GL Noble Denton

AUGE Response to AUGS Queries – Annexe to 2nd draft AUGS

Queries From	Various
Date Received	1st Consultation Period
Date of Response	04/07/2011

A number of the queries relating to the AUGS first draft were raised by more than one respondent. These common issues are detailed first followed by individual responses.

Issue 1:
Why does the AUGE believe that RbD is not largely composed of Unidentified Gas? Can they back up their assertion that RbD contains a significant component of model error?

Response:
This assertion comes from an analysis of worked examples of the Mod 228/228A methodology. Note that the data presented in the AUGS was based on information from the TPA Solutions assessment of these Mods, due to the fact that full data had not yet been supplied to the AUGE at the time it was written. Data has now been received and therefore all analysis now presented is the AUGE's own.

The allocation algorithms that produce the deemed load for both SSP and NDM LSP markets are statistical models. As such they are subject to error, because every naturally-occurring process contains random variation (known statistically as "common cause variation"), which is due to unknown causes and natural fluctuations in the process. Gas demand is such a process, and the AUGE has several decades of experience working with demand forecasting issues. This experience leads to the knowledge that such common-cause variation exists, and also to a general appreciation of its likely magnitude.

The presence of this common cause variation in the deeming algorithm process means that even if the input data used (e.g. AQ) is perfect, the output will not equal actual demand – there will always be an error component. RbD introduces "actual" LSP loads, which means that at this point model error is eliminated from the sector load estimates. RbD is the quantity that redresses the difference between deemed and metered LSP load, and hence in addition to containing Unidentified Gas, it must by definition also contain the model error. Hence the question is not whether RbD contains a model error component or not, because we know that it does. The question is how much of RbD corresponds to model error and how much is left representing Unidentified Gas.

Mods 288 and 228A do not recognise that this model error component exists in RbD.

The AUGE believes that the assumption that RbD is largely composed of Unidentified Gas is invalid due to the statistical behaviour of the data when such an assumption is made. The reasons are mostly connected with the calculation of theft as the "balancing factor" and the fact that no allowance is made for model error. Mods 228/228A make a small allowance for "genuine reconciliation" based on AQ drift, but this once again carries an inherent assumption that if the

correct AQs are supplied to the deeming algorithms, the output will be perfect, which is not the case. The remainder of RbD is split between a number of causes, with most calculated directly and theft calculated by subtraction at the end. The figures for theft that this process produces (taken from worked examples) are considered unrealistic for a number of reasons:

- The calculated value of theft across four years (06/07 to 09/10) hits a peak of 1.4% of throughput. This is five times higher than the theft estimate contained in Section N of the UNC, and is 350 times higher than the level of shipper-responsible detected theft calculated by Xoserve. Whilst it is recognised that actual theft levels are higher than those implied by detected thefts only, this still suggests that the values of theft calculated using this methodology are too high and hence are likely to contain another factor, whose values may be higher than the actual theft figures.

- It is reasonable to assume that theft varies with throughput, and that these two variables are positively correlated. The theft figures in the worked examples have a very high level of variation, however, in one case rising by 67% from one year to the next, and in another dropping by 60% from one year to the next whilst throughput remains relatively constant. In addition, the variation present appears to be random. This suggests that the additional factor identified above is model error, for two reasons:
  - model error must make up part of the catch-all balancing factor, because it is known to exist and it is not accounted for elsewhere in the calculation
  - model error, by definition, varies randomly, and this is how the balancing factor is behaving

  The size of the variation suggests that the randomly varying model error element is larger than the theft element.

- In the worked examples, the "balancing factor" accounts for an average of 56% of the RbD quantity. Hence if a large proportion of this is actually model error, it follows that a significant proportion of RbD in total is also accounted for by model error.

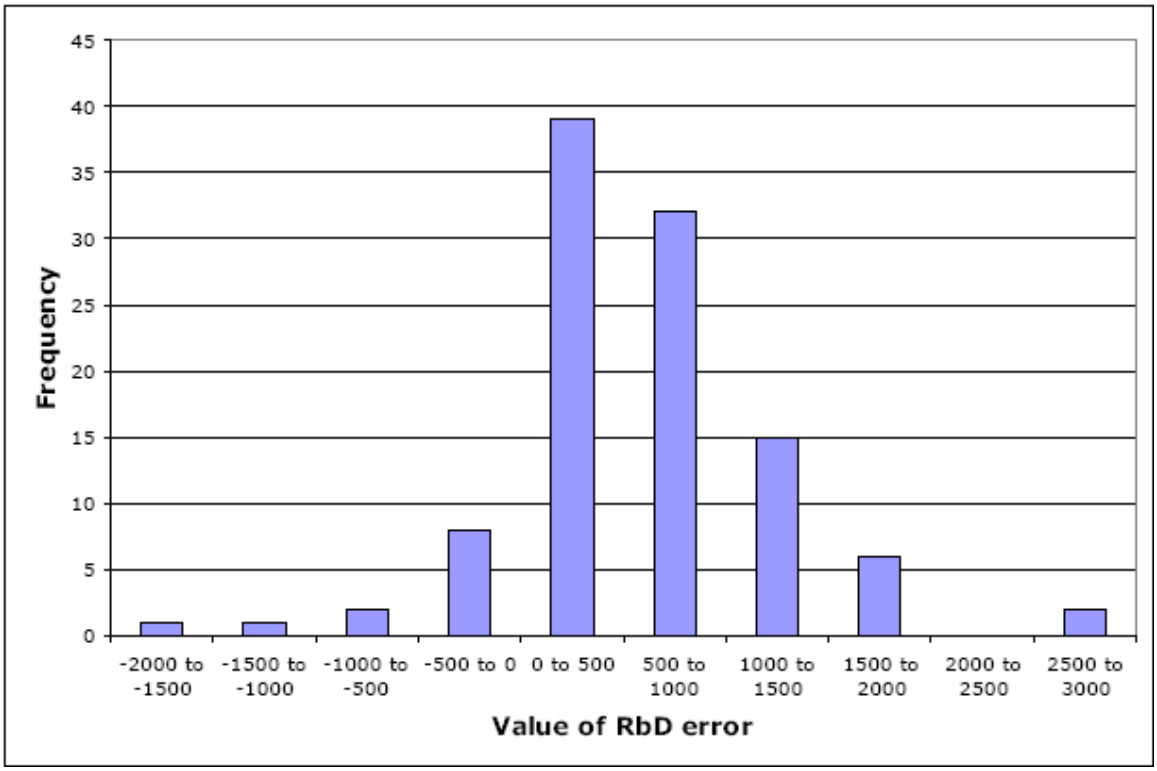
If certain assumptions are made about the likely level of true theft, an estimate of the proportion of RbD that is actually composed of model error can be made. If true shipper-responsible theft lies at the UNC level of 0.28% of throughput (i.e. 0.3% minus the 0.02% that is assumed to be transporter-responsible theft), it can be calculated that, on average, 43% of RbD is composed of model error. The maximum for any individual year is 58%.

It should be noted that RbD values are positive on approximately 80% of occasions. If up to half of it is randomly-varying model error, this result indicates that the error in question is positive more often than it is negative, i.e. it is skewed towards the LSP market. Given that common cause variation is randomly distributed around zero, this actually indicates the presence of two separate factors: model bias and model error. The two combine to create a random distribution around a positive mean. This is examined in more detail in Issue 2 below.

Finally, given that RbD is positive on 80% of occasions, it is by definition negative on 20% of occasions. When this occurs, the Mod 228/228A methodology splits what is now a negative RbD value into Unidentified Gas sources, leading to negative figures for theft, shipperless consumption and unregistered CSEP consumption. The physical lower bound for these is zero, however, and so the production of such negative values indicates once more that a factor has been left out of the calculation. This factor is the randomly-varying model error that evidence suggests makes up a significant part of the balancing factor.

Issue 2:
In order for model error to contribute a non-zero value to RbD over time, it cannot vary around zero but must contain an element of bias towards the LSP sector, thus causing allocations to be skewed towards this sector. Can the AUGE back up their assertion that this is the case?

Response:
As previously mentioned in the response to Issue 1 above, the evidence suggests that there are two elements of model error: bias (i.e. the amount by which, on average, allocations are skewed towards the LSP sector), and common cause variation (i.e. random scatter around a mean of zero). These two elements, along with Unidentified Gas, cause RbD values to vary randomly around a positive mean. This phenomenon is shown on the graph below, which contains RbD values from 1998 to 2006 and is taken from the CEPA document commissioned by Centrica and published in support of Mod 228.

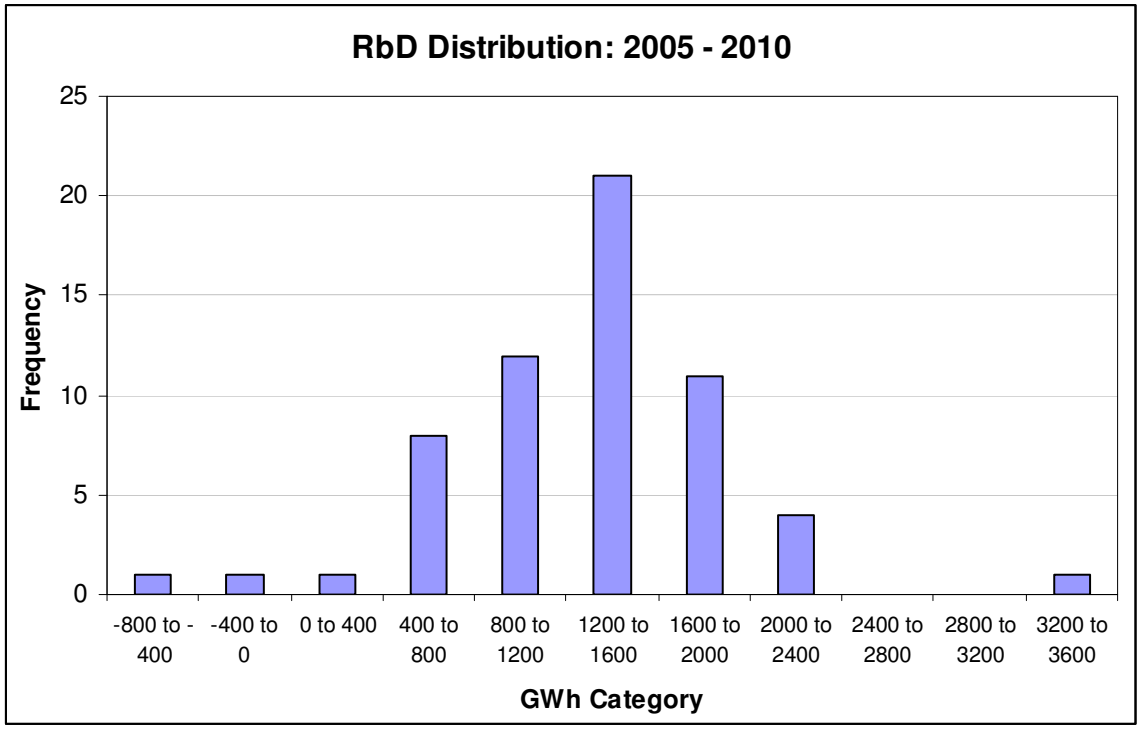


This shows that RbD values follow a very well-defined Normal distribution around a mean of 677GWh.

In it worth noting that this stage that CEPA drew an erroneous conclusion from this graph in their assessment of Mod 228, stating that the fact that RbD follows a well-defined distribution (ie the Normal distribution) indicates that it cannot contain model error. In fact the opposite is true: statistical theory states that any such model will be subject to error, and that those errors will follow a Normal distribution. It is actually rare to find an example from the field where the results are so clearly Normally distributed, and the pattern shown in the graph is precisely what would be expected if RbD contained a strong element of randomly-distributed model error.

This incorrect assertion by CEPA formed the basis for Centrica discounting model error as a factor contributing to RbD in Mod 228. The effects of this are discussed shortly.

As noted above, the distribution of RbD does not vary around zero, but around a positive mean of 677GWh. The AUGE's own analysis of data from 2005 to 2010 shows a very similar pattern:



In this case the data varies randomly around a mean of 860GWh.

