Fair allocation of unidentified gas: Phase I

A NOTE FOR CENTRICA

Introduction and objectives

Unidentified gas is gas which is lost from the distribution system without being recorded as consumed. In order to determine a fair allocation of the costs of unidentified gas, an Allocation of Unidentified Gas Expert (AUGE) has been appointed[1]. On 4th May 2011, the AUGE published its first statement, outlining its proposed methodology for allocating unidentified gas between those shippers that convey gas to larger customers and those that convey gas to smaller customers.

We have been commissioned by Centrica to review the AUGE's proposed methodology in two stages. The purpose of this first note is to provide early feedback on the AUGE's approach. We then intend to produce a further paper with more detailed analysis before the AUGE's second consultation closes in late August this year.

This note covers the following three areas:

- first we provide an overview of the current system for allocating gas consumption across the larger and smaller supply point sectors;
- we then set out the AUGE's proposed methodology for allocating unidentified gas between sectors and provide our initial feedback on this methodology; and
- finally, we summarise our initial conclusions to date.

Overview of the current system for allocating unidentified gas

In this section we set out the current approach to estimating consumption across the larger and smaller supply point sectors. We then outline the rationale for reforming this approach.

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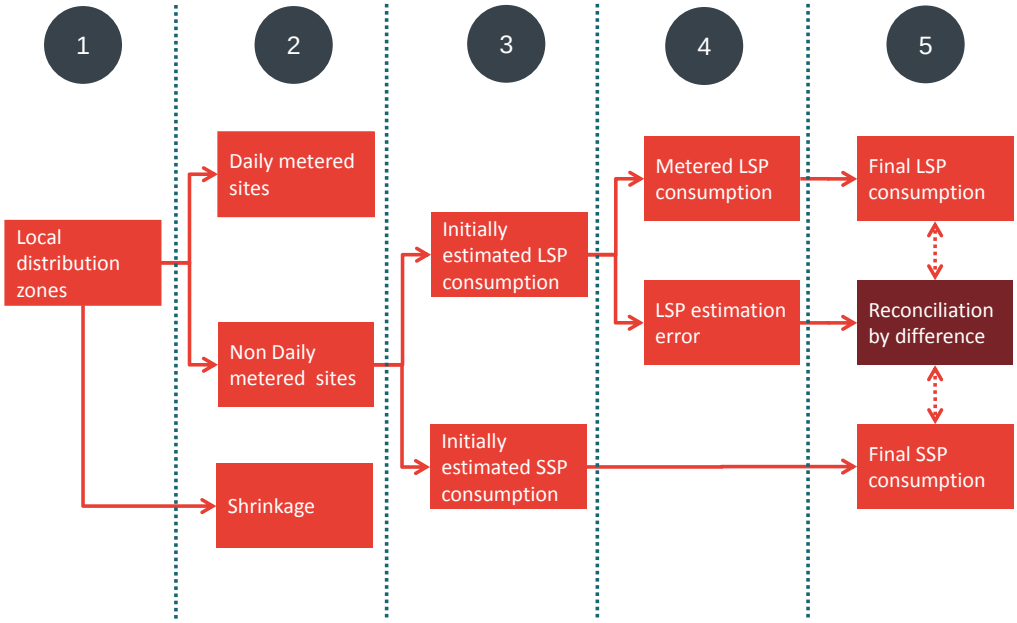
1 *UNC 229, Mechanism for correct apportionment of unidentified gas*, Joint Office of Gas Transporters, proposed on 20/05/2009 and accepted by Ofgem on 26/05/2010, http://www.gasgovernance.co.uk/0229. This modification proposal introduced a table to the UNC which will apportion a fixed volume of unidentified gas to the larger supply point sectors. It also introduced a requirement for an independent expert (the AUGE) to apportion values within this table on an enduring basis.

Measurement of LSP and SSP gas consumption under the current system

Figure 1 sets out the current approach to estimating consumption across the larger supply point (LSP) and smaller supply point (SSP) sectors[2].

Figure 1. Current system for estimating consumption



Source: Frontier Economics

There are five stages to this allocation:

1. Gas is metered on a daily basis as it enters the local distribution zone (LDZ).
2. The volume metered at the LDZ is adjusted for estimated shrinkage[3] on the LDZ and for consumption at daily metered sites to give total non-daily metered (NDM) consumption.
3. NDM consumption is then split between NDM LSPs and SSPs to give estimated (or deemed) consumption in each sector. The split is based on algorithms and is a function of, amongst other things, estimated gas annual offtake at each point in a year (AQs), end user categories (EUCs) and weather adjustments.

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2 LSP and SSP sectors are defined by the estimated quantity of gas offtake at each point in a year, known as the Annual Quantity (AQ). LSPs have an AQ of 73,201 kWh and above. SSPs have an AQ of up to 73,200 kWh a year.

3 Shrinkage is deducted from the total net gas throughput from the LDZ and consists of leakage, own use gas and transporter theft. We discuss its estimation in more detail below.

4. Most LSP meters are read at least once a year, so metered consumption for LSPs is known at the end of each year[4]. The LSP estimation error, that is the difference between the initial estimates of LSP consumption and LSP meter reads, is calculated at this stage.

5. The final estimate of SSP consumption is then calculated by assuming that any NDM gas not accounted for by LSP metered consumption has been consumed at SSPs. The LSP estimation error determines the Reconcilliation by Difference (RbD) transfer. This transfer is made each year between LSP and SSP shippers[5]. In theory, it could be a credit or debit to either sector (and will be an equal and opposite credit or debit to the other sector). In the absence of unidentified gas, or any bias in the algorithm process, over time, it should average to zero for each sector.

LSP shippers thus pay for their metered quantity of consumption, while SSP shippers pay for all gas entering the LDZ that is not accounted for elsewhere. In practice, the RbD has been a debit to SSPs and a credit to LSPs, to the equivalent of around 10-12 TWh annually.

The problem of unidentified gas

The presence of unidentified gas means that this system penalises SSPs. Unidentified gas is gas which is lost from the distribution system, after the LDZ metering point, and after adjustment for shrinkage, but before the gas can be recorded as consumed.

