UNC Modification Proposals 0228 and 0228A
Correct Apportionment of NDM Error – Energy

An Assessment by TPA Solutions Limited

January 2010

Summary

Daily balancing and reconciliation

1. The daily balancing regime for gas transportation requires that deemed daily consumptions for each non-daily metered (NDM) load are established using algorithms, driven largely by the assumed annual consumption (AQ).
2. Reconciliation corrects for the differences between the deemed daily quantities and those ultimately established when meter reads become available.
3. However, only the Large Supply Point (LSP) sector provides reconciliation meter reads, so the Small Supply Point (SSP) sector is subject to a process of Reconciliation by Difference (RbD). In broad terms, the RbD volumes apportioned to the SSP sector are equal and opposite to the aggregate measured reconciliation volumes for the LSP sector.

RbD and "unidentified" gas

4. In recent years the RbD process has consistently allocated volumes of around 10-13TWh pa to the SSP sector – and this is seen by some as evidence for the existence of significant "unidentified" gas volumes within the allocation process, in particular undetected theft. Several Modification Proposals have been put forward to address this issue, and five are now awaiting Ofgem decision.
5. Certain members of the ICoSS group[1] have asked TPA Solutions to review and assess two of these proposals (Mod.228/228A) to assist in responding to the Ofgem Impact Assessment concerning the modifications. We have reviewed the RbD process and, using RbD data provided by xoserve, we have looked at how the proposals would operate in practice. We have also made our own assessment of the likely origin of RbD volumes.

Mod.228/228A methodology

6. The Mod 228/228A methodology assumes the presence of significant quantities of "unidentified" gas within the RbD volumes and seeks to

[1] Corona Energy, GDF SUEZ Energy UK, Gazprom Marketing and Trading, Shell Gas Direct and Total Gas and Power have jointly commissioned TPA Solutions Limited to conduct this assessment. Each is a member of the Industrial and Commercial Shipper and Supplier (ICoSS) group.

apportion it across SSP, LSP and Daily Metered (DM) sectors in accordance with specified drivers.

7. Under this approach only 15% of RbD volumes are regarded as "genuine reconciliation" and retained fully by the SSP sector. Of the remaining 85% of RbD around 9% is regarded as "unidentified" gas associated with IGT/late-unregistered site/shrinkage issues and split across sectors. The remainder, some 76% RbD becomes the "balancing factor" and is assigned to theft – this is also split across sectors.

8. The overall effect is that RbD volumes, which are currently allocated 100% to the SSP sector, would instead be apportioned 74.7% SSP, 25.2% LSP and 0.06% DM.

Are RbD volumes indicators of significant quantities of "unidentified" gas?

9. We decided to test the key premise on which Mod.228/228A is based, that the observed RbD levels are caused by the presence of significant quantities of "unidentified gas" (mostly theft) within the allocation process.

10. We firstly analysed the allocation process and established the potential circumstances that can give rise to RbD volumes. We found that RbD volumes can arise when there is no "unidentified" gas, and no measurement or shrinkage errors. This can occur if the algorithms incorrectly split the gas between sectors, so that deemed daily LSP allocations are higher than they should be, and SSPs lower. In these circumstances the actual LSP measurements will be lower than the LSP deemed daily allocations, so LSP reconciliation will contribute to RbD volumes.

11. We also found that the presence of "unidentified" gas within the allocation process can give rise to RbD volumes (as can measurement errors and inaccurate shrinkage quantities, if not detected and corrected by adjustment). The "unidentified" gas inflates the deemed daily allocations for LSP load (assuming the algorithms split the total correctly between SSP and LSP load), and on reconciliation there is a contribution to RbD.

12. We then sought to examine the extent to which the algorithm process might, in practice, be skewing deemed daily allocations towards the LSP sector, and causing the observed RbD volumes, as might occur even in the absence of "unidentified" gas.

13. AQs are a key parameter in the algorithm process and we used recent AQ and other RbD data to analyse the extent to which AQs for the SSP and LSP sectors were representative of actual consumptions. We found consistently over a period of four years that AQs for both sectors were generally overstated compared to consumptions, but in percentage terms the LSP sector significantly more so. Use of these AQs in the algorithm process is likely, in our view, to have skewed the deemed

daily allocations towards the LSP sector. We also identified a number of other potential sources of inaccuracy in the algorithm process.

14. We conclude that it is perfectly feasible that the algorithm process and the AQs which drive it, has been skewing the deemed daily allocations towards the LSP sector, and making a major contribution to the observed RbD volumes. We note that if this is the case then the potential volume of "unidentified" gas within the allocation process is correspondingly reduced. We further note that Mod.228/228A does not appear to acknowledge that RbD volumes can arise from this source.

Does RbD apportionment appropriately deal with "unidentified" gas?

15. We decided to test the logic of the Mod.228/228A apportionment methodology to see if, to the extent there was "unidentified" gas within the allocation process, the proposed methodology would deal with it appropriately.

16. Firstly, we analysed the way in which the overall LDZ allocation and reconciliation process operates and developed worked examples. This revealed the first of what are, in our view, three major design issues with the proposed approach.

17. Our process analysis demonstrates that the apportionment of RbD volumes is not an appropriate way to deal with "unidentified" gas, and will give erroneous results. This is because, as we noted earlier, RbD volumes are influenced not only by the quantity of "unidentified" gas inflating deemed daily allocations, but also by the accuracy of the algorithms in splitting gas between SSP and LSP sectors.

18. So, for example, if "unidentified" gas remained unchanged over a two year period but LSP reconciliation quantities increased markedly in the second year (because, say, of a deterioration in the quality of AQs used in the algorithm process) the RbD volume would be higher in the second year. The Mod.228/228A methodology would then allocate higher quantities of "unidentified" gas across sectors in the second year. Clearly, the apportioned quantities of "unidentified" gas should be the same in each year as, in this example, the true level of "unidentified" gas remains unchanged.

19. To the extent that it might be necessary to deal with quantified volumes of "unidentified" gas, the quantities should (as with shrinkage gas) be excluded from the aggregate daily NDM quantities up-front and apportioned separately. The NDM allocation and RbD processes will then continue to operate effectively.

20. We conclude that the proposed Mod.228/228A RbD apportionment methodology does not appropriately deal with any issue there might be concerning "unidentified" gas within the allocation process.

How would the "genuine reconciliation" concept work in practice?

21. A key feature of Mod.228/228A is the "genuine reconciliation" concept under which the proportion of RbD to be apportioned 100% to the SSP sector is calculated using the relative AQ movement in the SSP and LSP sectors (the remainder of RbD is then treated as "unidentified" gas).

22. As we understand it, the "genuine reconciliation" adjustment is an attempt to account for the effect of the time-lag between establishing AQs via meter reading, and use of AQs in the algorithm process. In our view this is tantamount to saying "if we can only get the AQs right, the algorithms will give the correct SSP sector consumption and we can assume the rest of RbD is "unidentified" gas". This is the second major design issue we have with Mod.228/228A and we explain our reasons for this below.

23. Our analysis suggests that AQs are unreliable indicators of annual consumption even when time lag is accounted for, and as we described earlier, the unequal percentage overstatement of AQs in the respective sectors is highly likely to skew deemed daily allocations towards LSPs. Furthermore, our analysis shows that the year on year changes in AQs, on which the adjustment is based, are extremely volatile. In our view it would be inappropriate to regard algorithm output, especially after correction in the proposed manner, as more reliable than measurement by difference.

24. The Mod.228/228A proposal quoted a value for "genuine reconciliation" in 2007/8 of 1.77 TWh or 15% of RbD. We used the methodology and RbD data to calculate or, in one case, estimate "genuine reconciliation" values for the last four years. The results show an extremely high variability, ranging from 18% RbD to 54% RbD. This would appear to be at odds with the fact that RbD quantities are relatively stable over the same period. We believe the variability in values is driven by the dependency on AQ changes for the LSP and SSP market sectors, which are highly variable themselves.

25. Overall, we conclude that application of the "genuine reconciliation" concept would likely lead to unreliable final SSP allocations, due to the dependence on algorithm output as amended via the highly volatile "genuine reconciliation" adjustment. We find it difficult to conceive that this approach could be more accurate than the existing process based on measurement difference.

How would the theft "balancing factor" principle work in practice?

26. The Mod.228/228A methodology, after making deductions from RbD for "genuine reconciliation" and certain other issues, assigns the remainder (some 76% RbD) to theft as the "balancing factor".

27. Using the Mod.228/228A methodology and RbD data we calculated theft levels for four years. The calculated theft levels vary significantly year to

year – our analysis showed a >60% step change for one year – whilst reconciliation quantities remain relatively stable.

28. This highly improbable result is caused by the combined effects of the "genuine reconciliation" and theft "balancing factor" concepts within the methodology, indicating what we believe are inherent flaws. Intuitively we would expect theft to be linked to demand levels and clearly this is not the case for the theft values generated using Mod.228/228A methodology.

29. We have compared the calculated theft levels with information from other industry sources and found them to be far in excess of the assumption used by network operators and the xoserve detected theft statistics, without any corroboratory evidence:

Source	Corroboratory evidence	Theft levels % throughput
Mod.228/228A methodology	None: theft assumed to be "balancing factor"	0.8% – 1.4%
Network Operators assumption	Historical studies?? (not validated)	0.3%
xoserve	Detected theft statistics	0.006%

Note: Network Operators assumption and xoserve figures include network theft

30. We conclude that application of the proposed theft "balancing factor" principle would generate extremely high uncorroborated assumed theft levels, which are also highly variable year on year. We find it difficult to believe that the results would reflect the true level and variability of gas theft. We therefore regard the theft "balancing factor" principle as a third major design issue with the Mod.228/228A methodology.

Other concerns with the Mod.228/228A methodology

31. The Mod.228/228A methodology quantifies the proportion of RbD associated with "unidentified" gas arising from IGT issues (5.7% RbD), late/unregistered sites (2.9% RbD) and shrinkage reconciliation (0.0004% RbD).

32. Mod.228/228A states that the figures are derived from information provided by xoserve but we have been unable to validate this from the RbD material we have reviewed.

33. The Mod.228/228A methodology also specifies apportionment drivers for each category of "unidentified" gas, for the purposes of apportioning between SSP, LSP and (in the case of shrinkage reconciliation) DM sectors. Again, the proposal states that the figures are derived from xoserve information and, again, we have been unable to validate this in most cases.

IGT issues

34. We note that the 5.7% RbD figure for IGT issues is described in the proposal as a maximum – we would expect the proposal to specify a lower, average figure for application purposes.

Late/unregistered sites

35. It remains unclear to us the extent to which this is a transient problem, whereby contributions to RbD are reversed at a later stage. Where this is the case, there is no rationale in our view for any additional correction of the type proposed. We also note that the transporters' shrinkage quantities include an element covering unregistered sites within the "network" theft component and it is unclear to us whether this "allowance" for unregistered sites has been taken into account in determining the RbD treatment for unregistered site volumes.

36. We note that the proposed split across sectors (24% SSP, 74% LSP and 2% DM) which we have been unable to validate is significantly different from the sector AQ proportions (60% SSP: 23% NDM LSP: 17% DM LSP).

Shrinkage reconciliation

37. We do not believe shrinkage reconciliation quantities should be classified as "unidentified" gas – they constitute a simple correction to RbD, similar in nature to, for example, DM reconciliation quantities. We therefore believe that the proposed treatment of shrinkage reconciliation is inconsistent with RbD reconciliation principles in attempting to apportion the quantities across sectors (a logical extension of the proposal would be to apportion DM errors across the LSP sector and the shrinkage account, as well as the SSP sector).

38. Furthermore, we believe that the proposed apportionment driver (throughput) is inconsistent with the transportation charging methodology, which we understand takes account of tier usage and would therefore apportion less shrinkage cost per unit throughput to larger sites.

Theft apportionment

39. We have two main concerns with the way in which the Mod.228/228A methodology proposes to apportion theft quantities across market sectors. Firstly it ignores network theft, and secondly it apportions gas to SSP and LSP sectors on a basis we have been unable to reproduce using straightforward analysis of the same statistics:

Source	**SSP proportion %**	**LSP proportion %**
Mod.228/228A (allegation and detection based)	70.6%	29.4%
TPA analysis* (allegation and detection based)	92.9%	7.1%
TPA analysis (detection based)	96.6%	3.4%

*TPA does not subscribe to the view that theft allegations are a sound basis for apportionment, but conducted the analysis for comparison purposes

Transportation charge adjustment

40. Whist Mod.228/228A proposes the charges associated with the RbD apportionment reflect the gas costs, no equivalent adjustment of transportation charges is proposed. We think this would be an inconsistent application of the principles.

Is there evidence of "unidentified" gas within the system?

41. We concluded earlier that RbD volumes can be, but are not necessarily, an indicator of the presence of "unidentified" gas. We also concluded that it is perfectly feasible that the algorithm process and the AQs which drive it, has been skewing the deemed daily allocations towards the LSP sector, and making a major contribution to the observed RbD volumes.

42. We know that, in reality, there must be some level of "unidentified" gas within the system – the difficulty is in quantifying the likely levels. In our RbD analysis we have looked at errors in measurement and shrinkage estimation as potential sources of "unidentified" gas. Whilst we believe these areas are worthy of further investigation, no strong evidence of undetected errors was immediately apparent. We also looked at the correlation of RbD with demand and found no statistical link – if RbD quantities comprised mostly theft as assumed under Mod.228/228A one would expect a linkage, as theft would be expected to have a demand linkage.

43. Theft is clearly an issue, but there is a dearth of reliable information that would assist in establishing quantified estimates. We therefore welcome initiatives that might improve the situation – for example Mod.274 which proposes that an independent agent could determine strategies to improve the investigation, detection and prevention of theft in the GB gas market.

44. If the amount of "unidentified" gas could be reliably estimated then the allocation process would require amendment to deal with this new category of gas – as we noted earlier, the quantities should (as with shrinkage gas) be excluded from the aggregate daily NDM quantities up-front and apportioned separately, using market sector drivers developed for this purpose. The NDM allocation and RbD processes will then continue to operate effectively.

45. The distinction between Mod.228 (which apportions percentages of RbD across market sectors and Mod.228A (which calculates fixed volumes from the RbD values and apportions them to the LSP sector on a forward looking basis) is relevant here. We envisage any "unidentified" gas that could be quantified would be treated as a fixed daily volume to be apportioned through the allocation process. The use of fixed volumes has some similarities with the Mod.228A approach.

Is the existing RbD process still fit for purpose?

46. Under the existing process, the allocations to SSP consumption and shrinkage are likely subject to greater error (compared to measured DM and LSP consumptions) because of the absence of direct measurement, and the necessary use of estimation techniques – which are, by their very nature, much less reliable than direct measurements.

47. This, we would argue, is a natural consequence of the industry decision not to implement individual meter point reconciliation for the SSP sector, which comprises around 60% of throughput. We believe the decision was taken in full light of the knowledge that SSP allocations via RbD would likely be less accurate than meter reads.

48. As a general principle, it does not appear unreasonable to us that those who do not provide measurement information should bear a higher risk of error in the allocation process, compared to those that do provide measurement information (and bear the costs of doing so).

49. In volume terms, the problem of inaccurate estimation could be reduced at a stroke through the provision of SSP meter reads for reconciliation purposes. This would leave just shrinkage (<1% of throughput) plus any other "unidentified" gas (to the extent it exists) as unmeasured quantities.

50. This is not to say that the existing RbD based allocation process cannot be improved. On the contrary and as we argue above, if "unidentified" gas can be quantified, the allocation process can be amended to accommodate it.