The mean value of these distributions (ie the offset from zero) represents the bias in the RbD value, whilst the level of scatter around it represents the model error (common-cause variation). The bias may be due to two factors:

- Unidentified Gas
- Deeming algorithm bias

It is accepted that Unidentified Gas exists, and it is the job of the AUGE to quantify it. Deeming algorithm bias will only exist if information used by the algorithms can be shown to be skewed in favour of the LSP market. In Mod 228, Centrica make the assumption that algorithm bias is zero, and hence the full offset value consists of Unidentified Gas. The AUGE believes that algorithm bias is non-zero, that Unidentified Gas levels presented in Mod 228 are therefore too high, and that this is reflected in the large magnitude and unexpected random variation in the estimates of Theft as calculated using this methodology.

Evidence that the deeming algorithm is biased towards the LSP sector comes from that fact that the AQ values used are biased in this direction. AQ values can be shown to over-estimate actual (weather corrected) load for both the LSP and the SSP sectors. This is partly because AQ values are consistently falling from year to year, and by necessity the AQs calculated on 1st October in Year X are trained on data up to that point. Therefore, they are likely to overstate the true demand in Year X+1 when they are used in the deeming algorithm. There is also a smaller tendency for AQs to over-estimate loads even when they are applied to loads from Year X.

This alone will not cause the deemed values to be skewed unless the LSP sector is over-estimated by a greater margin than the SSP sector. In the AUGS, we referred to analysis undertaken by TPA solutions in this area. It is recognised that this analysis was flawed and incomplete, but with no other data available it was the best evidence available at the time. Data has now been received and we have carried out our own complete analysis which does not contain the errors incorporated by TPA.

Analysis of AQs and weather corrected demands shows that in the 5 years from 2005 to 2009, AQs for both the LSP and SSP sectors were over-stated for the reasons given above. It should be borne in mind when interpreting these figures that the SSP sector load estimate is calculated by subtraction and hence contains Unidentified Gas in addition to actual SSP load. Levels of over-estimation for each sector are as follows:

LSP: 10.1%
SSP (+UG): 2.5%

The SSP+UG figure is a comparison of SSP AQ with SSP plus UG actual, and so shows that the SSP AQ lies 2.5% above the sum of SSP load plus Unidentified Gas.

This alone does not show that AQs are skewed towards the LSP sector, because the SSP figure contains UG. It could be the case that the SSP AQ is also overstated by 10.1% and the figure is brought down to 2.5% by the UG component.

It can be proven, however, that in order to reduce the SSP AQ over-statement from 10.1% to 2.5%, the Unidentified Gas component would have to equate to 7.4% of the SSP total. Assuming that SSP comprises approximately 60% of total throughput, this results in an Unidentified Gas level of 4.4% of overall throughput.

Given that UG is a subset of RbD, and that RbD represents approximately 2% of total throughput, it is not physically possible for Unidentified Gas to be this high. Therefore the difference between the level of over-statement of AQ for the LSP and SSP sectors cannot be accounted for with UG, and it remains the case that AQs are over-stated by a higher amount for LSP sites. This results in a positive allocation model bias.

Hence it has been proven that the offset from zero demonstrated in the RbD histograms above is the result of the combined effect of Unidentified Gas and model bias, although the split between them is currently unknown. It is the job of the AUGE to provide the best available estimate of this split and hence calculate the level of Unidentified Gas as accurately as possible.

We propose to do this in a similar manner to that adopted in Mod 228, with a number of key improvements that eradicate the errors in this approach. This method is similar to that presented in the first draft of the AUGS, but with the Theft analysis overhauled for greater robustness.

1. Shipperless/Unregistered consumption and CSEP Registration Issues will be calculated directly in the manner outlined in the AUGS. In our analysis shrinkage error will be removed, however, for the reasons described in the AUGS.

2. Theft will be calculated using a “balancing factor” method similar to that adopted in Mod 228, with the important difference that the key missing factors - deeming algorithm bias and deeming algorithm error - will be accounted for in calculations.

3. Inclusion of the deeming algorithm bias element in calculations will reduce the magnitude of calculated theft to realistic levels that are more likely to represent what is happening in practice.

4. By accounting for the random deeming algorithm error in the analysis, the unusual variable behaviour of theft will be lost. This occurs in the Mod 228 method because under this, each individual annual value of RbD is used as a basis for calculations and specifically affects the balancing factor. As demonstrated, however, RbD contains a large element of random model error; this is not predictable and for any individual instance can fall anywhere within the distribution limits. Hence if model error is very high for one year, this would result in a large over-estimation of theft, whilst if it was low it would result in an under-estimation of theft. Theft as a balancing factor is therefore heavily dependent on deeming algorithm model error under the Mod 228 methodology, which is why it varies so much – in effect it includes the model error. Over time these errors will balance each other out, and so neither the LSP nor the SSP sector will be disadvantaged. Statistical evidence shows that around 30 readings are required before this kind of balance is achieved, however, and as Unidentified Gas is calculated on an

annual basis, this means such balance will not be achieved for up to 30 years. The AUGE does not believe it is acceptable for one sector to be disadvantaged for this length of time. Therefore the AUGE's method will discount year-to-year fluctuations in model error (and hence RbD) and instead calculate theft based on the stable *trend* in RbD offset over time (ie the offset shown in the histograms, adjusted for model bias). This will result in consistent and realistic values of theft whilst retaining the "balancing factor" method.

Queries From	British Gas
Date Received	15/06/2011
Date of Response	08/07/2011

Note:
The numbering of queries/comments in this response is as per the original document sent by British Gas. Not all points require a response, and hence only those that require an answer are included here.

Question/Issue:
13. The alternative method considered by the AUGE is not sufficiently defined for us to make an assessment of its suitability, but there is sufficient detail for us to determine that the approach suggested would lead to erroneous results. For example, the AUGE suggests that they could use demand data from the "training sample" of approximately 4000 meters with daily recording equipment, and then use this to model SSP load. It is not clear how the results of this will be weather corrected and scaled up however, and considering the best known method of doing this currently is the existing NDM allocation process, we have concerns that the AUGE's approach may perpetuate the misallocation issues currently faced by the SSP sector.

Response:
The AUGE shares British Gas' concerns about the accuracy of a purely top-down approach. We believe that we can employ more sophisticated techniques than are currently used in the allocation process, which would lead to an increase in model accuracy and hence avoid a certain amount of the model error and model bias that exists in the current calculations. The training data would remain the same, however, as it is the most exhaustive and accurate training set available. Regardless of the quality of the modelling, this would inevitably lead to some similarities with the current models and the potential for repetition of problems.

The AUGE is aware of this issue and would consider the implications carefully if it should prove necessary to go down this route. It should be borne in mind, however, that this approach will only be taken if the current approach fails, and there are no indications at this stage that this will happen. Whilst not all the necessary data has yet been supplied by Xoserve (and hence it has not been possible to conclude beyond doubt that the current approach will be successful), no information received so far suggests that it cannot be done. Therefore the top-down approach is mentioned in the AUGS as an alternative concept, but the fact that it has not been developed further at this stage is intentional. Should it prove necessary to pursue this route, it will be developed further at this point, with appropriate account taken of potential drawbacks.

Question/Issue:
14. Furthermore, and given the purpose of the NDM sample is to derive the consumption profile shapes used in the NDM demand models, we do not believe it is appropriate to use it as indication of SSP market consumption. We also note that the sample may have biases within

it, for example, customers have to actively respond to a letter asking for their consent before having demand recording equipment installed and no prepayment customers are included. This may make the sample tend towards more stable customers with fewer house moves and larger gas consumptions. Our conclusion is that whilst a "top down" approach may have merits a different approach would be required by the AUGE.

Response:
The current use to which the NDM sample is being put does not affect whether it can be effectively used to estimate SSP market consumption or not. Whilst it may not currently be used precisely for that purpose, the data available nevertheless represents a sizeable sample of domestic households, and the AUGE has extensive experience of using such data to estimate consumption as accurately as possible. Having said this, it is agreed that the potential exists for bias to exist in the sample with regard to the types of customer who are willing to be part of it. Should the need to change to a purely top-down approach arise, all possible options will be assessed and the most appropriate used. As explained in the answer to Issue 13 above, this section of the AUGS was intended to introduce the concept of the top-down approach as an alternative without defining it in any detail. It will only be defined in detail should the current approach fail, and there are no indications at this point that it will.

Question/Issue:
15. In addition to the concerns expressed above about the high level approach the AUGE has taken to this analysis, we are also concerned that, from the references contained within the AUGS, they have chosen to consider only some of the available material. As the AUGE states, there have been "several UNC modifications proposals intended to resolve this issue" and there is therefore a large volume of previous work for the AUGE to draw upon the course of developing their methodology. The AUGS only references unidentified gas related Modification Proposals raised before 2009 however, and ignores a number of Modification Proposals which were raised after that point, including 0317, 0317A and 0327.

Response:
Proposals 317, 317A and 327 detail interim measures designed to cover the period before the first AUGS is authorised. They have all been reviewed by the AUGE but as none are directly relevant to their analysis, none was referenced in the first draft of the AUGS. The AUGE does not intend to base their estimation method on any previously published UNC Mods or associated papers. The report by TPA solutions was referenced in the first draft of the AUGS, but this was only because the data it referred to was not available to the AUGE at the time, and this was the only source of the information in question. The AUGE never intended to use any TPA figures or analysis once full data was available, and it is accepted that this should have been made clear in the first draft of the AUGS. Full data is now available and no reference to the TPA report or the data within it will be made in subsequent drafts. Modification Proposals 194/194A and 228/228A will still be referenced because they are directly relevant to Mod 229, but this will only be to provide a history. All analysis within the AUGS will be the AUGE's own and will not be based on any previous modification proposal.

Question/Issue:

16. We are also concerned that the AUGS appears to rely solely on a report written by TPA Solutions as the only non-user assessment of unidentified gas when in fact there are other sources of information on the subject too. For example, no direct reference is made to the Cambridge Economic Policy Associates (CEPA) paper on the same subject and neither is it listed as a reference by the AUGE. Whilst we have specific concerns with the accuracy of the TPA Solutions report we believe that ignoring other bodies of work on the subject limits the value of the AUGS itself. Specifically, relying on the analysis of one sector of the industry at the expense of others inevitably risks the AUGS becoming as partisan as the analysis it relies on.

Response:

As stated above, figures were quoted from TPA as an interim measure only due to lack of data from Xoserve. It is accepted that this should have been made clear in the AUGS. The data used by TPA is now available and our own calculations have been carried out, removing any reference to TPA data or methods. The paper from CEPA has also been reviewed, and this is discussed in more detail later in this document. It will also be referenced in future drafts of the AUGS.

Question/Issue:

17. By way of example, we wish to stress that the report which the AUGE bases a large part of their work on is characterised by the I&C Shippers and Suppliers Group (ICoSS) as "not underpinned with sound data" and that "more high quality information and data is required before an apportionment methodology (such as the AUGS) could be used in practice".

Response:

This point is covered by previous responses. No reference to TPA Solutions, their data or methods is made in the AUGE's analysis.

Question/Issue:

18. Finally, we believe that when the AUGE publish the final AUGS, there exists an opportunity to publish a full list of sources which have been used, enabling the industry and future AUGEs to understand the depth of the analysis provided.

Response:

All data sources will be listed in future drafts of the AUGS.

Question/Issue:

19. The AUGE concludes that "the RbD quantity, whilst containing an element of Unidentified Gas, is largely composed of model error" and that as such the majority of RbD should be

apportioned to the SSP sector. This statement appears to be based on TPA Solutions figures which purport to show that in the initial allocation LSP sites are over allocated by an average of 8.9% per annum whereas SSP sites are over allocated by an average of just 1.8% per annum. The AUGE uses this to make two distinct conclusions, firstly that that LSP sites suffer from a greater degree of over-allocation compared to SSP sites and secondly that the majority of RbD is made up of model error and should therefore be allocated to the SSP sector.

Response:
See responses to subsequent issues.