Because SSP shippers pay the residual of other metered consumption (specifically consumption metered at daily metered sites and LSPs), the cost of any unidentified gas in the system will fall to them (Figure 2). Given that some unidentified gas may actually be attributable to LSPs (for example, if it is due to gas stolen at LSPs or consumed by unregistered LSPs), the presence of unidentified gas in the system may thus mean that SSP shippers are paying for more than their fair share of gas. In recognition of the potential unfairness of this system, the AUGE has been appointed to estimate how much unidentified gas should be attributed to the LSP sector.

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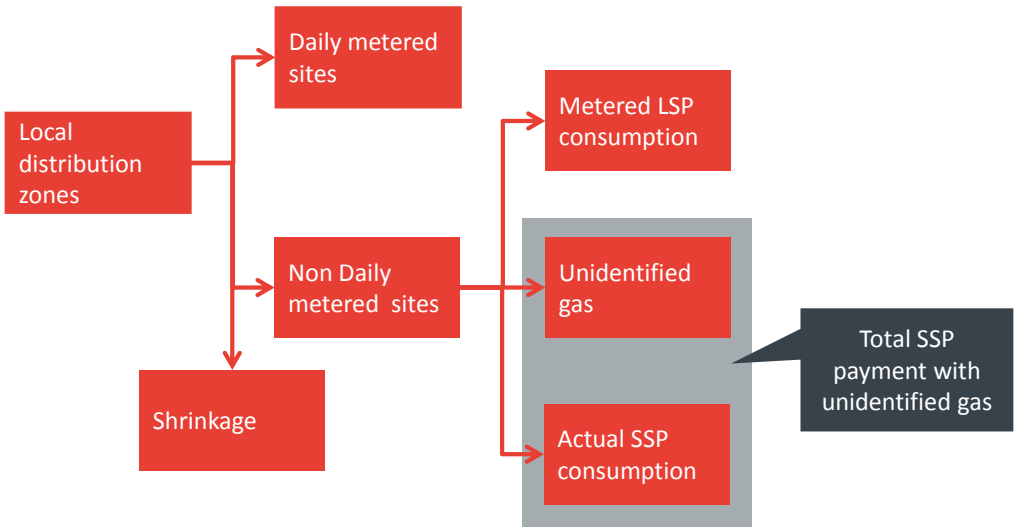
4 We note that in practice, a certain proportion of LSP meter readings are not submitted to the reconcilliation process each year. We discuss this issue further below.

5 We note that the RbD payment in any given year can contain reconcilliation payments from up to five years previously.

Figure 2. Current allocation of unidentified gas



Source: Frontier Economics

There are at least seven potential sources of unidentified gas.

- **Shipper responsible theft:** Gas which is stolen at metering points contributes to unidentified gas, as its consumption will not have been recorded at any point.[6]

- **Unregistered, shipperless or unknown sites:** Some sites flow gas but do not appear in the Site and Meters database. Others sites flow gas and appear in the database but are not registered to a shipper. Any consumption at both categories of sites will not be recorded, so any gas that is consumed at these sites will add to the quantity of unidentified gas.

- **Independent Gas Transporters (IGT) measurement errors:** Connected System Exit Points (CSEPs) are small networks owned by IGTs. Registration errors mean that some CSEPs or loads within CSEPs may not be recognised by the system. Any consumption from these unrecognised loads will contribute to unidentified gas.

- **Error in the estimation of shrinkage:** Shrinkage is gas lost after LDZ metering due to leakage, own use or transporter responsible theft (theft from the mains). Shrinkage is currently estimated based on total throughput,

6 Gas which is stolen from the mains however is the responsibility of the gas transporters and falls into the category of shrinkage.

sampled data on leakage and assumptions on the level of own use and theft from the mains. Any over or underestimate of shrinkage will reduce or increase the total quantity of unidentified gas.

- **Unreconciled LSP points:** Although the working hypothesis of the current allocation is that all LSPs are metered in any one year, this is in fact not the case. Those LSPs that are not reconciled will instead pay for the amount of consumption estimated by the algorithm process. If the algorithm under or overestimates their actual consumption, the error will add to or reduce the quantity unidentified gas in the system at any one point in time.

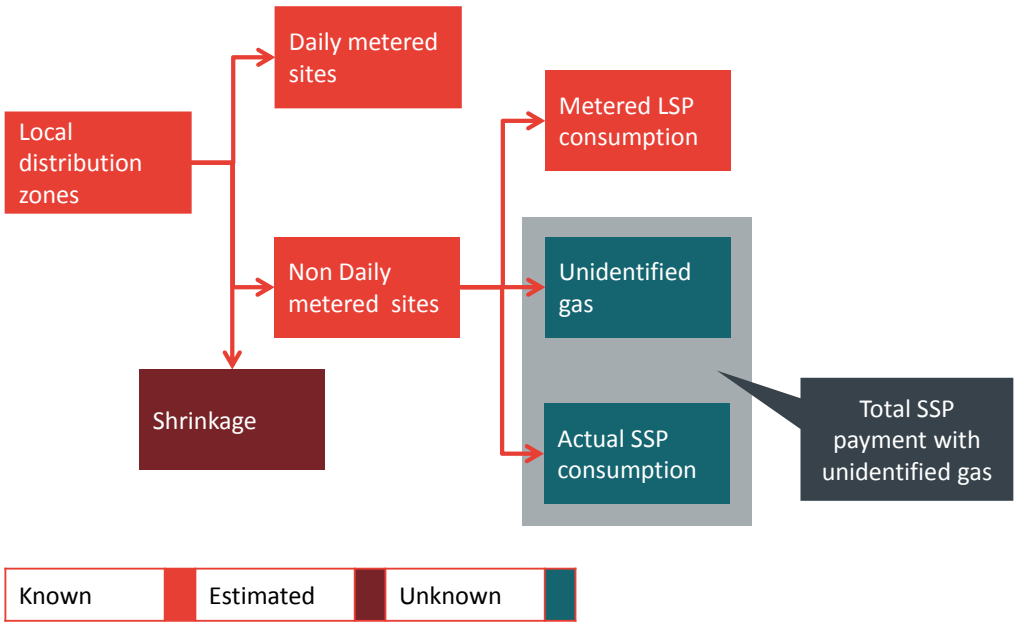
- **Metering errors:** Any metering errors at the LDZ or the LSP level will contribute to unidentified gas**.** For example, if LDZ meters overestimate gas that enters each LDZ, the quantity of gas thought to be in the system, but not recorded at any consumption point will increase. If LSP meters overestimate consumption, the quantity of unidentified gas will decrease.

