements.

## 2.2 Objective of a Shrinkage Incentive

35. As referred to the above, the objective of the current Shrinkage incentive is for National Grid to seek opportunities to reduce the overall cost of Shrinkage to the shipper community. Feedback received by National Grid from a number of market participants has indicated that this remains a key objective although participants also value predictability of costs associated with NTS Shrinkage.

## 2.3 Developments since 2009

36. Market and regime developments and trends that have an impact on performance under the current Shrinkage incentive arrangements and which National Grid believes are worthy of consideration for the development of future Shrinkage incentive arrangements for 2012/13 are:

- Change in supply patterns – see paragraph 55.
- Delay to installation of electric drive compressors - see paragraph 62.
- Variability in outturn UAG volumes – see paragraph 66.
- Electricity retail contracts (implications on Electricity Cost Reference Price (ECRP) uplift methodology) – see paragraph 90.
- Environmental considerations – see paragraph 96.

37. In its open letter Ofgem has also requested that the following issues be taken into account in the development of the 2012/13 arrangements:

- Compressor Fuel Use linkage to St Fergus and Milford Haven flows – see paragraph 42.
- The current exclusions regarding calorific value (CV) Shrinkage – see paragraph 74.
- Gas Cost Reference Price (GCRP) swing allowance – see paragraph 79.

Question 2.1	Are there any additional items which require consideration for the roll over of the Shrinkage incentive?
Question 2.2	What is the appropriate level of change and what are your priorities for the rollover of current arrangements in respect of the Shrinkage Incentive for a single year scheme for 2012/13?

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## 2.4 Volume

### Compressor Fuel Use

38. National Grid owns and operates compressor installations at 24 sites across the UK. Broadly these assets and all associated operating costs are funded through the Transmission Owner (TO) price control, with the exception of the costs of fuel (gas or electricity) and related emissions. These costs are incurred in their operation and recovered through the SO price control and incentivised through the Shrinkage incentive. The existing Shrinkage incentive encourages National Grid to optimise compressor operation to minimise fuel use for both the gas and electric driven compressors (as these costs are borne by the shipper community).
39. The primary reason for having compressors on the NTS is to assist in moving gas from points of supply to points of demand. Individual compressor units have different operating efficiencies at different operational envelopes (pressure/flow combinations that the compressor can operate within). Decisions on which specific compressor units to run, and in which combinations, are therefore made considering the efficiency and environmental impact of the fleet as a whole in moving gas from sources of supply to centres of demand.

### Compressor Fuel Requirements

40. In its open letter Ofgem highlighted the need for National Grid to report on the accuracy of the model for linking Shrinkage volumes to the flows from the St. Fergus terminal and in particular the link between Compressor Fuel Use (CFU) and flows from the Milford Haven terminal. These elements contribute to the appropriate determination of forecast CFU requirements for incentive target setting purposes.
41. This section of the document therefore includes an overview of how St. Fergus and Milford Haven flows are utilised within the prevailing CFU forecasting methodology that National Grid uses for the purposes of forecasting and procuring Shrinkage energy within year. In the subsequent sections National Grid also presents how this methodology has been applied to forecasting requirements for incentive setting purposes.

### Overview of CFU model and target adjuster

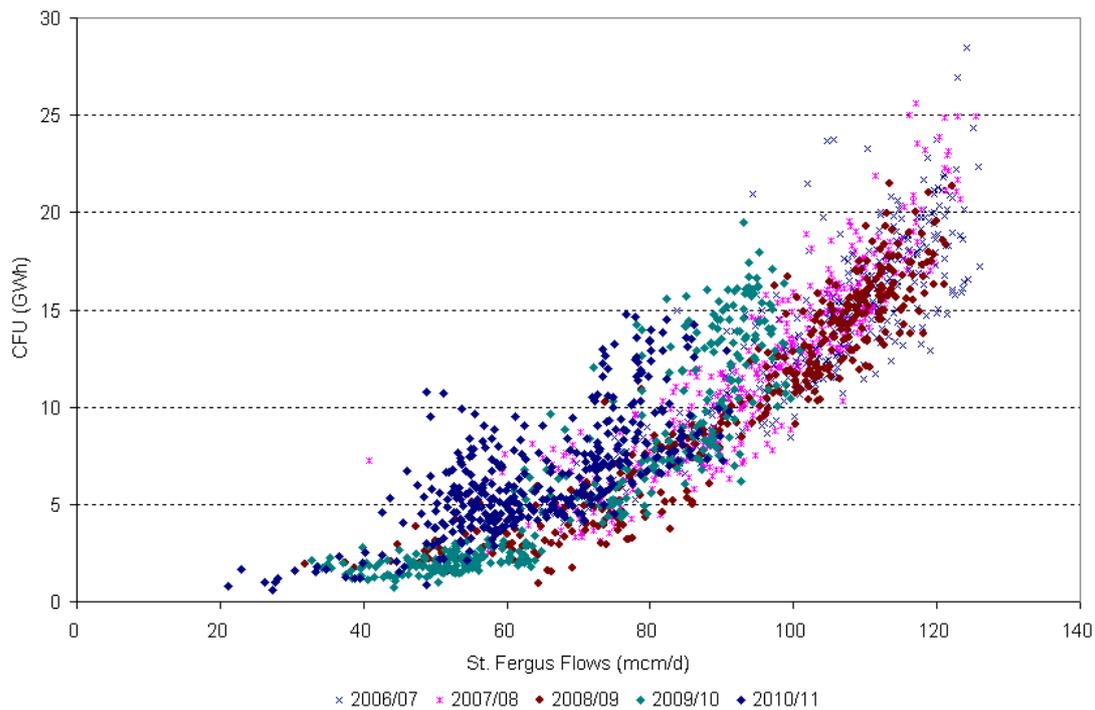
42. National Grid's CFU model utilises multiple linear regression techniques to capture the relationships between terminal supplies and the volume of CFU. Statistical analysis identifies all significant drivers that should be included in model development, to derive a fit-for-purpose model. Supplies at St. Fergus have been the most significant driver of CFU but, for the avoidance of doubt, other supplies, including Milford Haven where influential, form part of the derived model.
43. Once a model has been derived, forward looking supply-demand scenarios are input to enable a CFU forecast to be produced.

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44. This forecasting process is updated regularly within year to track changing conditions, particularly with respect to supply forecasts to inform our trading strategy for procurement of the CFU volume requirement. The latest model has a good fit to outturn data ( $r^2 = 0.89^9$ ) and National Grid considers this is an appropriate basis to derive volume forecasts for the purposes of Initial Proposals for 2012/13.
  45. The current form of incentive requires a baseline CFU volume target (and adjuster methodology) to be set ahead of the year. The incentive CFU volume target is derived at year end once all relevant parameters are known. National Grid generally adopts the same modelling approach to forecasting CFU for incentive setting purposes ahead of the year in question as we do for managing our procurement strategy.
  46. The central case CFU forecast assumes supply-demand forecasts are based on the 'Best Case' supply scenario developed in conjunction with industry using information provided from UK Continental Shelf producers, gas importers and project developers through the annual Transporting Britain's Energy (TBE) consultation process<sup>10</sup>. This CFU forecast has been adopted as the median basis for incentive volume target setting.
  47. As with any forecast there is uncertainty over the likely level of flows from any entry point. The degree of sensitivity of CFU volumes to supply-demand patterns could lead to material windfall gains or losses with significant variance in CFU resulting from a modest forecast error in supply-demand. The current form of incentive includes a CFU volume target adjuster to mitigate the uncertainty in forecast supply-demand and hence CFU, which adjusts the volume target based on out turn supply-demand.
  48. Supplies at St. Fergus have been the most significant driver of CFU due to the size of the terminal and geographic location, which can require several compressors to move gas through the network to centres of demand. The relationship between St. Fergus supply and CFU in the relevant year can be seen within the following chart.

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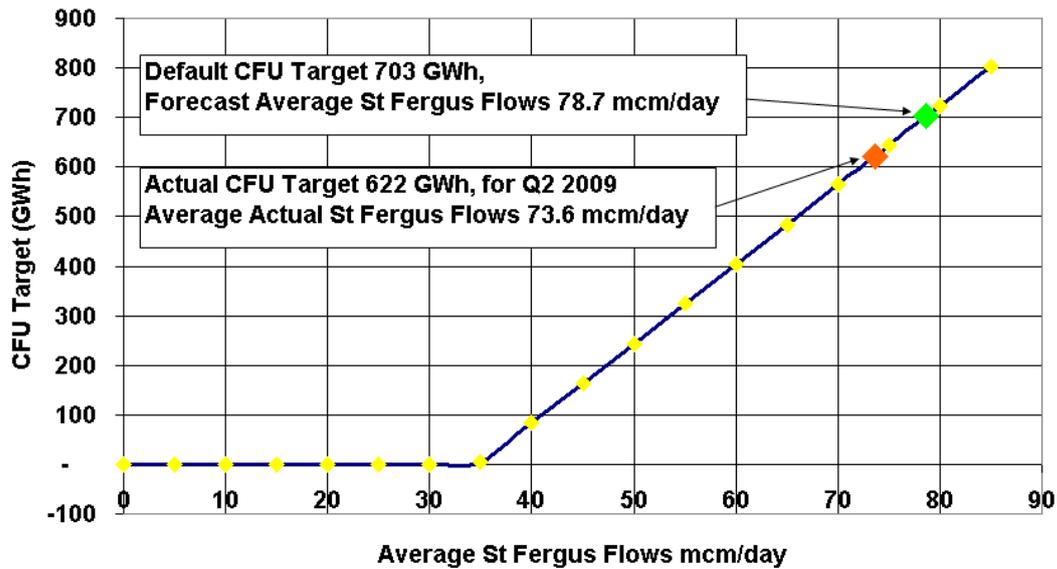
<sup>9</sup> Within Linear regression analysis (the relationship between two variables, X and Y) the value  $r^2$  is a fraction between 0.0 and 1.0. An  $r^2$  value of 0.0 means that knowing X does not help you predict Y. There is no linear relationship between X and Y, and the best-fit line is a horizontal line going through the mean of all Y values. When  $r^2$  equals 1.0, all points lie exactly on a straight line with no scatter. Knowing X lets you predict Y perfectly.

<sup>10</sup> <http://www.nationalgrid.com/uk/Gas/OperationalInfo/TBE/>



**Figure 2.4: Historic CFU vs. St. Fergus Flows**

49. Previous analysis has shown that the St. Fergus driver accounted for a significant proportion of the variance in CFU due to anticipated supply uncertainties. There was minimal expected value from including other supply drivers and in its current form the CFU target adjuster is based solely on the average flows through the St. Fergus terminal.
50. The parameters of the CFU adjuster are derived from a 'stress test' of the central case forecast model for the relevant year. For the current CFU adjuster, the average St. Fergus supply forecast was subjected to +/- 25% sensitivities with rebalance at other supplies pro-rated by historic supply swing factors. The results provided a linear fit to derive a CFU target volume adjustment per unit of change in average St. Fergus supply as shown in the figure below:



**Figure 2.5: Example of CFU Target Adjuster**

Question 2.3	Do you consider a review/update of the current CFU model appropriate for a rollover year, or do you believe that a more fundamental review is required? If so what approaches and/or techniques should be explored?
Question 2.4	Do you consider TBE base case at seasonal normal demand remains an appropriate supply-demand scenario assumption for CFU target setting?

### CFU model and target adjuster performance

51. The performance of the CFU forecast is shown in the following table:

Year	Target St. Fergus Flow (mcm/d) <sup>11</sup>	Actual / Forecast St. Fergus Flow (mcm/d)	Baseline Target (GWh)	Adjusted Baseline Target (GWh)	Adjustment	Out-turn (GWh)	Adjusted Target Error
2009/10	87.4	70.7	3,747	2,682	-28%	2,515	+6.6%
2010/11	85.7	63.9	3,606	2,212	-39%	2,419	-8.6%
2011/12	79.1	48.1 <sup>12</sup>	3,151	1,334 <sup>12</sup>	-58%	1,923 <sup>12</sup>	-44.0%

**Table 2.3: Historic CFU Forecast Performance**

<sup>11</sup> As specified in the NTS Licence Special Condition C8F paragraph (2)(d): Table C. This table specifies average daily volumes per quarter which for the purposes of Table 2.3 in this document has been aggregated into annualised volumes.

<sup>12</sup> Based on current model/forecast

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52. Over the 2009/10 and 2010/11 incentive years, average St. Fergus supplies have been 25-30% lower than the central case target setting scenario, reducing the CFU target by 28-39%.
53. When the St. Fergus target adjuster was set in early 2009, there were a number of drivers indicating that the St. Fergus flows would remain at or around their prevailing levels (around 90mcm/d) for the following few years, albeit in the context of global uncertainty. The uncertainties included the oil prices (which peaked around 2008), the Japanese earthquake in 2007 resulting in the shutdown of several nuclear reactors and import of large amounts of Liquefied Natural Gas (LNG), the start of the recession and uncertainty around the future of LNG production (notably in Qatar).
54. Prior to 2009, the main drivers which indicated the possibility of steady flows from St Fergus included:
- A view that the cost of gas sales to the UK for Norwegian gas was, due to proximity of source, less than that of LNG; and
  - The UK National Balancing Point (NBP) was trading at only a slight premium relative to the US Henry Hub which indicated LNG could go to both markets.

By 2009, this situation had changed due to:

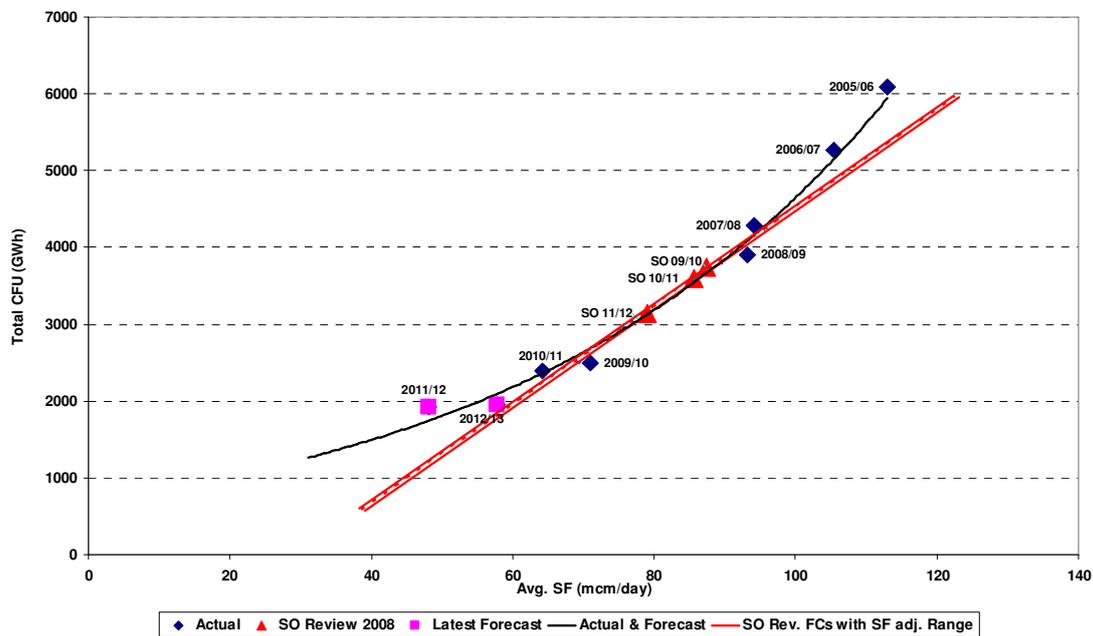
- A large increase in gas prices which has made the UK an attractive destination for both Norwegian gas and LNG (2011 prices averaging ~57p/th, average ~50p/th over the last 2 years compared with ~34p/th in the 4 years prior to 2008);
- The growth of US shale gas production leading to a fall in Henry Hub prices which are currently ~26p/th (which displaced LNG intended for the US);
- The global recession which increased LNG availability relative to demand; and
- An increase in global LNG production (notably Qatar and Australia).

These factors combined mean that LNG became a more significant supply source for the GB market than previously anticipated. Increased LNG flows had the effect of reducing flows through the St Fergus entry point.

55. Ongoing model developments have recognised the influence of these changing supply patterns and in particular the current operational model better reflects the increasing non-linear relationship of CFU with some supplies.
56. For 2009/10 and 2010/11, the CFU adjuster methodology has been largely successful in mitigating windfall gain or loss, reducing the CFU target error from 50% to less than 10%. The forecast error in average St. Fergus supplies lies just outside the stress test's plus or minus 25% range and thus we may expect the adjuster to have further reduced CFU volume variance due to supply-demand patterns. However, the target setting model did not reflect the

non-linear relationship of some supplies to CFU, particularly St. Fergus as shown above in Figure 2.4.

57. It is expected that a linear St. Fergus adjustment factor would give rise to an increasing error in the adjusted CFU target as lower average St. Fergus supply scenarios prevail. Current forecasts for 2011/12 predict average St. Fergus supplies to be 44% lower than the central case target setting scenario, reducing the CFU target by 58%. The expected error in adjusted CFU target at these historic low average St. Fergus supplies provides an estimated target allowance shortfall (at 50p/th) of £10.1m in 2011/12. Materiality could be exacerbated if the current CFU target adjuster was rolled over into 2012/13 and average St. Fergus supplies decline further as currently expected.