Question/Issue:
20. In the first instance we believe that the AUGE can do more to substantiate the claim that unidentified gas is largely made up of model error. Although some reference is made to the analysis completed by TPA Solutions the data referenced only pertains to the degree to which any model error should be ascribed between the LSP and SSP sectors, not to the scale of model error itself. We believe that given the importance the AUGS places on this point, further evidence of the actual scale of model error should be brought forward by the AUGE before the final draft is released.

Response:
This assertion comes from an analysis of worked examples of the Mod 228/228A methodology. The data presented in the 1st draft AUGS was based on information from the TPA Solutions assessment of these Mods, due to the fact that full data had not yet been supplied to the AUGE at the time it was written. Data has now been received and therefore all analysis now presented is the AUGE's own.

The allocation algorithms that produce the deemed load for both SSP and NDM LSP markets are statistical models. As such they are subject to error, because every naturally-occurring process contains random variation (known statistically as "common cause variation"), which is due to unknown causes and natural fluctuations in the process. Gas demand is such a process, and the AUGE has several decades of experience working with demand forecasting issues. This experience leads to the knowledge that such common-cause variation exists, and also to a general appreciation of its likely magnitude.

The presence of this common cause variation in the deeming algorithm process means that even if the input data used (e.g. AQ) is perfect, the output will not equal actual demand – there will always be an error component. RbD introduces "actual" LSP loads, which means that at this point model error is eliminated from the sector load estimates. RbD is the quantity that redresses the difference between deemed and metered LSP load, and hence in addition to containing LSP sector Unidentified Gas, it must by definition also contain the model error. Hence the question is not whether RbD contains a model error component or not, because we know that it does. The question is how much of RbD corresponds to model error and how much is left representing LSP Unidentified Gas.

Mods 228 and 228A do not recognise that this model error component exists in RbD.

The AUGE believes that the assumption that RbD is largely composed of Unidentified Gas is invalid due to the statistical behaviour of the data when such an assumption is made. The reasons are mostly connected with the calculation of theft as the "balancing factor" and the fact that no allowance is made for model error. Mods 228 and 228A make an allowance for genuine reconciliation based on AQ drift, but this once again carries an inherent assumption that if the correct AQs are supplied to the deeming algorithms, the output will be perfect, which is not the case. The remainder of RbD is split between a number of causes, with most calculated directly and theft calculated by subtraction at the end. The figures for theft that this process produces (taken from worked examples) are considered unrealistic for a number of reasons:

- The calculated value of theft across four years (06/07 to 09/10) hits a peak of 1.4% of throughput. This is five times higher than the theft estimate contained in Section N of the UNC, and is 350 times higher than the level of shipper-responsible detected theft calculated by Xoserve. Whilst it is recognised that actual theft levels are higher than those implied by detected thefts only, this still suggests that the values of theft calculated using this methodology are too high and hence are likely to contain another factor, whose values may be higher than the actual theft figures.

- It is reasonable to assume that theft varies with throughput, and that these two variables are positively correlated. The theft figures in our worked examples have a very high level of variation, however, in one case rising by 67% from one year to the next, and in another dropping by 60% from one year to the next whilst throughput remains relatively constant. This can be seen in the following table that contains data from the worked examples:

Year	RbD	Gen Rec	Direct	Balancing	0.28% Thft	Mod Err	Thrghput	Bal %	Err %	Bal Chng
06/07	11.65	5.66	1.00	4.99	1.70	3.29	608.26	42.8%	28.2%	
07/08	11.29	1.97	0.97	8.36	1.80	6.55	644.42	74.0%	58.0%	67.5%
08/09	12.04	2.41	1.03	8.60	1.71	6.90	609.29	71.4%	57.3%	3.0%
09/10	6.27	2.33	0.54	3.40	1.71	1.68	612.23	54.2%	26.9%	-60.5%
							Average	60.6%	42.6%	

In addition, the variation present appears to be random. This suggests that the additional factor identified above is model error, for two reasons:
- model error must make up part of the catch-all balancing factor, because it is known to exist and it is not accounted for elsewhere in the calculation, and
- model error, by definition, varies randomly, and this is how the balancing factor is behaving.

The size of the variation suggests that the randomly varying model error element is larger than the theft element.

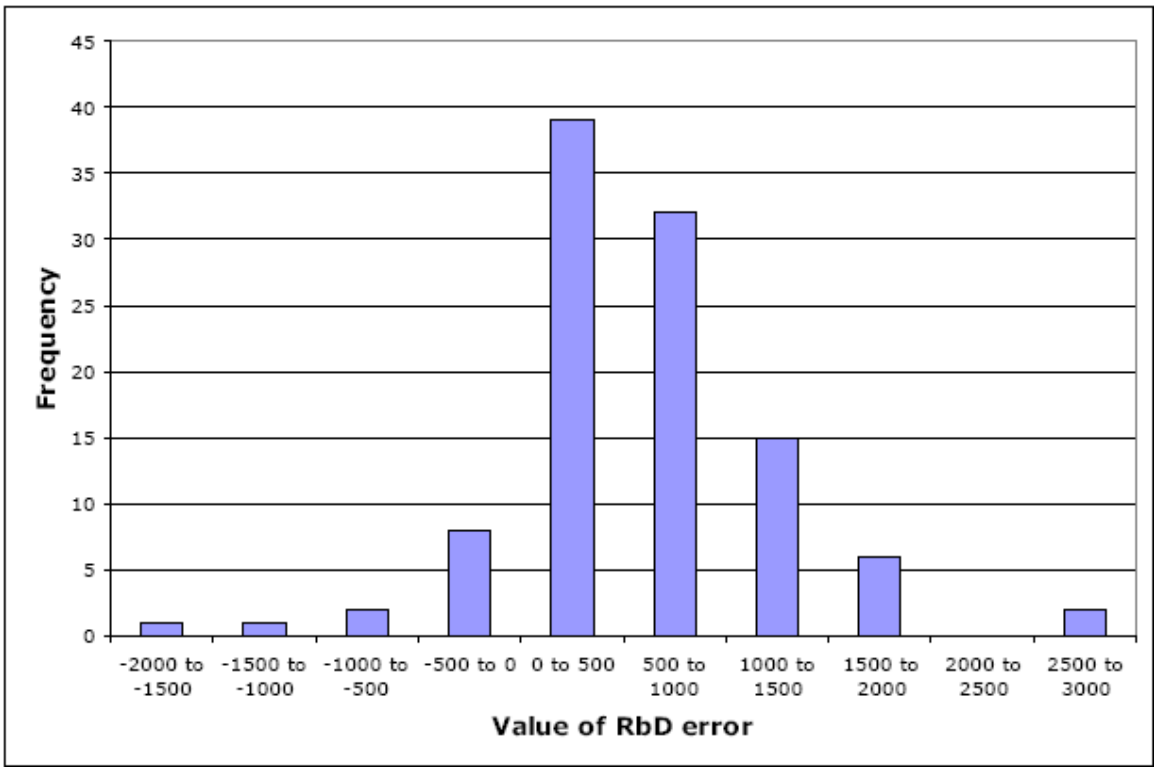
- In the worked examples, the "balancing factor" accounts for an average of 61% of the RbD quantity. Hence if a large proportion of this is actually model error, it follows that a significant proportion of RbD in total is also accounted for by model error.

If certain assumptions are made about the likely level of true theft, an estimate of the proportion of RbD that is actually composed of model error can be made. If true shipper-responsible theft lies at the UNC level of 0.28% of throughput (i.e 0.3% minus the 0.02% that is assumed to be transporter-responsible theft), it can be calculated that, on average, 43% of RbD is composed of model error. The maximum for any individual year is 58%.

It should be noted that analysis of raw RbD data shows that values are positive on approximately 80% of occasions. If up to half of RbD is randomly-varying model error, this result indicates that the error in question is positive more often than it is negative, i.e. it is skewed towards the LSP market. Given that common cause variation is randomly distributed around zero, this actually indicates the presence of two separate factors: model bias and model error. The two combine to create a random distribution around a positive mean. This is examined in more detail below.

Finally, given that RbD is positive on 80% of occasions, it is by definition negative on 20% of occasions. When this occurs, the Mod 228/228A methodology splits what is now a negative RbD value into Unidentified Gas sources, leading to negative figures for theft, shipperless consumption and unregistered CSEP consumption. The physical lower bound for these is zero, however, and so the production of such negative values indicates once more that a factor has been left out of the calculation. This factor is the randomly-varying model error that evidence suggests makes up a significant part of the balancing factor.

As previously mentioned, the evidence suggests that there are two elements of model error: bias (i.e. the amount by which, on average, allocations are skewed towards the LSP sector), and common cause variation (i.e. random scatter around a mean of zero). These two elements, along with Unidentified Gas, cause RbD values to vary randomly around a positive mean. This phenomenon is shown on the graph below, which contains RbD values from 1998 to 2006 and is taken from the CEPA document commissioned by Centrica and published in support of Mod 228.

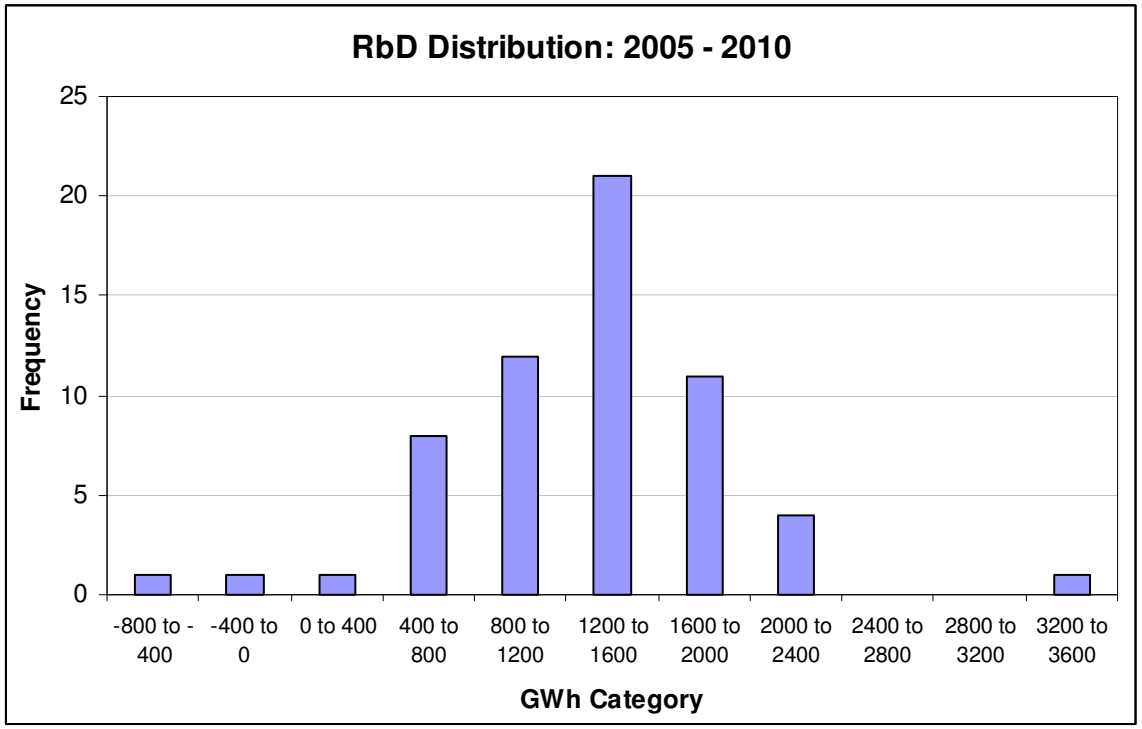


This shows that RbD values follow a very well-defined Normal distribution around a mean of 677GWh.

It is worth noting that this stage that CEPA drew an erroneous conclusion from this graph in their assessment of Mod 228, stating that the fact that RbD follows a well-defined distribution (i.e. the Normal distribution) indicates that it cannot contain model error. In fact the opposite is true: statistical theory states that any such model will be subject to error, and that those errors will follow a Normal distribution. It is actually rare to find an example from the field where the results are so clearly Normally distributed, and the pattern shown in the graph is precisely what would be expected if RbD contained a strong element of randomly-distributed model error.