- **Stock change:** Stock change is the difference between opening and closing stock on a given day. Any difference in stock between the opening and closing day of a given year could add or reduce unidentified gas.

Estimating unidentified gas

Figure 3 illustrates that more than one unknown component of total gas consumption is involved in the allocation of consumption across LSP and SSP sectors.

Figure 3. Estimating unidentified gas



Source: Frontier Economics

Given these two unknown elements, there are two alternative approaches to estimating the annual quantities of unidentified gas.

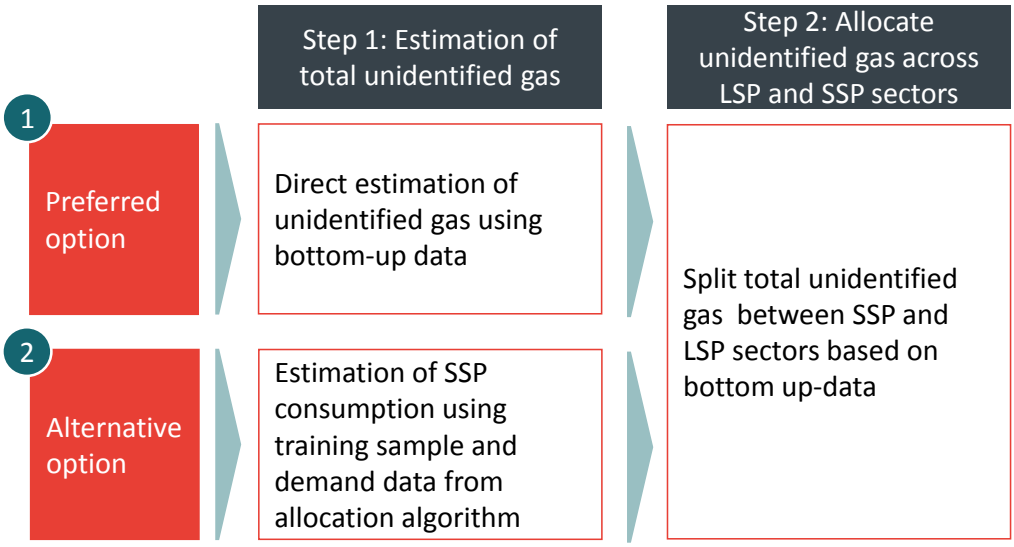
- **Top-down approach:** Total unidentified gas can be estimated as the residual of gas that is recorded as consumed. This approach would require knowledge of both SSP and LSP actual consumption. Here the difference between metered injection onto the LDZs and the sum of consumption of LSPs and SSPs would define the overall value of unidentified gas. In this case, total unidentified gas could be allocated between the LSP and SSP sectors, for example, based on throughput and the characteristics of each sector.

- **Bottom-up approach:** Unidentified gas (in total and by sector) can be estimated directly by estimating the quantity and incidence of each of the potential components set out above.

Overview of the AUGE's methodology

The AUGE has stated that its preferred approach to estimating unidentified gas is to undertake a bottom-up analysis. However, it recognises that data constraints may prevent this from yielding an accurate estimate. Depending on data constraints, the AUGE may thus follow an alternative top-down approach (Figure 4).

Figure 4. Overview of the AUGE's proposed approach



Source: Frontier Economics

We now comment on the AUGE's proposed approach in the following areas:

- reliance on previous analysis;
- scope of the bottom-up analysis;
- review of proposed methodology for each element of the bottom-up analysis; and
- review of the top-down methodology.

Reliance on previous analysis

The AUGE has stated up front that "*the RbD quantity, whilst containing an element of Unidentified Gas, is largely composed of model error.*"[7] By model error, the AUGE means the difference between actual demand, and demand estimated in advance by the algorithm at LSPs and SSPs. If, for example, the algorithm predicting LSP consumption always overestimated LSP actual consumption, while the algorithm predicting SSP consumption was more accurate, or always underestimated SSP consumption, a credit to LSPs from SSPs would be expected each year, even in the absence of unidentified gas.

It is unclear why the AUGE have reached the conclusion that the RbD quantity is largely composed of model error. This conclusion may be based on analysis

7 AUGE Statement, 4th May 2011, p. 10, http://www.gasgovernance.co.uk/auge/state .

commissioned from TPA in 2010[8], some of which is cited in the AUGE document[9].

The 2010 TPA analysis compares AQs (a key component of the estimation of demand) to "*actual demand*" and "*weather corrected demand*" across the LSP and SSP sectors. The TPA analysis shows that since 2005, both LSP AQs and SSP AQs have been greater than "*actual demand*" and "*weather corrected demand*" in each sector.

According to this analysis, LSP AQs have been more positively biased than SSP AQs over the period in question. If the data on "*actual demand*" and "*weather corrected demand*" presented by TPA represented what was actually consumed at SSPs and LSPs, then this analysis would imply the AQs are skewing estimated demand towards LSPs. If estimated demand was skewed in this way, even in the absence of unidentified gas, the RbD would be likely to entail a debit to SSPs and a credit to LSPs each year.

However, our understanding is that the "*actual demand*" and "*weather corrected demand*" data presented by TPA do not represent what was actually consumed at supply points in each sector. The TPA analysis is based on data released by xoserve in December 2009[10]. These data measure actual throughput by LDZ by month. Throughput is then split between sectors as follows:

- DM consumption is metered.
- NDM demand is total throughput minus the DM consumption (and is therefore accurate in as far as the DM and LDZ metered consumption is accurate).
- NDM throughput is then broken down into SSP and LSP sectors, based not on meter reads, but on the allocation to each sector under the demand distribution process.