51. Our high level assessment of Mod.228/228A in the context of measured and estimated gas quantities is that the proposed methodology attempts to attach spurious levels of accuracy to estimation techniques, whilst not recognising the importance and value of measurement information, which is the foundation of the allocation process.

Recommendations for further work

52. Our review and assessment has indicated a number of areas where greater clarity and understanding of the factors influencing the allocation and reconciliation process (and the scale of influence) would assist in informing future industry decisions regarding RbD.

53. We also believe that this would provide valuable context and information for regulatory purposes, particularly the Distribution Network Price Control Review.

54. Our recommendations for future work fall under the following headings – a more detailed description of the work envisaged is provided in Section 4.

    (1) Algorithm process and AQs

    (2) Gas measurement

    (3) Shrinkage

(5) Stock changes/LDZ transfers

(6) Theft

(7) IGT and late/unregistered sites

(8) Potential allocation process development

UNC Modification Proposals 0228 and 0228A
Correct Apportionment of NDM Error – Energy

An Assessment by TPA Solutions Limited

January 2010

Contents

1. Background

Daily balancing

1.1. The daily balancing regime introduced under the original Network Code in March 1996 provides for the calculation of daily shipper input/output imbalances, facilitating application of the imbalance cash-out rules.

1.2. For non-daily metered (NDM) supply points, deemed daily consumptions are established using algorithms, driven by the assumed annual consumption (AQ), and the daily demand in the Local Distribution Zone (LDZ) after taking account of shrinkage quantities.

Reconciliation

1.3. Reconciliation processes are used to correct for the differences between the deemed daily quantities used for daily balancing and the quantities ultimately allocated when meter reads become available. Reconciliation processes are also used to correct for identified metering and other errors.

1.4. Originally, individual meter point reconciliation was intended to apply to all NDM supply points, but a process of reconciliation by difference (RbD) for smaller NDM supply points was introduced in 1998, whereby individual reconciliation was avoided for this sector.

Reconciliation by difference (RbD)

1.5. For the smaller NDM supply point sector (SSPs) consuming <73.2 MWh pa, RbD was introduced in parallel with the roll-out of domestic competition, primarily to avoid the data processing associated with individual meter point reconciliation at large numbers of SSPs. The SSP sector does not therefore provide reconciliation meter reads.

1.6. Individual meter point reconciliation continues to apply for larger NDM supply points (LSPs) consuming >73.2 MWh pa, and monthly or annual meter reads are provided for this purpose.

1.7. In broad terms, the RbD volumes apportioned to the SSP sector within an LDZ are equal and opposite to the aggregate individual reconciliation volumes for the LSP sector, established using LSP meter reads.

1.8. xoserve, who now administer the RbD process, has said[2] that part of the original rationale for the introduction of the RbD methodology was that the value of reconciliations for each SSP was very low, meaning that the average costs of processing meter point

---

[2] xoserve response to Ofgem Consultation Ref: 57/06 Review of Reconciliation by Difference (RbD), 11 May 2006, p2

reconciliations, including failures and queries, would be disproportionately high compared to the amount of money being re-distributed.

Concerns over RbD

1.9. In recent years concerns have been raised in relation to RbD, in particular that significant quantities of gas (and hence cost) are consistently being allocated to the SSP sector through RbD (typically around 10-13TWh pa).

1.10. It had been expected that RbD volumes would reduce over time as data accuracy improved, leading to a closer match between deemed daily consumptions and post reconciliation consumptions, but this has not materialised.

1.11. An Ofgem review in 2006[3] concluded, inter alia, that RbD was fit for purpose in the immediate term and that RbD issues could be addressed under existing industry processes.

1.12. The continued significant allocation of RbD volumes to the SSP sector is seen by some as evidence for the existence of "unidentified" gas volumes within the allocation process, arising from various sources, in particular undetected theft and to a lesser extent IGT issues and late/unregistered sites.

1.13. It has been argued that the costs of such "unidentified gas" should not be borne solely by the SSP sector and that refinements to the RbD process are required to address this.

1.14. From early 2007 a series of RbD related Modification Proposals has been put forward addressing these issues. Ofgem decided against implementation of Mods.115/115A in October 2007, but Mods.194/194A, 228/228A and 229 are now awaiting a decision by Ofgem.

RbD Modification Proposals under Ofgem consideration

1.15. Mods.194/194A propose frameworks for apportionment of RbD volumes across the SSP, LSP and Daily Metered (DM) sectors, but do not specify the apportionment levels, leaving this to be implemented through subsequent modifications.

1.16. Mods.194 and 194A differ in the manner in which the reallocation of RbD volumes is administered, with the effect that under Mod.194 the risk of seasonal variability in RbD volumes is shared between sectors, whilst under Mod.194A fixed RbD volumes are established for the LSP and DM sectors, leaving the risk of RbD seasonal variability with the SSP sector.

1.17. Mods.228 and 228A build on and populate the Mod.194 and 194A frameworks respectively. In essence, the Modifications seek to re-

[3] Ofgem Consultation Ref: 57/06 Review of Reconciliation by Difference (RbD)

allocate around 25% of the RbD volumes to the LSP sector, on the basis that this sector should shoulder an appropriate responsibility for "unidentified" or unrecorded gas volumes (associated largely with theft, but also to a lesser extent with IGT issues and late/unregistered sites). Further modifications would be required to vary the proportions of RbD volumes borne by the market sectors.

1.18. Finally, Mod.229 seeks to establish a framework whereby fixed RbD volumes to be allocated to the LSP and DM sectors (as per Mod.194A) would be established via an independent third party in accordance with objective criteria. The third party would have an ongoing remit to refine and improve the methodology, and revise the apportionment to the market sectors accordingly.

Ofgem Impact Assessment

1.19. Ofgem published an Impact Assessment addressing the five RbD Modification Proposals under consideration on 30 November 2009.

1.20. Ofgem says it is minded to accept Mod.229 as it would establish a process for independently determining the causes of "unidentified" gas and apportioning it to shippers, improving on the current 100% allocation to the SSP sector and avoiding the need for future modifications to revise allocations.

1.21. Ofgem is minded to reject Mods.228 and 228A because they do not provide an explicit and traceable methodology for distributing unidentified gas, nor provide a mechanism for future updates other than by further Modification Proposals.

1.22. Ofgem notes that existing contractual arrangements in the LSP sector may not allow the costs of seasonal variations in unidentified gas to be passed on to customers, and it is therefore minded to reject Mod.194 (which shares this risk between sectors). Ofgem acknowledges that Mod.194A improves on current arrangements, but is minded to reject this Modification because of the absence of a mechanism for future updates (other than by further Modification Proposals).

TPA assessment of Mods.228 and 228A

1.23. Certain members of the ICOSS group[4] have asked TPA Solutions to review and assess Modification Proposals 228 and 228A, looking in detail at the methodology by which it is proposed that RbD volumes would be allocated across the market sectors, and the underlying rationale.

1.24. In undertaking our assessment we have reviewed in detail the LDZ and NDM allocation process and, using RbD data provided by

[4] Corona Energy, GDF SUEZ Energy UK, Gazprom Marketing and Trading, Shell Gas Direct and Total Gas and Power have jointly commissioned TPA Solutions Limited to conduct this assessment. Each is a member of the Industrial and Commercial Shipper and Supplier (ICoSS) group.

xoserve, we have looked at how the proposals would operate in practice. We have also made our own assessment of the likely origin of RbD volumes. As a general rule we have used gas year, rather than calendar year, data for analysis purposes. Further details of our approach are provided in section 3 and the Appendices.

2. Modification Proposals 228 and 228A

Mod.228 overview

2.1. Mod.228 was raised by British Gas Trading in October 2008 following extensive consideration of RbD issues earlier in the year through the Mod.194 Development Workgroup.

2.2. An indication of the proposer's motivation in raising the modification is provided in the preamble:

"RbD is not solely a function of NDM reconciliation; the majority of energy associated with RbD is caused by a number of measurement errors"

"Of these errors theft is believed to be by far the biggest contributor to RbD error"

"It is unacceptable for one market sector [SSPs] to bear the entire costs of these measurement errors".

2.3. The proposal seeks to apportion the RbD volumes that are currently borne 100% by the SSP sector across SSP, LSP and DM market sectors, using an allocation methodology which establishes the percentage proportion of RbD volumes that each sector should bear (in effect populating the RbD Allocation Table framework set out in the earlier Mod.194). Business rules then describe the mechanism by which apportionment to the sectors is effected.

2.4. In Table 2.1 we have summarised the proposed allocation process and the underlying rationale described within the proposal. In short, the process:

- Firstly establishes the "genuine reconciliation" quantities that should be fully borne by the SSP sector (some 15% of RbD volumes) by looking at the relative AQ movement in the SSP and LSP sectors.
- It then identifies RbD volumes arising from issues associated with late/unregistered sites (2.9% of RbD), IGTs (5.7% of RbD) and shrinkage (0.0004% of RbD) which should be shared across the sectors. (The process also provides for the identification of RbD volumes arising from other sources – e.g. LDZ or end supply metering – but these volumes are currently set at zero% of RbD).
- Finally, the remaining RbD quantities (some 76.4% of RbD) are regarded as the "balancing factor" and assigned to theft, and shared based on theft allegation and detection statistics for the LSP and SSP sectors.
- The overall effect is that RbD volumes which are currently 100% allocated to the SSP sector would instead be apportioned 74.7% SSP, 25.2% LSP and 0.06% DM.

Table 2.1: Mod 228 allocation process and rationale

Source of RbD volumes	Percentage of RbD volumes arising from various sources		Extent to which RbD volumes arising from various sources should be borne by market sectors				Resulting allocation of RbD volumes to market sectors		
	%	Rationale	SSP %	LSP %	DM %	Rationale	SSP %	LSP %	DM %
"Genuine reconciliation" (read submission issues)	15.0	Differences in AQ accuracy in LSP and SSP sectors can lead to "genuine" reconciliation quantities. Addressed by accounting for rate of movement in AQ share between sectors	100	0	0	Genuine reconciliation volumes are deemed fully attributable to the SSP sector	15	0	0
Late and Unregistered sites	2.9	Failure of shippers to register sites in a timely manner. Percentage inferred from xoserve analysis	24	74	2	Percentages inferred from xoserve analysis	0.69	2.11	0.06
IGT issues	5.7	Deficiencies in CSEP creation process. Percentage inferred from xoserve analysis	88	12	0	Percentages intended to reflect SSP and LSP throughput in CSEP sector	5.02	0.69	0
Shrinkage	0.0004	Difference between initial and final shrinkage allocations – xoserve data	62	24	14	Percentages intended to reflect throughputs in market sectors	0.00025	0.0001	0.00005
LDZ Metering	0	Primary assumption is that overall there is not an over or under registration of gas entering the system	62	38	0	Should be borne by all sectors. Basis for percentages not specified	0	0	0
End Supply Metering	0	Assumption is that supply point metering does not contribute to NDM error.	62	38	0	Basis for percentages not specified	0	0	0
LSP Temp & Press	0	No rationale provided	62	38	0	Basis for percentages not specified	0	0	0
LSP Temp & Press	0	No rationale provided	62	38	0	Basis for percentages not specified	0	0	0
Other	0	No rationale provided	62	38	0	Basis for percentages not specified	0	0	0
Theft	76.4	Theft is regarded as the "balancing factor" i.e. remaining RbD volumes that cannot be attributed to other causes or issues	70.6	29.4	0	Simple average of percentage theft allegations and percentage theft detection rates for LSP and SSP sectors	54.0	22.4	0
Totals	**100**		–	–	–		**74.7**	**25.2**	**0.06**

Mod.228A overview

2.5. Mod.228A was raised by Scottish Power in December 2008.

2.6. The proposal differs from Mod.228 in that it establishes fixed volumes of Unidentified/ Unknown Gas to be apportioned to LSP and DM sectors and recovered on a forward looking basis. This involves populating the Large Supply Point Unidentified Gas Allocation Table framework (set out in the earlier Mod.194A) with fixed volumes and introducing a methodology to determine the fixed volumes.

2.7. The methodology used in Mod 228A to establish the fixed LSP and DM volumes mirrors that within Mod 228. Thus, the methodology includes the concept that "genuine reconciliation" quantities are borne 100% by the SSP sector, whilst the remaining RbD volumes are shared across the market sectors. Again, theft is regarded as the "balancing" factor.

2.8. Table 2.2 shows how the proposed fixed volumes are calculated. Inspection of the table shows that the percentage figures used in the calculations are identical to those specified in Mod.228.

2.9. However, in determining the volumes arising from the four error sources under Mod.228A the percentages are applied to the Unidentified/Unknown Gas Volumes (i.e. RbD volumes after reduction for genuine reconciliation), whereas Mod.228 applies the percentages to the full RbD volumes. We are unclear whether this is an intentional departure from the Mod.228 methodology.

Table 2.2: Mod 228A allocation process

	TWh	Comments
RbD volumes (2007/8)	**11.80**	
Genuine reconciliation	**1.77**	As per Mod 228, genuine reconciliation is 15% of RbD volume
Unidentified/ Unknown Gas	**10.03**	

Source of Unidentified/ Unknown Gas	**Quantity of Unidentified/Unknown Gas volumes arising from various sources**			**Allocation of Unidentified/Unknown Gas volumes arising from various sources to LSP and DM market sectors**				
	%	**GWh**	**Comments**	**LSP**		**DM**		**Comments**
				%	**GWh**	**%**	**GWh**	
Late confirmation, unregistered and orphaned sites	2.9	286.3	Percentages as per Mod.228, but applied to Unidentified/Unknown Gas volume (i.e. RbD volumes after adjustment for genuine reconciliation)	74	211.8	2	5.7	Percentages as per Mod.228
IGT issues (Late confirmation, unregistered and orphaned sites)	5.7	572.5		12	68.7	0	0	
Shrinkage contribution	0.0004	0.04	(Mod.228 applies percentages to RbD volumes)	24	0.01	14	0.006	
Theft and unreported open meter by-pass valves	76.4	9171.2	Theft treated as balancing factor	29.4	2691.7	0	0	
Totals	**100**	**10030**		**–**	**2972.3**	**–**	**5.7**	

3. Commentary and key conclusions from our analysis

Introduction

3.1. We firstly made an assessment of the LDZ allocation and reconciliation processes, identifying potential sources of error and looking at the different categories of measured and unmeasured gas within the process, and the question of the associated error. The detail of the assessment is set out in Appendix 1.

3.2. This provided important context for our detailed analysis of RbD data presented in Appendix 2.

3.3. Below we provide a commentary and summarise the key conclusions from our analysis, drawing on the more detailed material in the Appendices.

3.4. The major areas that the analysis focuses on include the following:

- Sources of RbD volumes and the level and variability of these volumes
- "Genuine Reconciliation"
- AQs and algorithm performance
- DMP and datarecorder data
- Theft
- IGTs
- Late and unregistered sites
- Shrinkage
- Measurement errors
- Measured and unmeasured gas

Sources of RbD volumes

3.5. In broad terms, there are three sets of circumstances in which RbD quantities can arise:

(1) Due to inaccuracies in the deemed daily allocations to the LSP and SSP sectors, driven by errors in the algorithm process. These are then corrected via reconciliation (assuming LSP measurements are correct).

(2) Due to gas measurement error (LDZ inputs, DM consumptions and LSP consumptions) or error in the assumed shrinkage gas quantities

(3) Due to volumes of unmeasured gas consumption or usage within the system that are not properly accounted for in the allocation process – so called "unidentified" gas.