**Figure 2.6: Performance of St. Fergus Flow Adjuster**

58. National Grid acknowledges Ofgem's view that the CFU model should be reviewed for 2012/13 rollover target setting and considers that the ongoing development of the current model has established an appropriate basis for 2012/13 forecasts. Any target setting methodology should account for the materiality of supply-demand uncertainties which manifest as windfall gains or loss from inappropriate CFU adjustment. Experience since 2009 demonstrates the uncertainty in forward supply-demand scenarios which gives rise to greater risk of windfall gains or losses than the forecast error of the current model for a given supply demand scenario. National Grid considers that it is therefore appropriate to also review the CFU adjuster methodology.

Question 2.5	Do you believe it is necessary to review the CFU adjuster? If so, should this be an update of the current values or a revision of the methodology itself?
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### Own Use Gas (OUG) and Electric Compressor Energy (ECE) volume targets

59. National Grid is currently implementing a program to install electric drives at certain compressor sites, replacing gas fuelled turbines to meet National Grid's obligations under the Integrated Pollution Prevention and Control (IPPC) Directive which requires action to reduce emissions and improve local air quality.
60. Currently there is one electric drive in use on the NTS, at Lockerley with a further 5 at various stages of implementation and expected to be operational by March 2013. Over the next few years, the changeover program will mean that a larger proportion of the energy required for operating NTS compressors will be electrical, rather than gas.
61. In its current form the incentive requires an OUG target volume and an ECE volume target. The forecast CFU target (a gas equivalent volume) is disaggregated into an OUG and ECE target volumes based on expected operational dates for the electric drives and the relative efficiency of electric : gas operations (1:3).
62. Technical challenges have delayed the number of electric compressors installed and operational at this time. The following table shows the current expected operational dates for planned installations up to March 2013:

Relevant compressor sites	Expected Operational Dates as at November 2008 <sup>13</sup>	Current Expected Operational Dates
Lockerley	Operational	Operational
Wormington	Operational	Q2 2012 <sup>14</sup>
Churchover	Sep 2009	Q2 2012
Felindre	Jan 2009	Q2 2012
St Fergus	Dec 2009	Q4 2012
Kirriemuir	Jul 2009	Q4 2012

**Table 2.4: Commissioning Schedule for Electric Drive Compressors**

63. National Grid considers that delays to the installation of electric drive compressors has had no material impact on incentive performance. The total market cost for the expected electric load is of the order £20m per year

<sup>13</sup> A published within the National Grid Gas (NTS) SO Incentives for 1 April 2009 Initial Proposals Consultation issued on 12 November 2008

<sup>14</sup> This compressor has experienced technical issues that are anticipated to be resolved by Q2 2012

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(2009/10 to 2010/11), 90% of which relates to commodity cost. Whilst the target commodity cost is based upon forecast gas and electric load, a delay in installation of electric drive compressors will result in greater gas consumption which, with a consumption efficiency of 3 gas : 1 electric balanced by the wholesale gas/electric price ratio, means the aggregate cost remains unchanged and the incentive cost is largely neutral to delayed electric drive operations.

Question 2.6	Are the latest programmed dates for the installation of electric drive compressors an appropriate basis for the disaggregation of the baseline CFU target into gas and electric target volumes? If not, what do you believe would be the appropriate basis?
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### Unaccounted For Gas (UAG)

64. UAG<sup>15</sup> is the quantity of gas which remains after taking into account all measured inputs and outputs from the system, Own Use Gas consumption, CV Shrinkage and the daily change in NTS linepack.
65. National Grid believes the primary cause of UAG to be the inherent measurement tolerances associated with entry and exit metering equipment. The permitted tolerance for fiscal metering equipment is plus or minus 1%. The value of UAG compared to overall system throughput is below this figure at 0.6% (2009/10 figures). When correcting for recent known meter errors, in particular at the Braishfield and Aberdeen NTS to DN Network offtakes, we estimate that UAG will fall to around 5,100GWh gross which is less than 0.5% of system throughput.
66. The structure of the Shrinkage incentive prior to 2009 had a fixed UAG target volume which suggested that National Grid was able to forecast and control volumes of UAG to the same extent as other components of Shrinkage such as Compressor Fuel Use (CFU). However, given the unpredictability of the annual net UAG volume, the absence of an explainable driver and the extent to which it has varied historically, it was concluded that it would be difficult to have confidence in such a forecast leading to the potential for windfall gains and losses to arise.
67. Accordingly, for the current Shrinkage Incentive, instead of having a fixed UAG target volume it was considered appropriate to pass through the net outturn volume of UAG within the incentive scheme, whilst maintaining an incentive on National Grid to purchase this volume efficiently.
68. In addition to the net volume being accounted for within the Shrinkage scheme, from April 2009 onwards, in response to industry concerns, UAG volumes were also subject to a new incentive which uses annual gross (or absolute) levels of UAG as the performance measure (see section 3).

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<sup>15</sup> See section 3 for a more detailed definition of UAG.

Question 2.7	In respect of the Shrinkage procurement incentive, do you believe that it remains appropriate for the UAG component of the gas volume target to continue to be based upon net outturn volumes?
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### CV Shrinkage

69. The CV of natural gas determines the amount of energy transported. CV information is provided daily to gas shippers and suppliers, and is used to bill gas consumers for the energy they use. The methodology for calculating the daily CV within a charging zone is designed to ensure that customers within a zone are not at significant material risk of being charged for energy not supplied due to local variations in the CV of gas. This therefore gives rise to the possibility of energy being delivered that is not billed, which is termed CV Shrinkage.
70. Determination of the daily CV is enshrined within the Gas (Calculation of Thermal Energy) Regulations 1996 (Amended 1997). In summary, the methodology detailed in paragraph 4(A) of the Regulations says that the daily CV for a charging zone shall be the lowest of:
- the flow weighted average CV calculated across all of the inputs into charging zone; or
  - the lowest CV measured at any of the individual input points to the charging zone, plus 1MJ/m<sup>3</sup>.
71. A practical example of the application of these Regulations is shown in the following diagram:

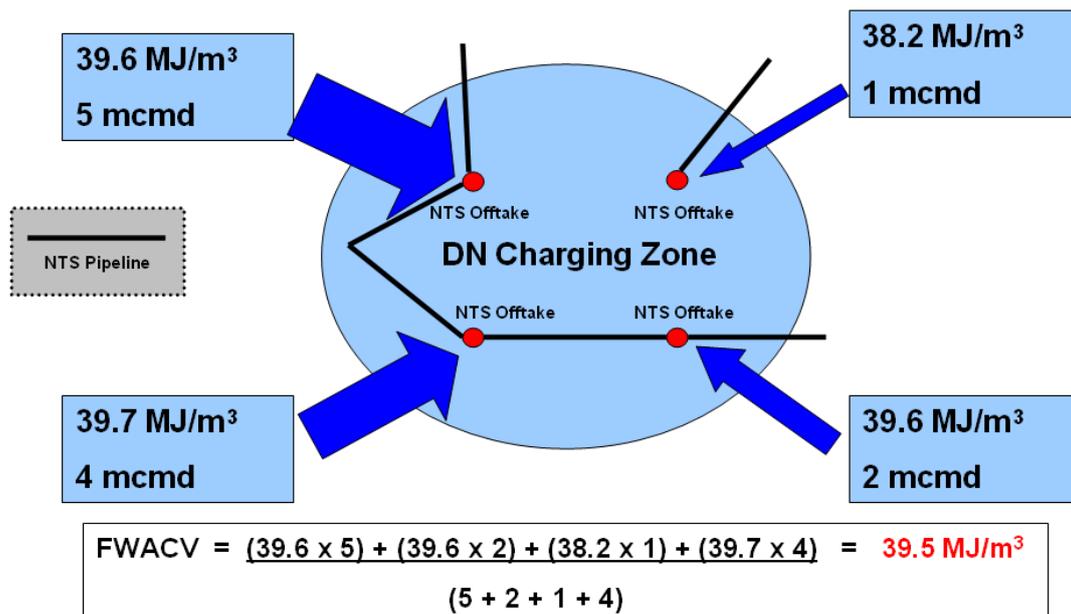


Figure 2.7: Example of Determination of CV within a DN Charging Zone

72. The example in Figure 2.7 presents the Flow Weighted Average CV (FWACV) calculation for a hypothetical Distribution Network (DN) and in this instance demonstrates the application of CV capping whereby the CV utilised for billing is the lowest NTS to DN offtake CV plus 1 MJ/m<sup>3</sup> (i.e. 39.2 MJ/m<sup>3</sup>) as this is less than the FWACV (39.5 MJ/m<sup>3</sup>). This network has three connected NTS to DN offtakes and another offtake which supplies a discrete pipeline network within the DN. The CV Shrinkage volume target captures the CV capping risk where National Grid has a level of control or influence. This underlying risk will remain for 2012/13.
73. In the example presented there is no mitigation (commingling) strategy that would have prevented the CV capping event (i.e. it is not possible for the DN to offtake all its gas through the 3 connected NTS to DN offtakes only). If there were continued limited mitigation opportunities, it might be appropriate for this individual offtake to be subject to the incentive cap exclusion methodology which is described below.
74. At the outset of the current incentive scheme, specific CV Shrinkage risks associated with Ross, Dyffryn Clydach and Cowpen Bewley offtakes and direct DN entry were identified. Such risks were excluded from the incentive arrangements as there were no economic and efficient mitigating actions that National Grid could take as the System Operator to manage these risks.
75. In the current incentive period there have been no instances of CV Capping directly attributed to the above excluded offtakes. There have also been no significant changes to the network recently but the site exclusion method does enable specific CV Shrinkage risks to be mitigated economically. Further analysis to review the current and other potential sites is required as it is necessary to ensure equal access to the network by all potential users. The initial work suggests that the presently excluded sites do provide a reasonable protection against CV Shrinkage for which it is not possible to economically mitigate against. Further analysis is still required to determine whether any additional excluded sites should be considered and the effect of the penetration of increasing LNG deliveries deep into the network.
76. For the avoidance of doubt, National Grid would still be required to procure gas to cover CV Shrinkage wherever it may arise. The Gas Cost Reference Price methodology would still provide National Grid with an incentive to procure these volumes efficiently in the market to minimise procurement costs and expose National Grid to the risk of inaccurately forecasting these volumes.

Question 2.8	Do you believe it is appropriate to maintain the mechanism that enables exclusions (for specific CV risks that cannot be mitigated economically) to be identified within the current incentive structure? If not, how should these risks be accommodated within the incentive structure?
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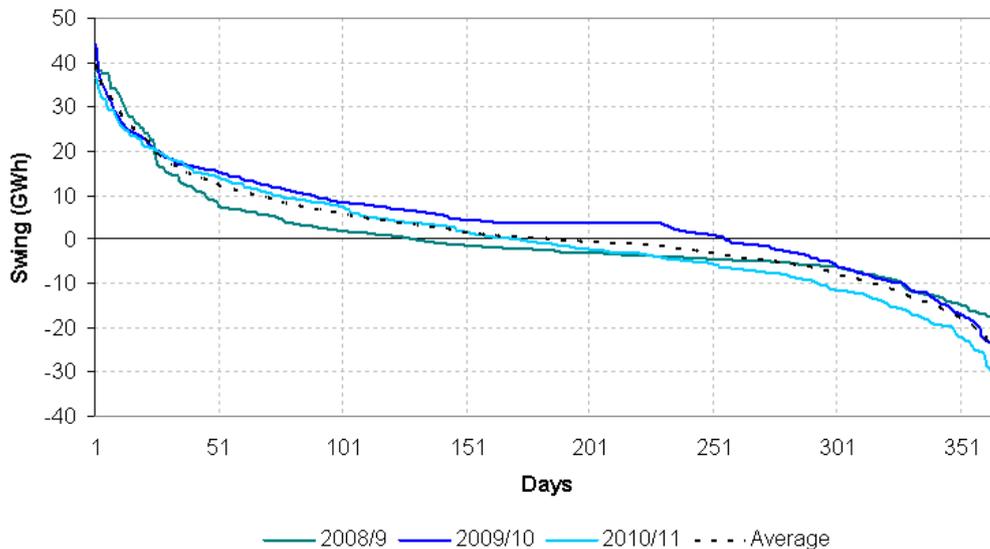
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## 2.5 Price

77. A GCRP and Electricity Cost Reference Price (ECRP) are used as the market price benchmarks to be applied to target volumes to calculate a target cost against which National Grid's incentive performance is measured.

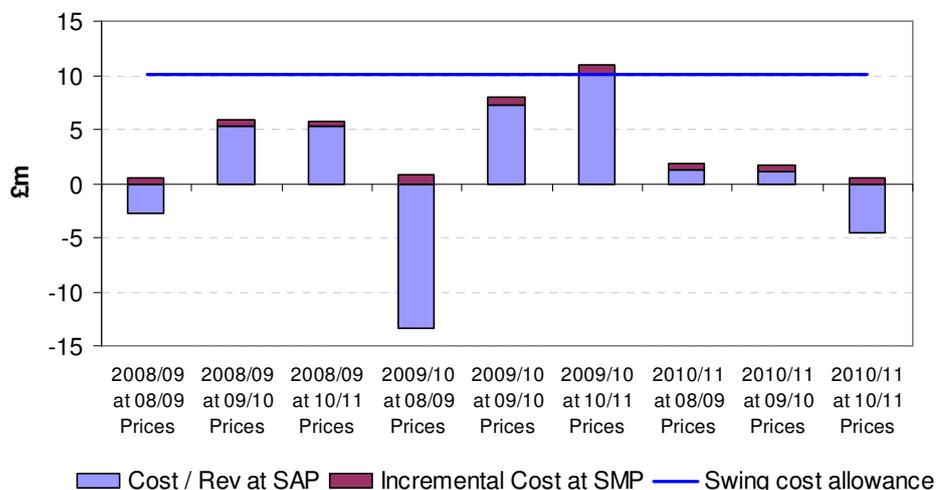
### Gas Cost Reference Price (GCRP)

78. The efficiency of the procurement strategy adopted by National Grid in purchasing gas to meet the gas Shrinkage volume requirement is measured against a GCRP methodology, which was revised and agreed for the period up to March 2013 as part of the 2009/10 review. The GCRP for each quarter is a combination of forward prices and prompt prices calculated by applying a 75% weighting to the average price of a quarter contract on each day in the previous year, and a 25% weighting to the average price of a monthly contract over each day in the month preceding delivery.
79. The GCRP methodology is used to provide a cost reference for a flat Shrinkage profile. However, due to the unpredictability of Shrinkage volumes, on any day, National Grid will need to undertake buy or sell trades to fine tune the procurement position to meet the daily Shrinkage allocation or incur penal imbalance charges. The volume of these daily buys and sells are referred to as the "swing" volumes.
80. The true level of swing cannot be fully determined until after the Gas Day as it is subject to entry and exit close-out of measurements. This pushes the fine tuning of the procurement to closer to real-time delivery for maximum accuracy. The daily change in swing (no two consecutive days are likely to be the same) further constrains how it is procured within the range of available NBP gas market products pushing it towards Day Ahead or Within Day markets. Any action taken in these markets (buy or sell) is exposed to potential extremes of prices associated with trading this close to delivery. Any remaining volume to buy or sell after the day will form the Shrinkage Provider imbalance and will be priced at the relevant Gas Day's System Clearing prices as defined within Section F of the Uniform Network Code (UNC).
81. Historic swing levels are shown in the following diagram, where the level of swing for each of the past 3 years has been ordered from high to low and plotted on the chart. The volatility in the level of swing is due to a number of factors including changes in demand and supply patterns and the unpredictability of UAG volumes. The incremental costs associated with these actions are currently captured through an incremental cost allowance to the GCRP (the "Gas Cost Reference Price Uplift" in the NTS Licence).



**Figure 2.8: Historic Swing Volume Load Duration Curve**

82. For the 2009-12 incentive scheme, an ex-ante adjustment approach for covering the cost of swing was adopted recognising the higher level of cost certainty with this as opposed to an ex-post adjustment approach. The market benchmark price for the swing allowance in the current GCRP is based upon the costs of provision of a storage service at the Rough storage facility to cover the expected level of swing.
83. To illustrate the volatility of the cost of swing, the chart below shows a range of costs for the last three years levels of swing priced at System Average Prices (SAP) also from the last three years. The chart also shows the incremental costs if settling swing at System Marginal Price (SMP) and the swing costs allowance as calculated using 2008/09 Rough storage service prices.