The figures referred to by TPA as "*actual demand*" therefore appear to represent estimated (or deemed) consumption, rather than metered LSP or SSP consumption (Figure 5).

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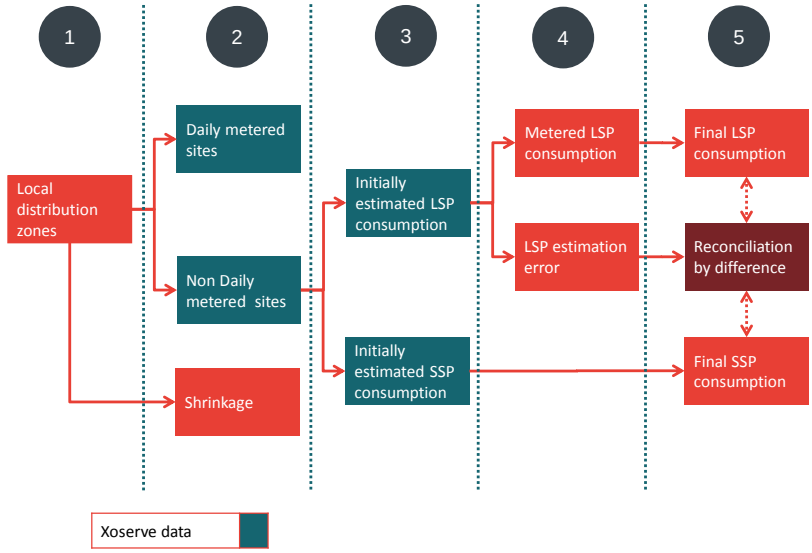
8 UNC Modification Proposals 0228 and 0228A – an assessment by TPA Solutions Limited, January 2010, http://www.ofgem.gov.uk/Licensing/GasCodes/UNC/Ias/Documents1/TPA%20response%20to%20Identification%20and%20Apportionment%20of%20Costs%20of%20Unidentified%20Gas.pdf This analysis was commissioned by members of the Industrial and Commercial Shipper and Supplier (ICoSS) Group.

9 AUGE Statement, 4th May 2011, p. 9, http://www.gasgovernance.co.uk/auge/state .

10 Xoserve, *Ofgem Data Request,* December 2009, Xoserve extranet, UK Link Documentation, folder 19, ODR1209_AQTotals_V3.xls, ODR1209_Aggregate_ConsumptionV2.xls.

Figure 5. Coverage of xoserve data



Source: Frontier Economics

Since unidentified gas has not been measured or allocated in this process, these estimated figures will still include unidentified gas. This is illustrated by the fact that total NDM throughput equals SSP "*actual consumption*" and LSP "*actual consumption*" in the numbers quoted by TPA (Figure 6).

Figure 6. TPA analysis of actual demand

Actual Demand	2005/6	2006/7	2007/8	2008/9
SSP AQ	403,896,092,043	399,887,548,698	385,273,784,540	374,757,728,913
SSP Cons.	393,810,792,339	348,149,387,734	374,759,609,667	363,476,234,922
Diff.	10,085,299,704	51,738,160,964	10,514,174,873	11,281,493,991
%	2.5%	12.9%	2.7%	3%
LSP AQ	168,682,432,319	158,985,763,389	150,425,700,6151	142,973,238,857
LSP Cons.	153,919,207,533	131,301,595,136	36,159,478,461	129,007,875,062
Diff.	14,763,224,786	27,684,168,253	14,266,222,154	13,965,363,795
%	8.8%	17.4%	9.5%	9.8%
LSP Act. – LSP WC	-1,700,238,511	-10,487,975,792	-3,562,493,786	387,321,267
DM AQ	198,851,148,316	109,351,587,792	101,569,044,641	102,814,686,822
DM Cons.	129,781,410,897	128,804,527,450	133,500,141,337	116,806,839,874
Diff.	69,069,737,419	-19,452,939,658	-31,931,096,696	-13,992,153,052
%	34.7%	-17.8%	-31.4%	-13.6%

NDM AQ	572,578,524,362	558,873,312,087	535,699,485,155	517,730,967,770
NDM SN Cons.	555,109,606,142	528,516,774,893	527,199,480,980	490,045,086,894
NDM AQ minus NDM SN	17,468,918,221	30,356,537,194	8,500,004,175	27,685,880,876
NDM Act. Cons.	547,729,999,872	479,450,982,870	510,919,088,128	492,484,109,984
NDM AQ minus NDM Act.	24,848,524,490	79,422,329,217	24,780,397,027	25,246,857,786

NDM Act Cons = SSP Cons + LSP Cons

Source: Frontier Economics based on TPA (2010), p 54-55[11].

We do not believe it is possible to draw conclusions on the accuracy of AQs (and therefore on the extent to which the RbD is made up of genuine model error) by comparing AQs to estimated consumption. In order to assess the accuracy of AQs, AQs would need to be compared to actual consumption in each sector. However, SSP actual consumption is not known. If SSP consumption were known, the total quantity of unidentified gas would be already known and the AUGE would not be required to investigate this.