3.6. The motivation for Mod.228/228A appears to be driven by concerns over the observed RbD levels, but the proposal itself does not appear to acknowledge that RbD volumes can arise purely from inaccuracies within the algorithm process ((1) above).

3.7. Instead the Mod.228/228A focus is on other RbD sources, and in particular assumes the presence of large quantities of "unidentified" gas within the allocation process ((3) above).

3.8. We believe this is an important point as the analysis we present later indicates that the algorithm process may be far from reliable, primarily as a result of the inaccuracies in the AQs.

3.9. In our view, there is nothing sinister about RbD volumes arising from this source, and they are not an indication of flaws in the overall allocation process – indeed they play an essential part in ensuring equitable allocation to the SSP and LSP sectors post reconciliation.

3.10. This is not to say that the algorithm process should not be improved where possible, but merely to point out that inaccuracies in the algorithm process are transient in effect as they are corrected by reconciliation.

3.11. In practice RbD volumes are likely to arise from a combination of the sources identified above, and we have looked at each possible source in our analysis.

3.12. It should be noted that RbD volumes arising from errors which are subsequently identified, for example gas measurement error, have only a transient effect as the impact is reversed by adjustment.

RbD volumes – level and variability

3.13. Over the gas years from 2005/6 to 2008/9 the RbD (or RQ) levels have been 10 to 12TWh, or 1.5 to 2% of throughput.

3.14. The absolute value of RbD should be set in the context of some very large annual consumption values (SSP sector 361 TWh, LSP sector 128 TWh in 2008/9). RbD is in effect the difference between two very large numbers.

3.15. There is perhaps some evidence of a rising trend in RbD quantities, but the absolute amount of year on year change is very small relative to the total demand (0.75 TWh or 0.12% throughput last year).

3.16. In summary, we conclude that RbD volumes are relatively stable and currently running at about 12 TWh per annum (about 2% of throughput).

"Genuine Reconciliation"

3.17. A key feature of Mod.228/228A is the "genuine reconciliation" concept under which the proportion of RbD to be apportioned 100% to the SSP sector is calculated using the relative AQ movement in the SSP and LSP sectors. The Mod. calculates a figure of 1.77 TWh or 15% of RbD for 2007/8.

3.18. We have used the Mod.228/228A methodology and the data provided by xoserve to calculate the level of "genuine reconciliation" for a number of years:

2006/7 Genuine Reconciliation		2007/8 Genuine Reconciliation		2008/9 Genuine Reconciliation		2009/10 Genuine Reconciliation (estimate)	
GWh	**%RQ**	**GWh**	**%RQ**	**GWh**	**%RQ**	**GWh**	**%RQ**
5659	48.47%	1968	17.59%	2407	19.88%	6469	54%

3.19. The results at a national level show the "genuine reconciliation" is highly variable, with extremes of 18% and 48% over three years. This would appear to be at odds with the fact that RbD quantities are relatively stable over the same period.

3.20. The high variability of "genuine reconciliation" (GR) and the relative stability of the full reconciliation quantities (RQs) calls into question the Mod.228/228A premise that the remaining reconciliation quantities (i.e. RQ-GR) – which also exhibit high variability – comprise unidentified gas, largely theft, as theft would not be expected to vary significantly year on year. This is explored in more detail later.

3.21. At an LDZ level "genuine reconciliation" is even more variable and certain values even appear as negative reconciliation (Appendix 2, section 3). It should be noted that the Mod.228/228A "genuine reconciliation" equation would mathematically produce a negative number in most cases but is intending to represent a positive reconciliation quantity into the SSP sector.

3.22. We believe the variability in "genuine reconciliation" values is driven by the dependency on AQ changes for the LSP and SSP market sectors, which are highly variable themselves. AQ issues are explored in more detail later.

3.23. We have also looked at "genuine reconciliation" in terms of its implications for the accuracy of deemed daily allocations established via the algorithm process. Under the existing RbD processes the implied inaccuracies in deemed daily consumptions for the sectors are the same order of magnitude (SSP 2.6% to 3.4%, LSP 6.3% to 8.5%). However, the "genuine reconciliation" approach would imply that whilst the inaccuracy in the LSP sector remains the same, inaccuracy in the SSP sector reduces significantly, and in some cases is an order of magnitude lower than LSP accuracy (SSP 0.7% to 1.7%). In our view this level of sector disparity in deemed allocation accuracy is unlikely.

Conclusions on "genuine reconciliation"

3.24. Overall, we believe the analysis results give rise to serious concerns regarding the effectiveness of the proposed "genuine reconciliation" process and the validity of its underlying principles. Key reasons for our concerns are summarised below.

3.25. The year on year variability of national "genuine reconciliation" values whilst the full reconciliation quantities are relatively stable.

3.26. The even more marked variability at an LDZ level and the incidence of negative values.

3.27. The implication that deemed daily allocations for the SSP sector would be significantly more accurate than those for the LSP sector.

Factors affecting algorithm process accuracy

3.28. Given the importance of AQs within the process for generating deemed daily consumptions, and hence influencing RbD quantities, we decided to assess the reliability and accuracy of AQs. There is a theoretical argument that if AQs are accurate then the AQ for a particular gas year should correspond to the weather corrected actual demand for the sector. We decided to test this hypothesis, and the table below shows the results:

SN 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.	399,490,160,097	386,727,203,965	387,477,508,733	361,424,533,098
Diff.	4,405,931,946	13,160,344,733	-2,203,724,193	13,333,195,815
%	1.1%	3.3%	-0.6%	3.5%
LSP AQ	168,682,432,319	158,985,763,389	150,425,700,615	142,973,238,857
LSP Cons.	155,619,446,044	141,789,570,928	139,721,972,247	128,620,553,795
Diff.	13,062,986,275	17,196,192,461	10,703,728,368	14,352,685,062
%	7.8%	10.8%	7.1%	10.1%
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%

3.29. The analysis suggests that the LSP AQ is significantly overstated, by between 10.7 to 17.2 TWh (7.1% to 10.8%). The equivalent figures for actual demand are (8.8% to 17.4%).

3.30. The SSP AQ is closer to the deemed consumption, being in the range -2.2 TWh to +13.3 TWh (-0.6% to 3.5%) but still generally overstated. The equivalent figures for actual demand are (2.5% to 12.9%).

3.31. The DM AQs are not used in the process for generating NDM deemed daily allocations, but the discrepancies with demand figures are extremely large and variable, adding further to concerns over the accuracy of AQs generally.

Conclusions on AQ analysis and algorithm performance

3.32. Further extensive analysis of AQ reliability is reported in Appendix 2, section 4 and we summarise our conclusions below.

3.33. LSP AQs are significantly over-stated compared with SN and actual consumptions (7.1 to 10.8% SN and 8.8 to 17.4% actual). SSP AQs are in most years also overstated compared to SN and actual consumption (-0.6 to 3.5% SN and 2.5 to 12.9% actual).

3.34. It would appear that AQs are simply not accurate enough to be an indicator of average annual consumption, frequently exhibiting discrepencies of 10 TWh or more.

3.35. The discrepencies are in large part (but by no means solely) due to the time lag between the measurements used in establishing AQs, and the period in which the AQs are applied in the algorithm process.

3.36. Given the importance of AQs within the algorithm process, it is highly likely that the use of AQs which are not representative of annual consumption will lead to inaccurate deemed daily allocations and give rise to RbD quantities.

3.37. The greater overstatement of LSP AQs (compared with SSP AQs) is consistent with the observed over-allocation of deemed daily quantities to LSPs, giving rise to RbD quantities.

Further conclusions on algorithm performance

3.38. We also report in Appendix 2, section 4 on weather correction and data variability issues that are likely to impact on algorithm performance, and summarise the various sources of potential error. Our overall conclusions are set out below.

3.39. Given the AQ reliability issues described above and the various other potential sources of error within the algorithm process, it is perfectly feasible that inaccurate LSP deemed daily allocations are making a major contribution to the observed RbD volumes.

3.40. An error of 12 TWh, accounting fully for the current level of RbD, represents 2% of total throughput, 3.3% of SSP throughput and 9.3% LSP throughput (all on a weather corrected basis).

3.41. If, as seems feasible, algorithm inaccuracy is the major source of RbD volumes then the potential volume of "unidentified" gas within the allocation process is correspondingly reduced.

Analysis of DMP sample data

3.42. We have reviewed Domestic Monitor Panel data provided by xoserve. This contains data sourced from BGT on about 5000 sample domestic customers, providing a comparison between "billed" energy based on the deemed daily allocations as reconciled via RbD, and "actual" energy derived from regular meter readings phoned in by the customer.

3.43. We understand that historically the DMP data has consistently shown "billed" energy in excess of "actual" energy, and this has been construed by some as an indication that the RbD process was in error. We note however that data recorder data presented by xoserve[5] showed the opposite trend.

3.44. Our analysis shows that there is significant reduction in the discrepancy between billed and actual energy in the last two years:

	2005/6	2006/7	2007/8	2008/9
Billed	18,938	16,269	17,343	16,379
Actual	18,266	16,003	17,236	16,251
Diff.	672	266	107	129
%age	3.7%	1.7%	0.6%	0.8%

3.45. Furthermore there has been an increased incidence of "under-billing" in certain months indicating perhaps that billing "accuracy" for these customers, although still not perfect, no longer has a consistent bias throughout the year.

Conclusions on DMP data analysis

3.46. The observed differences of <1% between "billed" and "actual" energy could be regarded as a "good" level of accuracy, given the range of potential errors that could occur when comparing this small sample to the general allocation for all sites in the SSP band.

3.47. Overall therefore, we find no evidence from DMP data to suggest the RbD process is significantly in error.

Year on year theft levels using Mod.228/228A methodology

3.48. The Mod.228/228A methodology takes RbD volumes, removes the "genuine reconciliation" element (15%) and deducts a further 8.6% for IGT/site registration/shrinkage issues, leaving theft as the "balancing factor" at 76% RbD.

3.49. Below we have used the Mod.228/228A methodology to generate theft values for each year with an estimate for 2009/10:

[5] RbD Subgroup – RbD Verification Presentation, dated 8 April, xoserve, filed on Joint Office web-site under Mod.194/194A Development Workgroup, 13 May 2008 meeting

	2006/7	2007/8	2008/9	2009/10
RQ (TWh)	11.65	11.29	12.04	12 [est]
Gen Rec (TWh)	5.66	1.97	2.41	6.47[est]
Late/unregistered+ IGT+ shrinkage issues (8.6%RQ) (TWh)	1.00	0.97	1.04	1.03
Theft balance (TWh)	**4.99**	**8.35**	**8.59**	**4.50**
Throughput (TWh)	608.2	644.5	609.3	600[est]
Theft % throughput	**0.8%**	**1.3%**	**1.4%**	**0.8%**

3.50. The resulting theft figures are highly variable. As noted above, a reasonable correlation between theft levels and consumption would be expected – but this is clearly not the case given the year on year variations of up to 60% in calculated theft levels.

3.51. Furthermore the calculated theft levels are huge – greater than the shrinkage quantities attributed to network usage and leakage, and more than two orders of magnitude greater than detected theft levels (see below).

3.52. Inspection of RbD data at an LDZ level reveals the reasonably frequent incidence of negative reconciliation. We presume the Mod.228/228A methodology would calculate a negative apportionment of theft in these cases. We find this concept difficult to comprehend, and believe it points to flaws in the methodology.

3.53. Overall, these results would seem to point to problems within the Mod.228/228A methodology, both in terms of the "genuine reconciliation" concept which causes the variability, and the theft as "balancing factor" concept which gives rise to enormous calculated theft levels for which there is no corroboratory evidence.

Analysis of xoserve theft data

3.54. xoserve has provided some data and analysis on the levels of theft allegations and the validity of those allegations (see tables below). We have examined this data and developed some additional analysis with a view to establishing what the data tells us about reported levels of theft and the differences in theft levels in the LSP and SSP sectors.

Theft allegations (including network theft)

Site Type	No of Allegations	%age of Allegations	Valid / Invalid	Reported Stolen kWhs	%age of Total Reported Stolen kWhs	No of Allegations	%age of Allegations
LSP	481	2.53%	Invalid			395	82.16%
			Valid	12575827	7.45%	86	17.84%
SSP	18563	97.47%	Invalid			12560	67.66%
			Valid	156326352	92.55%	6003	32.34%
Totals	19044	100%		168902179	100%	19044	100%

Theft allegations (excluding network theft)

Site Type	No of Allegations	%age of Allegations	Valid / Invalid	Reported Stolen kWhs	%age of Total Reported Stolen kWhs	No of Allegations	%age of Allegations
LSP	438	2.6%	Invalid			369	84.25%
			Valid	3913589	3.36%	69	15.75%
SSP	16410	97.4%	Invalid			10748	65.50%
			Valid	112468886	96.64%	5662	34.50%
Totals	16848	100%		116382475	100%	16848	100%

Detected theft levels

3.55. Aggregate theft (including network theft) over the 4 year 9 month period is about 169 GWh or about 0.006% of LDZ throughput (assumed to be 3000TWh over period). When network theft is excluded this figure falls to 116 GWh or about 0.004% throughput.

3.56. This compares with the 0.8% to 1.4% throughput theft levels calculated using the Mod.228/228A methodology – these are up to 350 times higher.

3.57. We note that in determining the level of the "network" theft contribution to shrinkage, network operators assume an aggregate theft level of 0.3% of throughput. We are not aware of the evidence underpinning this figure as the shrinkage documents we have reviewed merely refer to "historical evidence".

3.58. Even if this figure was approximately correct, the theft levels generated by Mod.228/228A are 3 to 5 times greater.

Proportions of "network" and "other" theft

3.59. Taken at face value the xoserve figures indicate total detected theft is divided 31% "network" theft and 69% "other" theft.

3.60. Previously, for the purposes of shrinkage calculation, a figure of 10% of total theft was regarded as "network" theft. Network operators now claim a much lower figure of 3.1%, but a "negotiated" settlement of 6.6% has now been agreed.[6]

"Network" theft and the Mod 228/228A methodology

3.61. Mod 228/228A methodology has been derived in part by analysis of the xoserve data – in particular to apportion the calculated theft "balancing factor" quantities between the SSP and LSP sectors. One would have expected the distinction between "network" and "other" theft to form part of the apportionment process, but it appears not to do so.

3.62. Within the Mod.228/228A framework it would appear logical (based on the data above) to apportion 31% of the theft "balancing factor" quantities to the networks, and then apportion the remainder to SSP and LSP sectors.

3.63. Using the figures presented by BGT in support of Mod.228 (11.8 TWh RbD, 76% RbD theft) this would allocate around 2.8 TWh to network as additional shrinkage – shrinkage volumes would need to increase by 50% or more as a consequence.

3.64. Even if the lower "network" theft proportion now used by network operators (6.6%) was applied the figure would be 0.6 TWh, equating to a 15% increase in shrinkage volumes.

3.65. For the avoidance of doubt we are not recommending that the Mod.228/228A methodology is applied to apportion theft to networks – we are merely pointing out that this is yet another area where the logic underpinning the Mod.228/228A methodology appears to fail.

Proportions of LSP and SSP sector theft

3.66. The Mod 228/228A methodology assumes that allegations are a reliable indicator of theft levels because of a perceived lack of incentive for theft detection in the LSP sector. It uses an average of allegation levels (taking account of AQ) and detection levels to derive sector theft apportionment figures of about 71% SSP and 29% LSP.