**Figure 2.9: Costs of Historic levels of Swing levels**

84. In its open letter Ofgem expressed an initial view that it would no longer be appropriate to retain the swing allowance for the purposes of the 2012/13 scheme. Ofgem expressed this view on the basis that information received from National Grid pursuant to Ofgem's monthly monitoring of its performance under the existing SO incentive scheme indicates that National Grid has been successful in procuring gas at a price lower than the current Gas Cost Reference Price (before applying the allowance for swing volumes).
85. However, as shown in Figure 2.8 above, the unpredictability of Shrinkage volume continues to necessitate the execution of buy and sell trades to address the daily shrinkage volumes and the issue of daily volume volatility will continue into 2012/13. These volumes are also subject to the variability of prompt prices as described in paragraph 80 and as shown in Figure 2.9, the financial risk associated with these buy and sell trades create additional costs over and above those reflected in the Gas Cost Reference Price.
86. Under the current incentive arrangements, National Grid is incentivised to identify and execute the optimal procurement strategy. However, due to the unpredictability of gas market prices and Shrinkage volumes, the opportunity to procure gas at a price lower than the market benchmark is not a given for any year.

Question 2.9	Do you believe that swing is an incremental cost for which there should be an allowance in addition to the benchmark price?
Question 2.10	Is the current ex-ante market benchmark approach appropriate for the purposes of a one year rollover? If not, what alternative arrangements do you believe are appropriate?

### Electricity Cost Reference Price (ECRP)

87. National Grid currently procures electric compressor energy as a retail consumer from an electricity supplier via a flexible retail contract. This gives National Grid some discretion to execute an appropriate risk management of wholesale electricity procurement.
88. The efficiency of the procurement strategy adopted by National Grid in purchasing electricity to meet the electricity Shrinkage volume requirement is measured against an Electricity Cost Reference Price methodology, which was agreed for the period up to March 2012 as part of the 2009 review.
89. The ECRP target price for each delivery quarter is set one month ahead of the delivery quarter and based upon the daily average of the quarterly contract wholesale prices in the month ahead period. The ECRP target reference period is closer to the delivery period when compared with its GCRP equivalent in recognition of the uncertainty around the timing of the installation

of electric compressors. These uncertainties remain for electric compressors expected to be operational for the 2012/13 rollover year.

90. In addition to the wholesale market price, electricity procurement via a retail contract attracts other supplier (risk premiums and margins), market (BSUoS, Renewables obligations etc) and delivery (TNUoS, DUoS) charges. Equivalent costs are not incurred for gas volumes which are traded wholesale through the Shrinkage provider shipper account at the NBP.
91. The current form of incentive incorporates a percentage uplift over the reference wholesale electricity price to cover the supplier and market costs bundled into the tariff, (this reflects the structure of retail contracts available, at the time, to National Grid), plus pass through of relevant delivery charges (TNUoS and DUoS).
92. Since benchmarking the current retail uplift, National Grid's electricity contracts have expired and been subject to competitive tender during the summer of 2010. Based on the NTS compressor load profile and uncertainty, market uncertainty and changing supplier appetite for risk, the products now available to National Grid are materially different to when the current ECRP uplift was set. National Grid is concerned that the current 18% uplift is not sufficiently robust to provide a reasonable benchmark for the 2012/13 incentive. A high level review of the £2.2m electricity charges (excluding TNUoS and DUoS charges) for 2010/11 indicates actual uplift charges are more than double the existing 18% allowance.

Question 2.11	Do you believe it is appropriate to review the ECRP reference price uplift?
Question 2.12	Do you believe it remains appropriate for the ECRP reference period within the rollover arrangements retain a bias to prompt price?

## Other Elements

93. **Electricity System charges (TNUoS, DUoS)**
94. National Grid's procurement of electricity for the electric driven compressors additionally attracts delivery charges (TNUoS<sup>16</sup> and DUoS<sup>17</sup>).
95. In order to derive an appropriate retail benchmark for electricity procurement, the current incentive provides a target allowance for TNUoS and DUoS delivery charges for relevant compressor sites. The current form of incentive sets out a methodology by which TNUoS and DUoS allowances are determined. The prevailing methodology as specified in the NTS Licence refers to formula year t (as opposed to a range of specific incentive years) and

<sup>16</sup> Transmission Network Use of System

<sup>17</sup> Distribution Use of System

therefore can be updated with appropriate tariffs for 2012/13. The schedule below summarises relevant compressor sites for rollover incentive arrangements for 2012/13 expected operational dates and the expected basis on which TNUoS charges will be levied.

Relevant compressor sites	Current Programme – Expected Operational Dates	TNUOS <sub>t,s</sub>
Lockerley	Operational	8,000 x TDT <sub>t,s</sub>
Wormington	Q2 2012	15,000 x TDT <sub>t,s</sub>
Churchover	Q2 2012	15,000 x TDT <sub>t,s</sub>
Felindre	Q2 2012	35,000 x TDT <sub>t,s</sub>
St Fergus	Q4 2012	48,000 x TDT <sub>t,s</sub>
Kirriemuir	Q4 2012	35,000 x TDT <sub>t,s</sub>

**Table 2.5: Timescale for Electric Compressor Installations**

## 96. Carbon Price Adjustment

97. Recognising the environmental impact of operating compressors, the shadow price of carbon adjustment encourages National Grid to factor in the environmental impacts in its decision making on use of the compressor fleet. Any under / out performance against the Compressor Fuel Use (CFU) volume target incurs a penalty / reward which reduces / increases the overall NTS Shrinkage Incentive Target. Under the current incentive, the Shadow Price of Carbon Adjustment rate has increased from 0.573 p/kWh (16.8p / therm) in 2009/10 to 0.621 p/kWh (18.2 p/therm) in 2011/12.
98. The Department of Energy and Climate Change's approach to carbon valuation has subsequently undergone a major review which concluded in July 2009. The new approach moves away from a valuation based on the damages associated with climate change (the shadow price of carbon) and replaced it with a measure to reflect the cost of mitigating emissions (the traded price of carbon).
99. To continue the current incentive arrangements in this area, an appropriate carbon price adjuster would be required for 2012/13.
100. The current form of the incentive may no longer be appropriate recognising developments in UK environmental legislation such as the Carbon Reduction Commitment Energy Efficiency Scheme (CRCEES) which may duplicate the current carbon price adjustment within the Shrinkage incentive. From National Grid's perspective, there will be an exposure to costs under this scheme, a proportion of which will directly relate to NTS Shrinkage electric compressor usage. This is one of the costs relating to the Shrinkage Manager

role which National Grid would expect to pass through the incentive and to Shippers via the NTS SO Commodity Charge. For the avoidance of doubt, there is no specific target allowance for CRCEES in the current form of the incentive. By way of illustration, a load equivalent to the ECE volume target for 2011/12 (551 GWh) would incur a CRCEES charge of £3.6m<sup>18</sup>.

Question 2.13	What do you consider is an appropriate incentive treatment of the TNUoS, DUoS and CRCEES costs?
Question 2.14	Do you think it is appropriate to have a bespoke environmental dimension to the NTS Shrinkage incentive? If yes, do you believe it is appropriate to review the adjustment for the shadow price of carbon within the 2012/13 scheme to ensure the appropriate level of interaction with environmental legislation?

## 102. Impact of Carbon Capture and Storage (CCS) Project

103. There is currently a proposal for one of the current NTS pipelines to be re-assigned and re-used as part of a Carbon Capture, Transport and Storage project<sup>19</sup>. There may be incremental SO costs including Shrinkage associated with the re-assignment of this pipeline.
104. In the event that this project goes ahead, it is proposed that the NTS consumer would not bear any incremental costs associated with the re-assignment of the pipeline and therefore a methodology<sup>20</sup> has been consulted on and developed to enable these costs to be paid by the third party who is proposing to purchase the pipeline. If this purchase of the pipeline proceeds, then associated licence changes may be required to the NTS Licence to enable the relevant costs to be re-allocated.

<sup>18</sup> Based upon an indicative price of £12/tonne

<sup>19</sup> Further information is available at

<http://www.ofgem.gov.uk/Networks/Trans/GasTransPolicy/CCS/Pages/CCS.aspx>

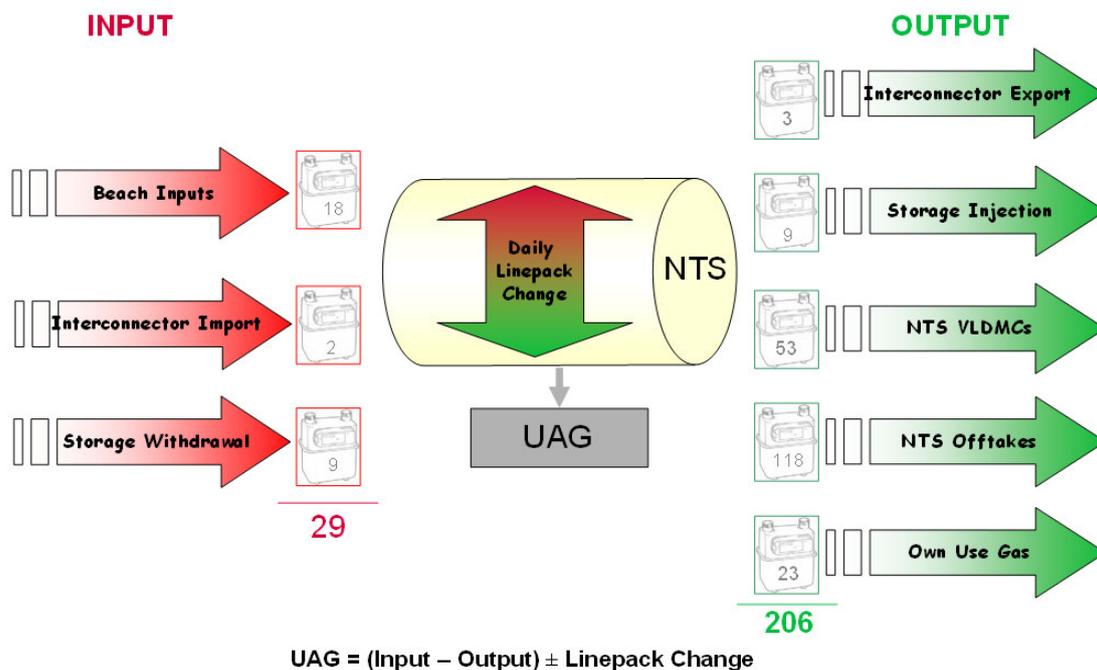
<sup>20</sup> <http://www.nationalgrid.com/uk/Gas/Charges/statements/CCS/>

## Section 3 Unaccounted for Gas (UAG)

This section describes the existing UAG Incentive. Views on the appropriateness of an incentive on the System Operator in light of the level of influence it can exert in this area are invited. If it is believed appropriate to incentivise the System Operator, views are invited in respect of the issues that should be considered when developing an effective scheme for April 2012 to March 2013.

### 3.1 Background

105. As previously stated in paragraph 64, UAG is that energy which remains unallocated after accounting for all measured inputs and outputs from the NTS, Own Use Gas consumption, CV Shrinkage and the change in NTS linepack. National Grid believes that the primary cause is believed to be the inherent measurement tolerances associated with entry and exit metering equipment. The permitted tolerance for fiscal metering equipment connected to the NTS is plus or minus 1%. A further factor is meter error, which could be as a result of technical issues<sup>21</sup>. The following diagram summarises the calculation of UAG and shows the number of input and output measurement systems that may be in service on a particular day.



**Figure 3.1: UAG Calculation and Metering Inputs**

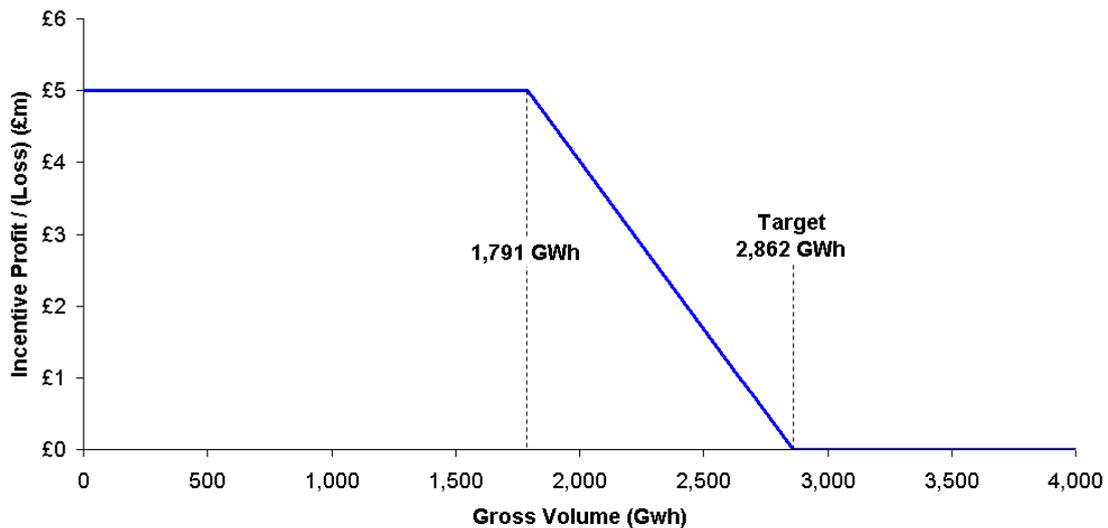
### Current Incentive Structure

106. UAG volumes for the purposes of the Shrinkage incentive are determined on a net basis per annum. However this does not recognise the component misallocations whereby, due to the socialisation of such costs, individual parties will gain or lose as a result of the misallocation of volumes under every individual measurement error. Where UAG arises as a consequence of measurement error the implications are illustrated in the table below:

Nature of UAG		Impact on Shippers at the Relevant Metered Point	Socialised Impact on All Shippers
Positive UAG	Gas metered into system exceeds the gas metered out. Gas has been 'lost' from the network.	Error at exit metering: Gain	Loss  More Shrinkage gas purchased leading to an increase in the NTS SO commodity charge
		Through not paying for gas that they have actually taken	
Negative UAG	Gas metered out of the system exceeds the gas metered in. Gas has been 'created' in the network.	Error at entry metering: Gain	Gain  Less Shrinkage gas purchased leading to a decrease in the NTS SO commodity charge
		Through being paid for putting more gas into the system than they actually have.	
Positive UAG	Gas metered into system exceeds the gas metered out. Gas has been 'lost' from the network.	Error at exit metering: Loss	Loss  More Shrinkage gas purchased leading to an increase in the NTS SO commodity charge
		Through paying for gas that they have not actually taken	
Negative UAG	Gas metered out of the system exceeds the gas metered in. Gas has been 'created' in the network.	Error at entry metering: Loss	Gain  Less Shrinkage gas purchased leading to a decrease in the NTS SO commodity charge
		Through being paid for putting less gas into the system than they actually have.	

**Table 3.1: Summary of Effects of UAG due to measurement errors on Industry Parties**

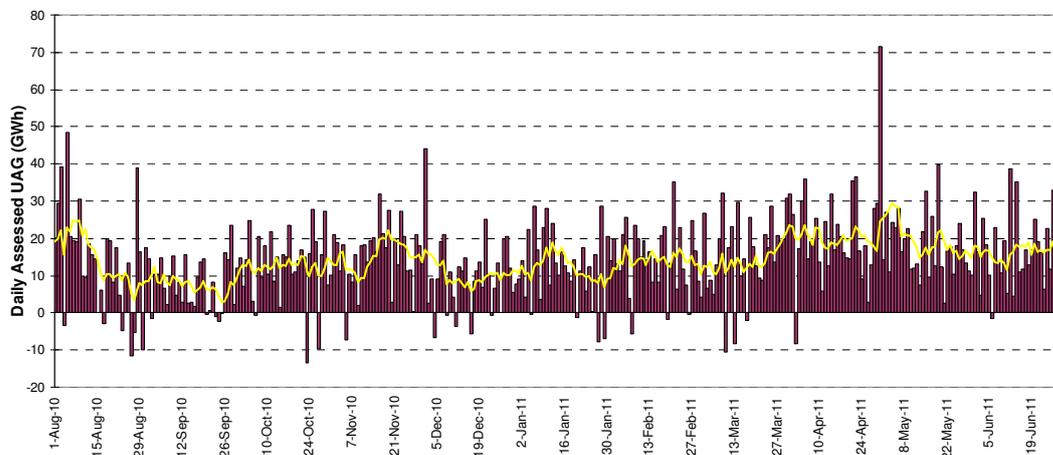
107. In 2009, in response to industry concerns, National Grid accepted that it was able to take action to try to reduce UAG and therefore proposed, from 2009 onwards, that UAG volumes be incentivised via a distinct scheme which uses annual gross (or absolute) levels of UAG as the performance measure. Gross (or absolute) levels of UAG provide a more accurate view of the extent of the consequential misallocation of costs compared to the net volumes.
108. In February 2009, Ofgem concurred that a distinct incentive was appropriate and its final proposals comprised a three year scheme with a fixed target of 2,862 GWh per annum. Recognising that National Grid would incur costs in seeking to address UAG and the extent of direct influence National Grid can exert in this area, the incentive was 'upside only' in nature with a payment cap of £2m in year one, £3m in year two and £5m in year three.
109. Whilst National Grid has a meter assurance role, the NTS connected meter assets are predominately owned by Distribution Network Owners, Terminal Operators, Storage Operators, Interconnector Operators and large industrial end consumers. National Grid's success under this incentive is reliant therefore on mutual working and collaboration with these stakeholders who own and are responsible for this equipment.
110. The following diagram illustrates the UAG incentive in place for the period April 2011 to March 2012. The cap on the amount that National Grid can earn in 2011/12 is £5m.