This assertion by CEPA formed the basis for Centrica discounting model error as a factor contributing to RbD in Mod 228. The effects of this are discussed shortly.

As noted above, the distribution of RbD does not vary around zero, but around a positive mean of 677GWh. The AUGE's own analysis of data from 2005 to 2010 shows a very similar pattern:



In this case the data varies randomly around a mean of 860GWh.

The mean value of these distributions (i.e. the offset from zero) represents the bias in the RbD value, whilst the level of scatter around it represents the model error (common-cause variation). The bias may be due to two factors:

- Unidentified Gas (from the LSP sector)
- Deeming algorithm bias (including bias due to AQ drift as recognised by Centrica)

It is accepted that Unidentified Gas exists, and it is the job of the AUGE to quantify it. Deeming algorithm bias will only exist if information used by the algorithms can be shown to be skewed in favour of the LSP market. In Mod 228, Centrica make the assumption that algorithm bias is due to relative AQ drift only, and hence the vast majority of the offset value consists of Unidentified Gas. The AUGE believes that additional algorithm bias exists. This implies that Unidentified Gas levels presented in Mod 228 are too high, and this is reflected in the large magnitude and unexpected random variation in the estimates of theft as calculated using this methodology.

Evidence that the deeming algorithm is biased towards the LSP sector comes from the fact that the AQ values used are biased in this direction. AQ values can be shown to over-estimate actual (weather corrected) load for both the LSP and the SSP sectors. This is partly because AQ values are consistently falling from year to year, and by necessity the AQs calculated on 1st October in Year X are calculated on data up to that point. The movement of AQ values over time and their relationship with weather-corrected actual demand can be seen in the table below:

WC Demand	2005	2006	2007	2008	2009
SSP AQ	403896	399888	385274	374758	361424
SSP WC Cons[1]	399490	386727	387478	361425	342008
Diff	4406	13160	-2204	13333	19416
%	1.1	3.3	-0.6	3.6	5.4
LSP AQ	168682	158986	150426	142973	134663
LSP WC Cons	155619	141790	139722	128621	114593
Diff	13063	17196	10704	14353	20070
%	7.7	10.8	7.1	10.0	14.9
DM AQ	198851	109352	101569	102815	97101
DM WC Cons	129781	128805	133500	116807	119254
Diff	69070	-19453	-31931	-13992	-22152
%	34.7	-17.8	-31.4	-13.6	-22.8

[1] Calculated SSP actual consumption also contains Unidentified Gas

Therefore, AQs are likely to overstate the true demand in Year X+1 when they are used in the deeming algorithm. There is also a smaller tendency for AQs to over-estimate loads even when they are applied to loads from Year X.

This alone will not cause the deemed values to be skewed unless the LSP sector is over-estimated by a greater margin than the SSP sector. In the AUGS, we referred to analysis undertaken by TPA solutions in this area. It is recognised that this analysis was flawed and incomplete, but with no other data available it was the best evidence available at the time. Data has now been received and we have carried out our own complete analysis which does not contain the errors incorporated by TPA.

Analysis of AQs and weather corrected demands (as shown in the table above) shows that in the 5 years from 2005 to 2009, AQs for both the LSP and SSP sectors were over-stated for the reasons stated. It should be borne in mind when interpreting these figures that the SSP sector load estimate is calculated by subtraction and hence contains Unidentified Gas in addition to actual SSP load. Levels of over-estimation for each sector are as follows:

LSP: 10.1%
SSP (+UG): 2.5%

The SSP+UG figure is a comparison of SSP AQ with SSP plus UG actual, and so shows that the SSP AQ lies 2.5% above the aggregate of SSP load plus Unidentified Gas.

This alone does not show that AQs are skewed towards the LSP sector, because the SSP figure contains UG. It could be the case that the SSP AQ is also overstated by 10.1% and the figure is brought down to 2.5% by the UG component.

It can be proven, however, that in order to reduce the SSP AQ over-statement from 10.1% to 2.5%, the Unidentified Gas component would have to equate to 7.4% of the SSP total. Assuming that

SSP comprises approximately 60% of total throughput, this results in an Unidentified Gas level of 4.4% of overall throughput.

Whilst there is no physical limit that prevents the Unidentified Gas total (across both LSP and SSP market sectors) from being this high, such a large magnitude of UG does necessitate very high levels for its components. Particularly in the case of theft, we do not consider these values to be realistic. Under Mod 228 methodology, an Unidentified Gas level of 4.4% of throughput results in shipper-responsible theft levels of 3.52% of total throughput on average, over the 4 years from 06/07 to 09/10. This is nearly 13 times higher than the UNC figure of 0.28%, and over 900 times higher than the level of shipper-responsible detected theft calculated by Xoserve. This figure is considered by the AUGE to be suspiciously large, and certainly warrants further investigation into whether the premise (that UG accounts for the difference in AQ overstatement between LSP and SSP sectors) is valid.

Hence it has been shown that the offset from zero demonstrated in the RbD histograms above is likely to be the result of the combined effect of LSP sector Unidentified Gas and model bias, although the split between them is currently unknown. It is the job of the AUGE to provide the best available estimate of this split and hence calculate the level of Unidentified Gas as accurately as possible.

We propose to do this in a similar manner to that adopted in Mod 228, with a number of key improvements that eradicate the errors in this approach. This method is similar to that presented in the first draft of the AUGS, but with the theft analysis overhauled for greater robustness.

1. Shipperless/Unregistered consumption and CSEP Registration Issues will be calculated directly in the manner outlined in the AUGS. In our analysis shrinkage error will be removed, however, for the reasons described in the AUGS.

2. Theft will be calculated using a “balancing factor” method similar to that adopted in Mod 228, with the important difference that the key missing factors - deeming algorithm bias and deeming algorithm error - will be accounted for in calculations.

3. Inclusion of the deeming algorithm bias element in calculations will ensure that the calculated level of theft is realistic, and that the resultant figures represent the best available estimate of what is happening in practice.

4. By accounting for the random deeming algorithm error in the analysis, the unusual variable behaviour of theft will be lost. This occurs in the Mod 228 method because under this, each individual annual value of RbD is used as a basis for calculations and specifically affects the balancing factor. As demonstrated, however, RbD contains a large element of random model error; this is not predictable and for any individual instance can fall anywhere within the distribution limits. Hence if model error is very high for one year, this would result in a large over-estimation of theft, whilst if it was low it would result in an under-estimation of theft. Theft as a balancing factor is therefore heavily dependent on deeming algorithm model error under

the Mod 228 methodology, which is why it varies so much – in effect it includes the model error. Over time these errors will balance each other out, and so neither the LSP nor the SSP sector will be disadvantaged. Statistical evidence shows that at least 30 readings are required before this kind of balance is achieved, however, and as Unidentified Gas is calculated on an annual basis, this means such balance will not be achieved for a minimum of 30 years. The AUGE does not believe it is acceptable for one sector to be disadvantaged for this length of time. Therefore the AUGE's method will discount year-to-year fluctuations in model error (and hence RbD) and instead calculate theft based on the stable *trend* in RbD offset over time (i.e. the offset shown in the histograms, adjusted for model bias). This will result in consistent and realistic values of theft whilst retaining the "balancing factor" method.

Question/Issue:

21. In addition, we also have concerns with the conclusion that the majority of model error is attributable to the SSP sector. An examination of the TPA Solutions report itself reveals that instead of providing figures which are representative of actual consumption in each sector, they have instead taken total LDZ throughput, deducted DM consumption and then deducted LSP allocation from the remainder leaving a figure purported to be "SSP Consumption".

Response:

See responses to Issue 20. It should also be noted that the AUGE is not proposing to estimate the amount of model error in RbD directly, and will make no assumptions about it. Examples from the TPA report were drawn simply to illustrate certain points about weaknesses in Mods 194 and 228, and this report was only referenced at all because a lack of data prevented us from carrying out our own analysis. The AUGE's proposed approach to estimating Unidentified Gas is to estimate each component directly, with the exception of theft, which will be calculated by subtraction. This process involves estimation of model bias but not model error, and there will be no reliance on TPA data or methods.

Question/Issue:

22. Given unidentified gas has not been allowed for in this process, the result is that the values provided for "SSP Consumption" contains a quantity unidentified gas and does not therefore truly show the degree to which SSP sites are over-allocated. In effect the analysis from both TPA Solutions and the AUGE shows that even when the SSP sector is allocated all unidentified gas, the sector is still over allocated by an average of 1.8%. This does not therefore demonstrate the extent of model error in the SSP deeming algorithm. We note that if the AUGE believed that they had received figures denoting actual SSP and LSP consumption then unidentified gas could be calculated more accurately using the "top-down" approach as proposed in Modification Proposal 0327.

Response:

See responses to Issue 20. The AUGE is aware that TPA's analysis contained some errors and their figures for total SSP load include Unidentified Gas. The AQ drift calculations in Mod 327 have

been noted, and whilst we will employ our own calculation methods, AQ drift will be accounted for in our estimates.

Question/Issue:

24. The conclusion that the majority of any model error should remain attributable to the SSP sector is therefore wholly inaccurate. We are disappointed at the nature of the error made by the AUGE in this regard, but believe that the drafting and consultation process give them an opportunity to resolve the matter before the final draft. Our view is that the evidence does not substantiate the claim that the SSP sector is subject to more model error than the LSP sector, and that the initial conclusion that "the RbD quantity, whilst containing an element of Unidentified Gas, is largely composed of model error" is therefore flawed.

Response:

See responses to Issue 20. We believe that this analysis indicates that the deeming algorithms contain an element of bias towards the LSP sector due to LSP AQs being overstated by a larger factor than their SSP counterparts. Please note, however, that no assignment of gas to the SSP sector will be made based only on this early conclusion. An in-depth analysis of the deeming algorithms, which includes running the algorithms on large samples of SSP and LSP loads without the scaling factor (which introduces Unidentified Gas into the calculations), is currently ongoing. This will return robust estimates of the underlying deeming bias in both the LSP and SSP sectors, and a model bias element will only be included in our Unidentified Gas calculations if this analysis shows that it exists.

Question/Issue:

26. We disagree with the AUGE's statement that any differences between estimated and actual Shrinkage "are not a part of Unidentified Gas, due to the fact that Unidentified Gas is a (positive) physical quantity of gas that has been used somewhere in an unrecorded manner" . The suggestion that gas lost to Network Owner related activities or responsibilities is not "physical" seems illogical, and the reliance on the fact that Shrinkage errors may be either positive or negative does not address the point that it has the potential to cause unidentified gas to be allocated to the SSP sector through RbD.

Response:

It is accepted that errors in the Shrinkage model will affect SSP load, but a number of distinctions have to be made:

- Shrinkage gas and Unidentified Gas are two separate entities. As stated in the AUGS, LDZ Shrinkage occurs between the LDZ offtake and the end consumer (but not at the Supply Meter Point - the LDZ shrinkage zone stops immediately before this point). Unidentified Gas occurs downstream of Shrinkage, i.e. at the Supply Meter Point. Therefore whilst errors in the Shrinkage model will affect SSP load, the volumes of gas involved are composed of Shrinkage gas and not Unidentified Gas and therefore fall outside the remit of the AUGE.

- Whilst Shrinkage itself is a physical quantity of gas that has been burnt or lost in an unrecorded manner, Shrinkage Error is not: it is a quantification of inaccuracies in the shrinkage model and the data that feeds into it. Shrinkage Error cannot cause Unidentified Gas to be allocated to SSP, but it can and does affect SSP load calculated using RbD and can have either a positive or negative effect. It is for this very reason that Shrinkage Error, should there be a need to address it, should be addressed in RbD, not as part of Unidentified Gas.