3.67. We note from the above data that apportionment based on reported theft would give figures of about 92.5%SSP and 7.5%LSP including network theft, and 96.6%SSP and 3.4% LSP excluding network theft.

3.68. We are not persuaded that the Mod.228/228A hypothesis – that allegations are a good indicator of theft levels – is sound. We do not believe that there is sufficient evidence to make this the basis for an apportionment methodology. We nevertheless attempted to derive sector apportionments using this approach.

[6] National Grid presentation to Mod.194 Development Workgroup, 9 June 2008

3.69. We derived a theft quantity per allegation for each sector from the valid allegation and reported stolen figures and applied this to all allegations for that sector. This still gave SSP apportionment figures far higher than the Mod.228/228A methodology – 87.3% SSP and 12.7% LSP including network theft, 92.9%SSP and 7.1% LSP excluding network theft.

Theft as a function of load band size

3.70. xoserve has also provided a further breakdown of theft allegation and detection data for sites in different load bands. We have reproduced this data below, specifying meter reading frequency and adding in estimated load band throughput data so that we can get a feel for the relative incidence of detected theft in each load band:

Category	Load band kWh	Meter reading frequency	Estimated* load band throughput over period TWh	Reported stolen (Includes network theft)			Relative theft per unit throughput compared to average for whole system
				GWh	% of total reported stolen	% of load band throughput	
SSP	<73,200	Annual	1698	149.3	92.76%	0.0088%	1.57
LSP NDM (1)	73,200 to 293,000	Annual	–	7.7	4.80%	–	–
LSP NDM (2)	293,000 to 732,000	Monthly	–	0.6	0.39%	–	–
Total LSP NDM (1) + LSP NDM (2)	73,200 to 732,000	–	257	8.4	5.19%	0.0033%	0.59
LSP NDM (3)	732,000 to 58,600,000	Monthly	373	3.3	2.05%	0.0009%	0.16
DM	>58,600,000	Daily	548	0.0	0.00%	0.0000%	0.00
LDZ			**2876**	**160.9**	**100.00%**	**0.0056%**	**1.00**

*Estimated using load band throughput percentages derived from load band throughput data for the period

3.71. Reported theft as a percentage of band throughput shows a clear trend of decrease with increasing meter read frequency and increasing load size. Relative theft rates are far higher for the SSP sector than for the larger load bands, and there is a decreasing trend with site size.

3.72. These trends suggest that more frequent meter reading and/ or site visits for the purposes of meter reading, together with more stringent credit checks, may act as a deterrent to theft at larger sites.

Theft and consumption relationship

3.73. The Mod.228/228A methodology assigns more than 76% of RbD volumes (almost 9 TWh) to theft. If these volumes were broadly correct we believe it would be a reasonable assumption that the amount of reconciliation should in some way be linked to throughput of either the NDM sector or total throughput, as theft will be closely related to the consumption profile of typical gas customers. There is no evidence that we are aware of to suggest that the behaviour of customers that steal gas will necessarily be any different to that of other customers.

3.74. We have tested this hypothesis using plots of monthly reconciliation against NDM consumption and total consumption (Appendix 2, section 6) and found the relationship between monthly consumption and the monthly RQ Total (and by inference monthly theft) is statistically insignificant (r^2 value 0.033).

3.75. In conclusion, we believe that one of the key elements of the Mod.228/228A methodology – that the reconciliation quantities largely comprise theft – is undermined by the absence of any correlation between reconciliation quantities and demand.

Approach to theft analysis

3.76. We recognise that the available data on theft is somewhat limited, and we welcome initiatives that might improve the situation – for example Mod.274 proposes that an independent agent could determine strategies to improve the investigation, detection and prevention of theft in the GB gas market.

3.77. We also recognise that theft levels are, in reality, going to be greater than the detected theft levels reported by xoserve, which should be regarded as an absolute minimum. We are aware of the 0.3% throughput total theft assumption used by network operators, but we have been unable to validate this.

3.78. In the absence of additional substantiated evidence we have been restricted in our analysis. We believe the approach we have adopted, involving a straightforward analysis of the available data, to be reasonable in the circumstances.

Key conclusions from theft analysis

3.79. Overall, we have strong reservations as to the validity of theft treatment within the Mod.228/228A methodology, for the reasons described below.

3.80. One of the key elements of the Mod.228/228A methodology – that theft is the "balancing factor" and the reconciliation quantities largely comprise theft – can be challenged. Theft levels generated using the Mod.228/228A methodology vary significantly year to year – our analysis showed a >60% step change for one year – whilst reconciliation quantities remain relatively stable. This highly improbable result is caused by the combined effects of the "genuine reconciliation" and theft "balancing factor" concepts within the methodology, indicating inherent flaws.

3.81. The methodology results in theft levels far higher than both the assumption used by network operators and the xoserve detected theft statistics, without any corroboratory evidence:

Source	Corroboratory evidence	Theft levels % throughput
Mod.228/228A methodology	None: theft assumed to be "balancing factor"	0.8% – 1.4%
Network Operators assumption	Historical studies?? (not validated)	0.3%
xoserve	Detected theft statistics	0.006%

Note: Network Operators assumption and xoserve figures include network theft

3.82. We have two main concerns with the way in which the Mod.228/228A methodology proposes to apportion theft quantities across market sectors. Firstly it ignores network theft, and secondly it apportions gas to SSP and LSP sectors on a basis we have been unable to reproduce using straightforward analysis of the same statistics, as the results in the table below show:

Source	SSP proportion %	LSP proportion %
Mod.228/228A (allegation and detection based)	70.6%	29.4%
TPA analysis* (allegation and detection based)	92.9%	7.1%
TPA analysis (detection based)	96.6%	3.4%

*TPA does not subscribe to the view that theft allegations are a sound basis for apportionment, but conducted the analysis for comparison purposes

3.83. The theft apportionment methodology would apply to negative reconciliation volumes and therefore calculate negative theft apportionments. We find this concept difficult to comprehend, and believe it points to flaws in the methodology.

3.84. The Mod 228/228A methodology is further undermined by the absence of any correlation between reconciliation quantities and consumption as one would expect theft to be almost certainly linked to consumption.

Key conclusions on IGT issues

3.85. We have concerns over the proposed Mod.228/228A approach to IGT issues for the reasons set out below.

3.86. We have been unable to link the proposed 5.7% apportionment of RbD to IGT issues to data provided by xoserve. Furthermore, the 5.7% RbD figure is quoted in Mod. 228/228A as a maximum and we would expect the proposal to specify a lower average figure for application purposes. We have not separately sought to establish whether CSEP energy is understated.

3.87. We have not been able to validate the proposed consumption based split across sectors (88%SSP, 12% LSP), although we note that these figures correspond to the respective SSP and LSP sector AQ proportions.

3.88. CSEPs are a growth area in contrast to other parts of the markets and CSEP AQs and RbD quantities have increased significantly in recent years. Problems at CSEPs with the application of algorithms (which are developed for the market as a whole) may be part of the reason why the CSEP RbD level of 3.4% AQ is greater than the national average of 2.3%.

Key conclusions on late and unregistered sites

3.89. We have concerns over the proposed Mod.228/228A to approach late/unregistered site issues for the reasons set out below.

3.90. We have been unable to link the proposed 2.9% apportionment of RbD to late/unregistered site issues to data provided by xoserve. We note that certain data from xoserve indicates an average annual contribution of about 0.5% RbD for unregistered sites. We have not separately sought to establish the contribution to RbD.

3.91. We have not been able to validate the proposed split across sectors (24% SSP, 74% LSP and 2% DM), although we note that these figures are significantly different from the sector AQ proportions (60% SSP: 23% NDM LSP: 17% DM LSP). We have not separately sought to establish the contribution to RbD that the site registration process might generate.

3.92. It remains unclear to us the extent to which this is a transient problem, whereby contributions to RbD are reversed at a later stage. Where this is the case, there is no rationale in our view for any additional correction of the type proposed.

3.93. Transporters' shrinkage quantities include an element covering unregistered sites within the "network" theft component and it is unclear to us whether this "allowance" for unregistered sites has been taken into account in determining the RbD treatment for unregistered site volumes.

Levels of shrinkage and RbD

3.94. There have been some changes to the shrinkage factors each year. However the scale of the change has been relatively low compared to the level of reconciliation. The amount of LDZ shrinkage in 2004 was 5 TWh falling to 3.8 TWh by 2008. The intervening years figures are 2005 4.4 TWh, 2006 4.2 TWh and 2007 3.9 TWh. Therefore there has been a decline in shrinkage quantities of 1.2 TWh in total over 4 years, representing around 2 to 3% of annual reconciliation quantities. It is possible that if the reductions in assumed shrinkage do not reflect reality (we have seen no evidence that this might be the case), then the reductions could be viewed as a contributor to the slightly rising trend in reconciliation quantities.

Potential shrinkage errors

3.95. To get a feel for the potential contribution of shrinkage errors to RbD we have estimated the scale of error that would be required to account for the full RbD quantities – this would be about 2% of LDZ throughput.

3.96. The current shrinkage levels are typically in the range 0.5% to 0.8% (although these are converted into fixed volumes for application in the allocation process) so these figures would have to be substantially in error to account for the additional 2% of throughput.

Fixed daily shrinkage quantities

3.97. The introduction of a fixed daily shrinkage adjustment from 1st October 2008 may create a within-year impact on RbD as there are some LDZs that demonstrate a linkage between leakage and throughout, which may mean that shrinkage is understated in winter and overstated in summer. There is an insufficient period of data to analyse this but it may be worth re-visiting in future.

Shrinkage adjustments via RbD

3.98. At the end of each year an assessment of shrinkage in the previous year is made and compared to the forecast at the beginning of the year (forecasts are the basis on which the shrinkage quantities within the LDZ allocation process are set). An RbD adjustment between the SSP sector and the shrinkage account is made to reflect the difference. Apparently these have been very small – Mod.228 quotes 0.0004% of RbD which would equate to around 50 MWh 0.001% of shrinkage.

3.99. The Mod.228/228A methodology proposes apportioning these quantities to the market 62%SSP, 24%LSP and 14% DM, on the basis of sector throughput. Whilst the quantities involved are insignificant, there are two important issues concerning the methodology.

3.100. Firstly, it is inappropriate to apportion shrinkage reconciliation quantities to DM and LSP sectors which have measured consumptions – the reconciliation should purely be between the SSP sector and the shrinkage account. If shrinkage quantities have been too low during the year SSP quantities will have been too high (and vice versa) and reconciliation simply corrects this. Any increase or decrease in shrinkage account quantities will feed through to the transportation charges payable. A logical extension to the Mod.228/228A treatment of shrinkage reconciliation would be to apply the same treatment to (for example) DM reconciliation, requiring apportionment of DM errors across LSPs and shrinkage as well as the SSP sector. This would clearly be contrary to basic reconciliation principles.

3.101. Secondly, even if it were appropriate to apportion shrinkage reconciliation across sectors, we do not believe sector throughput proportions to be an appropriate driver. As we understand it, shrinkage costs are recovered through a transportation charging methodology which takes accounts of the costs of the system tiers used by sites of various size (typically the larger the site the fewer tiers used). We suspect that this would give different results from a pure throughput driven apportionment of cost.

Key conclusions from shrinkage analysis

3.102. The main points emerging from our review of shrinkage issues are set out below.

3.103. Assumed annual shrinkage quantities have declined by about 1.2TWh over a 4 year period, and it is theoretically possible that, if the reductions do not reflect reality (and we have no evidence that this might be the case) then the reductions could be viewed as an inappropriate contribution to RbD, amounting to some 2-3% of annual RbD.

3.104. Current shrinkage levels are typically in the range 0.5% to 0.8% of throughput and these figures would have to be substantially in error to account for the full RbD quantities, which are equivalent to 2% of throughput.

3.105. We have concerns over the proposed Mod.228/228A methodology for treatment of shrinkage reconciliation in that it is inconsistent with reconciliation principles in attempting to apportion the quantities across sectors (a logical extension of the proposal would be to apportion DM errors across the LSP sector and the shrinkage account as well as the SSP sector).

3.106. Furthermore the proposed apportionment driver (throughput) is, we believe, inconsistent with the transportation charging methodology which takes account of tier usage in apportioning cost.

Key conclusions on measurement errors

3.107. We have not reviewed the accuracy of LDZ, DM and LSP measurements in detail as there are other industry processes to do this. However, to get a feel for the potential contribution of these errors to RbD we have estimated the scale of error that would be required to account for the full RbD quantities (which are about 2% of LDZ throughput).

3.108. LDZ meter reads would have to show a consistent 2% over-read error across the whole network, which we would expect to be identified through the shrinkage volume setting process

3.109. DM meter reading would have to be in error by about 11TWh in total which is equivalent to around 9% of DM demand, which is again quite unlikely to go undetected, particularly given that the sites are daily read.

3.110. LSP Meter reads would have to be in error by above 8% which is also unlikely to go undetected and there is a minimum metering standard that requires a much better level of accuracy.

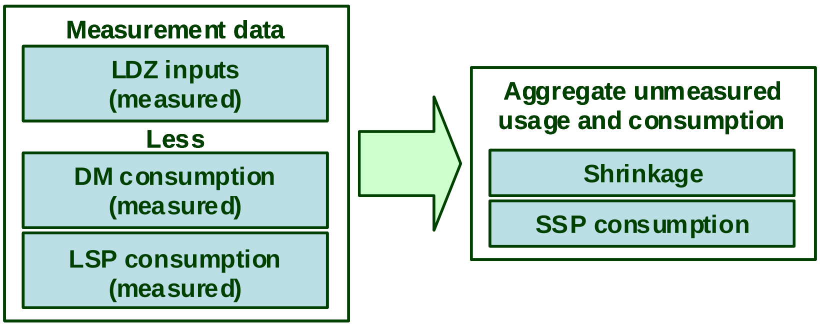
3.111. It is conceivable that there could be a combination of errors with a specific bias (LDZ metering over-reading in combination with DM and LSP meter under-reads) but would be quite unlikely.

3.112. It is important to recognise that measurement errors which are subsequently identified are corrected through a reverse adjustment to RbD. Therefore only undetected measurement errors in a particular direction can make permanent contributions to RbD – this would appear unlikely in significant quantities.

Measured and unmeasured gas and risk of inaccuracies

3.113. Three sets of measurement information are used within the allocation process: LDZ inputs, DM consumptions and LSP consumptions.

3.114. Unmeasured gas within the allocation process comprises SSP consumption and shrinkage, the aggregate of which is determined by measurement difference.



3.115. The relative proportions of unmeasured quantities of shrinkage and SSP consumption are, of necessity, ascertained through estimation techniques – which are, by their very nature, much less reliable than direct measurements.

3.116. Thus, the allocations to shrinkage and SSP consumption will be subject to greater error (compared to measured DM and LSP consumptions) because of the absence of direct measurement.

3.117. This, we would argue, is a natural consequence of the industry decision not to implement individual meter point reconciliation for the SSP sector which comprises around 60% of throughput. We believe the decision was taken in full light of the knowledge that SSP allocations via RbD would likely be less accurate than meter reads.

3.118. As a general principle, it does not appear unreasonable to us that those who do not provide measurement information should bear a higher risk of error in the allocation process, compared to those that do provide measurement information (and bear the costs of doing so).

3.119. In volume terms, the problem could be reduced at a stroke through the provision of SSP meter reads for reconciliation purposes. This would leave just shrinkage (<1% of throughput) plus any other "unidentified" gas (to the extent it exists) as unmeasured quantities.