**Figure 3.2: The UAG Incentive for 2011/12**

### 3.2 Developments since 2009

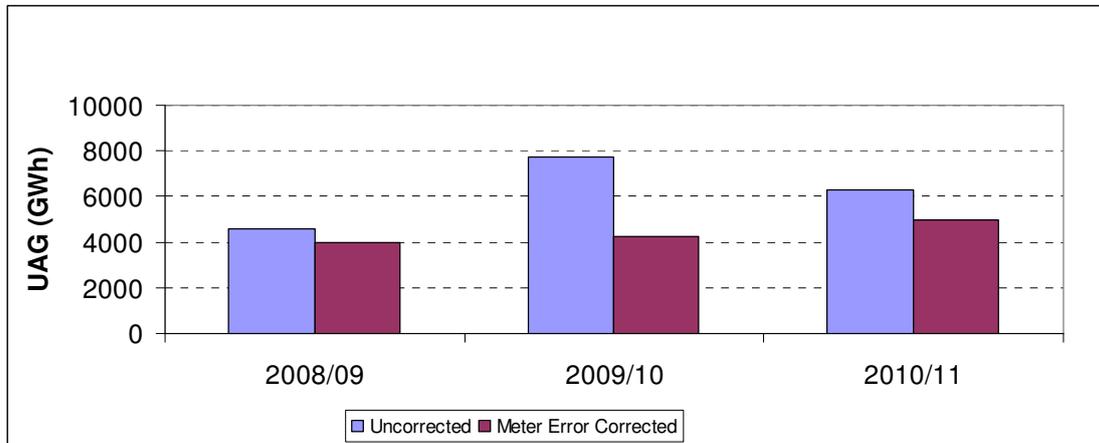
111. UAG volumes continue to show a high level of positivity and volatility on a daily basis as shown in Figure 3.3 below. Despite the considerable analysis completed by National Grid (see paragraph 115) it has not been possible to determine any correlation between UAG and network behaviour or dynamics.



**Figure 3.3: Daily UAG profile with a seven day average (yellow line) for August 2010 to June 2011.**

112. The volume target for 2009/10 to 2011/12 was based upon the average of the historic outturn gross UAG data from 2001/02 to 2007/08. This set the target at 2,862GWh. The incentive (absolute) UAG volumes have increased significantly during the current incentive period, out turning at 7,716GWh in 2009/10 and 6,313GWh in 2010/11. The net levels of UAG also reflected these increases at 7,571GWh and 5,996GWh respectively.

113. The observed UAG volumes have been greatly influenced by two significant measurement errors (SMERs) at the Braishfield and Aberdeen NTS to DN offtakes. While the measurement issues have been rectified by the asset owner, resulting in no further mis-measurement, financially these have yet to be reconciled via the UNC process. Both have been reported to the Joint Office of Gas Transporters<sup>21</sup> by the relevant DN Operators. National Grid has also been proactive in resolving a long standing entry terminal energy delivery reporting issue and this has also contributed to a further reduction in the underlying baseline UAG level.
114. The absolute level of UAG<sup>22</sup> as reported under the incentive has fallen back from the 2009/10 peak volume of 7,716GWh although the incentive volumes corrected for known measurement errors<sup>23</sup> show a more consistent baseline level between 3,960GWh in 2008/09 to 4,968GWh in 2010/11 as shown in the Figure below.



**Figure 3.4: Incentive UAG (Absolute) behaviour uncorrected and corrected for known meter errors<sup>23</sup>**

115. It is the underlying level of absolute UAG of around 4,500GWh which is driving further investigation and analysis. On 20 June 2011, National Grid issued a letter<sup>24</sup> outlining the work it has undertaken to identify the drivers and reduce the volumes of UAG. The letter summarised the completed actions that have been undertaken to date and those which are currently ongoing. This work includes;

<sup>21</sup> A list of notified Meter errors is available at <http://www.gasgovernance.co.uk/MER/Report>

<sup>22</sup> Incentive absolute UAG includes all closed out meter errors irrespective of whether they have been financially reconciled.

<sup>23</sup> This accounts for the major known meter errors at the Aberdeen, Braishfield offtakes and the data issue with a terminal. The offtake errors are still the subject of the SMER process and only an indicative reconciled volume estimate, in line with the original Joint Office notification, has been used.

<sup>24</sup> Industry update on UAG is available at <http://www.nationalgrid.com/uk/Gas/soincentives/SupportingInfo/>

- 
- Data mining and other statistical methods;
  - Increased witnessing of 3<sup>rd</sup> party measurement system validations across all NTS entry and exit points;
  - Work to improve the quality and timeliness of measurement information; and
  - The formation of a dedicated UAG team to coordinate the National Grid UAG activities.
116. Whilst UAG has always been regarded as the consequence of inherent measurement tolerances associated with entry and exit metering equipment, in respect of meter error there has never been any recognition within the incentive structure which allows for correction of UAG volumes for errors corrected and reconciled more than 15 days after the month(s) in which the error occurred. Meter Error Reconciliations for large and/or complex issues can take many months to be resolved. Accordingly, whilst National Grid's aspiration will always be to identify and seek correction of errors in measurement over the longer term for the benefit of the industry, this industry benefit is not recognised within the current close out periods<sup>25</sup>, and is therefore not reflected within the current UAG incentive. National Grid's view is that the 15 day close-out of energy allocations for UAG compared to the typical timeframe to investigate and influence industry parties to resolve meter errors means that National Grid is unlikely to be suitably rewarded for its performance under the current incentive structure irrespective of the volume of UAG identified.
117. NTS offtake meter error reconciliation is the mechanism whereby costs are reapportioned between the impacted parties and National Grid as the Shrinkage Manager. These costs are subsequently recovered or returned to the community through revised NTS SO commodity charges (see Table 3.1). To ensure meter reconciliation is processed effectively, National Grid has streamlined reconciliation throughput<sup>26</sup> minimising the delay in cost reapportionment. Reconciliation has no direct benefit to the UAG incentive performance but is a fundamental principle of Shrinkage stewardship and correct cost apportionment as laid out in the UNC.
118. National Grid incurs costs in striving to deliver good UAG volume performance. There has been considerable effort expended to increase National Grid's measurement system validation presence across the NTS. Further development of these activities, the refining of validation processes and encouraging the more widespread use of meter diagnostic tools, will assist in National Grid's continued objective of UAG minimisation.

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<sup>25</sup> For entry and UAG volumes the close out period is M+15 (business days). No subsequent reconciliation is allowed after this time. For exit, the close out period is D+5 although reconciliation is possible up to a four to five year rolling window after the event occurred.

<sup>26</sup> Reconciliation throughput is a measure of time from Meter Error Report (MER) submission to National Grid to invoicing.

119. The current UAG incentive has only upside benefit, the level of which is determined on the basis of absolute volumes compared to a fixed (absolute) annual target. The basic principle of absolute UAG volumes is considered to have merit as significant assessed negative UAG for example, is also undesirable and is still indicative of meter measurement imbalance across the NTS. However, in its open letter, Ofgem has questioned whether it remains appropriate for National Grid to have an incentive in this area and has suggested that an alternative approach of introducing a new licence obligation on National Grid requiring it to undertake certain work related to UAG should be considered.
120. In 2009/10 and 2010/11 the annual UAG target of 2,862GWh was exceeded by months 7 (October 2009) and 4 (July 2010) respectively. In the event that an UAG incentive on National Grid is continued into 2012/13, National Grid believes that one element worthy of consideration is the appropriateness of an annual target. Such a target does not provide an enduring incentive subsequent to the annual target volume being exceeded. Therefore it may be more effective if a target was applied for shorter periods within year (for example, monthly).

Question 3.1	Do you believe that National Grid has a central role in the minimisation of UAG volumes? If not, who do you believe should take this role?
Question 3.2	If you consider that National Grid has a central role to play, do you believe that National Grid should be incentivised to perform this role or should it be subject to a funded obligation?
Question 3.3	If an incentive were in place for UAG in 2012/13, what would an appropriate incentive structure be? For example, the current incentive scheme is based upon the absolute volume of UAG in a year.

## Section 4

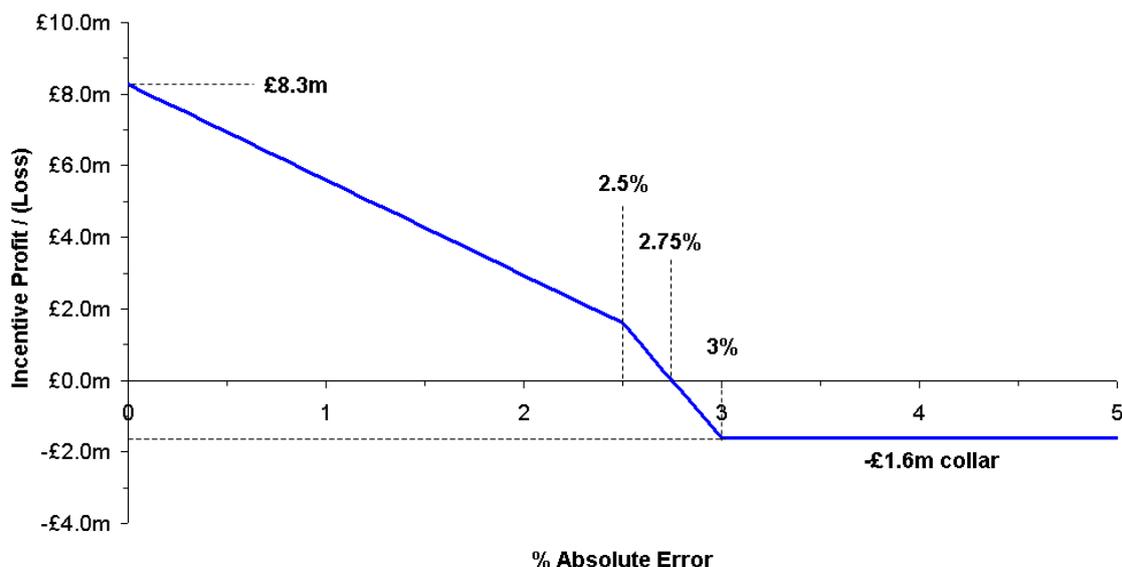
### Demand Forecasting

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*This section provides background information on the existing demand forecasting incentive and summarises how the target performance level for the two year scheme effective from 1 April 2010 was set. The section then asks questions on how the incentive could be set from April 2012 onwards.*

#### 4.1 Demand Forecasting Background and Context

121. Following feedback from market participants in winter 2005/6 (and supported by Ofgem analysis), it was suggested that improvements to National Grid's daily demand forecasts would deliver significant commercial benefits to customers.
122. At the time a number of discussions took place on demand forecasting, the key points of which are summarised below:
  - The key forecast was determined to be the 13:00 forecast for the following gas day (D-1), as this was used by market participants when putting in place their energy strategy for the following gas day; and
  - The focus should be on improving the annual average level of performance (i.e. by reducing inaccuracies).
123. Ofgem determined the most appropriate form of regulation to drive improvements in demand forecasting was to introduce an incentive.
124. National Grid believes the continued incentivisation of demand forecasting is appropriate as this role continues to deliver value to the market through better information which in turn leads to more economic and efficient decisions by market participants.
125. The demand forecasting incentive has continued to be based around the absolute error of the day ahead (D-1) 13:00 forecast and operates on an annual average basis. The current scheme for 2011/12 has a target error of 2.75%. The sharing factors of the scheme are designed to give a profit or loss to National Grid of £1.6m for an increase or decrease in performance around the target to 2.5% or 3%. There is a shallower upside sharing factor for performance increases beyond the 2.5% level which extends up to a maximum payment of approximately £8.3m. This payment is achieved if there is a zero average absolute demand forecast (i.e. zero demand forecast error on every day of a year). The 2011/12 scheme is shown in the figure below:



**Figure 4.1: 2011/12 demand forecasting incentive**

#### 4.2 Demand Forecasting Incentive from April 2010

126. During the consultation on incentives to apply from April 2010, National Grid indicated that uncertainty around flows due to an expected increase in the proportion of price responsive demand (namely interconnector demand driven by new LNG supplies and the effect of the growth in fast cycle storage facilities) on the system could impact on the level of demand forecasting error through changes to price related demand response and volatility of exports through IUK.
127. National Grid reflected these new risks in the estimated forecast errors provided to Ofgem during the development of the Final Proposals Consultation. National Grid considered that 2010/11 would see an annual forecast error of 3.0% and 2011/12 an annual forecast error of 3.1%, assuming the same level of forecasting performance achieved in 2009 (that is, without further improvement). Following Ofgem's Final Proposals consultation the target level of error was set at 2.85% for 2010/11 and 2.75% for 2011/12.
128. The outturn performance achieved for 2010/11 was 2.754% which resulted in National Grid earning an incentive profit of £1.021m

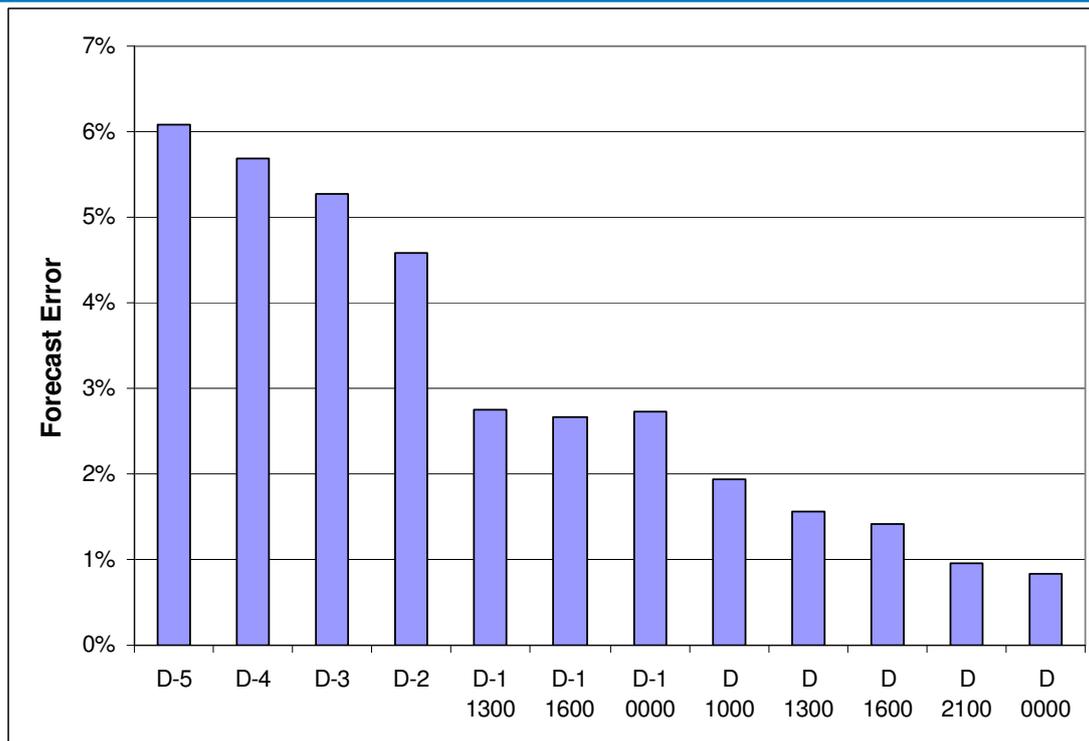
#### 4.3 Demand Forecasting Incentive from April 2012

129. In Ofgem's Final Proposals Consultation in respect of National Grid's SO Incentive Schemes to apply from 1 April 2011, Ofgem stated that it considered it appropriate to 'roll over' (as far as possible) the incentive schemes that expire on 31 March 2012 to 31 March 2013. National Grid agrees that this is a pragmatic approach in order to develop options for incentivising National Grid's SO role from 1 April 2013 to align with the incentives on National Grid as Transmission Owner (TO) as part of RIIO – T1. As such, National Grid supports a one year Demand Forecasting scheme to apply from 1 April 2012.

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130. During previous incentive development processes respondents have reiterated the value they place on the D-1 13:00 Demand Forecast and the overall annual measure of performance. To ensure the Demand Forecast Incentive remains appropriate we are seeking views from the industry and consumers on the value they place on accurate demand forecasts and whether there are specific aspects of demand forecasting that are of particular value. In particular we would like to gauge whether there are any aspects of value to customers that are not captured within the current Demand Forecast Incentive.
131. We believe that customers may have views on the following aspects of demand forecasting:
- The forecasts published at specific times;
  - Whether the value of having an accurate forecast is any way dependent on the time of the year (e.g. summer vs. winter); and
  - Whether accuracy is measured annually (a measure of average performance over a year) or daily (avoiding large forecast errors on an individual day) or somewhere between these two parameters.
132. The following paragraphs provide more information on these issues and invite views on the value that is placed on accurate demand forecasts and whether there are specific facets of demand forecasting that are of particular value. Understanding which facets of demand forecasting are of particular value will help National Grid bring forward Initial Proposals for incentives for 2012/13.