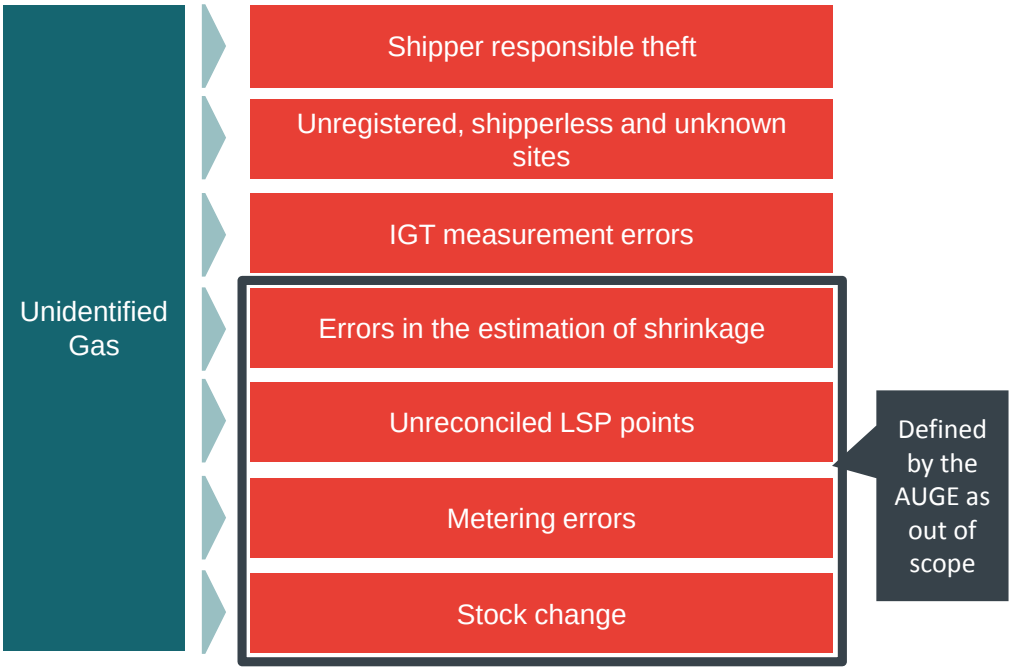
We therefore do not think it is possible to conclude that model error makes up the majority of the RbD based on the TPA analysis. We argue that the AUGE should not accept the conclusions of the TPA analysis on the makeup of the RbD without further interrogation of the underlying assumptions and data.

Scope of the bottom-up analysis

In this section, we comment on the overall scope of the AUGE's analysis. The AUGE has limited the scope of its analysis to exclude four potential components of unidentified gas (Figure 7). This section deals with each of these in turn.

11 UNC Modification Proposals 0228 and 0228A – an assessment by TPA Solutions Limited, January 2010, p. 54-55 http://www.ofgem.gov.uk/Licensing/GasCodes/UNC/Ias/Documents1/TPA%20response%20to%20Identification%20and%20Apportionment%20of%20Costs%20of%20Unidentified%20Gas.pdf,

Figure 7. Scope of the AUGE's bottom-up analysis

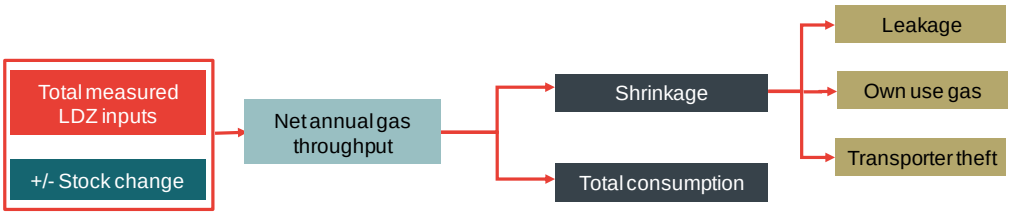


Source: Frontier Economics

Errors in the estimation of shrinkage

Shrinkage is deducted from the total net gas throughput from the LDZ and consists of leakage, own use gas and transporter theft, as shown in Figure 8 below.

Figure 8. Components of shrinkage



Source: Frontier Economics

Each of the above three components is estimated in December for the formula year ahead, based on forecasted dependent variables. At the end of the formula year these estimates are updated using actual variables. Any difference in the before and after formula year shrinkage estimates is accounted for in an adjustment between the SSP sector and the shrinkage account.

Any errors in the post-year shrinkage estimates will reduce or increase unidentified gas. For example, if shrinkage is underestimated, the gas assumed to have been consumed at NDM supply points will be overestimated. Since SSPs are assumed to consume the residual of measured consumption, they, rather than the transporters, will bear the cost of the underestimated shrinkage.

Each of the components of shrinkage is estimated as follows:

- **Leakage**: distribution mains and service leakage using the results from National Leakage Tests, GL Noble Denton, 2003, and AGI leakage derived from 2003 AGI tests (leakage accounts for virtually all of shrinkage);
- **Own use gas**: derived from Own Use Gas Model, GL Noble Denton, 2006, which applies a national average of 0. 0113% to total throughput; and
- **Transporter-responsible theft**: constant of 0.02% of LDZ throughput is attributed to transporter-responsible theft.

The AUGE proposes to exclude errors in the estimation of shrinkage from their estimation of unidentified gas on the basis that *"the current Shrinkage estimation system is fit for purpose and provides the most equitable solution available."*[12]

We would question this for the following reasons:

- distribution and mains service leakage continues to be estimated using the 2003 National Leakage Tests performed by GL Noble Denton and AGI leakage based on tests from 2003, which may now possibly not be fully reflective of current network installation programmes; and
- the figure of 0.02% of LDZ throughput assumed for transporter responsible theft is based on *"current consensus"* with no data cited to support it.

We also recognise that given shrinkage estimates are applied to the whole of throughput, small errors in the proportion of shrinkage could potentially have a major impact on unidentified gas. We therefore argue that the potential for errors in the estimation of shrinkage should be included in the AUGE's scope.

Unreconciled LSPs

We understand that a proportion of LSPs are not reconciled to meter reads on an annual basis.

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12 The AUGE (that is, GL Noble Denton) notes that "*each element of Shrinkage is already calculated using the most accurate information available, however, with estimates based on GL Noble Denton models for mains and service leakage, AGI leakage and OUG. Therefore, any corrections would be more likely to increase errors rather than decrease them.*" AUGE Statement, 4th May 2011, p. 17, http://www.gasgovernance.co.uk/auge/state .

The presence of unreconciled LSPs means that the volume of consumption for some LSPs is estimated rather than metered. If any LSP volume deemed under the algorithm process is not reconciled after five years, the opportunity to reconcile is removed, and thus the inaccuracy will persist.