3.120. This is not to say that the existing RbD based allocation process cannot be improved. On the contrary, if there is clear quantified evidence that certain volumes of gas are inappropriately being allocated to RbD then the allocation process should be amended to address this. As we explain in our earlier commentary, we are not convinced at this stage that there is clear evidence for quantified levels of "unidentified" gas within the process, nor that a simple reapportionment of RbD volumes is an appropriate solution.

3.121. If the amount of "unidentified" gas could be reliably estimated then the allocation process would require amendment to deal with this new category of gas – the quantities should (as with shrinkage gas) be excluded from the aggregate daily NDM quantities up-front and apportioned separately, using market sector drivers developed for this purpose. The NDM allocation and RbD processes will then continue to operate effectively.

3.122. The distinction between Mod.228 (which apportions percentages of RbD across market sectors and Mod.228A (which calculates fixed volumes from the RbD values and apportions them to the LSP sector on a forward looking basis) is relevant here. We envisage any "unidentified" gas that could be quantified would be treated as a fixed daily volume to be apportioned through the allocation process. The use of fixed volumes has some similarities with the Mod.228A approach.

3.123. Our high level assessment of Mod.228/228A in the context of measured and unmeasured gas quantities is that the proposed methodology attempts to attach spurious levels of accuracy to estimation techniques, whilst not recognising the importance and value of measurement information, which is the foundation of the allocation process.

Testing apportionment methodologies for "unidentified" gas

3.124. We have tested by way of theoretical examples whether any "unidentified" gas within the system could be adequately dealt with via an RbD apportionment methodology. Firstly we modelled our preferred approach to dealing with "unidentified" gas whereby it is, like shrinkage, excluded from the total NDM quantity. We then modelled the RbD apportionment methodology whereby it is included in the total NDM quantity.

3.125. The analysis demonstrates that excluding "unidentified" gas from the total NDM quantity gives correct apportionments as it removes the impact of any deemed allocation errors on the allocation of the "unidentified" gas. By contrast, the RbD apportionment methodology does not, and gives incorrect results as a consequence

3.126. We have therefore concluded that RbD apportionment is not a suitable method for dealing with "unidentified" gas as it would give inaccurate final allocations. Furthermore we do not believe that any correction factor (as "genuine reconciliation" appears to be) could be effective in accounting for algorithm performance issues. Further details of our analysis containing the worked examples are in Appendix 1.

4. Recommendations for further work

4.1. Our review and assessment has indicated a number of areas where greater clarity and understanding of the factors influencing the allocation and reconciliation process (and the scale of influence) would assist in informing future industry decisions regarding RbD.

4.2. We also believe that this would provide valuable context and information for regulatory purposes, particularly the Distribution Network Price Control Review.

4.3. In this context, we briefly set out below our recommendations for future work below.

Algorithm process and AQs

4.4. An important aspect that arises from our analysis is the accuracy of the AQs. We are aware of Mod.209 which relates to the introduction of a rolling AQ. This should go some way to reducing the lag that is inherent in the current process.

4.5. However this assumes that the accuracy of the AQs calculated will be good. As our analysis demonstrates, even relatively small errors in the AQ can generate significant reconciliation quantities. We have highlighted many reasons as to why AQs can be inaccurate, but it is important to establish that every possible uncertainty in the calculation of AQ has been minimised.

4.6. In particular, the validity of AQs in the respective SSP and LSP sectors should be examined to gain a better understanding of the apparent bias.

4.7. We acknowledge that there is no simple solution, but the whole AQ calculation and agreement process should be evaluated, to establish where improvements can be made to the benefit of the reconciliation process.

4.8. There are some other potential sources of inaccuracy within the NDM algorithm process which should be investigated, particularly the recent changes to the WCF which increases the prominence of the AQ. The effects of these changes should be monitored closely to assess the impact on RbD.

4.9. In addition there should be a review of the accuracy of the split of deemed demand between the SSP and LSP sectors, if the AQs are assumed to be perfect. This will identify any inherent bias in the models.

Gas measurement

4.10. Industry standards and developments relating to measurement of LDZ inputs, LSP consumptions and DM consumptions should be monitored and the potential for inaccuracies assessed. All aspects of the measurement process should be covered, including CVs and temperature and pressure correction.

4.11. The impact of potential errors within the allocation and reconciliation process should then be assessed.

4.12. We note that Ofgem[7] has raised concerns over the lower standards of metering at LDZ entry compared to NTS entry. It will be interesting to see if work in this area sheds light on the potential for RbD impacts.

Shrinkage

4.13. In view of its status as an unmeasured quantity within the allocation process, it is essential that shrinkage is as accurate as possible.

4.14. Work in the Shrinkage forum should be monitored and the potential for inaccuracies within the various shrinkage components should be assessed. In particular, any theft component should be considered in the wider context of overall theft levels.

4.15. The impact of potential shrinkage inaccuracies within the allocation process should then be assessed.

4.16. Historical RbD data should be examined to determine any linkage between shrinkage factor changes and RbD volumes.

Stock changes/LDZ transfers

4.17. The historic level of Stock Change and LDZ Transfer adjustments to the LDZ input measurements should be examined and validated, and their impact within the allocation process assessed.

Theft

4.18. The existing theft data should be reviewed and assessed. In particular the evidence underpinning theft level assumed by network operators in setting the network theft component of shrinkage should be examined.

4.19. Industry developments, in particular the Mod.274 proposal to appoint an industry agent, should be monitored.

4.20. Additional sources of theft information should be sought, perhaps including through consultation with network operators outside GB and other utility industries

IGT and late/unregistered sites

4.21. Further analysis on the historical impacts of these processes on RbD should be conducted, and the current scale of the problem assessed.

[7] Ofgem paper dated 22nd September 2009 presented to the 1st October 2009 Transmission Workstream under agenda item "Metering Standards and Impact on Shrinkage"

4.22. Consideration should be given to process improvements that would minimise the scope for energy loss e.g. by assigning clear responsibilities for gas offtake at the outset.

LDZ level assessments

4.23. Further analysis of RbD data of the type reported here should be conducted at an LDZ level, as this may reveal trends and linkages that are not apparent at national level.

4.24. The future initiatives described above should also where necessary conduct assessments and impact analyses at an LDZ level.

Potential allocation process development

4.25. A more detailed analysis should be made of the amendments necessary to the allocation process to deal appropriately with any properly quantified "unidentified" gas.

4.26. An assessment should be made of the feasibility and cost of accommodating SSP meter reads for reconciliation (and AQ update) purposes.

Appendix 1

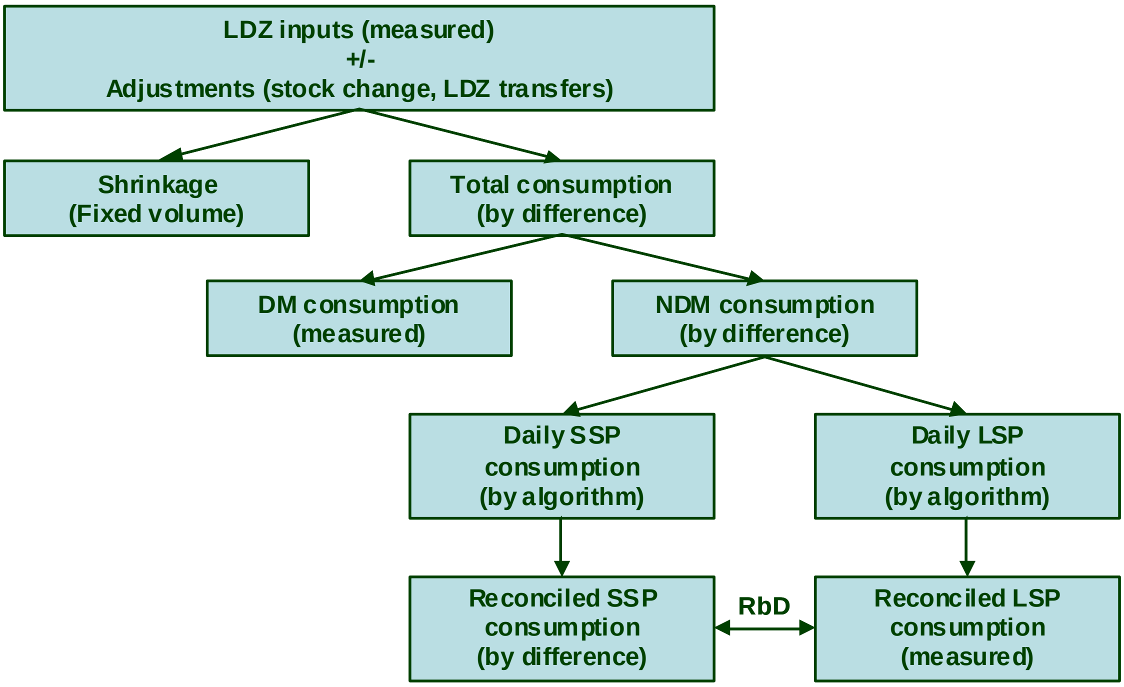
Context for RbD – the LDZ allocation process

Introduction

1.1. Below we review the LDZ allocation and reconciliation processes and identify potential sources of error. This provides important context for the analysis we report on in later sections.

LDZ allocation process

1.2. The schematic below summarises the daily process by which gas entering the LDZ is allocated to shrinkage and the three market sectors (DM, SSP and LSP) and then reconciled:



1.3. Starting with the LDZ input quantities, a fixed quantity of shrinkage is deducted first. Shrinkage is not measured directly – it is an amount established by the transporter through estimation techniques and now applied as a fixed daily volume (previously it was applied as a fixed percentage of throughput).

1.4. The quantity remaining after shrinkage deduction represents the total consumption for all three sectors.

1.5. The directly measured DM consumption is then deducted from the total consumption to give NDM consumption.

1.6. NDM consumption is then divided between SSP and LSP sectors using algorithms intended to represent the load characteristics of consumption in each sector adjusted for weather conditions on the day.

1.7. This results in daily allocations (the deemed daily quantities) for each site in the SSP and LSP sectors.

1.8. When LSP meter reads become available the actual consumption at an LSP site is established and reconciliation takes place to give the reconciled LSP quantity. An equal and opposite reconciliation is applied to the SSP sector through the RbD process.

Reconciliation by difference

1.9. RbD is necessary because the SSP sector does not provide meter reads for reconciliation purposes.

1.10. The RbD process operates on the principle that if deemed daily allocations in the LSP sector are too high over a period (as later established by LSP meter reads) then the SSP deemed daily allocations for the same period were too low by the same amount (and vice versa). RbD corrects for this error in the SSP deemed daily allocations.

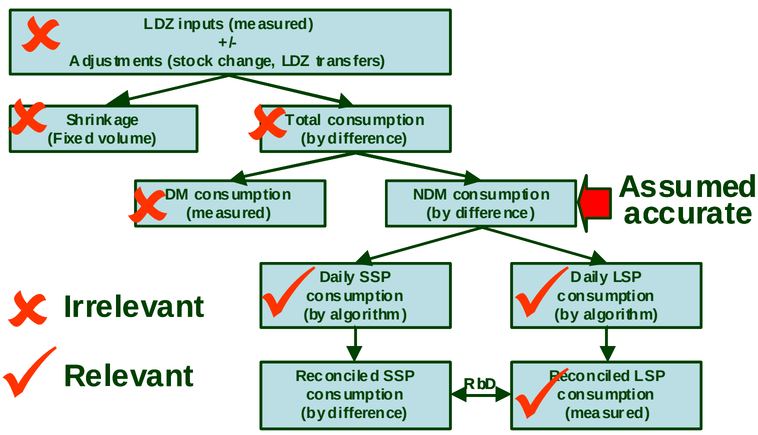
Potential causes of RbD volumes

1.11. We look now at circumstances which can give rise to RbD volumes within the allocation process. This is important because it provides a framework for our analysis and assists in explaining the likely or potential origins of the RbD volumes observed in practice.

1.12. We believe it is helpful to look separately at the RbD volumes that can arise in two circumstances, firstly when NDM consumption as a whole has been accurately established, and secondly when it has not due to errors in the LDZ allocation process.

NDM consumption accurately established

1.13. In this case the only relevant parameters in the allocation process are the deemed daily consumptions for the SSP and LSP sectors, and the reconciled LSP consumptions:



1.14. RbD quantities can arise:

(1) Due to inaccuracies in the deemed daily allocations to the LSP and SSP sectors driven by the algorithm process. These are then corrected via reconciliation (assuming LSP measurements are correct).

(2) Inaccuracies in LSP measurements (these are retained post reconciliation unless the error is identified and a subsequent adjustment made)

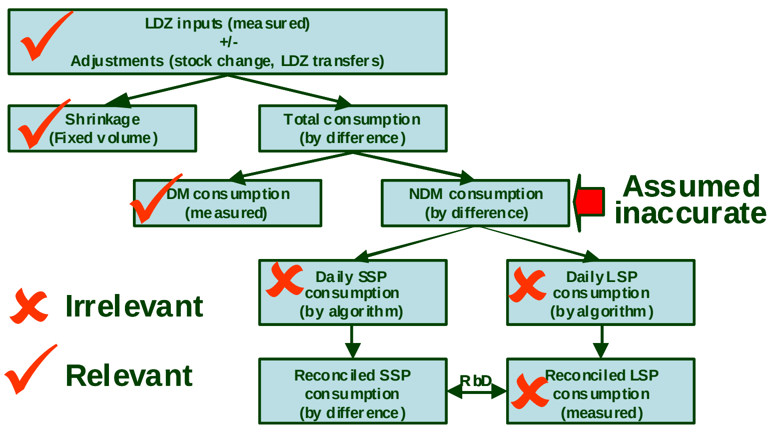
1.15. The motivation for Mod.228/228A appears to be driven by concerns over the observed RbD levels, but the proposal itself does not appear to acknowledge that RbD volumes can arise purely from inaccuracies within the algorithm process (i.e. (1) above). We believe this is an important point as the analysis we present later indicates that the algorithm process is inherently inaccurate.

1.16. In our view, there is nothing sinister about RbD volumes arising from this source, and they are not an indication of flaws in the overall allocation process – indeed they play an essential part in ensuring equitable allocation to the SSP and LSP sectors post reconciliation.

1.17. This is not to say that the algorithm process should not be improved where possible, but merely to point out that errors in the algorithm process are transient in effect as they are corrected by reconciliation.

NDM consumption inaccurate

1.18. We turn now to the situation where the established NDM consumption is inaccurate. In this case the full range of parameters comes into play so we have made some simplifying assumptions in the schematic below.



1.19. We have assumed that the algorithms would give accurate deemed daily consumptions had the total NDM consumption been correct, and that the LSP measurements are accurate. Thus, absent inaccurate NDM consumption, RbD volumes would be zero.

1.20. However, because NDM consumption is incorrect the deemed daily allocations for both sectors will both be incorrect. For example, if the NDM consumption is too high, the deemed dailies for the SSP and LSP sectors will be too high. This will give rise to RbD volumes when LSP measurements are provided and reconciliation takes place. Ultimately, the full amount of the NDM consumption error is borne by the SSP sector, partly as an error in deemed daily allocations, and partly through RbD.