### **Forecast Times**

133. National Grid currently produces 14 daily demand forecasts (from seven days ahead of the gas day (D-7) to midnight within day) for each gas day, with all but the D-6 and D-7 forecasts published externally. From D-7 to D-2, these forecasts are driven by weather forecast data. The day-ahead and within day forecasts use more detailed weather forecast data, data submitted by shippers together with a range of market information. The forecast time and the accuracy of the published forecasts for 2010/11 are summarised Figure 4.2 below.



**Figure 4.2: Error in the various demand forecasts in 2010/11**

134. As in previous consultations we are inviting views on the relative value that customers place on the various forecasts, to inform our thinking on whether it is appropriate that the incentive should only be based around the 13:00 D-1 forecast. Should the feedback received indicate that customers place significant value on other forecasts, we would look at how a performance target for each forecast could be developed alongside the current incentive scheme.

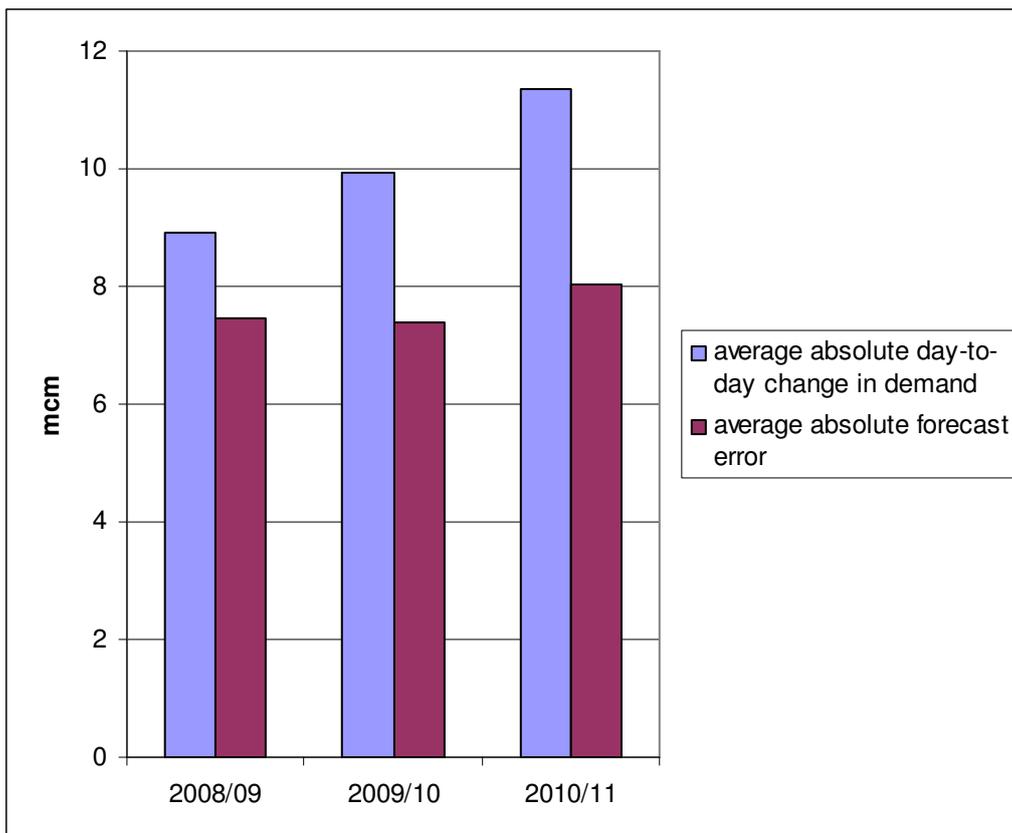
### Target Accuracy Measure

135. The current incentive structure is based around the annual average level of forecast error. This structure implies that the value of an accurate demand forecast is equal for all days in the year (i.e. there is no increased value on winter or higher demand days) and that the focus of our activities should be on reducing the average level of forecasting error rather than trying to specifically address the rare occurrence of an individual day with a large forecast error.

### Demand Volatility

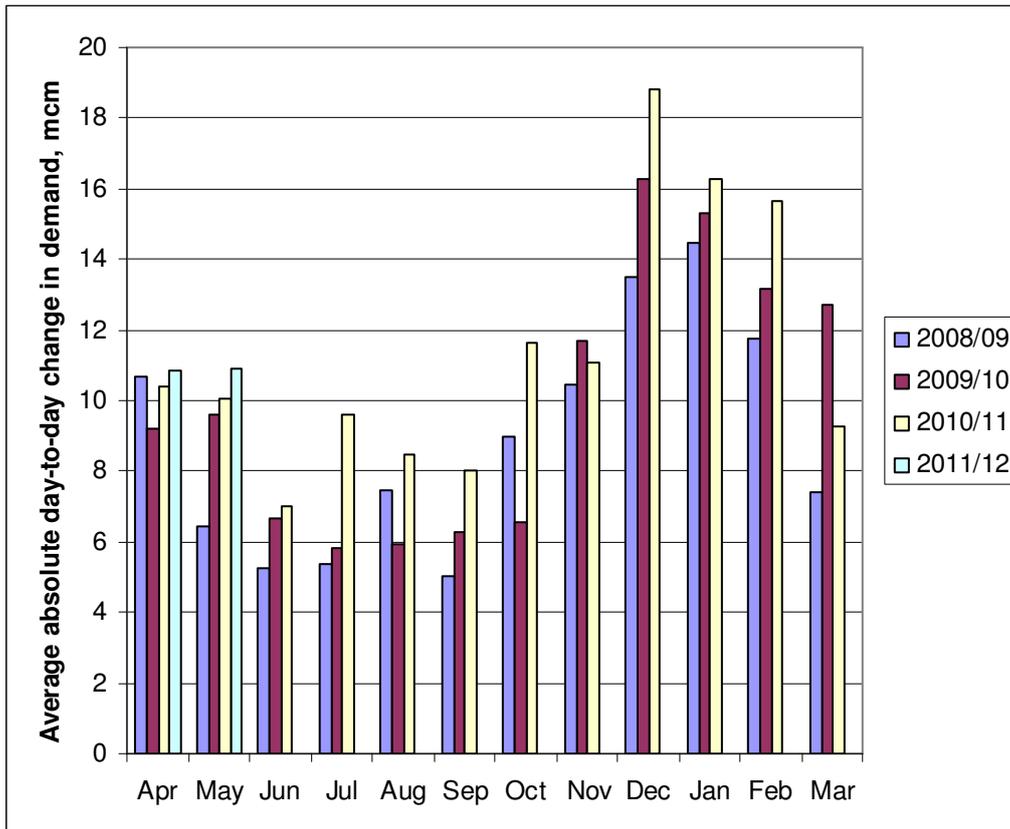
136. National Grid continues to consider that increasing demand volatility will impact on Demand Forecasting performance. As such, further to the impacts of new fast cycle gas storage and interconnectors on daily gas demand considered during the 2010 incentive review we are inviting views on the relative level of, and drivers for, demand volatility in 2012/13.

137. To illustrate the current trend of growing demand volatility, the graphs below describe NTS demand volatility in the last three incentive years. Figure 4.3 shows the absolute change in demand from one day to the next, in mcm, averaged over each year. The graph also shows the average absolute error of the D-1 1300 forecast. This error, divided by the average demand, gives the percentage error that National Grid is incentivised to reduce below the prescribed target. As the graph shows, the day-to-day volatility has increased, stepping up 2.4mcm from 2008/09 to 2010/11. Although this has impacted on forecast accuracy, with continued focus on forecasting improvement the corresponding rise in error has been limited to 0.6mcm.



**Figure 4.3: Day-to-day demand volatility & D-1 13:00 forecast error in the last three incentive years.**

138. Figure 4.4 shows the day-to-day change figures for each month. This shows that the growth in volatility is throughout the year (rather than say concentrated in one season). In fact in 9 out of the 12 months in 2010/11 the day-to-day changes were the highest seen in the last 3 years. The graph also includes the first months of the current incentive year, showing continued growth in demand volatility, with both April and May showing the largest day-to-day changes in since 2008/9



**Figure 4.4: Day-to-day demand volatility by month in the last three incentive years.**

139. In the Open Letter on National Grid Gas System Operator Incentives from April 2012, Ofgem provided an initial view that the annual error target should be further refined as part of this year’s incentive development process. National Grid considers that a review of this target is worthwhile to ensure that we continue to focus on the most valuable elements of demand forecasting.
140. National Grid considers that a review of the annual error target should analyse and evaluate a number of issues previously discussed in this section, namely;
- The likely level of demand volatility in 2012/13 and the impact of this to the Demand Forecasting role
  - The likely level, if any, of performance improvement that can be applied to the forecast process
  - The value of the D-1 13:00 forecast to customers and the additional value of any improvements.
141. In line with our support for a one year scheme to enable future incentive schemes to coincide with the implementation of RIIO – T1 National Grid is not recommending a change to the structure of the D-1 13:00 Demand Forecast Incentive.

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142. In addition to the D-1 13:00 forecast, we would also be interested to understand whether the introduction of further incentivised forecasts would provide additional value to customers.

Question 4.1	Do you support the view that the structure of the current D-1 13:00 Demand Forecasting Incentive remains fit for purpose for incentivising National Grid to provide valued information to customers? If you do not agree with this view, do you have any views as to how the structure could be improved to apply from 1 April 2012?
Question 4.2	Do you have any views or evidence regarding the volatility of demand in 2012/13? In addition, do you have any views on how this demand volatility will impact the Demand Forecast incentive?
Question 4.3	If National Grid was able to improve its demand forecasts, how would this impact on your business?
Question 4.4	Do you agree with the analysis we propose to undertake in order to review the annual error target as described in paragraph 140 above? If you do not agree with this proposed approach are you able to state which amendments or additions you consider are appropriate to this analysis?
Question 4.5	What value (or relative value) do you place on each of the demand forecasts?
Question 4.6	Which of the forecast times do you believe should be incentivised?

## Section 5

### Data Publication

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*This section describes the existing Data Publication Incentive and summarises the responses to last year's consultation on this Incentive. Views on potential incentives on data publication from April 2012 are invited.*

#### 5.1 Context and Background

143. Following winter 2005/6 it was identified that improvements to the data published to market participants would have significant commercial benefits to both consumers and the industry.
144. Through the Demand Side Working Group (DSWG) and subsequent questionnaires to users of the National Grid website, Ofgem explored the value and importance that users place on the information provided by National Grid. The key results of this review were:
  - The focus was on a key number of data items; and
  - Any performance measures in relation to publication of this data should include both availability of the website and the timeliness of publication of the data items.
145. As a result of this review, Ofgem introduced a new data publication incentive. The incentive was structured to deliver a return on the investments necessary to deliver the required performance improvements, subject to such improvements actually being made.
146. The incentive has been subsequently changed to reflect the maintenance of the current levels of performance rather than seeking to fund further investments and improvements<sup>27</sup>. To reflect this change the value of this incentive has been reduced to a maximum profit or loss of £100,000/year.

#### The Existing Data Publication Incentive

147. The data publication incentive relates to publication of information on the National Grid Website<sup>28</sup>. National Grid is incentivised to keep three key screens (Prevailing View, Data Item Explorer and Report Explorer) available with a target of 99.30% availability. In addition National Grid is incentivised to publish four key data items; Predicted Closing Line Pack, National Forecast Flow, National Physical Flow, and Forecast NTS Throughput<sup>29</sup> when available in a timely manner. The target benchmark for timeliness is 90.50% of updates within 10 minutes of the start of the hour.
148. The data publication incentive from April 2010 was a two year scheme and was a rollover of the scheme from the previous year. In summary, National

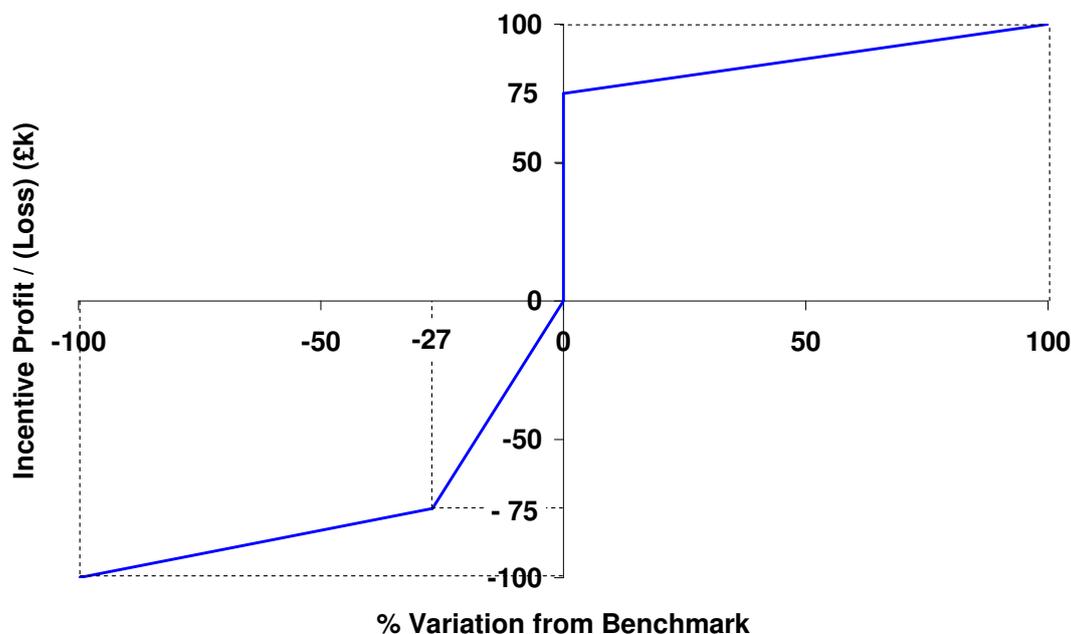
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<sup>27</sup> Note: There is a separate cost recovery mechanism to fund delivered improvements

<sup>28</sup> <http://www.nationalgrid.com/uk/Gas/Data/prevailingview/>

<sup>29</sup> These four data items appear as Predicted Closing Linepack (PCLP1), Demand Forecast NTS, System Entry Flows, National Forecast and System Entry Flows, National Physical on the National Grid website

Grid receives £75,000 if performance measures for timeliness and availability are met. There is a possibility of earning additional revenue for any over performance up to a maximum of £25,000 if a 100% improvement could be made. There is a maximum penalty of £100,000 should performance fall below the benchmark targets. The scheme is summarised in the following diagram.



**Figure 5.1: Data Publication Incentive**

149. In response to the incentive, National Grid currently has a “24/7” service level agreement in place to ensure delivery of the required performance standards. In addition, we pay an external party to monitor the website and have dedicated business resources available should issues occur. As the website is not classed as part of National Grid’s Critical National Infrastructure (CNI) systems, this high level of system support would not normally be expected to be in place.

## 5.2 Data Publication Incentive from April 2010

150. In the Initial Proposals consultation for the SO Incentives beginning 1 April 2010 National Grid proposed rolling over the Data Publication incentive from the previous year for a two year scheme to run up to what, at the time, was believed to be the end of the price control period (31 March 2012). Responses to this proposal were mixed with two respondents proposing removing the incentive completely, one respondent supporting the retention of the scheme and two parties suggesting that the incentive should be set as a downside only scheme.

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151. In Ofgem’s Final Proposals Consultation for National Grid Gas System Operator Incentives from 1 April 2010 Ofgem proposed to retain the Data Publication incentive, as described above, for a two year scheme.
152. National Grid’s outturn performance for 2010/11 was 99.66% availability against a target of 99.30% and 91.63% timeliness against a target of 90.50%.

### 5.3 Data Publication Incentive from April 2012 onwards

153. Also within the 2010/11 Final Proposals Consultation Ofgem stated that it considered it appropriate to ‘roll over’ (as far as possible) the incentive schemes that expire on 31 March 2012 to 31 March 2013. National Grid agrees that this is a pragmatic approach in order to develop options for incentivising National Grid’s SO role from 1 April 2013 to align with the incentives on National Grid as Transmission Owner (TO). Further, in the Open Letter on National Grid Gas System Operator Incentives from April 2012 Ofgem considered that it may be appropriate to roll over this incentive scheme in its current form for a further year.
154. National Grid considers that the structure of the current Data Publication incentive remains appropriate and therefore recommends a one year scheme to apply from 1 April 2012. However National Grid is interested to know whether there is an appetite for the incentivised arrangements to be widened to cover a larger subset of the total information published, e.g. real time flow data, after the day data etc.

Question 5.1	What value do users put on the data items that are published under this incentive? In particular we welcome views from small suppliers and large consumers.
Question 5.2	Are the current target levels of website availability and timeliness of data publication appropriate?
Question 5.3	Do you agree with our recommendation that the structure of this Incentive should not be reviewed for the rollover year in order to allow for a more detailed focus on SO Incentive schemes effective from 1 April 2013?
Question 5.4	What information, if any, do users consider should be incentivised beyond the existing defined dataset?