Whilst a dedicated estimation of Shrinkage Error is therefore outside the remit of the AUGE, it is accepted that the AUGE's current intended hybrid top-down and bottom-up approach will necessarily include the effects of Shrinkage Error in the balancing factor. Whilst the Shrinkage Model, like any statistical model, will produce results with an error component, if these errors are centred around zero they will already have been accounted for in our calculations. This is due to the fact that if this is the case, Shrinkage error will only contribute to the scatter in RbD and not the bias. Work is ongoing to estimate the contribution of Shrinkage Model error to RbD bias, if any, and this will be taken into account in calculations where this is possible.

Question/Issue:

27. Shrinkage represents an estimate of the level of unidentified gas lost during activities or areas of responsibility attributable to Network Owners, with any errors in this estimation leading to that unidentified gas being allocated to the SSP sector through RbD. Any under or over estimation in the volume of Shrinkage in any given year leads to a direct and corresponding over or under estimation of the NDM allocation, in effect moving unidentified gas between the Network Owners and the Shipper community.

Response:

It is agreed that the Shrinkage estimate affects NDM allocation and hence RbD, and ultimately any error in it will affect SSP load. As described above, however, the quantities of gas being referred to here are composed of Shrinkage gas and not Unidentified Gas. Once again, the fact that SSP load is affected via RbD illustrates why a change to the RbD process is the correct place to deal with this issue. As stated in the response to Issue 26, however, Shrinkage contribution to the balancing factor will be taken account of in calculations if possible.

Question/Issue:

28. We note that despite their view that errors within the Shrinkage model do not have the capability to pass unidentified gas in to the system, the AUGE asserts that "the current Shrinkage estimation system is fit for purpose and provides the most equitable solution available". This statement goes further than before and suggests that the Shrinkage model is sufficiently accurate to not pass unidentified gas from the Network Owner to the SSP sector. This claim is not directly substantiated, but we infer from the AUGS that it is the AUGE's position that as "each element of Shrinkage is already calculated using the most accurate information available" there is little scope for the Shrinkage model to be incorrect.

Response:
The AUGE makes no assertion that the Shrinkage Model is accurate – we simply assert that it is the most accurate currently available. It is beyond the remit of the AUGE to re-write the Shrinkage model, particularly when this model refers to Shrinkage Gas and not Unidentified Gas. The Shrinkage model cannot and does not pass Unidentified Gas to SSP or any sector, as any errors are composed of Shrinkage gas and therefore, by definition, not Unidentified Gas.

Question/Issue:
29. Furthermore, the AUGE states that as the Shrinkage model comprises "estimates based on GL Noble Denton models for mains and service leakage, AGI leakage, and OUG … any corrections would be more likely to increase errors rather than decrease them" , suggesting that even if Shrinkage model errors could lead to unidentified gas being incorrectly allocated to Shippers rather than Network Owners, and even if the model was inaccurate, any inaccuracy would actually be in Shipper's favour, reducing the unidentified gas bill they face. If true then we accept that this could lead to a deduction from any eventual assessment of the scale of unidentified gas, however this point is not substantiated, and therefore either needs to be fully evidenced in the final AUGS or removed altogether.

Response:
The distinction between Shrinkage and Shrinkage Error is important here. The AUGE is not suggesting that any calculations would increase the calculated volume of Shrinkage itself, but the magnitude of the Shrinkage Error, either positive or negative. Regardless of whether the Shrinkage Model is viewed as accurate or inaccurate, it consists of relatively sophisticated modules that cover leakage and OUG. Any attempted correction via Unidentified Gas would be based on a relatively simplistic equation rather than the far more extensive analysis that went into the models, and hence would have a high risk of making the error component larger rather than smaller. There is no suggestion that it would introduce a bias either in favour of the transporter or shipper, however. As stated above, Shrinkage is outside the remit of the AUGE (notwithstanding its necessary inclusion in the balancing factor), and hence is best dealt with via changes to the RbD calculation.

Question/Issue:
30. It is our belief that not only is Shrinkage a potential cause of unidentified gas, but that the model upon which it is based on is both out of date and comprising of questionable assumptions which are likely to cause unidentified gas to be allocated to the SSP sector unnecessarily and therefore should be within scope of the AUGS.

a) Leakage. The leakage survey used to estimate the amount of gas lost in leaks was completed in 2002/03, some nine years ago, and we believe that the age of this research calls in to question its ongoing suitability for calculating shrinkage quantity levels. We also note that although the conclusions of the leakage survey are known, the detail of the survey itself is not known and cannot be scrutinised by the wider industry. The claim that it is therefore "fit for purpose" cannot therefore be independently substantiated.

b) Upstream Theft. The leakage model assumes a certain level of theft from the Network which is largely based on actual theft levels found downstream of the meter. As the AUGE themselves accept, "this will under-estimate true theft" due to the poor level of industry investment in theft detection activity. Our own experience is that there is a significant amount of upstream theft and that the fact that the assumptions contained within the Shrinkage model are based on such poor quality data means that more unidentified gas will flow through to the SSP sector. The statement by the AUGE that there is "consensus" over the assumed upstream theft levels is also without foundation. We note that were the assumptions within the model be understated by just 0.005% this would equate to approximately 25 GWh of unidentified gas being allocated to the SSP sector per annum. The potential for this issue to contribute to unidentified gas is therefore significant and is worthy of further analysis.

Response:
Whilst it is accepted that the Shrinkage Model may contain inaccuracies, as described it is beyond the remit of the AUGE to rewrite the model, or to be involved in dedicated assessment of its error levels. Whilst we accept that the accuracy of the Shrinkage Model has a direct impact on RbD and therefore calculated SSP load, these errors consist of Shrinkage gas and not Unidentified Gas. The Shrinkage Model is based on work carried out, in some cases, a number of years ago, and hence improvements in accuracy may be possible by reworking it. This would be a separate project to the one currently being carried out by the AUGE, however.

The word "consensus" was used because the theft figures used in the Shrinkage Model are based on levels defined in the UNC, and they are used by all shrinkage providers in their calculations. We understand that the UNC theft level was arrived at by negotiation between all parties rather than analysis. Hence it is reasonable to apply the word "consensus" to the figure agreed in these negotiations.

The leakage rates proposed by the Gas Transporters each year do take into account changes in the population of the network so these are not based on the population of pipes in the ground as of 2002/3. The question then is whether the leakage rate for a particular pipe of a particular age and material calculated in 2002/3 is reliable (bearing in mind that pipe work will now be several years older and therefore different leakage rates will be applied in the model based on the age of the pipe). The AUGE will review the leakage survey and OUG publications if the UNCC requires this, in order to assess what impact potential issues may have. Any action regarding the models should be taken by the Shrinkage forum, however.

Question/Issue:
31. Finally, we are also mindful of the risks created by the apparent conflict of interest on this specific point, with the AUGE (GL Noble Denton) being asked to assess the credibility of the work underpinning the Shrinkage model (completed by GL Noble Denton). We are keen to stress that there is no evidence of improper behaviour by the AUGE, however we believe that the very existence of this conflict of interest presents a risk that the integrity of the process

itself may be called in to question, endangering the final AUGS and therefore the correction the SSP sector is entitled to.

Response:
There is no conflict of interest because it is outside the AUGE's remit to amend the Shrinkage model. Whilst the AUGE is happy to review the Shrinkage model publications if required, any request for them to do so will be made in the knowledge that it was the same company the created the models.

Question/Issue:
32. We disagree with the AUGE's conclusion that Meter Errors are not a cause of unidentified gas. The AUGS concludes that although "Metering errors … can have an effect on the calculated loads for each market sector if there is found to be a non-zero bias over time", "Metering Error does not contribute to Unidentified Gas" because "LDZ meters and LSP meters … demonstrate no particular bias in metering error". We believe that not only is it demonstrable that LDZ Offtake Meter errors are generally biased towards an under-recording, but that the information which shows this is publicly available for the AUGE to scrutinise in advance of the final draft.

Response:
It is acknowledged that the majority of large LDZ offtake metering errors are under-reads, but the assumption is made that all such errors are found and corrected at some point, and none carries on indefinitely. When such errors are found, RbD is credited/debited as appropriate and hence for any errors that have been discovered (or will be discovered) the net effect is zero. We have found no evidence up until this point that small undetected bias exists in LDZ offtake metering that would affect RbD calculations over time. Note that undetected LDZ metering errors affect RbD and hence the calculated SSP load, but as in the case of Shrinkage, do not contribute to Unidentified Gas per se.

We also note that Centrica, in Mod 228 and in the supporting information that accompanied it, concluded the following:

- "Consensus was reached via discussions at the modification 194 development group that there is *potential* for measurement errors to be caused by LDZ offtake metering … however our primary assumption is that overall there is not an over or under registration of gas entering the system" (Mod 228)
- "Consensus was reached via discussions at the modification 194 development workgroup that there is *potential* for measurement errors to be caused by supply point metering. However there was no evidence presented to demonstrate that supply point metering had an adverse impact on RbD. Nor was any evidence or rationale presented to demonstrate that any one market classification made a greater contribution to supply point metering and measurement errors than the other. Our assumption is that supply point metering does not contribute to NDM error." (Mod 228)

- "Ofgem confirmed that, based on their data, they did not see evidence of a systematic bias. The group concluded that there was therefore no evidence to support 'supply meter error' as a contributory factor to RbD." (Mod 228 Supporting Information)

We are continuing to investigate the possibility of errors in supply point metering, however, particularly with reference to loads that have dropped considerably from previous levels and hence may no longer be appropriate for the meter size installed. This may have the potential to cause under-reads, and our conclusions from this analysis will appear in the next draft of the AUGS.

Question/Issue:

33. We also believe that LSP meters are equally as susceptible to fault as SSP meters and that these too are a source of unidentified gas which the AUGE must account for.

Response:

Analysis carried out in support of previous Mods drew the opposite conclusion, as referenced in the response to Issue 32 above. It should be noted that any meter will only contribute to Unidentified Gas if it is from the LSP sector and is exhibiting an *undetected* bias over time (i.e. one that is therefore not accounted for later via a credit/debit to RbD). It is accepted that meters that may under-read due to a change in the level of load are more likely to come from the LSP sector than the SSP sector, and analysis in this area is ongoing. The potential for undetected bias in all LSP meters (even where the level of load has not changed) will also be considered.

Question/Issue:

34. The Joint Office of Gas Transporters record and report information on all LDZ meter errors and this shows the vast majority of recorded errors were an under-recording, with a material amount of energy allocated to RbD in the process. We believe that the AUGE now has an opportunity to analyse the xoserve held data with a view to reassessing their claim that "LDZ meters … demonstrate no particular bias in metering error" before the final AUGS is published. The AUGE dismisses the historic examples of large scale meter error by saying that they are subsequently corrected, however this fails to highlight that the corrective action taken is to allocate the resulting energy entirely to the SSP sector.

Response:

It is stated in this issue that the vast majority of recorded LDZ meter errors are under-reads. Where this happens, this results in an under-allocation of energy to the SSP market whilst the under-read is ongoing. Therefore, once the error is discovered and corrected, the correct course of action is to charge the SSP market for the value of its previous under-allocation. This is a fair and equitable approach. It should be noted that the SSP market is also credited as it should be as and when LDZ meter over-reads are detected. The AUGE makes the assertion that LDZ meter errors do not affect RbD over time based on an assumption that LDZ metering errors are not indefinite, but are always detected and corrected in time. When this happens, RbD is credited/debited as appropriate, leaving a net zero effect.

Question/Issue:

35. Furthermore, we do not agree with the AUGE's assertion that "LSP meters are of a different construction to SSP meters". Whilst we accept that some LSP meters do not have diaphragms within them, a large proportion of the LSP market uses meters with similar constructions to typical SSP meters, and are thus no more or no less accurate. For example, at least 80% of LSP sites registered with British Gas have a meter installed on site which uses the same diaphragm technology as a typical SSP site. A good example of this is the U16 meter typically found in a large number of LSP sites, although we note that this is not the only example. We understand xoserve will have market wide data on the meter types prevalent in the LSP community. Any mis-measurement within the LSP sector will result in RbD volumes attributed to the SSP sector.

Response:

The information presented in the AUGS on this subject was supplied in good faith and it is recognised that it is an over-simplification of the actual situation. This area of the AUGS is therefore under review and investigation into supply point meter error as a potential cause of Unidentified Gas (or correction to RbD calculations) is ongoing as described in the response to Issue 32.