1.21. The potential sources of inaccuracy in NDM consumption are:

(1) LDZ input measurement error (or stock change/transfer adjustment errors). Over-reading LDZ input meters for example would result in over-allocation to the SSP sector (and vice versa)

(2) Shrinkage error. An over-estimate of the fixed volume of shrinkage would result in under-allocation to the SSP sector (and vice versa)

(3) DM consumption error. Over-reading DM meters would result in under-allocation to the SSP sector (and vice versa)

1.22. There is also the potential for over-allocation to the SSP sector if there are volumes of unmeasured gas consumption or usage within the system that are not properly accounted for in the allocation process – so called "unidentified" gas. This would be similar to the situation described above where NDM consumption is too high, and RbD volumes can arise as a result.

Combined RbD sources

1.23. In practice RbD volumes are likely to arise from a combination of the sources identified above – broadly algorithm inaccuracy, measurement error and (to the extent it exists) any "unidentified" gas volume.

Error correction

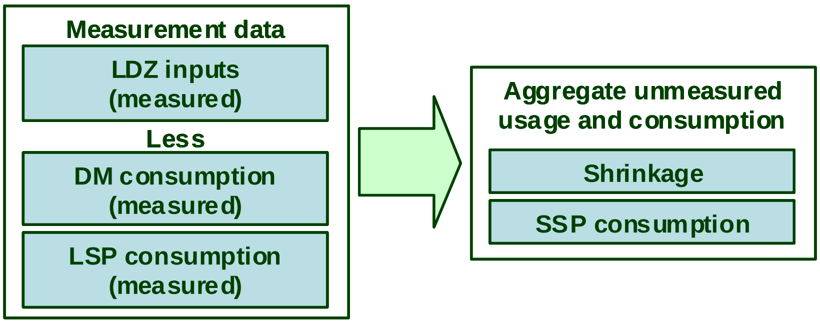
1.24. It should be noted RbD arising from certain sources has only a transient effect – for example the effects of measurement errors that are subsequently identified can be reversed by adjustment.

Measured and unmeasured quantities

1.25. We now step back from the detail of the existing allocation and reconciliation process to look at the categories of gas involved and the measurement or otherwise of the associated quantities.

1.26. Three sets of measurement information are used within the allocation process: LDZ inputs, DM consumptions and LSP consumptions

1.27. Post reconciliation, the difference between measured inputs and measured consumptions represents the aggregate of other unmeasured usage and consumption, comprising SSP consumptions and shrinkage.



1.28. Whilst the aggregate unmeasured consumption and usage can be determined by measurement difference, the relative proportions of unmeasured quantities in various categories must, of necessity, be ascertained through estimation techniques – which are, by their very nature, much less reliable than direct measurements.

1.29. Thus, the allocations to shrinkage and SSP consumption will be subject to greater error (compared to measured DM and LSP consumptions) because of the absence of direct measurement.

1.30. This, we would argue, is a natural consequence of the industry decision not to implement individual meter point reconciliation for the SSP sector which comprises around 60% of throughput. We believe the decision was taken in full light of the knowledge that SSP allocations via RbD would likely be less accurate than meter reads.

1.31. As a general principle, it does not appear unreasonable to us that those who do not provide measurement information should bear a higher risk of error in the allocation process, compared to those that do provide measurement information (and bear the costs of doing so).

1.32. In volume terms, the problem could be reduced at a stroke through the provision of SSP meter reads for reconciliation purposes. This would leave just shrinkage (<1% of throughput) plus any other "unidentified" gas (to the extent it exists) as unmeasured quantities.

1.33. This is not to say that the existing RbD based allocation process cannot be improved. On the contrary, if there is clear quantified evidence that certain volumes of gas are inappropriately being allocated to RbD then the allocation process should be amended to address this. As we explain later, we are not convinced at this stage that there is clear evidence for quantified levels of "unidentified" gas within the process, nor that a simple reapportionment of RbD volumes is an appropriate solution.

1.34. Our high level assessment of Mod.228/228A in the context of measured and unmeasured gas quantities is that the proposed methodology attempts to attach spurious levels of accuracy to estimation techniques, whilst not recognising the importance and value of measurement information, which is the foundation of the allocation process.

Testing apportionment methodologies for "unidentified" gas

1.35. We sought to test whether any "unidentified" gas within the system could be adequately dealt with via an RbD apportionment methodology. Firstly we modelled our preferred approach to dealing with "unidentified" gas whereby it is, like shrinkage, excluded from the total NDM quantity. We then modelled the RbD apportionment methodology whereby it is included in the total NDM quantity.

"Unidentified" gas apportioned separately

1.36. Assume there are 10 units of "unidentified" gas to be apportioned 90% SSP and 10% LSP. These are excluded from the total NDM quantity of 100 units which the algorithms split between SSP and LSP sectors to give the deemed daily allocations. The LSP measurements are kept constant at 25 units. Reconciliation takes place as per the existing RbD process. Finally the "unidentified" gas is added to give the final allocation.

1.37. The table shows the results of varying algorithm performance in establishing the deemed daily allocations. The process gives correct final allocation results consistently, irrespective of algorithm performance.

	SSP	LSP	RbD	SSP	LSP	RbD	SSP	LSP	RbD	SSP	LSP	RbD
Deemed daily allocations	75	25		70	30		65	35		80	20	
LSP measurement		25			25			25			25	
RbD	0		0	5		5	10		10	-5		-5
Allocation (before unidentified gas apportionment)	75	25		75	25		75	25		75	25	
Unidentified gas apportionment	9	1		9	1		9	1		9	1	
Final allocation	84	26		84	26		84	26		84	26	

RbD apportionment of "unidentified" gas

1.38. In this case we have the same 10 units of unidentified gas which should be apportioned in the same proportions 90% SSP and 10% LSP. However, these are included within the total NDM quantity which is now 110 units and which the algorithms split between SSP and LSP sectors to give the deemed daily allocations. The LSP measurements are again kept constant at 25 units. Reconciliation takes place for the LSP sites but the RbD amount is now split using the 90:10 driver.

1.39. The table shows how the final allocations are dependent on algorithm performance and the RbD value generated. The correct allocation, 84 SSP and 26 LSP, is only obtained, because of the way the arithmetic works, when the RbD quantity is equal to the quantity of "unidentified" gas. Note that negative apportionments of "unidentified" gas can occur – surely an indication of an inherent flaw.

	SSP	LSP	RbD	SSP	LSP	RbD	SSP	LSP	RbD	SSP	LSP	RbD
Algorithm apportionment	85	25		80	30		75	35		90	20	
LSP measurement		25			25			25			25	
RbD apportionment 90%SSP 10%LSP	0	0	0	4.5	0.5	5	9	1	10	-4.5	-0.5	-5
Final allocation	85	25		84.5	25.5		84	26		85.5	24.5	

1.40. We conclude that RbD apportionment is not a suitable method for dealing with "unidentified" gas as it would give inaccurate final allocations. Furthermore we do not believe that any correction factor (as "genuine reconciliation" appears to be) could be effective in accounting for algorithm performance issues.

Appendix 2

RbD data analysis

1. Introduction

1.1. Below we present the RbD data analysis we have conducted in making our assessment of the Mod.228/228A proposals, providing a commentary on our findings.

1.2. In December 2009 xoserve made available a package of RbD data for the previous four years, covering various aspects of the process. This has been used as the main source data for our analysis.

1.3. We would have preferred more time to conduct our analysis as there are a number of areas where we would liked to probe more deeply or expand the analysis scope.

1.4. Of necessity and (quite rightly) we have been constrained by the end-January deadline for consultation responses.

2. Level and variability of RbD volumes

2.1. We wanted initially to get a feel for the level of RbD and the year on year variability. This analysis takes the total gas year reconciliation quantities from the xoserve data and shows how this has changed from year to year.

Gas Yr	2005/6	2006/7	2007/8	2008/9
RQ Total (kWh)	10,364,160,852	11,648,907,462	11,291,307,769	12,041,750,409
RQ Total (TWh)	10.36	11.65	11.29	12.04
Year on Year Change (TWh)		1.28	-0.36	0.75
%age NDM AQ	1.81%	2.08%	2.11%	2.33%
%age NDM SN	1.87%	2.20%	2.14%	2.46%
%age NDM Actual	1.89%	2.43%	2.21%	2.45%
%age Total SN	1.51%	1.77%	1.71%	1.98%
%age Total Actual	1.53%	1.92%	1.75%	1.98%

2.2. The RbD (or RQ) levels are 10 to 12TWh, or 1.5 to 2% of throughput over this period.

2.3. It is important to acknowledge that although the value of the reconciliation charge is significant in financial terms, the kWh quantity of reconciliation has to be taken in the context of some very large consumption values. RbD is in effect the difference between two very large numbers.

2.4. RbD levels should also be viewed in the context of the potential for error in the calculation of the deemed daily allocations to SSP and LSP sectors (which can ultimately give rise to RbD quantities). This is considerable, given the different approximations and assumptions that are made to arrive at the daily allocated values. This is examined elsewhere in the analysis.

2.5. There is perhaps some evidence of a rising trend in RbD quantities, but the absolute amount of year on year change is very small relative to the total consumption (within the accuracy of gas measurement equipment used on the GB gas network).

3. **"Genuine Reconciliation"**

3.1. The Mod.228/228A process for calculating "Genuine Reconciliation" works on the principle that the change in the LSP share of NDM AQ from one specific year to the next as a proportion of total NDM AQ will provide an indication of RbD attributable to the different rates of decline in AQ for the two sectors SSP and LSP.

3.2. The proportion of the Reconciliation Quantity that is attributed to "Genuine Reconciliation" is established as follows:

$$\left(\begin{matrix}\text{LSP Share of} \\ \text{NDM AQs} \\ \text{(2007/08)}\end{matrix} - \begin{matrix}\text{LSP Share of} \\ \text{NDM AQs} \\ \text{(2006/07)}\end{matrix} \right) \times \begin{matrix}\text{Total} \\ \text{NDM AQs} \\ \text{(2007/08)}\end{matrix}$$

3.3. Using the data provided by xoserve and the above methodology we have calculated the "Genuine Reconciliation" at LDZ and national level for 2006/7, 2007/8 and 2008/9, expressed in GWh and as a percentage of the Reconciliation Quantity. We have also estimated national figures for 2009/10 by taking the 2009 AQ Review data (which only has LSP AQs inclusive of DM AQs) and applying the actual AQ reduction year on year entirely to the LSP AQs i.e. assumed that the DM AQs have not changed. The assumed total RQ is estimated at 12 TWh. The results are presented in the following table:

	2006/7 Genuine Reconciliation		2007/8 Genuine Reconciliation		2008/9 Genuine Reconciliation		2009/10 Genuine Reconciliation	
	GWh	%RQ	GWh	%RQ	GWh	%RQ	GWh	%RQ
EA	542	97.91%	127	11.58%	271	24.54%		
EM	372	26.88%	190	13.28%	567	41.14%		
NE	712	124.13%	305	35.35%	(92)	(10.5%)		
NO	30	6.84%	105	20.61%	19	2.9%		
NT	578	54.53%	160	8.84%	672	46.1%		
NW	491	41.03%	282	53.75%	163	13.55%		
SC	967	95.85%	(84)	(13.50%)	209	27.51%		
SE	640	22.29%	100	7.68%	278	27.27%		
SO	(13)	(1.81%)	389	42.53%	13	1.72%		
SW	335	181.95%	(42)	(7.20%)	147	23.59%		
WM	832	62.51%	472	42.39%	193	12.21%		
WN	69	30.17%	(4)	(1.48%)	11	6.30%		
WS	92	87%	(13)	(5.19%)	(58)	(12.83%)		
TOTAL	5659	48.47%	1968	17.59%	2407	19.88%	6469 [Estd]	54% [Estd]

3.4. We have not been able to replicate exactly the figures quoted in Mod.228/228A for 2007/8 (1.77 TWh of "genuine reconciliation" associated with a reconciliation quantity of 11.8 TWh). The AQs used in the worked examples presented to the Distribution Workstream (23/10/08) are slightly different to those that we have been provided by xoserve for the 2007/8 year. Worked examples provided by BGT in its Mod.228 response also give a marginally different result.

3.5. The results at a national level show the "genuine reconciliation" is highly variable, with extremes of 18% and 48% over three years.

3.6. At an LDZ level "genuine reconciliation" is even more variable, with some values showing what could be called negative reconciliation. It should be noted that the Mod.228/228A "genuine reconciliation" equation would mathematically produce a negative number in most cases but is intending to represent a positive reconciliation quantity into the SSP sector.

3.7. The high variability of "genuine reconciliation" (GR) and the relative stability of the full reconciliation quantities (RQs) calls into question the Mod.228/228A premise that the remaining reconciliation quantities (i.e. RQ-GR) – which also exhibit high variability – comprise unidentified gas, largely theft, as theft would not be expected to vary significantly year on year. This is explored in more detail later.

Implications for the accuracy of deemed daily allocations

3.8. The mod 228/228A proposed allocation process appears to operate on the premise that the deemed daily allocations for the SSP sector are an accurate reflection of actual consumption, once account is taken of relative AQ movements in the SSP and LSP sectors (the "genuine reconciliation" element).

3.9. Contrast this with the LSP sector perspective; the deemed daily consumptions are demonstrably inaccurate to the tune of the full RbD quantities – as evidenced by meter reads provided by the LSP sector. This is not an estimation of inaccuracy, it is a reliable measurement. In this context, "genuine reconciliation" for the LSP sector represents 100% of RbD volumes.

3.10. We have looked at the accuracy of the deemed daily allocations, firstly by assuming the error in these quantities equates the full RbD quantities, and secondly by assuming that the SSP deemed daily quantities are corrected by only the level of Mod.228/228A "genuine reconciliation" (with 100% of RbD continuing to apply to the LSP sector):

	2005/6	2006/7	2007/8	2008/9
RQ Total	10,364,160,852	11,648,907,462	11,291,307,769	12,041,750,409
SSP Actual Cons.	393,810,792,339	348,149,387,734	374,759,609,667	363,476,234,922
Deemed Allocation Error	2.6%	3.4%	3.1%	3.4%
LSP Actual Cons.	153,919,207,533	131,301,595,136	136,159,478,461	129,007,875,062
Deemed Allocation Error	6.3%	8.1%	7.7%	8.5%

	2006/7	2007/8	2008/9
RQ Total	11,648,907,462	11,291,307,769	12,041,750,409
"GR"	5,659,094,268	1,967,676,833	2,406,858,968
SSP Actual Cons.	348,149,387,734	374,759,609,667	363,476,234,922
Deemed Allocation Error	1.7%	0.5%	0.7%
LSP Actual Cons.	131,301,595,136	136,159,478,461	129,007,875,062
Deemed Allocation Error	8.1%	7.7%	8.5%

3.11. Under the existing RbD processes the implied inaccuracies in deemed daily consumptions for the sectors are the same order of magnitude (SSP 2.6 to 3.4%, LSP 6.3 to 8.5%).

3.12. However, the "genuine reconciliation" approach would imply that whilst the inaccuracy in the LSP sector remains the same, inaccuracy in the SSP sector reduces significantly, and in some cases is an order of magnitude lower than LSP accuracy (SSP 0.7 to 1.7%). In our view this level of sector disparity in deemed allocation accuracy is unlikely.

"Genuine Reconciliation" conclusions

3.13. Overall, we believe the analysis results give rise to serious concerns regarding the effectiveness of the proposed "genuine reconciliation" process and the validity of its underlying principles. These are driven primarily by:

(1) The year on year variability of national "genuine reconciliation" values whilst the full reconciliation quantities are relatively stable.

(2) The even more marked variability at an LDZ level.

(3) The incidence of negative "genuine reconciliation" values at LDZ level.

(4) The implication that deemed daily allocations for the SSP sector would be far more accurate than those for the LSP sector.