## Section 6

### Residual Balancing

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*This section summarises the existing Residual Balancing Incentive, set as a two year scheme in 2010 and provides some thoughts around this year's review. The 2010/11 scheme refined the parameters of the Residual Balancing Incentive following a fundamental review of the scheme ahead of 2009/10. Data is provided to enable a comparison of the operation of the current scheme to the scheme for previous years. No proposals for changing the structure of the incentive are made, however views on the need to further refine the scheme parameters are invited. Views on the recommendation to set a one year scheme in order to align the SO Incentive Schemes to RIIO-T1 are also invited.*

#### 6.1 Context and Background

155. Shippers have the primary role in ensuring there is sufficient gas supply to meet their customers' demand on any particular day, and the cashout mechanism provides commercial incentives to encourage shippers to resolve their own supply and demand positions by the end of each gas day.
156. In its role as residual balancer, National Grid has responsibility for managing any residual system end of day imbalance position and ensuring that NTS pressures are maintained within safe limits at all times within the day. In fulfilling this role, we primarily take energy balancing trades on the 'On the day Commodity Market' (OCM) Title market.
157. The way that National Grid undertakes its role as residual balancer is important as it affects the industry and consumers in a number of ways:
  - The prices of any trades directly impact on the System Clearing (cashout) prices faced by shippers, which indirectly affect the system average price (SAP) and to some extent gas forward prices.
  - The carrying over of physical imbalances to subsequent days could potentially lead to the costs associated with resolving those imbalances being misaligned from those parties that caused them.
158. The Residual Balancing Incentive is designed to incentivise National Grid to consider the implications of our actions on the market, particularly how and when we trade in the market. As a result of the incentive National Grid minimises its market impact through signalling a requirement for more or less gas on the network through trading a small volume, rather than undertaking larger trades to solve the requirement in full. The incentive design therefore encourages the delivery of the behaviours and outcomes desired by the shipping community.
159. If there were no residual balancing incentive, National Grid would tend towards taking actions that balance the system to the physical needs of the NTS. Historically, such a situation has led to a greater spread in the marginal prices on some gas days, which could in turn lead to greater volatility in market prices.

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## 6.2 Design of the Residual Balancing Incentive

160. The current incentive contains two elements, the Price Performance measure (PPM) and the Linepack Measure (LPM). The two elements are described in the following paragraphs.
161. As National Grid has no direct exposure to the costs of its balancing actions, the PPM is set to encourage National Grid to trade efficiently on behalf of the community, minimising the overall costs flowing through neutrality and paid by shippers, and minimising the residual balancer's impact on cashout prices.
162. On its own the PPM incentivises National Grid to avoid taking balancing actions whenever possible. Where actions are required, the incentive would encourage National Grid to seek opportunities to resolve imbalances within a tight price spread, or to delay actions until absolutely necessary even if they are not on the same day that the imbalance had arisen. This behaviour could cause poor cost targeting with those causing any imbalance not necessarily facing the appropriate incentives to balance and paying the associated costs. This issue is addressed in the Residual Balancing incentive through the LPM.
163. The LPM incentivises National Grid to minimise any changes between "opening" and "closing" NTS linepack over a gas day. This is intended to encourage any system imbalances to be resolved on the relevant day, ensuring that the costs of resolving any imbalances are more likely to be targeted to those responsible for the imbalance (referred herein as the polluter pays principle). As a result of the LPM, National Grid is incentivised to manage linepack changes in a tighter commercial band than the physical system limits that may exist on the day. Hence the LPM may cause National Grid to trade for 'polluter pays' reasons rather than purely against a physical balancing requirement.
164. Between the two parts of the incentive there is an inherent tension between trying to avoid taking balancing trades as a result of the PPM, whilst also being encouraged to trade as a result of the LPM to try and return linepack close to its opening level, thereby upholding the polluter pays principle. In the event that a trade is necessary, the incentive ensures that we trade within a small price range thereby minimising the spread in cashout prices.

## 6.3 Residual Balancing Incentive from April 2010

165. A thorough review of the Residual Balancing incentive in 2008/09 concluded that the incentive structure remained appropriate and that only refinements to the parameters of the incentive were required. The 2009/10 review maintained the existing incentive structure and further refined the parameters to become applicable for a two year scheme.
166. For the Residual Balancing Incentive effective from 1 April 2010 further refinements to the parameters of the incentive scheme were introduced as highlighted in Table 6.1:

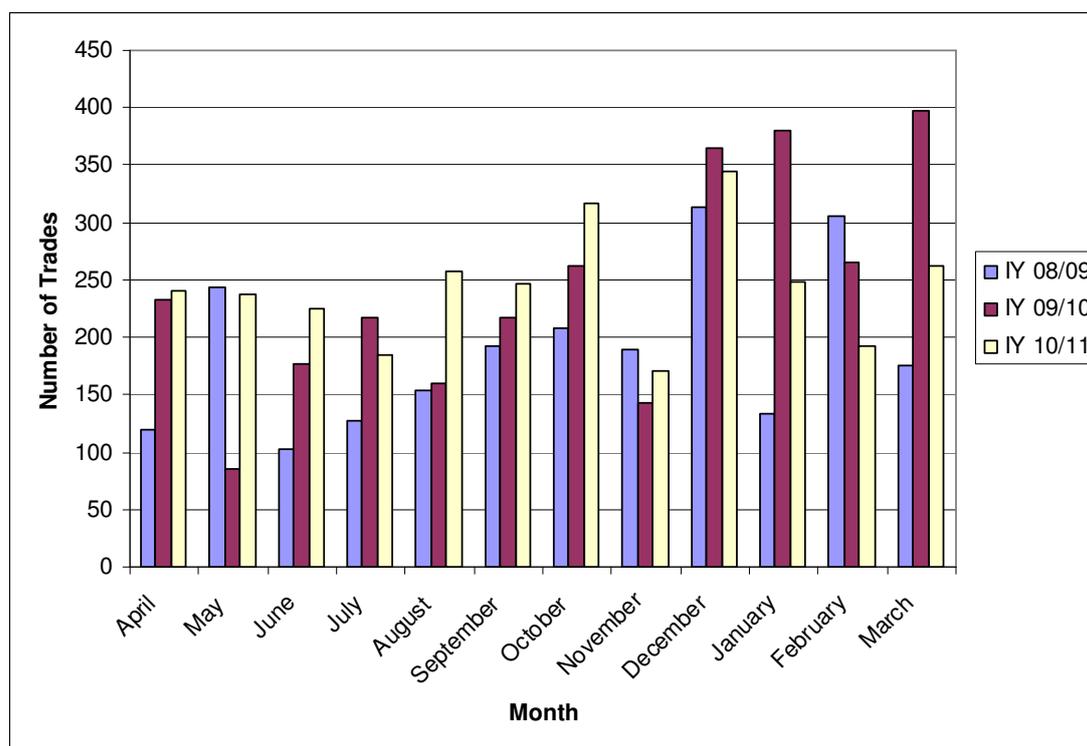
	1 April 2009	1 April 2010	1 April 2011
PPM Target	5%	2.5%	1.5%
LPM Target	2.8mcm	2.8mcm	2.8mcm

**Table 6.1: Summary of current Target Parameters against 2009/10 Scheme**

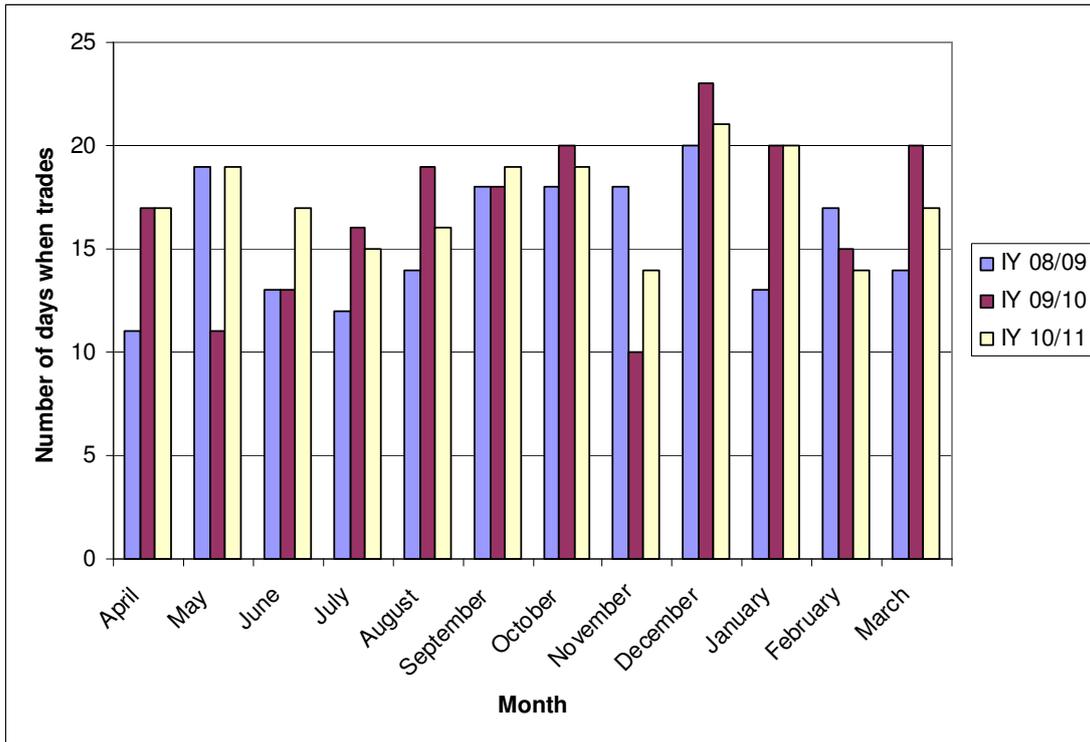
167. To aid the reader in forming views on the performance of the residual balancing incentive, we have included a number of charts which compare performance of the 2010/11 scheme to the past two years schemes. The charts included show the following:

- The number of trades undertaken;
- The number of days when trades undertaken;
- The distribution of the times when we trade;
- The number of days when trades undertaken in each hour;
- The aggregate volume of residual balancing trades;
- The volume of buy and sell residual balancing trades;
- The average linepack measure; and
- The average price measure per month.

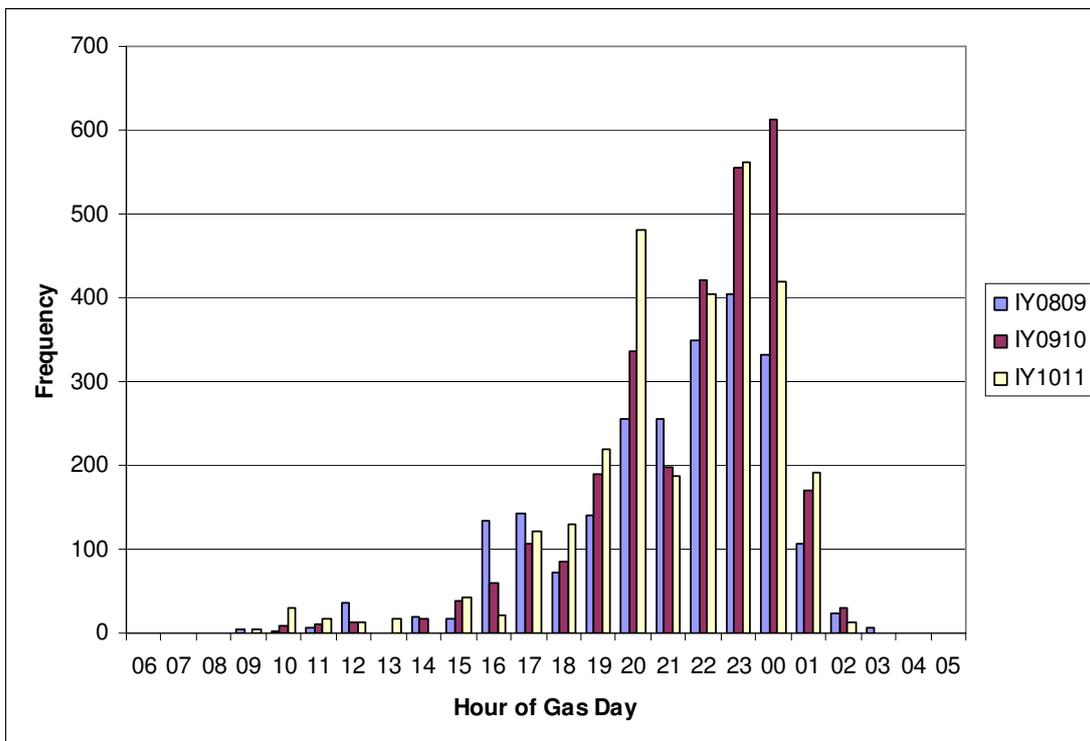
The information shown in these charts is also summarised in Table 6.2.



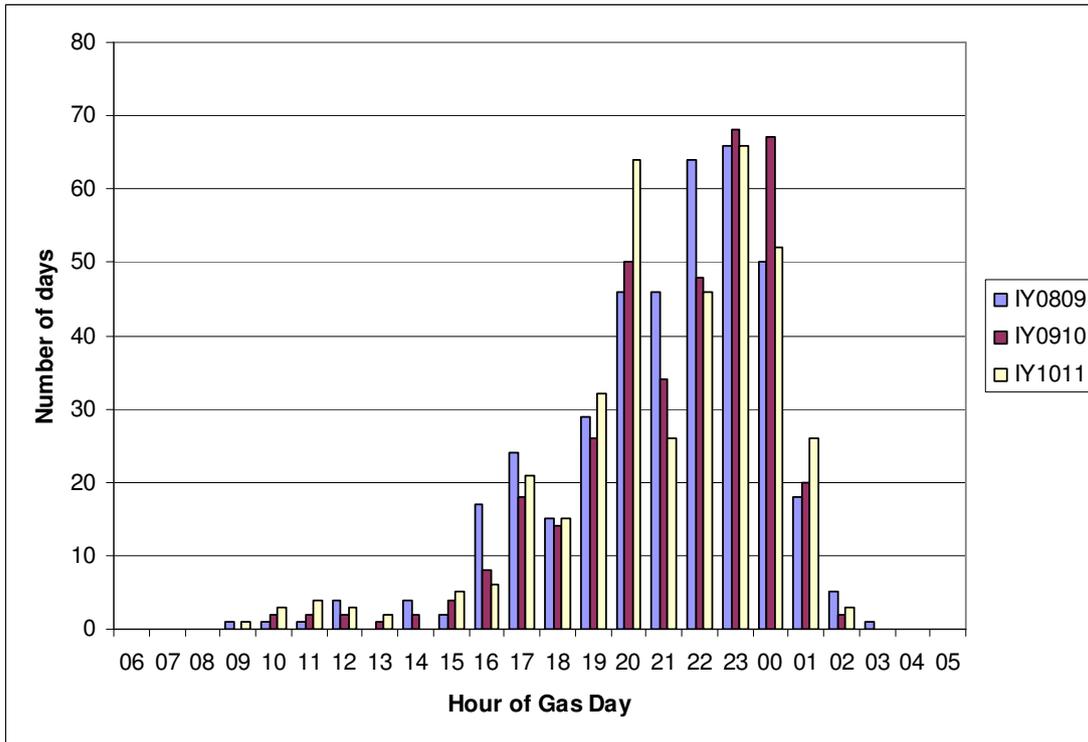
**Figure 6.1: The number of residual balancing trades undertaken**



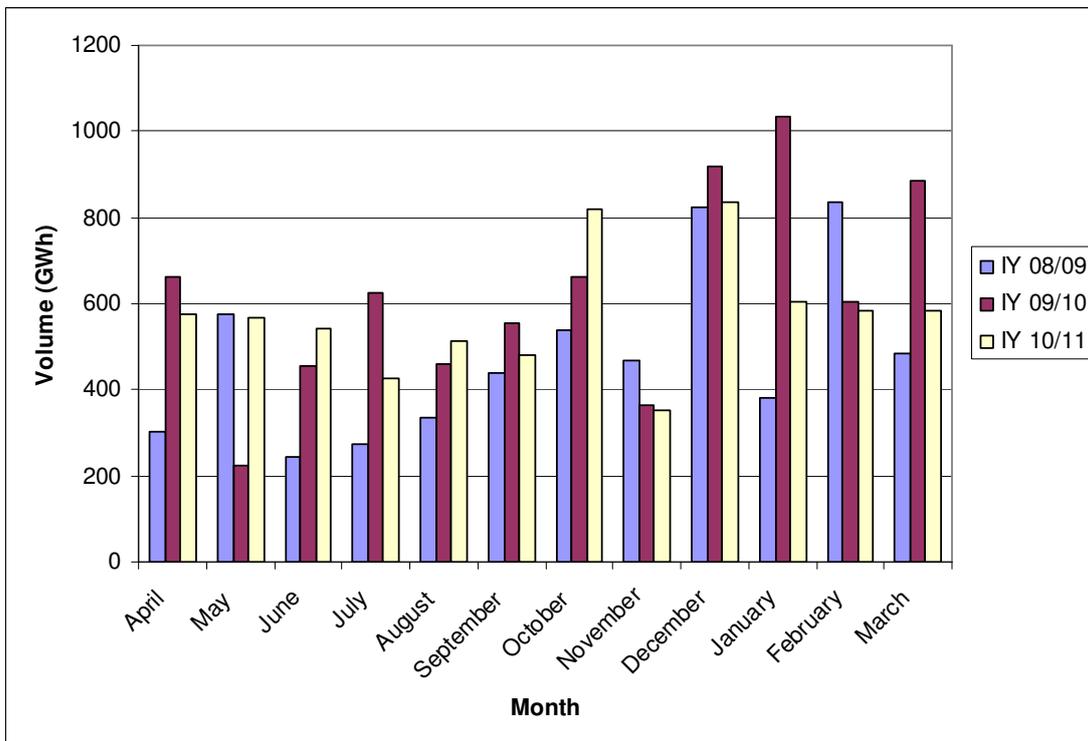
**Figure 6.2: The number of days when residual balancing trades undertaken**