Question/Issue:

36. We also note that no evidence was provided to support the assertion that LSP meters which do not use diaphragm components are more accurate. Given this point is central to the conclusion that LSP meters are more accurate than SSP meters, we believe that the AUGE needs to do more before it can conclude that LSP meter errors do not generate unidentified gas. We believe ourselves that such issues have the potential to create substantial volumes of unidentified gas given the size of aggregate LSP AQ, and that the AUGE should take this opportunity to attempt a quantification of the scale issue. In doing so, the AUGE should take in to account both the absolute bias in meter error within each sector and the degree to which that bias differs between the sectors.

Response:

It is accepted that this area of the AUGS requires further work, and analysis is ongoing as required. It is noted, however, that previous studies, including those carried out by Centrica, have concluded that meter error does not contribute to RbD over time. This is covered in the response to Issue 32.

Question/Issue:

37. We also wish to highlight the existence of meters which fail completely, and are referred to as "passing unregistered gas". This type of meter is regularly found and exchanged by Suppliers in both the SSP and LSP sector with the impact of the meter failure being a failure to record any gas usage, as opposed to just a percentage. We believe that the existence of these meters also needs to be quantified by the AUGE so that they may estimate the amount of gas which has passed unregistered to LSP sites. In doing this, the AUGE must have regard for the

fact that LSP sites with meters passing unregistered gas may erroneously be shown as SSP sites on industry systems.

Response:
Further information is required on this subject. We note that Centrica have supplied us with two examples where this has happened, but further information in needed for us to assess the scale of the issue and the potential amount of energy involved. The key issue here is whether there is any catch-up process in place that results in RbD being debited when these issues are detected. The two examples supplied include details of financial balancing actions between the shipper and the customer, but this does not necessarily imply that there is also a process for amending RbD. If there is such a process, then the net contribution of this area to Unidentified Gas will be zero over time, because RbD will be debited as necessary when such faults come to light. If there is no RbD update process, however, Unidentified Gas can and will arise. If this is the case then more data is required to allow us to analyse this area.

Question/Issue:
38. The AUGE makes no acknowledgement of the fact that customers may switch between SSP and LSP with no change of meter type. The assertion that LSP meters are more accurate than SSP meters is therefore meaningless and should be corrected before the final AUGS is published.

Response:
It is accepted that the first draft of the AUGS contained an over-simplification of the actual situation with LSP and SSP meters. This area of Unidentified Gas is consequently being reanalysed, and results to date will be presented in the second draft of the AUGS.

Question/Issue:
39. Given both the inherent bias of LDZ Offtake meter errors and the propensity for LSP meters to become inaccurate we disagree with the AUGE's initial decision to exclude Meter Error as a potential cause of unidentified gas, and ask that this is revisited as soon as possible so that the final AUGS contains a reasonable quantification of Meter Error across both sectors as a cause of unidentified gas.

Response:
The decision to exclude meter error is under review as described in the responses to previous issues.

Question/Issue:
41. We consider that whilst the AUGE is correct when they say that "the problem with calculating theft levels is that the true level is unknown", we do not agree that the "detected theft and alleged theft [act] as lower and upper bounds respectively". There is no evidence to support

the premise that every instance of theft leads to an allegation; indeed the suggestion that number of allegations form the upper boundary of a particular crime would be automatically dismissed as incorrect were this any other matter, for example burglary or fraud. The artificial cap on the volume of theft is not only both inaccurate and without rationale, but is likely to skew the resulting conclusions on the scale of theft and thus the validity of the AUGS itself. A more realistic method must be sought.

Response:
It is recognised that the approach to the theft analysis detailed in the first draft of the AUGS is not ideal. However, in the real world we have to work with what data is available. No data on "actual" theft is available or ever will be, and so if it is to be calculated directly, assumptions have to be made that are agreed to be reasonable. Having reviewed both the data provided by Xoserve and that provided by the shippers, we have concluded that insufficient information exists in order to be able to calculate theft directly in a satisfactory manner. Therefore we are proposing a new approach, which combines elements of both a top-down and bottom-up analysis. Certain elements of RbD will be calculated directly, including Shipperless/Unregistered Sites, iGT CSEP issues and model bias (if it is shown to exist). Total LSP Unidentified Gas will also be estimated, and theft calculated by subtraction. The AUGE believes that given the limited data available, this method will give more robust and defensible estimates of theft.

Question/Issue:
42. The AUGE dismisses the higher industry estimations on the scale of theft by arguing that should such levels of theft exist then "one would expect a much more concerted effort to detect and prevent theft". In doing so the AUGE fails to understand that the current lack of investment in theft detection is not owing to a lack of theft on Suppliers' portfolios but more a failure in the current market arrangements. Ofgem themselves have supported efforts to address this problem and continue to press the industry on the delivery of reform which will address the current lack of investment in theft detection activities.

Response:
Given that the method of estimating theft has now changed, this section of the AUGS will be re-worded for the second draft. The new method will allow the level of theft to be estimated without being influenced by expectations of its likely magnitude, either on the part of the AUGE or any other interested party.

Question/Issue:
43. As undetected theft forms part of RbD a supplier would recoup only their SSP market share of any theft prevented. As such this carries differing levels of incentive depending on SSP market penetration. An LSP only supplier has zero incentive since RbD volumes do not apply to them currently. The potential to collect the lost revenue rarely acts as an incentive, indeed we have presented Ofgem with evidence which suggests that the bad debt charge associated with theft is as high as 75%. Given the high cost of building and maintaining a Revenue Protection

business, these factors combined mean that many Suppliers simply choose to do nothing but the bare minimum in terms of theft detection.

Response:
It is accepted that LSP Shippers gain little from active theft detection and that this may drive the fact that such initiatives are not commonplace. This may have contributed to the fact that despite the excellent response to our request for information concerning theft, too little useful data could be obtained to make it possible to make a reliable direct calculation. This is the reason for changing to the new method, which we believe will produce a reliable and defensible estimate.

However, despite the apparent lack of incentives for LSP shippers to identify theft, it has been found from data supplied by Xoserve that LSP theft detection rates (alleged, proven and quantity stolen) have increased significantly over the last 2 years.

Question/Issue:
44. This is borne out by the industry statistics on theft detection performance, collated and published by xoserve . These show that in 2010 British Gas made 78% of all theft detections, despite having a combined market share of almost 45%. Furthermore, those same statistics show that only 33% of the total industry leads in the same period related to British Gas sites. If the AUGE was right and that investment naturally followed the true level of theft then they are essentially claiming that a British Gas customer is much more likely to steal gas than a customer at another Supplier; an assertion which is shown to be false by the published xoserve data.

Response:
Under the method described here, we did not intend to compare detection rates between different shippers, but to track any changes in detection rates for individual shippers if and when levels of investment in anti-theft initiatives changed. This method is now obsolete, however, and we believe the new method will be more effective.

Question/Issue:
45. Despite this, the AUGE continues by proposing that the most accurate way of estimating the level of theft in the market is to use actual Shipper performance from periods in time when those Shippers were taking adequate steps to address theft, in effect using actual theft detection performance of those with active Revenue Protection services to suggest theft levels for the rest. Even though this suggests that the estimate of theft detection levels would be based solely on our theft detection activity alone, there is no evidence to suggest why this is likely to produce a “reasonable figure”. Indeed the AUGE’s conclusion that this approach should find a solution “that all parties are happy with” appears to be the primary driver, something we believe risks undermining the eventual AUGS.

Response:
It is accepted that based on the previous methodology, arriving at a theft figure acceptable to all parties was a primary driver. This was not due to any intent to influence the theft figure that resulted from the analysis, but was just a recognition of what was possible with the limited data available in this area. The wording here was simply providing a realistic viewpoint so that levels of expectation remained reasonable. The new method of calculating theft provides a more robust platform for the calculation, and we hope that it will alleviate British Gas's concerns on this issue.

Question/Issue:
46. Indeed, we consider that there are good reasons to conclude that even using our own theft detection performance to estimate true theft levels is likely to lead to inaccurate results. For example, it is our belief that despite investing considerable sums in theft detection activity, we are only partially successful at managing theft on our portfolio and that much work remains for us to do. We continue to make year on year improvements in the volume of theft detected, and see this as an indicator that the amount of theft we have detected is only a small part of the actual total.

Response:
Covered by previous responses.

Question/Issue:
47. Furthermore, theft of gas is, by its very nature, difficult to detect with thieves able to remove meter tampers within only a few seconds and, unlike in electricity theft, little evidence being left behind once the tamper has been removed. The result is that Suppliers have to catch the customer in the act if they are to successfully detect the offence. Our conclusion is that even if we were to inspect every property in our portfolio with an experienced theft team we would only detect a proportion of the total theft which occurs.

Response:
Covered by previous responses. The AUGE also notes that examples of theft techniques have been provided by some of the Shippers as part of the responses to our questions on theft which provided a useful insight to the difficulties of detecting theft.

Question/Issue:
48. In addition, and as we have demonstrated above, our theft detection activities in recent years have had the effect reducing our share of total theft in the market. This indicates that using the performance of Suppliers with active Revenue Protection services to estimate theft in the remainder of the market is likely to under-estimate the true volume of theft present in the market, as the sample chosen will be entirely be based on the "cleaner" portfolios of Suppliers who have invested most effort in to detecting theft.

Response:
Covered by previous responses.

Question/Issue:
49. Our experience is that theft on LSP sites is harder to find than on SSP sites. It is also worth noting that meter readers are likely to under-report LSP theft because unless caught in situ it leaves little or no evidence and meter readers' primary incentive is to maximise the number of accurate reads they record each day. As the nature of LSP sites is such that the number of properties a meter reader can visit on one day is less than for SSP sites on a housing estate, there is greater pressure on throughput of reads and less on theft detection for this reason alone. In reality meter readers, including Must Inspect Visits, generally do not identify where theft has occurred.

Response:
Covered by previous responses.

Question/Issue:
50. We argue that, whatever model is chosen, the AUGS needs to take account of the different risks associated with theft in the SSP and LSP sectors. For example, although only 17% of our theft detections in 2010 were on LSP sites, the amount of gas assessed as stolen on these sites accounts for 44% of the total assessed gas stolen over our entire portfolio in the same period.

Response:
The estimated volume of gas stolen in each case has been supplied by Xoserve, and so when splitting theft between the LSP and SSP markets, the size of the theft as well as the number of occurrences will be taken into account.

Question/Issue:
51. Finally, the AUGE also states that "theft levels are likely to differ between geographical areas, with such activities likely to be centred in large cities" . We would appreciate clarification from the AUGE that this refers to absolute numbers of theft detections and not a statement that the incidence of theft per capita is higher in large cities than it is anywhere else in the country. Our experience is that theft can be found in all sectors, in all geographies and we would expect any finding to the contrary to be accompanied with sufficient evidence.

Response:
This statement did indeed refer to theft figures per capita. The new theft calculation renders this AUGS text obsolete, however, and so it will not appear in the second draft.

Question/Issue:

52. Our conclusion is that the volume of undetected theft is higher than the total number of allegations which are made and that any model which seeks to estimate it based on actual theft detection levels will lead to erroneously low results. We therefore believe the AUGE should take this opportunity to revisit its proposed methodology here and develop something which is likely to properly assess the scale of theft.

Response:

The previous method was an objective attempt to quantify theft given the data available. The true level of theft may or may not exceed the number of allegations, but the new method means that this issue does not have to be resolved. We believe the new method will result in an estimate of theft that is as accurate as possible in the circumstances.

Question/Issue:

54. In relation to the sites classified by xoserve as being "Shipper Activity" or "Orphaned" we recognise the AUGE's reliance on the xoserve view over which of these sites is believed to have a meter or not. It is our understanding that that there is scope for a proportion of the sites where a meter is not believed to exist to actually have a meter and be burning gas. Our own analysis of xoserve's data shows that of the sites defined as Orphaned and without a meter in May 2010, 568 were subsequently found to have a meter one year later.