4. Factors affecting algorithm process accuracy

AQ reliability and the algorithm process

4.1. It is acknowledged in the analysis conducted by CEPA[8] that AQ inaccuracy could be a contributor to the levels of RbD but the report also stated that inaccuracy is much less likely now given improvements in the process.

4.2. Given the importance of AQs within the process for generating deemed daily consumption, and hence RQs, we decided to assess the reliability and accuracy of AQs.

AQs (SSP, LSP and DM) compared with weather corrected demand

4.3. There is a theoretical argument that if AQs are accurate then the AQ for a particular gas year should correspond to the weather corrected actual consumption for the sector. We decided to test this hypothesis.

4.4. The following figures compare AQs with weather corrected actual consumption for the three sectors SSP, LSP and DM:

SN 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.	399,490,160,097	386,727,203,965	387,477,508,733	361,424,533,098
Diff.	4,405,931,946	13,160,344,733	-2,203,724,193	13,333,195,815
%	1.1%	3.3%	-0.6%	3.5%
LSP AQ	168,682,432,319	158,985,763,389	150,425,700,615	142,973,238,857
LSP Cons.	155,619,446,044	141,789,570,928	139,721,972,247	128,620,553,795
Diff.	13,062,986,275	17,196,192,461	10,703,728,368	14,352,685,062
%	7.8%	10.8%	7.1%	10.1%
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%

4.5. Allocation using an AQ when actual weather is outside seasonal normal demand should not automatically create reconciliation, as weather correction takes place every day for every allocation in order to get the initial allocation as close as possible to the actual demand.

[8] BGT response to Mod.228, Appendix 3, Correct Apportionment of Unallocated Gas Volumes And Mod 228, Reconciliation by Difference, A paper commissioned by Centrica, Submitted by: CEPA LLP

4.6. There is however a significant difference between the LSP AQ and the LSP weather corrected demand, in the range 10.7 TWh to 17.2 TWh. This would suggest that the LSP AQ in aggregate is significantly overstated. It is also possible that the weather correction of LSP demand is subject to inaccuracy. This could also be carried forward into the daily weather correction during allocation.

4.7. It is also interesting that the SSP AQ is closer to the deemed consumption, being in the range -2.2 TWh to +13.3 TWh but in percentage terms it is significantly closer, although still not close enough to put any confidence in the AQ as a basis for revising RbD quantities.

4.8. The DM AQs are not used in the process for generating NDM deemed daily allocations, but the discrepancies with demand figures are extremely large and variable, adding further to concerns over the accuracy of AQs generally.

Aggregate NDM AQs compared with weather corrected demand

4.9. We have also looked at the reliability of AQs for the NDM sector as a whole, by comparing with NDM sector consumptions:

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

4.10. The comparison between the aggregate NDM AQ and the weather corrected demand provides another clear indicator of how inaccurate the AQs are. The table above shows a difference in the range of 8.5 to 30.4 TWh. This clearly shows how much impact the time lag between setting the AQ and the actual demand period has on the accuracy of the AQ. Even allowing for this there is still a significant error of between -9.5 TWh and +7.2 TWh.

SSP, LSP and DM AQs compared with actual demand

4.11. Further analysis was carried out comparing AQs with actual demands, because the movements that take place during reconciliation will be determined by the actual demand as opposed to the weather corrected demand. The table below provides the same comparison as above but using actual demand. It also shows the effect of the difference between actual demand and weather corrected 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%

4.12. Again, the discrepancies between AQs and demand figures are very large and variable. AQs for both SSP and LSP sectors are in all years overstated compared with actual demands, but with LSP AQs more so in percentage terms.

AQ ratio reliability

4.13. The following table looks at whether the ratio of the AQs in the SSP and LSP sectors might be more reliable than the absolute level of AQs. We have taken the weather corrected total NDM consumption and divided it between SSP and LSP sectors using the AQ proportions for each sector. This gives a theoretical allocation (SSP Alloc. and LSP Alloc. in the table). We have then compared the LSP theoretical value against the actual and weather corrected LSP consumptions:

	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
LSP AQ	168,682,432,319	158,985,763,389	150,425,700,615	142,973,238,857
NDM AQ	572,578,524,362	558,873,312,087	535,699,485,155	517,730,967,770
SSP Alloc.	386,367,977,544	343,058,926,082	367,451,782,448	356,482,880,246
LSP Alloc.	161,362,022,328	136,392,056,788	143,467,305,680	136,001,229,738
LSP SN Cons. Diff	155,619,446,044	141,789,570,928	139,721,972,247	128,620,553,795
LSP Act. Cons. Diff	153,919,207,533	131,301,595,136	136,159,478,461	129,007,875,062

4.14. Significant differences between the calculated and measured/weather corrected consumptions are apparent, indicating perhaps that use of AQ ratios or AQ proportions may not be a reliable methodology for splitting load between sectors.

SSP and aggregate NDM AQs compared with forecast consumptions

4.15. A final comparison that can be made is to take the AQ for a particular year (effective from the October) and compare that with the forecast consumption for that year as set out in the December Ten Year Statement. This is not a straightforward process as the data available from NG NTS and the Networks does not identify NDM consumption separately in all cases, so it is necessary to examine the forecast of SSP consumption as well. The following table shows the results:

TWh	2005/6	2006/7	2007/8	2008/9
SSP Consumption Forecast (Ten Year Statement)	430	396	400	394
SSP AQ	403.9	399.9	385.3	374.8
SSP SN Consumption	399.5	386.7	387.5	361.4
NDM Consumption Forecast (Ten Year Statement)	Data not available	546	550	530
NDM AQ	-	558.9	535.7	517.7
NDM SN Consumption	-	528.5	527.2	490

4.16. What the above shows is that SN consumption (both SSP and NDM) is always much lower than the forecast of SN consumption. The AQs however show no consistent relationship with the forecast. The only conclusion that can be drawn from this is that the forecasts should not be used to pro-rate AQs down or up to equal the forecast and that careful consideration should be given to how the forecasts are used in the application of the NDM algorithms. Some changes have been made under Mod.204 as stated below, but it may be prudent to see what impact if any this has had before taking things further.

Conclusions on AQ reliability

4.17. It would appear that AQs simply are not accurate enough to be an indicator of average annual consumption, frequently exhibiting discrepancies of 10 TWh or more.

4.18. The discrepancies are in large part (but by no means solely) due to the time lag between the measurements used in establishing AQs, and the period in which the AQs are applied in the algorithm process.

4.27. LSP AQs are significantly over-stated compared with SN and actual consumptions (7.1 to 10.8% SN and 8.8 to 17.4% actual). SSP AQs are in most years also overstated compared to SN and actual consumption (-0.6 to 3.5% SN and 2.5 to 12.9% actual).

4.19. Given the importance of AQs within the algorithm process, it is highly likely that the use of AQs which are not representative of annual consumption will lead to inaccurate deemed daily allocations and give rise to RbD quantities.

4.20. Overstatement of LSP AQs is consistent with the observed over-allocation of deemed daily quantities to LSPs, giving rise to RbD quantities.

Weather correction issues and the algorithm process

4.21. The fundamental principle behind the "genuine reconciliation" concept appears to be that if the AQs are accurate then there would be no reconciliation. This is not strictly true because AQ is not the only variable in the NDM allocation equation that can create errors in the allocation between SSP and LSP. For example, the way that weather correction is applied could skew the allocation in one direction or the other during the year with no guarantee that at the end of the year there has been accurate allocation between these sectors. The fact that allocations are weather corrected makes the "genuine reconciliation" model rather simplistic, and in theory an adjustment to reflect the impact of weather would be required.

4.22. The impact of weather correction issues on daily NDM allocations has been highlighted through the recent Mod.204, through which a revised method of determining the WCF used in the NDM allocation formula was implemented. The earlier Review Group 176 report (page3) stated that the then current weather correction methodology "has potential to increase misallocation between market sectors directly influencing the level of reconciliation required."

4.23. The Mod.204 report contains in its justification (page 4) the following statement with regard to the impact of changing the calculation of WCF for the gas year 2006/7

4.24. “This would have reduced reconciliation volumes leading to lower costs for the industry from both processing reconciliation and from reduced volumes failing the filter. This would be evident both in original commodity invoices being more accurate and in the reduction of reconciliation for the large supply point market and reduced RbD charges for the small supply point sector.”

4.25. The basis for the changes to WCF were to remove reliance on the Networks' forecast of NDM SN demand used in the WCF formula and to replace it with something that contains a summed NDM AQ divided by 365 and multiplied by ALP. ALP is the term used to create an annual load profile for each load band.

4.26. The claim is that the changes would have improved NDM allocation by 32% if applied in the 2006/7 gas year. But there is no comment on how it would improve the split between SSP and LSP.

4.27. Clearly the introduction of AQ into the weather correction process raises concerns as to whether this will ultimately result in an improvement, given our concerns with regard to the accuracy of AQs. The impact of these changes on RQs should be monitored to gauge effectiveness of the revised methodology.

Data variability and the algorithm process

4.28. We have taken the consumption data provided by xoserve, which is assumed to be the final figures for each year adjusted for reconciliation, and calculated the year on year percentage changes at LDZ and national level for the AQ, seasonal normal demand (SN) and actual demand in different categories. These categories are SSP, LSP (including and excluding DM), total NDM and total LDZ.

4.29. The summary results for each year of data are shown in the tables below:

Gas Yr SSP	2005/6 to 2006/7			2006/7 to 2007/8			2007/8 to 2008/9		
	AQ	SN	Act	AQ	SN	Act	AQ	SN	Act
EA	-1.14	-0.27	-11.61	-3.64	-1.82	8.38	-2.08	-5.00	-1.91
EM	-0.98	-4.36	-11.01	-4.44	0.96	7.85	-2.96	-7.69	-4.52
NE	-0.24	-3.24	-9.12	-3.62	1.77	7.94	-2.81	-8.71	-5.84
NO	-1.11	-5.84	-10.24	-4.37	-0.82	3.81	-3.53	-6.74	-5.61
NT	-1.92	-1.46	-13.14	-3.58	-1.10	9.48	-2.18	-4.20	-0.88
NW	-1.43	-5.35	-11.82	-3.71	0.53	6.09	-3.54	-7.51	-2.91
SC	0.05	0.95	-3.58	-3.52	-0.20	2.96	-1.36	-5.60	-3.18
SE	-1.23	-5.29	-15.03	-3.51	1.26	10.17	-2.71	-5.30	-1.85
SO	-0.80	-1.50	-16.09	-2.43	0.03	11.94	-1.72	-8.93	-2.30
SW	-0.39	-4.99	-14.02	-4.25	0.62	7.76	-2.74	-6.02	-0.66
WM	-0.79	-2.91	-10.84	-3.82	1.26	8.66	-3.23	-8.87	-5.14
WN	-0.32	0.64	-5.49	-3.14	-2.12	2.38	-3.98	-9.38	-4.87
WS	-1.29	-4.54	-12.84	-2.36	-0.64	6.39	-4.34	-6.05	-1.01
TOTAL	-0.99	-3.19	-11.59	-3.65	0.19	7.64	-2.73	-6.72	-3.01

Gas Yr LSP	2005/6 to 2006/7			2006/7 to 2007/8			2007/8 to 2008/9		
	AQ	SN	Act	AQ	SN	Act	AQ	SN	Act
EA	-7.23	-6.86	-15.06	-5.15	-2.84	4.92	-5.47	-7.87	-5.60
EM	-3.99	-7.98	-12.87	-6.03	-1.57	3.43	-7.98	-11.28	-8.94
NE	-9.40	-11.50	-16.43	-7.83	-2.67	2.88	-1.45	-7.65	-5.43
NO	-1.55	-6.94	-10.40	-5.95	-1.25	2.41	-3.85	-8.35	-7.55
NT	-6.06	-8.58	-16.34	-4.78	-0.96	6.49	-7.46	-8.04	-5.82
NW	-5.02	-8.76	-13.58	-5.86	-2.60	1.14	-4.85	-6.87	-3.07
SC	-9.16	-9.71	-12.51	-2.66	1.22	2.72	-3.54	-7.27	-5.56
SE	-7.18	-11.12	-18.03	-4.49	-0.22	6.32	-5.58	-5.01	-2.86
SO	-0.65	-5.80	-14.15	-7.02	-1.45	4.47	-1.89	-7.76	-3.13
SW	-5.56	-8.75	-14.82	-3.57	-0.20	4.30	-5.21	-7.36	-3.21
WM	-7.83	-10.64	-16.33	-8.05	-3.10	2.23	-5.08	-9.36	-6.50
WN	-5.81	-6.57	-10.06	-2.81	-2.47	-0.42	-4.92	-10.84	-7.63
WS	-2.90	-9.71	-14.96	-2.12	-0.72	3.62	-3.28	-6.37	-2.82
TOTAL	-5.75	-8.89	-14.69	-5.38	-1.46	3.70	-4.95	-7.95	-5.25

Gas Yr LSP +DM	2005/6 to 2006/7			2006/7 to 2007/8			2007/8 to 2008/9		
	AQ	SN	Act	AQ	SN	Act	AQ	SN	Act
EA	-6.01	-5.78	-11.12	-4.22	-0.36	4.62	-6.38	-6.06	-4.63
EM	-5.82	-3.46	-5.61	-5.90	-0.29	1.83	-5.17	-12.45	-11.47
NE	-7.59	-4.98	-7.25	-6.12	-3.59	-1.24	-1.68	-7.30	-6.30
NO	1.77	-0.37	-1.80	-6.72	-3.50	-2.09	-5.39	-1.09	-0.64
NT	-1.31	-8.12	-13.92	-5.83	1.01	6.55	-5.09	-8.87	-7.28
NW	-6.69	-3.77	-6.22	-7.40	0.87	2.80	-1.88	-13.05	-11.36
SC	-10.47	0.09	-1.33	-1.88	-0.61	0.06	2.21	-6.90	-6.05
SE	-79.54	-16.07	-19.26	-5.44	19.22	23.05	4.89	-10.98	-10.15
SO	11.35	0.39	-4.74	-9.47	0.69	4.08	-1.31	-10.49	-7.97
SW	-5.42	-6.40	-10.27	-4.87	-2.91	-0.31	-3.46	-13.40	-10.87
WM	-7.05	-6.12	-10.09	-8.61	-2.72	0.80	-3.16	-13.78	-11.95
WN	-5.42	-11.11	-12.56	0.18	-1.88	-1.01	-8.38	-17.32	-16.06
WS	-7.18	-3.50	-5.13	-8.84	0.25	1.48	-3.05	-13.88	-12.92
TOTAL	-26.99	-5.19	-8.32	-6.09	0.97	3.67	-2.46	-10.17	-8.84