**Figure 6.3: The distribution of the times of residual balancing trades**



**Figure 6.4: The number of days when residual balancing trades undertaken in the hour**



**Figure 6.5: The aggregate volume of residual balancing trades**

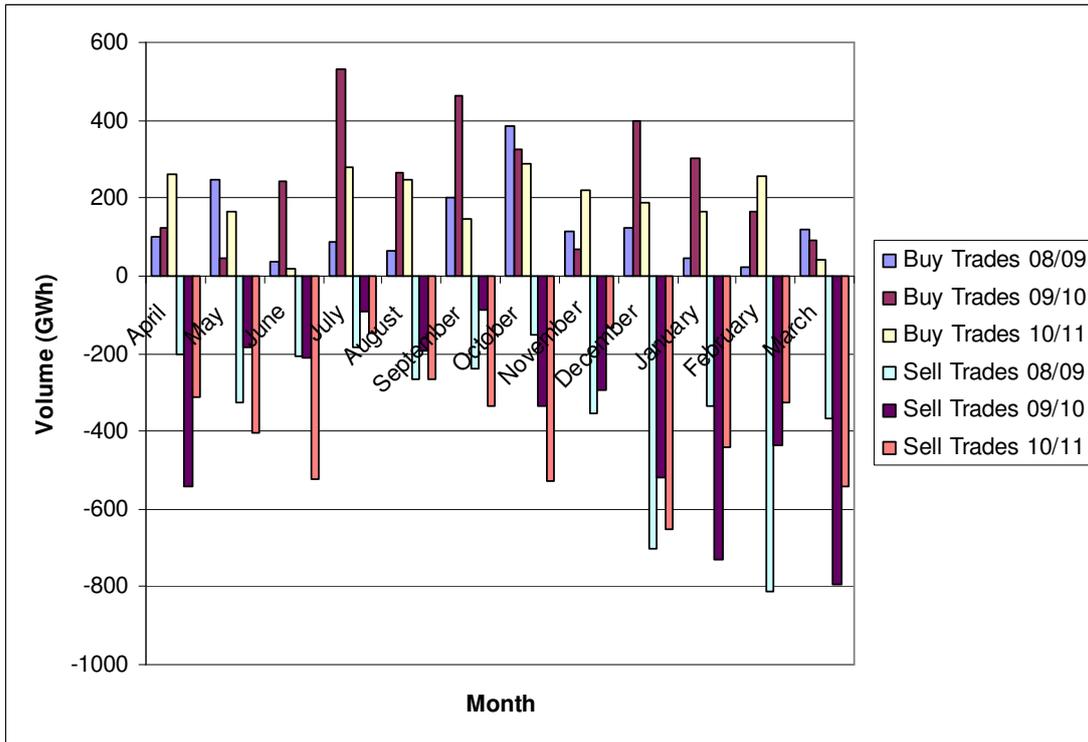


Figure 6.6: The volume of buy and sell residual balancing trades

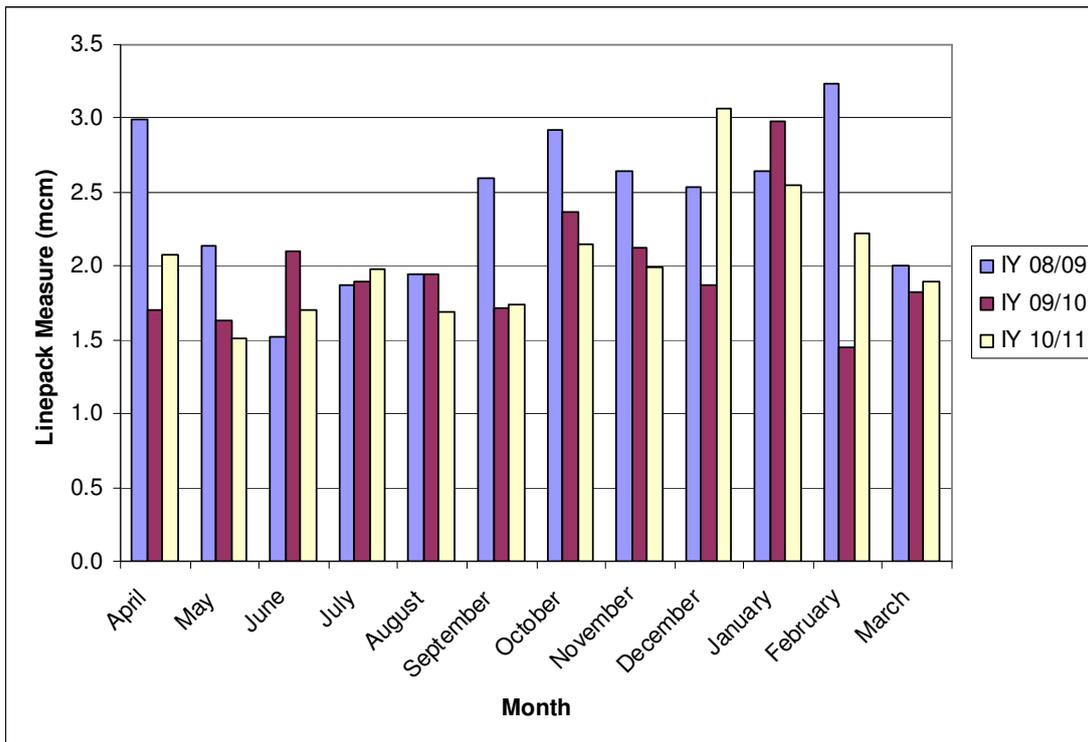
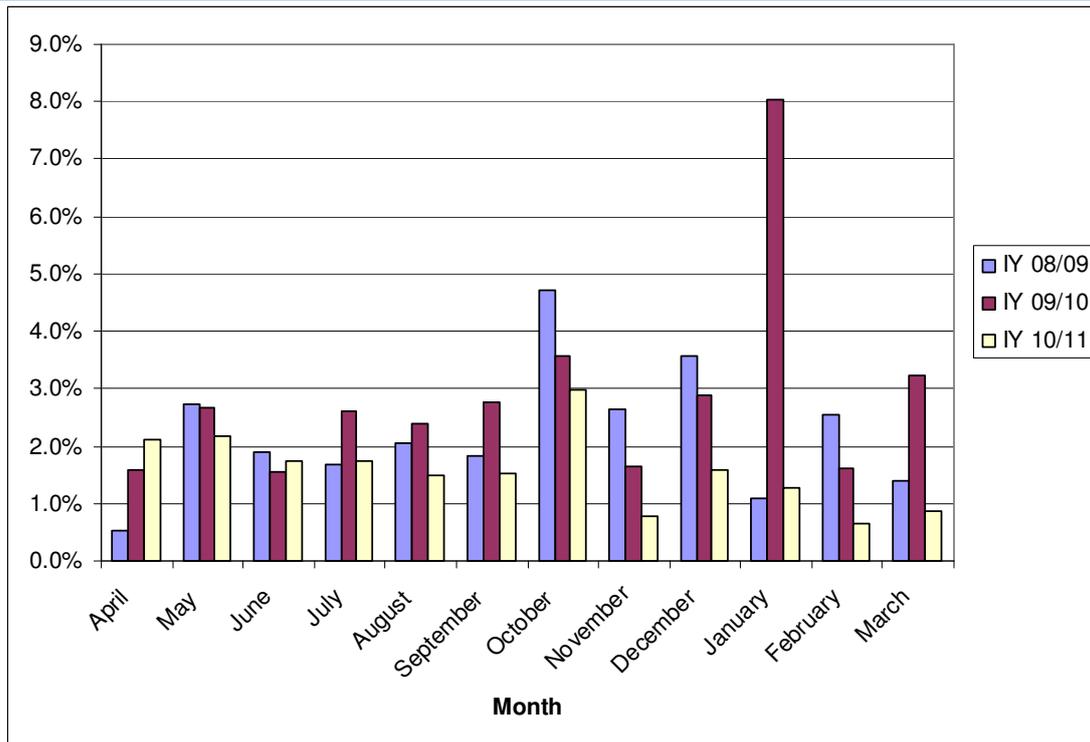


Figure 6.7: The average linepack measure



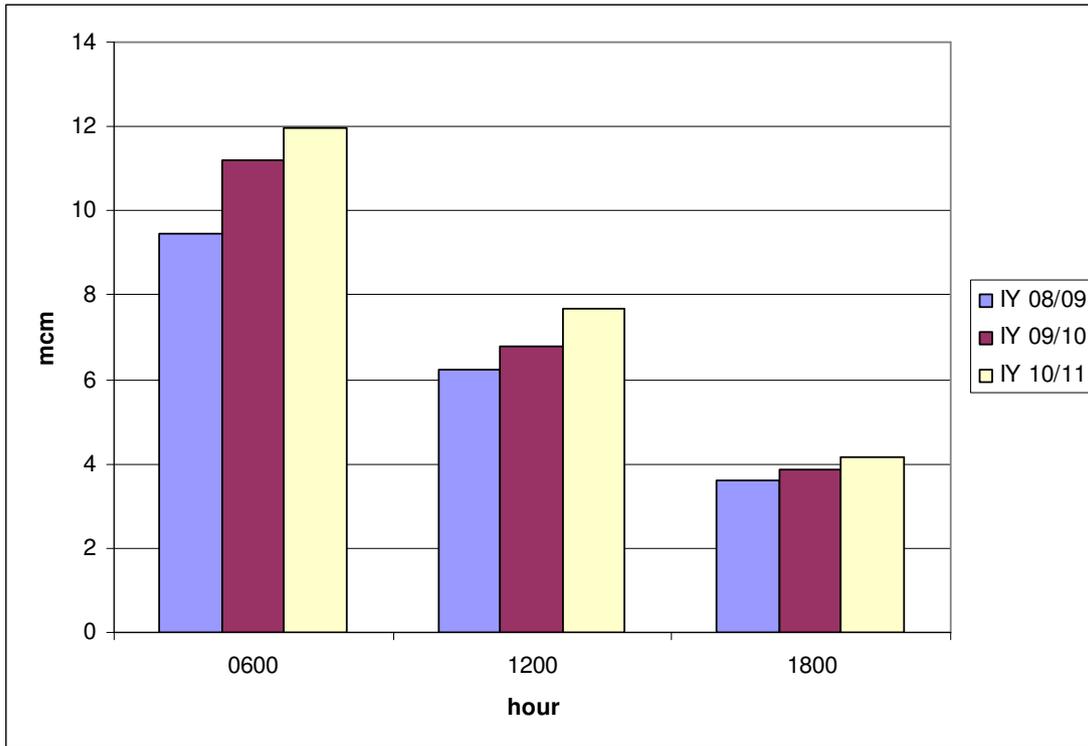
**Figure 6.8: The average price performance measure**

Incentive Year	2008-09	2009-10	2010-11
Number of residual balancing trades	2266	2903	2927
Number of days when residual balancing trades done	187	202	208
Aggregate volume of residual balancing trades	5692 GWh	7443 GWh	6879 GWh
Volume of buys	1543 GWh	3026 GWh	2277 GWh
Volume of sells	4149 GWh	4417 GWh	4602 GWh
Average linepack performance measure	2.41 mcm	1.97 mcm	2.05 mcm
Average price performance measure	2.22%	2.90%	1.58%

**Table 6.2: Summary of residual balancing trades and incentive performance**

168. National Grid's residual balancing in 2010/11 led to an average linepack performance measure of 2.05mcm, within the daily target of 2.8mcm. This is a similar level to 09/10, and below the 08/09 average of 2.41mcm.
169. The price performance measures of trading in 2010/11 averaged 1.6%, within the daily target of 2.5% (though outside the current 11/12 target of 1.5%). This is below both the 09/10 level (2.9%) and 08/09 (2.2%).

170. This current performance has been achieved against a background of increasing market imbalance, as summarised in the graph below. The graph shows the average over the year of the absolute value of the market imbalance, at the beginning of the gas day, and at 1200 and 1800. Here market imbalance is PCLP (Predicted Closing Linepack) minus OLP (Opening Linepack).



**Figure 6.9: Average of absolute value of market imbalance (PCLP-OLP).**

### Development of a Linepack Product

171. During the 2008/9 consultation process, National Grid outlined a potential commercial service whereby shippers could transfer energy imbalance between gas days which National Grid would manage through linepack potentially in lieu of the LPM. After responses from industry, this was set aside from National Grid's Initial Proposals to be pursued separately. In its Final Proposals, Ofgem asked National Grid to carry out further work regarding the development of such a service.
172. During the 2009/10 review of the residual balancing incentive, respondents to our initial proposals once again debated whether the LPM was the most appropriate solution with two respondents supporting the current scheme, three respondents supporting a softening of the LPM and one respondent considering it appropriate to remove the LPM altogether.
173. In response to customers who would have liked further changes to the LPM, and in light of the absence of a Linepack Product, Ofgem proposed within its Final Proposal Consultation for the SO Incentives from 1 April 2010 to

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implement a new licence condition, Special Licence Condition C27: Balancing Arrangements, requiring National Grid to use reasonable endeavours to develop (and implement if appropriate) a gas linepack product.

174. During 2010/11 National Grid developed an inter-day Linepack Product in consultation with the industry and raised UNC Modification Proposal 0337<sup>30</sup>. However, in response to our open letter of 11 January 2011 which sought to gauge demand for such a linepack product there was little expression of interest from shippers.
175. In April 2011, given the apparent lack of demand from shippers for a Linepack product, Ofgem considered that any further development of this particular product was not appropriate and the associated UNC Modification Proposal should be allowed to lapse.
176. Within the Final Proposals Consultation Ofgem considered that the refinement to the PPM target from 2.5% in 2010/11 to 1.5% in 2011/12 would provide a further incentive for National Grid to improve its performance and to progress work on the development of a gas linepack product. Accordingly, following the non-implementation of a Linepack product, National Grid recommends a review of the PPM target parameter for 2012/13.

#### Update to the default cashout values

177. Daily cashout values are set either by the price of National Grid's trades or a fixed differential price. Currently the default cashout price is derived by taking the System Average Price (SAP) and adding or subtracting the relevant fixed differential price which are derived from the Hornsea storage facility injection/withdrawal costs in 2000.
178. As part of the 2010 Final Proposals Consultation, Ofgem proposed that, in addition to the development of a Linepack Product, Special Licence Condition C27 also include the requirement for National Grid to use reasonable endeavours to update the fixed differential prices as the use of the same prices, in light of changing storage costs, may no longer be appropriate.
179. During 2010/11 National Grid developed an update to the fixed differential prices in consultation with the industry and raised UNC Modification Proposal 0333<sup>31</sup>. Modification Proposal 0333 proposed to implement an annual update to the default cashout prices from 1 October each year with the price derived from up to date operational costs of the NTS pipeline system. An alternate Modification Proposal 0333A which was identical to Modification Proposal 0333 in all but the funding arrangement was approved by Ofgem on 13 April 2011.

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<sup>30</sup> Modification Proposal 0337 – Introduction of an Inter-day Linepack Product is available at the Joint Office website via the following link: <http://www.gasgovernance.co.uk/0337>

<sup>31</sup> Modification Proposal 0333/A – Update of the default System Marginal Buy Price and default System Marginal Sell Price is available at the Joint Office website via the following link: <http://www.gasgovernance.co.uk/0333>

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180. Modification Proposal 0333A states that the first update to the default cashout prices will be effective from 1 October 2011 with the inaugural update reducing the fixed differentials by between 8 – 18%. National Grid is unable to quantify how this reduction in the fixed differentials will influence shipper balancing behaviour but expects that a change of this magnitude may lead to a decline in shipper balancing behaviour. Therefore due to the unknown impact of the implementation of Modification Proposal 0333A, National Grid does not recommend amending the structure of the current Residual Balancing Incentive but does recommend a review of the PPM target parameter.

#### **6.4 Residual Balancing incentive from 1 April 2012 onwards**

181. In Ofgem's Final Proposals Consultation in respect of National Grid's SO incentive schemes to apply from 1 April 2011, Ofgem stated that it considered it appropriate to 'roll over' (as far as possible) the incentive schemes that expire on 31 March 2012 to 31 March 2013. National Grid agrees that this is a pragmatic approach in order to develop options for incentivising National Grid's SO role from 1 April 2013 to align with the incentives on National Grid as Transmission Owner (TO) as part of RIIO – T1. As such, National Grid supports an extension of one year to the Residual Balancing scheme to apply from 1 April 2012.