Any difference between the estimated level of consumption and the actual level will contribute to unidentified gas and will be allocated to the SSP sector.

We therefore tend to believe that this category should be included within the AUGE's scope of work.

Metering errors

Metering errors[13] can occur at three different parts of the gas distribution process:

- LDZ
- LSPs; and
- SSPs.

A persistent level of metering error will cause the total quantum of gas for reconciliation at the end of the formula year to be incorrect, which will impact upon the level of unidentified gas and the sector allocations.

The AUGE has decided that metering errors will not contribute to unidentified gas, based on the following:

- LDZ and LSP meters are checked frequently and *"demonstrate no particular bias in metering error."*[14]
- LSP meters are constructed using different technology (rotary/turbine) to SSP meters and are less likely to develop errors over time; and
- though SSP meters are more likely to be biased, they are not relevant to the calculation of LSP unidentified gas.

In response, we would note that:

- there is evidence that LDZ meter errors can occur. For example, there are 43 current measurement errors listed in the Joint Office of Gas Governance Measurement Report Summary[15]. Given the volume of throughput at LDZs, even small errors can have a large impact. Even

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13 We are referring here to meters passing unregistered gas, rather than errors in taking a supplying meter readings.

14 AUGE Statement, 4th May 2011, p. 22, http://www.gasgovernance.co.uk/auge/state

15 http://www.gasgovernance.co.uk/MER

where these errors are later corrected for, the presence of unreconciled LSPs will mean that in the event of an LDZ under-measurement error, the LSP sector as a whole may pay less than it has actually consumed;

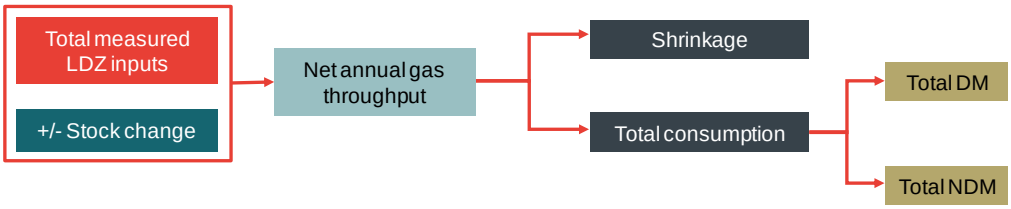
- no evidence is presented by the AUGE to show that meters based on rotary/turbine technology are more accurate than the typical SSP meter; and
- even if meters based on rotary/turbine technology were more accurate than the typical SSP meter, consumers can switch between being a SSP to being a LSP as their consumption of gas changes, without any change in their meter type. Therefore it may be the case that a significant number of LSP meters are exactly the same as SSP meters.

While we accept that metering errors are extremely challenging to detect and quantify, we do not agree that their exclusion from unidentified gas calculations is the correct course of action. We therefore would argue that the AUGE should consider including metering errors within its scope.

Stock change

Stock change is the difference between the pressure (or stock) of gas at opening and closing time on any given day in the gas calendar. The component of stock change to be incorporated in the RbD process will be the difference between the opening and closing stock in a gas year, as RbD is an annual process. Stock change can either be positive or negative, and is applied to the total measured LDZ input to derive the net annual gas level for sub-allocation, as shown in Figure 9.

Figure 9. Derivation of the level of net annual gas throughput



Source: Frontier Economics

The AUGE notes that *"any adjustment due to stock change (which in this case would be the difference in stock between the start of the UG year and the end of the UG year) will be negligible"*.[16] It has therefore proposed to exclude stock change from the scope of its analysis. We think this may be reasonable as our understanding is that stock

change can be no more than the difference between stock within a given day. It is therefore likely to be marginal in magnitude.

However, it would seem that deriving the magnitude of stock change would be a relatively straightforward task, given that opening and closing stock data is available. Demonstrating that stock change is negligible would be a useful and not particularly onerous task for the AUGE to perform.

Conclusions on scope

Overall therefore, we accept that stock change is likely to be negligible (as our understanding is that it can be no more than the difference between stock within a given day). However, we believe there may be reasons why errors in the estimation of shrinkage, unreconciled LSP points and metering errors should be included in the scope of the AUGE's analysis.

Review of the proposed methodology for estimation of each of the bottom-up elements within the AUGE's scope

This section presents our comments on the three categories of unidentified gas which the AUGE proposes to estimate:

- shipper responsible theft;
- unregistered, shipperless and unknown sites; and
- Independent Gas Transporter (IGT) measurement errors

Shipper responsible theft

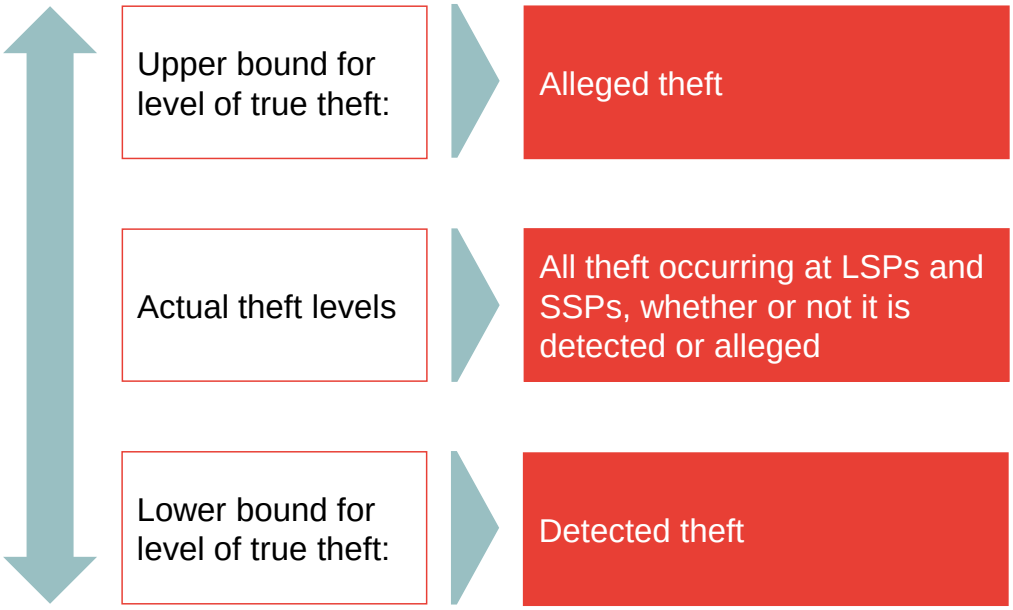
Gas which is stolen at metering points contributes to unidentified gas, as its consumption will not have been recorded at any point. Given theft is, by its nature, a hidden activity, its true levels will be very hard to estimate.