Response:

The AUGE accepts that any data set may contain inaccuracies, and the Shipper Activity and Orphaned data is no exception. The "no meter" dataset may contain sites with meters, and equally the "meter" dataset may contain sites with no meter. We have to work with the most accurate information available, however, and the Xoserve data is the most complete and accurate that we have. With reference to the example quoted, as far as our analysis goes in this area, it is the number of Orphaned or Shipper Activity sites that have a meter at the time of reporting rather than a year later that is important. We believe that the Xoserve data gives the best estimate of this, but if more accurate information is available from another source we would be pleased to use it.

Question/Issue:

55. We believe that the AUGE should work with xoserve and Shippers to establish the accuracy of these pots before proceeding to use them as the basis for any assessment of the number of sites which are burning gas. Notwithstanding this, we believe that the principle of adjusting the resultant number of sites believed to have a meter by an estimation of the proportion of those sites likely to be actually burning gas to be sound and likely to produce a reasonably accurate outcome. This is also our view for the proposed remedy for those shipperless and unregistered sites created less than twelve months ago.

Response:
We have worked closely with Xoserve with regard to this dataset, and they are confident that the data provided to us is the most accurate that they have. If the Shippers have additional information that could improve accuracy further we will be glad to receive it. Data has also now been received from Xoserve regarding the number of sites that have a meter and are believed to actually be burning gas, and this has proved to be fit for purpose.

Question/Issue:
56. We believe the AUGE may experience difficulties however with the proposed approach to assess the proportion of sites which have seen an advance on the meter index from "zero" given the lack of robust data. It is our understanding for example that xoserve, having rejected the metering flows sent by the Shipper for these sites, will not hold installation or read data, and that this may frustrate the proposed approach. We instead recommend that the AUGE analyse the AQ data provided when the site was originally nominated.

Response:
As described in the response to Issue 55, Xoserve have been able to provide such data. It has been reviewed and is fit for purpose, and therefore no problems are anticipated with this area of the analysis.

Question/Issue:
57. With regard to sites classified as legitimately unregistered, we dispute the argument that all these sites will have no meter and are therefore unable to generate unidentified gas. Unregistered sites are merely defined as sites without a registered Shipper and have not previously been registered by a Shipper. To this end there is no reason why such a site cannot exist without a meter and without burning gas. This includes those considered to be "legitimately" unregistered, where the assessment of legitimacy is based only on assumptions. We therefore ask the AUGE to complete some analysis, perhaps involving site visits, on supply points within this pot to determine how many genuinely have no meter and are not burning gas before they draft their final AUGS.

Response:
We have worked closely with Xoserve regarding the "Legitimately Unregistered" dataset, and are happy that it contains the most accurate information available. Legitimately Unregistered sites form a subset of the full Unregistered category: those either confirmed to have meters or believed to have meters fall into "Passed to Shipper", "Shipper Specific Report", or "Shipperless for <12 Months" categories. Those believed to have no meter are listed as "Legitimately Unregistered". Just as for Shipper Activity and Orphaned sites, it is accepted that the dataset will contain some errors. We have to work with the most accurate data available, however, and we believe that the information from Xoserve provides this. If more accurate information is available from another source we would be pleased to use it, although site visits are beyond the scope of work currently agreed for the AUGE.

Question/Issue:

58. Analysis of xoserve's data shows there to be unregistered and shipperless LSP sites with significant scale of usage. The latest data shows that the aggregate AQ of orphaned LSP sites believed to have a meter present to be 939 GWh, and the aggregate AQ of LSP Shipperless sites to be 129 GWh. This was reinforced by xoserve at a recent industry forum when they presented data showing that the total Orphaned population had an aggregate AQ in excess of 1000 GWh and that LSPs made up approximately 18% of those sites, with a much larger share of the aggregate AQ.

Response:

AQs will be taken into account in the calculations, and so the correct consumption split between the LSP and SSP market sectors will be achieved.

Question/Issue:

59. Whilst we accept that a small proportion of the orphaned sites may be attributable to data errors, for example meters which are already registered under an alternative MPRN, the data suggests that the amount of unidentified gas generated by Shipperless LSP sites alone could be as much as £2m per annum , with Orphaned "believed to have a meter" sites contributing more to unidentified gas; potentially as much as £15m per annum. Given the size of this cause of unidentified gas, we believe the AUGE should work closely with xoserve to get the data it needs in advance of the final AUGS.

Response:

The AUGE recognises the scale of this issue and is working closely with Xoserve in order to ensure that all of the necessary data is obtained.

Question/Issue:

60. We do not agree with the AUGE's understanding that "it is not possible for a site to exist and be taking gas within a CSEP without it being registered on the relevant iGT system" and are surprised that given this claim is central to their findings in this area the statement is not substantiated. It is our view that it is just as possible for individual sites on iGT networks to become unregistered as it is on other networks, and that, given the prevalence of new build SSP and LSP properties on iGTs, the risk of unregistered and shipperless sites is actually higher than average.

Response:

This information was supplied to the AUGE by Xoserve in good faith, but it is now recognised that it is incorrect. Data regarding unregistered sites on CSEPs has been requested from Xoserve. This has been partially received and full data is expected to be available shortly. Given that it is now accepted that unregistered sites on CSEPs do exist, the analysis will be amended accordingly.

Question/Issue:

61. We therefore believe the AUGE should use the opportunity afforded to them by this consultation process to either substantiate this point or take steps to estimate the scale of the issue, potentially by extrapolating out from known unregistered and shipperless data from the large Network Owners if iGT data is not made available. Were this not to happen then any unregistered site burning gas within a CSEP would continue to create unidentified gas which has the potential to be incorrectly allocated, undermining the validity of the AUGS in the process.

Response:

Covered by response to Issue 60.

Question/Issue:

62. We understand the rationale behind the AUGE's intention to use average CSEP composition from known iGT networks to infer data for unknown iGT networks, and hope that this will not be necessary. If a lack of response from iGT network does make this necessary however, we expect to see accompanying evidence from the AUGE which demonstrated the degree to which those known iGT networks were representative, or not, of the overall picture.

Response:

The AUGE received responses to the data request from two iGTs, both of whom expressed support for the project but pointed us towards Xoserve for our data. Xoserve can supply raw data regarding unregistered sites on known CSEPs, but their information about CSEPs not present on their system is limited to the summary information in the "Unrecognised Projects" report. Therefore the composition of the networks that are in this report remains unknown and cannot be retrieved, and it will therefore be necessary to estimate the composition of these unknown CSEPs using the average composition of known ones. Given that we are having to take this step due to the unavailability of data about the unknown CSEPs, it will unfortunately not be possible to quantify how accurately this "average composition" reflects the true nature of the unrecognised projects.

Queries From	E.ON
Date Received	23/05/2011
Date of Response	31/05/2011

AUGS Text (Section 4.2):
"…The AUGE believe that the assumption that the RbD value is composed largely of Unidentified Gas (as was put forward in modifications 228 and 228A) is not valid…."

Question/Issue:
Given that the amount of UG is not currently known but the value of reconciled gas is known, can the AUGE explain the rationale for making the above assertion?

Response:
This assertion comes from an analysis of worked examples of the Mod 228/228A methodology. Note that at this stage these examples are based on data from the TPA Solutions assessment of these Mods, due to the fact that full data has not yet been supplied to the AUGE. Once full data has been received, no reference to TPA figures will be made and all figures quoted will be from the AUGE's own analysis.

The allocation algorithms that produce the deemed load for both SSP and NDM LSP markets are statistical models. As such they are subject to error, because every naturally-occurring process contains random variation (known statistically as "common cause variation"), which is due to unknown causes and natural fluctuations in the process. Gas demand is such a process, and the AUGE has several decades of experience working with demand forecasting issues. This experience leads to the knowledge that such common-cause variation exists, and also to a general appreciation of its likely magnitude.

The presence of this common cause variation in the deeming algorithm process means that even if the input data used (e.g. AQ) is perfect, the output will not equal actual demand – there will always be an error component. RbD introduces "actual" LSP loads, which means that at this point model error is eliminated from the sector load estimates. RbD is the quantity that redresses the difference between deemed and metered LSP load, and hence in addition to containing Unidentified Gas, it must by definition also contain the model error. Hence the question is not whether RbD contains a model error component or not, because we know that it does. The question is how much of RbD corresponds to model error and how much is left representing Unidentified Gas.

Mods 288 and 228A contain no recognition of this model error element of the RbD quantity, which is one reason for questioning their validity.

The AUGE believes that the assumption that RbD is largely composed of Unidentified Gas is invalid due to the statistical behaviour of the data when such an assumption is made. The reasons

are mostly connected with the calculation of theft as the "balancing factor" and the fact that no allowance is made for model error. Mods 228/228A make a small allowance for "genuine reconciliation" based on AQ drift, but this once again carries an inherent assumption that if the correct AQs are supplied to the deeming algorithms, the output will be perfect, which is not the case. The remainder of RbD is split between a number of causes, with most calculated directly and theft calculated by subtraction at the end. The figures for theft that this process produces (taken from the worked examples) are unrealistic for a number of reasons:

- The calculated value of theft across four years (06/07 to 09/10) hits a peak of 1.4% of throughput. This is five times higher than the theft estimate contained in Section N of the UNC, and is 350 times higher than the level of shipper-responsible detected theft calculated by Xoserve. This suggests that the values of theft calculated using this methodology are too high and hence are likely to contain another factor, whose values are higher than the actual theft figures.

- It is reasonable to assume that theft varies with throughput, and that these two variables are positively correlated. The theft figures in the worked examples have a very high level of variation, however, in one case rising by 67% from one year to the next, and in another dropping by 48% from one year to the next whilst throughput remains relatively constant. In addition, the variation present appears to be random. This suggests that the additional factor identified above is model error, for two reasons:
  - model error must make up part of the catch-all balancing factor, because it is known to exist and it is not accounted for elsewhere in the calculation
  - model error, by definition, varies randomly, and this is how the balancing factor is behaving

  The size of the variation suggests that the randomly varying model error element is larger than the theft element.

- In the worked examples, the "balancing factor" accounts for an average of 56% of the RbD quantity. Hence if a large proportion of this is actually model error, it follows that a significant proportion of RbD in total is also accounted for by model error.

If certain assumptions are made about the likely level of true theft, an estimate of the proportion of RbD that is actually composed of model error can be made. If true shipper-responsible theft lies at the UNC level of 0.28% of throughput (i.e. 0.3% minus the 0.02% that is assumed to be transporter-responsible theft), it can be calculated that, on average, 42% of RbD is composed of model error. The maximum for any individual year is 58%.

It should be noted that RbD values are positive on approximately 80% of occasions. If up to half of it is randomly-varying model error, this result indicates that the error in question is positive more often than it is negative, i.e. it is skewed towards the LSP market. This is accounted for by the fact that across the four formula years from 2005/06 to 2008/09, AQs for the SSP sector exceeded weather corrected demands by an average of 1.8%, whilst the for LSP sector, AQs exceeded

weather corrected demands by an average of 8.9%. This skews the allocations (and hence model error) towards LSP and hence results in RbD being positive more often than negative.

Finally, given that RbD is positive on 80% of occasions, it is by definition negative on 20% of occasions. When this occurs, the Mod 228/228A methodology splits what is now a negative RbD value into Unidentified Gas sources, leading to negative figures for theft, shipperless consumption and unregistered CSEP consumption. The physical lower bound for these is zero, however, and so the production of such negative values indicates once more that a factor has been left out of the calculation. This factor is the randomly-varying model error that evidence suggests makes up a significant part of the balancing factor.

AUGS Text (Section 6.3):
"…Xoserve understands that it is not possible for a site to exist and be taking gas within a CSEP without it being registered on the relevant IGT system, and hence this area is ruled out as a source of Unidentified Gas…"

Question/Issue:
Given that it is known and accepted that unregistered sites exist on DN primary networks can the AUGE explain why it is assumed that unregistered sites cannot exist within a IGT system? CSEPs may be 'nested' and therefore control of the registered supply points may prove problematic, can the AUGE query this with Xoserve please.