182. In the Open Letter on National Grid Gas System Operator Incentives from April 2012, Ofgem consider that the current combined incentive has retained and strengthened the incentive on National Grid not to enter the market. National Grid also considers that the existing structure of the Residual Balancing incentive remains fit for purpose, in so far that it is closely aligned to with both shipper and system requirements, and is therefore not recommending a review of the incentive structure.

183. Ofgem's Open Letter also provided an initial view that the PPM target should be further refined as part of this year's incentive development process. National Grid supports a review of the PPM target parameter and considers that there are a number of factors, as discussed previously within this document, that require further analysis as part of this year's incentive development. We propose to analyse the following elements;

- The trend, if any, of within day price spreads within wholesale gas prices;
- The trend, if any, of shipper balancing behaviour, particularly at different stages of the gas day;
- The likely impact, if any, to shipper balancing behaviour as a result of the implementation of UNC Modification 0333A;
- The improvements, if any, to the Residual Balancer role that may have been possible from a Linepack product as described in UNC Modification Proposal 0337; and
- Any further improvements, if any, that are possible for the Residual Balancer role.

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Question 6.1	Do you support the view that the structure of the current Residual Balancing Incentive remains fit for purpose in incentivising National Grid to not enter the market where possible and minimise our impact on the market when we do enter? If you do not agree with this view, do you have any views as to how the structure could be improved to apply from 1 April 2012?
Question 6.2	Do you support the view that the target parameters of the PPM should be reviewed?
Question 6.3	Do you agree with the analysis we propose to undertake in order to review the PPM target as described in paragraph 183 above? If you do not agree with this proposed approach are you able to state which amendments or additions you consider are appropriate to this analysis?
Question 6.4	Do you believe that the LPM target parameter should also be reviewed?
Question 6.5	If possible could you provide your views on suitable levels for the residual balancing scheme parameters?

## Section 7

# Information on Incentive Performance

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*This section contains a summary of the information that is available in respect of the current SO Incentives Schemes and National Grid's performance under these arrangements.*

### 7.1 Supporting Information

184. The Supporting Information Document is produced annually and contains:
- further information on the existing incentive schemes;
  - historic annual performance under these schemes; and
  - impacts of incentive payments on charges.
185. The information provided in respect of each scheme includes the nature of the behaviour being incentivised along with the principle features and financial parameters of each scheme. The supporting information document is available on the National Grid website at:  
<http://www.nationalgrid.com/uk/Gas/soincentives/SupportingInfo/>

### 7.2 Quarterly Gas Incentive Report

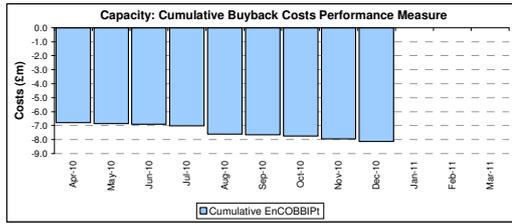
186. The purpose of the Quarterly Gas Incentive Report is to provide information in respect of the actions and performance measures which National Grid is incentivised against during the relevant quarter in operating the gas transmission system. The Quarterly Gas Incentive Report is available on the National Grid website at:  
<http://www.nationalgrid.com/uk/Gas/soincentives/QuarterlyReports/>
187. The report contains (amongst other data) volume and cost information associated with balancing actions and Shrinkage trading and is based on the latest data and information available at the time of publication. As future quarterly summaries are produced, information in the graphs and tables are updated to reflect the latest information available at that time. Changes to preliminary data that occur after the publication of the relevant quarter's report are thus visible in the graphs and tables of future reports. Each quarterly report will report volume data on a monthly rolling basis.
188. The report presents a summary of performance on the first sheet, and then covers each of the following incentives in more detail:
- Capacity;
  - Demand Forecasting;
  - Data Publication;
  - Operating Margins;
  - Residual Balancing;
  - Shrinkage;
  - Greenhouse Gas Emissions from Compressors Incentive (previously the NTS Environmental Incentive); and
  - Unaccounted for Gas.

An example of the 'summary of performance' format is displayed on the following page.

Quarterly Incentive Report

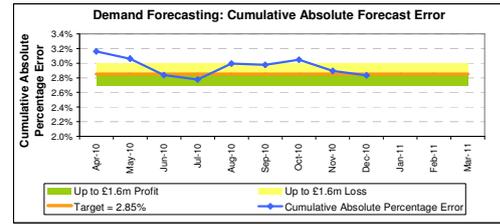
2010-2011 Q3 Performance Data

Capacity



The chart shows the monthly cumulative buy-back cost performance measure. The annual target cost for this incentive is £15.96m. The scheme has upside and downside sharing factors of 50% with a profit cap of £15.96m and a loss collar of £11.82m (all values in 2010/11 prices). The current position is a cumulative revenue of £8.1m.

Demand Forecasting



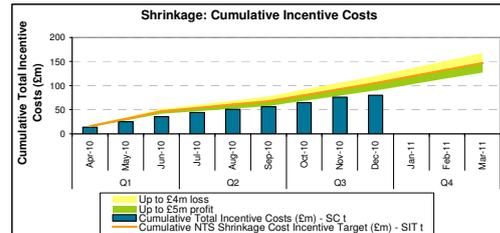
The chart compares the monthly cumulative absolute forecast error (the blue line) to the incentive target (the orange line), where the target is a cumulative absolute error of 2.85% for the full year. The current position is a cumulative absolute forecast error of 2.84%.

Operating Margins



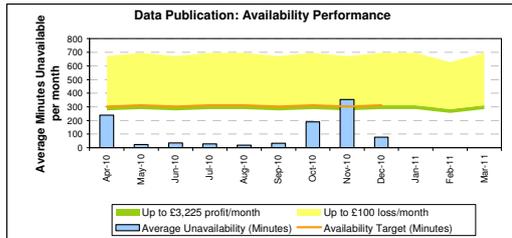
The chart shows the cumulative costs of Operating Margins availability and utilisation. Costs of holding and utilising Operating Margins are subject to pass-through for the year 2010/11.

Shrinkage

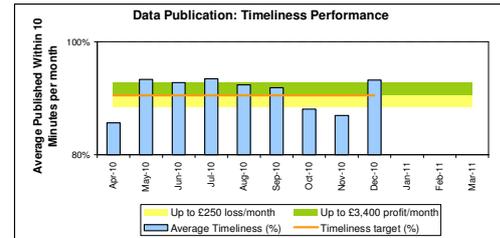


The chart compares cumulative total shrinkage costs (the blue bars) to an indicative cumulative target (the orange line). The current position is a cost of £80.05m.

Data Publication

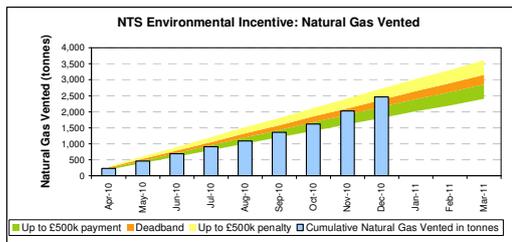


The chart compares the average number of minutes for which the incentivised web pages were unavailable in the month (the blue columns) to the incentive target (the orange line), where the target represents 99.3% availability. The chart shows that performance in October and December was above target, but performance in November was below the Target.



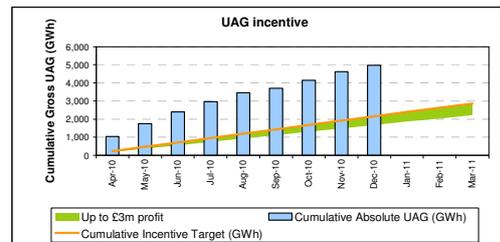
The chart compares the average timeliness of the incentivised reports for the month (the blue columns) to the incentive target (the orange line), where the target represents 90.5% published within 10 minutes. Performance was above target for December, but below target for October and November.

NTS Environmental Incentive



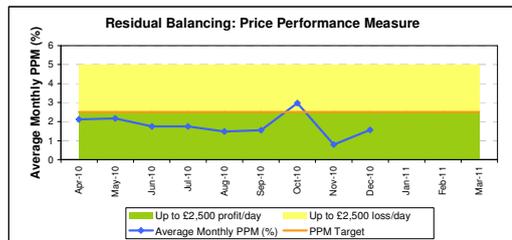
The chart compares the cumulative mass of natural gas ventied (the blue columns) to a cumulative target (the orange line). The current position is a ventied mass of 2,465 tonnes.

Unaccounted for Gas

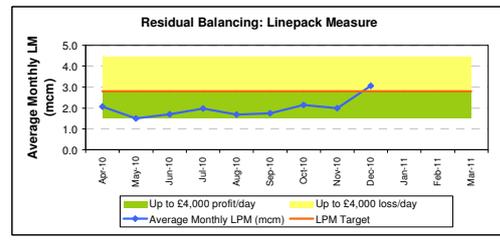


The chart compares cumulative absolute UAG (the blue columns) to a cumulative target (the orange line). The current position is cumulative absolute UAG of 4,960 GWh.

Residual Balancing



The chart compares the average Price Performance Measure in the month (the blue line) to the incentive target (the orange line), where the target is a PPM of 2.5%. The chart shows that average monthly performance was worse than the target in October but better than the target in November and December.



The chart compares the average Linepack Measure in the month (the blue line) to the daily incentive target (the orange line), where the target is an LM of 2.8mcm. The chart shows that average monthly performance was better than the target in October and November, but worse than the target in December.

Figure 7.1: Example of the 'summary of performance' page within the Q3 2010/11 quarterly report

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Question 7.1	Is the information provided as summarised above useful?
Question 7.2	Is there any further data that could be issued by National Grid to improve the level of information available in respect of SO Incentives?

## Section 8

### Summary of Questions

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*This section provides a summary of the questions contained within this document. Responses to these questions are requested by 4<sup>th</sup> August 2011. If you would like to discuss the issues raised in this document or other SO Incentive issues please contact us using the contact details in Section 10 of this document.*

Question 2.1	Are there any additional items which require consideration for the roll over of the Shrinkage incentive?
Question 2.2	What is the appropriate level of change and what are your priorities for the rollover of current arrangements in respect of the Shrinkage Incentive for a single year scheme for 2012/13?
Question 2.3	Do you consider a review/update of the current CFU model appropriate for a rollover year, or do you believe that a more fundamental review is required? If so what approaches and/or techniques should be explored?
Question 2.4	Do you consider TBE base case at seasonal normal demand remains an appropriate supply-demand scenario assumption for CFU target setting?
Question 2.5	Do you believe it is necessary to review the CFU adjuster? If so, should this be an update of the current values or a revision of the methodology itself?
Question 2.6	Are the latest programmed dates for the installation of electric drive compressors an appropriate basis for the disaggregation of the baseline CFU target into gas and electric target volumes? If not, what do you believe would be the appropriate basis?
Question 2.7	In respect of the Shrinkage procurement incentive, do you believe that it remains appropriate for the UAG component of the gas volume target to continue to be based upon net outturn volumes?
Question 2.8	Do you believe it is appropriate to maintain the mechanism that enables exclusions (for specific CV risks that cannot be mitigated economically) to be identified within the current incentive structure? If not, how should these risks be accommodated within the incentive structure?
Question 2.9	Do you believe that swing is an incremental cost for which there should be an allowance in addition to the benchmark price?
Question 2.10	Is the current ex-ante market benchmark approach appropriate for the purposes of a one year rollover? If not, what alternative arrangements do you believe are appropriate?
Question 2.11	Do you believe it is appropriate to review the ECRP reference price uplift?
Question 2.12	Do you believe it remains appropriate for the ECRP reference period within the rollover arrangements retain a

	bias to prompt price?
Question 2.13	What do you consider is an appropriate incentive treatment of the TNUoS, DUoS and CRCEES costs?
Question 2.14	Do you think it is appropriate to have a bespoke environmental dimension to the NTS Shrinkage incentive? If yes, do you believe it is appropriate to review the adjustment for the shadow price of carbon within the 2012-13 scheme to ensure the appropriate level of interaction with environmental legislation?
Question 3.1	Do you believe that National Grid has a central role in the minimisation of UAG volumes? If not, who do you believe should take this role?
Question 3.2	If you consider that National Grid has a central role to play, do you believe that National Grid should be incentivised to perform this role or should it be subject to a funded obligation?
Question 3.3	If an incentive were in place for UAG in 2012/13, what would an appropriate incentive structure be? For example, the current incentive scheme is based upon the absolute volume of UAG in a year.
Question 4.1	Do you support the view that the structure of the current D-1 13:00 Demand Forecasting Incentive remains fit for purpose for incentivising National Grid to provide valued information to customers? If you do not agree with this view, do you have any views as to how the structure could be improved to apply from 1 April 2012?
Question 4.2	Do you have any views or evidence regarding the volatility of demand in 2012/13? In addition, do you have any views on how this demand volatility will impact the Demand Forecast incentive?
Question 4.3	If National Grid was able to improve its demand forecasts, how would this impact on your business?
Question 4.4	Do you agree with the analysis we propose to undertake in order to review the annual error target as described in paragraph 140 above? If you do not agree with this proposed approach are you able to state which amendments or additions you consider are appropriate to this analysis?
Question 4.5	What value (or relative value) do you place on each of the demand forecasts?
Question 4.6	Which of the forecast times do you believe should be incentivised?
Question 5.1	What value do users put on the data items that are published under this incentive? In particular we welcome views from small suppliers and large consumers.
Question 5.2	Are the current target levels of website availability and timeliness of data publication appropriate?
Question 5.3	Do you agree with our recommendation that the structure of this Incentive should not be reviewed for the rollover year in

	order to allow for a more detailed focus on SO Incentive schemes effective from 1 April 2013?
Question 5.4	What information, if any, do users consider should be incentivised beyond the existing defined dataset?
Question 6.1	Do you support the view that the structure of the current Residual Balancing Incentive remains fit for purpose in incentivising National Grid to not enter the market where possible and minimise our impact on the market when we do enter? If you do not agree with this view, do you have any views as to how the structure could be improved to apply from 1 April 2012?
Question 6.2	Do you support the view that the target parameters of the PPM should be reviewed?
Question 6.3	Do you agree with the analysis we propose to undertake in order to review the PPM target as described in paragraph 183 above? If you do not agree with this proposed approach are you able to state which amendments or additions you consider are appropriate to this analysis?
Question 6.4	Do you believe that the LPM target parameter should also be reviewed?
Question 6.5	If possible could you provide your views on suitable levels for the residual balancing scheme parameters?
Question 7.1	Is the information provided as summarised above useful?
Question 7.2	Is there any further data that could be issued by National Grid to improve the level of information available in respect of SO Incentives?

## Section 9

### Glossary

Cap	The upper most limit of financial benefit available to National Grid from an incentive scheme per annum
CFU	Compressor Fuel Use
CNI	Critical National Infrastructure
Collar	The upper most limit of financial cost National Grid can incur from an incentive scheme per annum
CRCEES	Carbon Reduction Commitment Energy Efficiency Scheme
CV	Calorific Value
DN	Distribution Network
DSWG	Demand Side Working Group
DUoS	Distribution Use of System
ECRP	Electricity Cost Reference Price
FWACV	Flow Weighted Average Calorific Value – The calculation of an average NTS Calorific Value based on the volume weighting of flows into the NTS
GCRP	Gas Cost Reference Price
GWh	Gigawatt Hour (equal to 1,000,000 kWh)
IUK	The sub sea gas pipeline between Bacton (UK) and Zeebrugge (Belgium) operated by Interconnector (UK) Limited
kWh	Kilowatt Hour
LNG	Liquefied Natural Gas
mcm	Million Cubic Meters
NBP	National Balancing Point
NTS	National Transmission System
NTS Linepack	The volume of gas within the NTS
OCM	On the day Commodity Market (wholesale gas trading platform)
RIIO-T1	RIIO-T1 is the first transmission price control review under a new regulatory framework following Ofgem's RPI-X@20 review. RIIO-T1 was formerly known as TPCR5. The RIIO model is based on Revenue = Incentives + Innovation + Outputs
SAP	System Average Price
Sharing Factor	The percentage share of a financial benefit or cost arising from an incentive scheme incurred by National Grid
SMER	Significant Measurement Error Report
TBE	Transporting Britain's Energy
TNUoS	Transmission Network Use of System
UAG	Unaccounted for Gas
UNC	Uniform Network Code

## Section 10 Contact Details

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If you would like to discuss any issue on SO Incentives, please contact us via the contact details below.

To register your interest in receiving future communications on this consultation process please email: [SOIncentives@uk.ngrid.com](mailto:SOIncentives@uk.ngrid.com)

### **On the web:**

The dedicated web pages for this incentive review process are available at the following address:

<http://www.nationalgrid.com/uk/Gas/SOIncentives/>

### **Contact us:**

Juliana Urdal      Tel: 01926 656195      [juliana.urdal@uk.ngrid.com](mailto:juliana.urdal@uk.ngrid.com)

General enquiries:      [SOincentives@uk.ngrid.com](mailto:SOincentives@uk.ngrid.com)