The AUGE recognises that theft is largely unknown but argues that boundaries can be placed around the true level using existing data sources: *"the problem with calculating theft levels is that the true level is unknown, with detected theft and alleged theft acting as lower and upper bounds respectively"* [17] (Figure 10). In order to place true levels of theft between the assumed upper and lower bounds, the AUGE states that it will "*attempt to link changes in theft detection rates with shipper initiatives.*"[18]

17 AUGE Statement, 4th May 2011, p. 21-22, http://www.gasgovernance.co.uk/auge/state

18 AUGE Statement, 4th May 2011, p. 21-22, http://www.gasgovernance.co.uk/auge/state

Figure 10. The AUGE's proposed boundaries around true levels of theft



Source: Frontier Economics

This approach seems on the face of it to be driven by the availability of data rather than on any clear rationale. There are a number of reasons why this approach is likely to underestimate total theft, and allocate proportionally too much theft to the SSP sector:

- **Detected theft levels may not be a good indication of actual theft levels:**
  - Theft of gas is very hard to detect as thieves have to be caught red-handed. Our understanding is that if perpetrators are given any notice of an inspection, the theft apparatus can be quickly dismantled.
  - Only one major supplier has an active detection unit. Our understanding is that most suppliers, on receiving an allegation of theft, will make an appointment with the customer to investigate it further. This gives the customer ample opportunity to hide the evidence of theft.
  - LSP shippers have no incentive to detect theft, since detection effort is costly and all of the costs of theft fall to the SSP sector.

- **Alleged theft is not an appropriate upper bound on actual levels of theft.** The AUGE notes that that shippers are obliged to inspect each meter at least every two years and to report suspected theft to the transporters. According to the AUGE "*assuming that these inspections are carried out properly, this should limit the level of unknown theft closer to the level of alleged theft and hence this is a suggested upper bound for theft.*"[19] We cannot see any obvious link between alleged theft and true levels of theft. It is perfectly possible that many thefts escape allegation. It is also possible that not all allegations are a sign of actual theft. On balance however, we believe that theft allegations are likely to underestimate true theft:
  - Theft allegations rely on meter readers and engineers spotting subtle signs like scratched or polished fittings, while operating under a system which we understand incentivises them to maximise the number of meters they read per day.
  - Meter readers and engineers are likely to underreport LSP signs of theft even more than SSP signs of theft. LSP meters are more diverse, and tend to be based on larger and more complex sites, so tampering is likely to be harder to spot.
- **Even detected theft under shipper initiatives will underestimate actual theft.** While using detection rates of shippers with theft detection initiatives will be an improvement on using sector-wide detection rates, we believe these data may still significantly underestimate true levels of theft, and may not accurately represent the split of theft between sectors:
  - Even under an active theft detection regime, given the difficulties around detection, a significant proportion of theft may be missed.
  - It is plausible that customers of companies with active theft detection units may steal less than customers of other suppliers.
  - Where theft detection units exist, theft detection officers may put differing amounts of effort into detecting theft at SSP and LSPs, for example if theft at one type of supply point is easier to detect.

We argue therefore that the AUGE's methodology for estimating theft requires further consideration.

Unregistered, shipperless and unknown sites

Some sites flow gas but do not appear in the Site and Meters database. Other sites flow gas and appear in the database but are not registered to a shipper. Any

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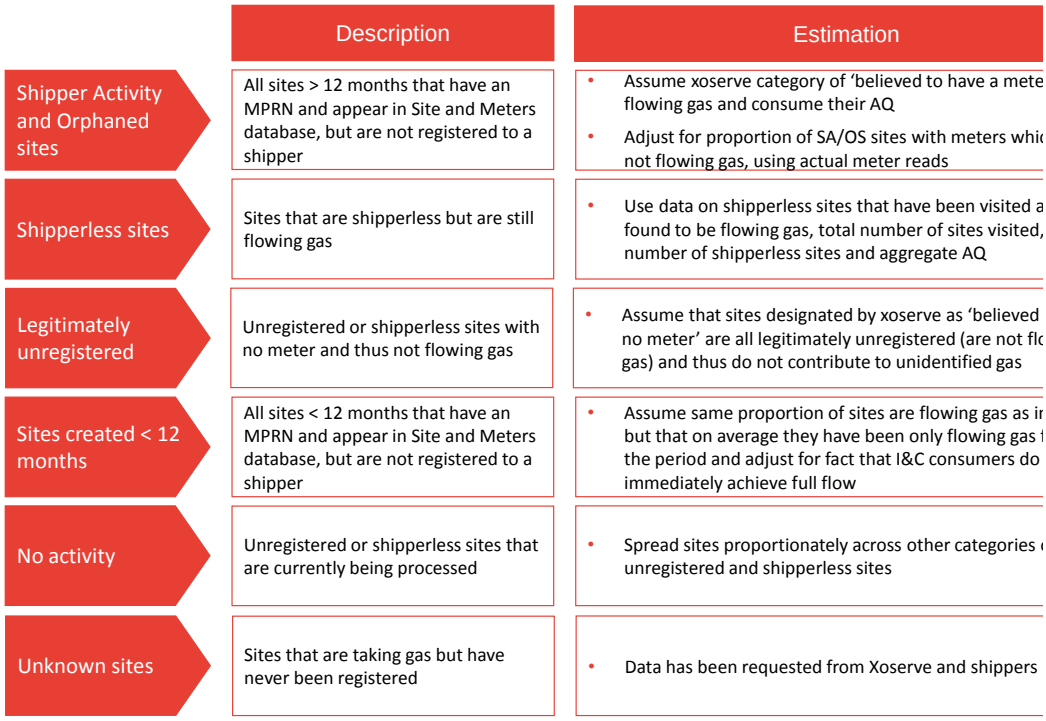
19 AUGE Statement, 4th May 2011, p. 21, http://www.gasgovernance.co.uk/auge/state .

consumption at both categories of sites will not be recorded, so any gas that is consumed at these sites will add to the quantity of unidentified gas.