Response:
The understanding that it is not possible for a site to exist and be taking gas within a CSEP without it being registered on the relevant IGT system was provided to the AUGE by Xoserve in good faith. Since the validity of this assumption was questioned at the UNCC meeting on 16th May, this area is being investigated further. The issue has been raised with Xoserve and a response is awaited. If it is found that unregistered LSP sites do exist and take gas from CSEPs, options will be investigated for including this element in the Unidentified Gas calculation. Unregistered SSP sites on CSEPs do not affect the calculation as RbD automatically assigns them to the SSP sector at present, which is the correct location for such demands. Therefore, if it is found that only SSP sites are affected, no action is required.

AUGS Text (Section 6.5):
"…Metering errors (at both the LDZ entry points and the supply points) can have an effect on the calculated loads for each market sector if there is found to be a non-zero bias over time. Any such bias should be dealt with as a correction to RbD rather than UG,…"

Question/Issue:
We understand how meter errors at LDZ entry points affect the SSP market sector and how they are corrected via the RbD process. We do not understand how meter errors at supply points can be dealt with via this process. The RbD process adjusts for modelling versus actual usage. Supply

point meter errors will affect the accuracy of actual usage only. Can the AUGE explain their rationale for this assertion ?

Response:
Unidentified Gas is a physical quantity of gas that has been burned somewhere in an unrecorded manner. Hence theft, shipperless sites, unregistered CSEPs etc all clearly fall into this category. Meter error works in a different way, in that whilst negative errors (under-reads) do result in unrecorded gas being burnt, positive errors (over-reads) have the opposite effect. Therefore meter error is somewhat different to other components of Unidentified Gas.

In is agreed that the RbD process adjusts for the difference between deemed and actual consumption at NDM LSP sites. However, this means that by definition the accuracy of the metering at these sites directly affects the calculation. If, for example, LSP meters were known to over-read by an average of x%, the true consumption at LSP sites equals the metered consumption minus x%. It is this true consumption that should be taken forward into the remainder of the RbD calculation, and hence it is at this point (i.e. during the RbD process) that any such metering error adjustments should be made.

Both LDZ entry point meter errors and DM meter errors affect the RbD quantity in a similar manner, as they directly affect the calculation of total SSP plus NDM LSP load (i.e. total LDZ load minus shrinkage and DM load). Hence the optimal place to adjust for these errors is also during the RbD calculation.

AUGS Text (Section 6.5):
"…The AUGE understands that LDZ meters and LSP meters are regularly checked and maintained and demonstrate no particular bias in metering error. The LSP meters are of different construction to SSP meters, in that they are typically of a rotary/turbine meter type and constructed of parts less likely to distort over time. When there have been incidents of large scale metering error these are corrected accordingly. SSP meters contain a diaphragm which can warp over time and therefore can have a longer term drift effect. As this investigation is aimed at establishing UG particularly for the LSP market, and SSP metering will not be used in the formulation of the estimate of UG, any potential bias in the SSP meters will have no effect and therefore can be ignored…"

Question/Issue:
We do not believe that this is a correct statement. Diaphragm type meters are subject to a regular (20 year) replacement programme but not to any in service testing. Rotary Positive Displacement meters are maintained from a mechanical perspective (oil change) but as is also the case with Rotary Turbine meters, are not subject to any in service testing. LSP meters consist of Rotary meters described above and also larger diaphragm type. As far as we understand the only large scale errors identified are those involving LDZ input meters which are subject to an in service test regime.

However our concern is not that meters are inaccurate *per se* but that there is potential for gas at low flow rates through large rotary meters to be measured inaccurately or without being registered at all. This due to the fact that these types of meters are designed to measure accurately within a defined flow rate band width. These meter installations are originally designed to cater for maximum flow rates. Recent years have seen a downturn in industrial output with corresponding reduction in industrial gas usage. In addition industrial premises that have ceased production or changed ownership are likely to be consuming considerably less gas which will continue to be measured by the original metering equipment. As a consequence we believe that there is potential for widespread under measurement.

Response:
The AUGE recognises that this statement in the AUGS is a simplification of the actual situation, and that sites at the lower end of the LSP market do have diaphragm meters. It was never the AUGE's intention to suggest that such meters are subject to regular maintenance, as this was a reference to the simplified case presented as SSP = diaphragm, LSP = rotary. The wording of the AUGS will be changed to reflect the actual situation more closely.

The potential for flows to be recorded inaccurately or not at all due to changing on-site conditions resulting in the meter being inappropriate for flow conditions has not been considered up to this stage. Further investigation will take place with regard to this issue. It remains the case, however, that such errors are best dealt with during the RbD calculation for the reasons given in the response above. The particular situation described does always lead to meter under-read rather than over-read, however, and hence any such quantities, should they be shown to exist, could be included in the Unidentified Gas calculation as an alternative. Discussions will be held with Xoserve on this issue with regard to the availability of data, and a way forward will be established.

AUGS Text (Section 6.5):
Mods 194/194A and 228/228A noted that a consensus had been reached that no such long-term bias exists and metering error does not contribute to Unidentified Gas or RbD error over time.

Question/Issue:
We are not aware that the above Mods reached any such consensus. In any event without a full investigation and analysis of the issues as described above we do see how any conclusions can be drawn.

Response:
The text referred to in the AUGS relates to the following section of Mod 228:

- Supply point metering

Consensus was reached via discussions at the modification 194 development workgroup that there is **potential** for measurement errors to be caused by supply point metering.

However there was no evidence presented to demonstrate that supply point metering had an adverse impact on RbD. Nor was any evidence or rationale presented to demonstrate that any one market classification made a greater contribution to supply point metering and measurement errors than the other. Our assumption is that supply point metering does not contribute to NDM error.

- LDZ off take metering

Consensus was reached via discussions at the modification 194 development group that there is **potential** for measurement errors to be caused by LDZ offtake metering.

Any error in the measurement of gas entering the system would, so long as undiscovered, simply distort the true level of NDM error. The costs and benefits associated with any under-statement or over statement of gas entering the system should be borne by all sectors.

However our primary assumption is that overall there is not an over or under registration of gas entering the system.

This extract implies that consensus was reached with regard to the impact of both supply point and LDZ offtake metering on RbD/Unidentified Gas. Therefore, the statement in the AUGS was simply there to note that our conclusions were the same as those drawn by previous analyses. Having said this, the issue of inappropriate meter size will be investigated, and this may affect this conclusion. The wording of the AUGS will be updated dependent on the outcome of this investigation.

GL Noble Denton

Queries From	National Grid Transmission
Date Received	6/5/2011
Date of Response	2nd Draft AUGS

Question/Issue:
One possible source of shrinkage that is not mentioned in the draft paper, are CV shrinkage issues that could be introduced at inter-LDZ transfer points. Some of these sites rely on an assumed gas composition rather than measured data, where gas crosses between LDZs. This of course means there is the potential for shrinkage on each of these sites, affecting the figures used for LDZ stock changes.

Compared to leaks, etc. this is likely to be a small effect but it might be worth taking account of it?

Response:
This has been included in the 2nd draft AUGS as a potential additional source of UG. Data has been requested in order to judge its significance.

GL Noble Denton

Queries From	EDF Energy
Date Received	16/6/2011
Date of Response	2nd Draft AUGS

Question/Issue:
Shrinkage Methodology: Although any updates to the methodology are approved by OFGEM, we believe that further analysis is required to demonstrate that the shrinkage methodology is not giving rise to UAG that should be covered by the transporters. In particular we note that a lot of the assumptions and parameters within the shrinkage methodology have not been updated for almost 9 years, whilst over factors (such as theft at 0.3) were arrived at by negotiation rather than using known figures or facts.

Response:
See 2nd draft of AUGS.

Question/Issue:
Bypass Valves: We believe that further work and analysis is required to identify whether unreported bypass valves are a significant contributing factor to UAG. We have heard anecdotal evidence that the presence of open bypass valves are a lot more prevalent than the figures held by Xoserve suggest, and so is a contributing factor to UAG.

Response:
Open bypass valves are included in the new UG calculation via the Balancing Factor. Given the nature of this issue and the lack of data surrounding it, a direct estimate of Unidentified Gas from this source would be difficult to calculate. Therefore, as in the case of theft, the Balancing Factor is the most appropriate place to include it.

Question/Issue:
Reliance on TPA data/Analysis: We are concerned that the AUG Statement refers to data provided by TPA in their report for ICOSS. We have significant concerns with reliance on this data or report, given that it was commissioned by parties with an explicit interest in the UAG process. We do not believe that any reliance should be placed on this data without significant verification and substantiation.

Response:
See response to British Gas issue 15 above.

GL Noble Denton

Queries From	Scottish Power
Date Received	17/6/2011
Date of Response	2nd Draft AUGS

Question/Issue:
On a separate point we are disappointed that the AUGE has stated that they do not consider meter error as contributing to unidentified gas. We are unclear what evidence has been provided that confirms that there is no long term bias in one direction. We would ask the AUGE to share this as part of their findings in order to resolve the issue, or if no such evidence is available, to extend their investigations to include this.

Response:
The 2nd draft of the AUGS now contains a more thorough discussion of meter error and its potential contribution to UG.

Queries From	GDF Suez
Date Received	16/6/2011
Date of Response	2nd Draft AUGS

Question/Issue:
In general it would be useful to review the current industry processes as many of the sources of unidentified gas arise from deficiencies in the processes.

Response:
Noted. The current analysis is aimed at understanding and quantifying UG. If industry processes can be improved to reduce the overall quantity of UG then this is of benefit as it reduces the potential size of error in the UG estimate. However, given estimates of UG are necessarily based on historical data there is a danger that changing processes will reduce the level of UG but that the estimates do not reflect this reduction. It may therefore be of benefit to consider the potential change in UG from one year (i.e. the training year) to the next (i.e. the application year) when making calculations. This assessment will be undertaken for future releases of the AUGS.

Question/Issue:
It may be appropriate to review the opening meter read process. The industry may be better served by Xoserve taking a more robust role in policing opening reads for new meters. The assumption should be meters start from zero unless there is compelling evidence to the contrary. Clearly if the customer has just moved into a premise then their opening would not be zero. However, there are cases where this is unlikely and the read has been changed.

Response:
This process issue has been noted. Whilst this is a general issue regarding control over meter reads, it does not directly affect the AUGE's calculations of Unidentified Gas, and hence no changes are required to current methods as a result.

Question/Issue:
The industry process where meters are installed without a supplier can lead to a situation whereby consumers are taking gas without paying for it. We learn of meters being installed by MAM's trying to charge us for sites where we have no customer contract. Customers inform us, but it is unclear when the meter was installed. There may be something to learn from the MRA process in electricity where a supply contract must be in place prior to a meter being installed. If this process were applied to gas this may result in a significant reduction in Unidentified Gas.

Response:
This process is one of the major contributors to the Unregistered and Shipperless element of the Unidentified Gas calculation. The level of UG resultant from current processes is calculated as

accurately as possible, and should processes change and the quantity of UG reduce, the AUGE's calculations will reflect this.

Question/Issue:
Within the current industry processes MAMs install or exchange existing meters on the instruction of the customer without informing the supplier. This is especially true of newer MAMs. If MAMs were obliged to inform the supplier then the process and data quality could be substantially improved.

Response:
This issue is noted. The AUGE will ensure that should processes change in this manner, Unidentified Gas estimates will also change to reflect this.

Question/Issue:
We would be keen to see a uniform improvement to the standards for IGTs. Bringing the industry processes and file flow formats into line with the larger transporters would be helpful to improve data quality. There is currently little incentive for the IGTs to improve performance as their revenues are largely immune from the impact of gas usage hence there is little interest from this sector to deal with metering problems in a timely manner. We have had instances where resolving meter problems have taken over a year; during this time the meter would not be properly recording. Better standards of service from IGTs would be beneficial.

Response:
Unidentified Gas arising from IGT networks is calculated directly under the latest UG methodology. The nature of the process introduced by Mod 229 means that UG estimates will be updated year on year rather than remaining fixed, so any changes in the level of UG from CSEPs will be included in calculations as and when they occur.