The AUGE proposes to estimate gas consumed at unknown, unregistered and shipperless sites using xoserve data. The proposed methodology is set out in Figure 11.

Figure 11. The AUGE's proposed methodology for estimating gas from shipperless and unregistered sites



Source: Frontier Economics

At a high level, we believe the AUGE's approach to estimating unidentified gas in this area seems reasonable. We have three areas of concern however:

- It is possible that sites which are 'believed to have a meter' are only lower bound on the actual number of sites with meters. It may be worthwhile for the AUGE to investigate the extent to which sites believed not to have a meter, actually have meters.
- Before assuming that all sites 'believed to have no meter' are legitimately unregistered, it may be worth investigating a sample of these sites.
- It is not clear to us how data on unknown sites could be sourced. We would therefore like to see further details of the AUGE's proposed methodology for estimating unknown sites.

Independent Gas Transporter (IGT) measurement errors

Connected System Exit Points (CSEPs) are small networks owned by IGTs. Registration errors mean that some CSEPs or loads within CSEPs may not be recognised by the system. Any consumption from these unrecognised loads will contribute to unidentified gas.

The AUGE proposes to look only at entire unrecognised CSEPs which are not recognised, on the basis that "*xoserve understands that it is not possible for a site to exist and be taking gas within a CSEP without it being registered*."[20] Data on CSEPs is held by IGTs who are not obligated to provide data to the AUGE. The AUGE thus proposes to base its estimation on average CSEP composition from known IGT networks.

We would like to see further evidence on the suitability of this approach in two main areas:

- Further rationale and evidence of the exclusion of loads within CSEPs; and
- Evidence that CSEP composition at known IGT networks is representative of overall CSEPs.

Without further details in these two areas, it is difficult to judge whether or not the AUGE's approach to IGT measurement areas is reasonable.

Conclusions on bottom-up methodology

In the absence of a detailed description of the proposed methodology, we have some concerns over the AUGE's proposed approach to estimating unidentified gas from unknown sites and IGT measurement errors. We believe the approach to estimating levels of theft is driven by data availability rather than any clear rationale, and that it is likely to underestimate significantly true levels of theft.

Review of the AUGE's proposed top-down approach

In principle, we would support the AUGE's proposal to use a top-down approach to estimating unidentified gas if the bottom-up approach is not feasible due to data constraints.

However, the AUGE's proposed approach to top-down analysis may have some shortcomings. This approach involves comparing estimated SSP demand to actual demand found in the "*training sample*". Our understanding is that the training sample is a sample of several thousand daily metered SSP customers. The sample is chosen randomly by xoserve, but is likely to be biased for two reasons.

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20 AUGE Statement, 4th May 2011, p. 20, http://www.gasgovernance.co.uk/auge/state .

- It does not include any customers with prepayment meters, who we believe make up around 10% of domestic customers. Customers with prepayment meters tend to have lower consumption.

- Though the sample is randomly chosen, customers have to agree to take part. Those willing to have daily meters installed in their properties are likely to be more stable, more mature customers. Landlord owned properties for example are likely to be underrepresented.

The AUGE does not give details of any adjustments it will make to correct for these biases in the training sample.

The AUGE should also consider using xoserve data on SSP actual consumption that is collected to calculate AQs. Xoserve hold data on meter reads from the majority of SSPs and most would have had two meter reads with a 12 month interval. Basing the top-down approach on an analysis of these data, rather than on an analysis of the training sample would lead to significantly less bias in the estimation of SSP consumption.

Conclusions

The purpose of this note is to provide early feedback on the AUGE's proposed approach to allocating unidentified gas across the SSP and LSP sectors.

We recognise that estimating unidentified gas is a difficult task. By definition, data on most types of unidentified gas are not held anywhere. Inevitably decisions will have to be made with imperfect information. Nonetheless, we think in some areas the AUGE has drawn conclusions without sufficiently interrogating analysis previously published by the industry, has overly narrowed the scope of the analysis, and has proposed to base the bottom-up analysis on a methodology which in most cases will underestimate true levels of unidentified gas. We believe our concerns relating to the following three areas are particularly important.

- **Acceptance of the TPA (2010) analysis on the contribution of unidentified gas to RbD:** The AUGE has stated up front that it believes that the majority of the reconciliation between SSPs and LSPs is due to model error rather than due to the presence of unidentified gas. This statement appears to be based on 2010 analysis by TPA. Our understanding is that the TPA analysis is based on a comparison of AQs with estimated consumption in the LSP and SSP sectors. We argue that for conclusions to be drawn on the accuracy of AQs, (and therefore on the extent to which the RbD is made up of genuine model error), AQs would need to be compared to actual, not estimated consumption in the SSP and LSP sectors. We

therefore do not think it is possible to conclude that model error makes up the majority of the RbD based on the TPA analysis.

- **Exclusion of shrinkage errors, unreconciled LSPs and meter errors from the scope:** The AUGE has narrowed the scope of its work to exclude three components which could potentially make a significant contribution to unidentified gas. We do not believe that sufficient evidence has been presented to justify exclusion of these components.

- **Using theft detection and allegation statistics to provide an upper and lower bound on theft:** The assumption that theft detection rates represent a lower limit on theft and that theft allegation rates represent an upper limit on theft seems without foundation. Theft detection rates of shippers with theft detection initiatives are also not likely to underestimate the true level of theft.

Before the end of the second consultation period, we will present a second paper to Centrica that will examine these issues in more detail.