Gas Yr NDM	2005/6 to 2006/7			2006/7 to 2007/8			2007/8 to 2008/9		
	AQ	SN	Act	AQ	SN	Act	AQ	SN	Act
EA	-2.83	-2.10	-12.57	-4.04	-2.09	7.45	-2.97	-5.76	-2.88
EM	-1.86	-5.36	-11.53	-4.90	0.28	6.64	-4.38	-8.64	-5.69
NE	-3.02	-5.66	-11.27	-4.81	0.55	6.54	-2.43	-8.43	-5.73
NO	-1.24	-6.13	-10.28	-4.83	-0.93	3.45	-3.62	-7.16	-6.11
NT	-3.30	-3.78	-14.18	-3.96	-1.05	8.53	-3.87	-5.39	-2.42
NW	-2.39	-6.24	-12.28	-4.26	-0.27	4.81	-3.87	-7.35	-2.95
SC	-2.78	-2.25	-6.29	-3.27	0.20	2.89	-1.99	-6.07	-3.85
SE	-2.64	-6.65	-15.73	-3.73	0.93	9.30	-3.35	-5.24	-2.07
SO	-0.76	-2.70	-15.55	-3.83	-0.37	9.83	-1.77	-8.62	-2.52
SW	-1.82	-6.01	-14.24	-4.07	0.40	6.83	-3.41	-6.37	-1.33
WM	-3.06	-5.36	-12.58	-5.12	-0.04	6.70	-3.78	-9.01	-5.54
WN	-2.00	-1.55	-6.88	-3.04	-2.22	1.55	-4.26	-9.80	-5.67
WS	-1.89	-5.80	-13.36	-2.27	-0.66	5.73	-3.96	-6.12	-1.44
TOTAL	-2.39	-4.79	-12.47	-4.15	-0.25	6.56	-3.35	-7.05	-3.61

Gas Yr LDZ	2005/6 to 2006/7			2006/7 to 2007/8			2007/8 to 2008/9		
	AQ	SN	Act	AQ	SN	Act	AQ	SN	Act
EA	-2.93	-2.32	-11.43	-3.85	-1.29	6.98	-3.60	-5.39	-2.90
EM	-3.13	-3.95	-8.53	-5.07	0.39	4.99	-3.91	-9.85	-7.72
NE	-3.56	-4.05	-8.25	-4.70	-0.68	3.61	-2.33	-8.08	-6.05
NO	0.19	-3.44	-6.48	-5.44	-2.03	1.05	-4.37	-4.22	-3.36
NT	-1.68	-4.08	-13.44	-4.46	-0.30	8.33	-3.31	-5.98	-3.34
NW	-3.52	-4.72	-9.56	-5.13	0.67	4.71	-2.92	-9.76	-6.39
SC	-4.76	0.57	-2.58	-2.82	-0.38	1.66	0.19	-6.16	-4.45
SE	-56.52	-9.56	-16.71	-4.15	7.87	15.11	-0.22	-7.61	-5.25
SO	3.59	-0.77	-11.71	-5.17	0.29	8.67	-1.57	-9.54	-4.56
SW	-2.47	-5.51	-12.64	-4.50	-0.67	4.70	-3.03	-8.66	-4.35
WM	-3.28	-4.18	-10.54	-5.65	-0.28	5.52	-3.20	-10.73	-7.74
WN	-2.82	-5.42	-9.17	-1.55	-2.00	0.68	-6.12	-13.23	-10.38
WS	-4.26	-4.01	-8.92	-5.53	-0.18	3.79	-3.74	-10.07	-7.18
TOTAL	-13.38	-4.03	-10.22	-4.63	0.51	5.95	-2.62	-8.15	-5.45

4.30. The above tables illustrate there is considerable variability year on year at both the national and LDZ level at all demand levels and across AQs, SN Demand and Actual Demand. Actual consumption is particularly volatile with at the national level demand changes ranging from -10.2% to +6%.

4.31. This volatility could be a contributor to the level of reconciliation that is being observed. The accuracy and reliability of many of the relevant processes including the calculation of AQs, the updating of the NDM algorithms and the calculation of daily weather correction could be influenced by this volatility and uncertainty.

4.32. Fundamentally, the level of variability in the data that forms the basis of daily allocations is larger than the total reconciliation quantities and the variation in reconciliation is an order or magnitude smaller.

Summary of potential sources of inaccuracy in the algorithm process

4.33. Algorithms are not representative of individual supply point daily consumptions and are not intended to be. However they are expected to be sufficiently accurate for an individual supply point over a substantial period (typically a meter read period) and on an individual day at supply point aggregate level (e.g. shipper portfolio). But even at this level they are intended to be subject to reconciliation.

4.34. Individual supply points may exhibit unusual behaviour which will have a marginal effect on the initial allocation and when meter readings are received result in reconciliation.

4.35. The major contributor to algorithm inaccuracy is the AQ which could be subject to error or is biased for the following reasons

- Weather correction of actual consumption may not be accurate for individual sites or even for an EUC
- Not updated at all or not frequently enough
- Sites change consumption during the year
- Actual growth/decline in demand different to what is expected – in theory the AQs in aggregate should add up to the total forecast annual consumption but it is also true that the forecast will be subject to error
- The AQ on the system is not consistent with what should be the AQ based on weather correction of actual consumption
- Accuracy of CSEP data – becoming quite a significant proportion of the total and growing

4.36. The weather correction methodology used to correct daily for actual weather may be subject to error or biased or the method used to correct consumption data to create an AQ is applied differently

Scale of deemed allocation process errors to account for RbD volumes

4.37. To account fully for RbD volumes the error in the deemed daily demand would have to be the same as RbD say, 11 TWh or about 2% of throughput, as a result of under-allocation to the SSP market and over-allocation to the LSP market.

4.38. It is quite possible given the list of possible causes of error that there could be significant problems with the accuracy of the allocation process when looking at the split between SSP and LSP.

5. Analysis of DMP sample data

5.1. xoserve has provided site sampling data originating from two sources:

(1) Domestic Monitor Panel data from about 5000 sample domestic customers provided by BGT, which provides a comparison between "billed" energy based on the deemed daily allocations as reconciled via RbD, and "actual" energy derived from regular meter readings phoned in by the customer.

(2) Data recorder and data logger data from a range of sample sites of various sizes used by network operators for algorithm development purposes.

5.2. Historically, the DMP data has consistently shown "billed" energy in excess of "actual" energy, and this has been construed by some as an indication that the RbD process was in error. We note however that data recorder data presented by xoserve[9] showed the opposite effect.

5.3. Firstly, we look at differences between the DMP sample and the data recorder sample sites from which the algorithms applicable to the DMP loads are derived, as these may influence the DMP output.

5.4. As a key point it should be noted that one of the fundamental principles of the NDM algorithm process is that algorithms are unlikely to be representative of individual sites, but should be representative of the load band which they cover (although as highlighted throughout this report there may be several reasons why this might not be the case).

5.5. A single algorithm applies to the SSP sector covering all loads under 73,200 kWh. The DMP loads have an average consumption of about 17,000 kWh and are all domestic, whereas the data recorder loads have an average AQ of about 23,700 kWh, significantly higher, and some non-domestic loads are included. This could be expected to have some impact on the accuracy of the DMP billing data.

5.6. We have briefly looked at the DMP data most recently provided by xoserve. The following table shows the DMP data on an annual basis and it is clear that there is significant reduction in the discrepancy between billed and actual energy in the last two years.

	2005/6	2006/7	2007/8	2008/9
Billed	18,938	16,269	17,343	16,379
Actual	18,266	16,003	17,236	16,251
Diff.	672	266	107	129
%age	3.7%	1.7%	0.6%	0.8%

5.7. What is also of note is that in the final gas year, 5 of the 12 months are under-billed, whereas in previous years under-billing has occurred in 3 months for 2007/8, one month in 2006/7 and none in 2005/6. This appears to indicate that billing "accuracy" for these customers, although still not perfect, no longer has a consistent bias throughout the year.

5.8. Differences of <1% between "billed" and "actual" energy could be regarded as a "good" level of accuracy, given the range of potential errors that could occur when comparing this small sample to the general allocation for all sites in the SSP band.

[9] RbD Subgroup – RbD Verification Presentation, dated 8 April, xoserve, filed on Joint Office web-site under Mod.194/194A Development Workgroup, 13 May 2008 meeting

5.9. Overall therefore, we find no evidence from DMP data to suggest the RbD process is significantly in error.

6. Theft analysis

Year on year theft levels using Mod.228/228A methodology

6.1. Below we have used the Mod.228/228A methodology to generate theft values for each year with an estimate for 2009/10:

	2006/7	**2007/8**	**2008/9**	**2009/10**
RQ (TWh)	11.65	11.29	12.04	12 [est]
Gen Rec (TWh)	5.66	1.97	2.41	6.47[est]
Late/unregistered + IGT + shrinkage issues (8.6%RQ) (TWh)	1.00	0.97	1.04	1.03
Theft balance (TWh)	**4.99**	**8.35**	**8.59**	**4.50**
Throughput (TWh)	608.2	644.5	609.3	600[est]
Theft % throughput	**0.8%**	**1.3%**	**1.4%**	**0.8%**

6.2. The resulting theft figures are highly variable. As noted above, a reasonable correlation between theft levels and consumption would be expected – but this is clearly not the case given the year on year variations of up to 60% in calculated theft levels.

6.3. Furthermore the calculated theft levels are huge – greater than the shrinkage quantities attributed to network usage and leakage, and more than two orders of magnitude greater than detected theft levels (see below).

6.4. Overall, these results would seem to point to problems within the Mod.228/228A methodologies, both in terms of the "genuine reconciliation" concept which causes the variability, and the theft as "balancing factor" concept which gives rise to enormous calculated theft levels for which there is no corroboratory evidence.

Analysis of xoserve theft data

6.5. Xsoerve have provided some data and analysis on the levels of theft allegations and the validity of those allegations. We have examined this data and developed some additional analysis with a view to establishing what the data tells us about reported levels of theft and the differences in theft levels in the LSP and SSP sectors.

6.6. The data below was provided by xoserve as part of the presentations for review group 208 and contains allegations of theft over the period 01/07/03 and 31/03/08. The first table includes both "network" theft which occurs upstream of the emergency control valve and is the responsibility of network operators via shrinkage, and "other" theft which occurs downstream of the emergency control valve and is the responsibility of shippers. The second table excludes network theft.

Theft allegations (including network theft)

Site Type	No of Allegations	%age of Allegations	Valid / Invalid	Reported Stolen kWh	%age of Total Reported Stolen kWh	No of Allegations	%age of Allegations
LSP	481	2.53%	Invalid			395	82.16%
			Valid	12575827	7.45%	86	17.84%
SSP	18563	97.47%	Invalid			12560	67.66%
			Valid	156326352	92.55%	6003	32.34%
Totals	19044	100%		168902179	100%	19044	100%

Theft allegations (excluding network theft)

Site Type	No of Allegations	%age of Allegations	Valid / Invalid	Reported Stolen kWh	%age of Total Reported Stolen kWh	No of Allegations	%age of Allegations
LSP	438	2.6%	Invalid			369	84.25%
			Valid	3913589	3.36%	69	15.75%
SSP	16410	97.4%	Invalid			10748	65.50%
			Valid	112468886	96.64%	5662	34.50%
Totals	16848	100%		116382475	100%	16848	100%

Detected theft levels

6.7. Aggregate theft (including network theft) over the 4 year 9 month period is about 169 GWh or about 0.006% of LDZ throughput (assumed to be 2876 TWh over period). When network theft is excluded this figure falls to 116 GWh or about 0.004% throughput.

6.8. This compares with the 0.8% to 1.4% of throughput theft levels calculated using the Mod.228/228A methodology – these are up to 350 times higher.

Proportions of "network" and "other" theft

6.9. Taken at face values the figures indicate total theft is divided 31% "network" theft and 69% "other" theft.

6.10. Mod 228/228A methodologies have been derived in part by analysis of this data – in particular to apportion the calculated theft "balancing factor" quantities between the SSP and LSP sectors. One would have expected the distinction between "network" and "other" theft to form part of the apportionment process, but it appears not to do so. Within the Mod.228/228A framework it would appear logical (based on the data above) to apportion 31% of the theft "balancing factor" quantities to the networks, and then apportion the remainder to SSP and LSP sectors. Using the figures presented by BGT in support of Mod.228 (11.8 TWh RbD, 76% RbD theft) this would allocate around 2.8 TWh to network as additional shrinkage – factors would need to increase by 50% or more as a consequence.

6.11. For the avoidance of doubt we are not recommending that the Mod.228/228A methodology is applied to apportion theft to networks – we are merely pointing out that this is yet another area where the logic underpinning the methodology appears to fail.

"Negotiated" levels of "Network" theft

6.12. In determining the level of the "network" theft contribution to shrinkage, network operators assume an aggregate theft level of 0.3% of throughput. We are not aware of the evidence underpinning this figure as the shrinkage documents we have reviewed merely refer to "historical evidence". Previously, for the purposes of shrinkage calculation, a figure of 10% of total theft was regarded as "network" theft. Network operators now claim a much lower figure of 3.1%, but a "negotiated" settlement of 6.6% has now been agreed.[10] This converts into a figure of 0.02% of total throughput.

6.13. It should be noted that transporters' shrinkage quantities include an element covering unregistered sites within the "network" theft component but this is not quantified by the transporters in any of their shrinkage publications.

Proportions of LSP and SSP sector theft

6.14. The Mod 228/228A methodology assumes that allegations are a reliable indicator of theft levels because of a perceived lack of incentive for theft detection in the LSP sector, and uses an average of allegation levels (taking account of AQ) and detection levels to derive sector theft apportionment figures of about 71% SSP and 29% LSP.

6.15. We note from the above data that apportionment based on reported theft would give figures of about 92.5% SSP and 7.5% LSP including network theft, and 96.6% SSP and 3.4% LSP excluding network theft.

6.16. We are not persuaded that the Mod.228/228A hypothesis - that allegations are a good indicator of theft levels – is sound. We do not believe that there is sufficient evidence to make this the basis for an apportionment methodology. We nevertheless attempted to derive sector apportionments using this approach. We derived a theft quantity per allegation for each sector from the valid allegation and reported stolen figures and applied this to all allegations for that sector. This still gave SSP apportionment figures far higher than the Mod.228/228A methodology – 87.3% SSP and

[10] National Grid presentation to Mod.194 Development Workgroup, 9 June 2008

12.7% LSP including network theft, 92.9%SSP and 7.1% LSP excluding network theft.

Theft as a function of load band size

6.17. xoserve has also provided a further breakdown of theft allegation and detection data for sites in different load bands:

Sector (Therms)	Sector (kWhs)	No of Allegations	%age of Allegations	Valid / Invalid	No of Allegations	%age of Allegations	Reported Stolen kWhs	%age of Total Reported kWhs
<2,500 (<73,267.75 kWhs)	<73,200	18,546	97.50%	Invalid	12,544	67.64%		
				Valid	6,002	32.36%	149,253,658	92.76%
2,500 to 10,000 (73,267.75 to 29,3071 kWhs)	73,200 to 293,000	381	2.00%	Invalid	304	79.79%		
				Valid	77	20.21%	7,724,948	4.80%
10,000 to 25,000 (293,071 to 732,677.5 kWhs)	293,000 to 732,000	46	0.24%	Invalid	43	93.48%		
				Valid	3	6.52%	629,744	0.39%
>25,000 (>732,677.5)	>732,000	49	0.26%	Invalid	47	95.92%		
				Valid	2	4.08%	3,290,505	2.05%
Total		19,022	100.00%		19,022	100.00%	160,898,856	100.00%

6.18. The data includes "network" theft and covers the same period as the data discussed previously, although we note that the totals are marginally but not significantly different.

6.19. This theft data shows that the percentage of valid allegations in the small LSP load band at 20% is substantially higher than the larger LSPs 4% to 6.5%, but still substantially lower than SSPs. Monthly meter reading is carried out on all sites in the two highest LSP load bands, but in the lowest LSP load band there is no requirement under the UNC to carry out monthly meter reading.

6.20. In the table below we have reproduced the reported theft figures above, specified the meter reading frequency for each load band and added in the DM load band (where there appears to be industry consensus that theft levels are very low – assumed to be zero). We have also related the theft figures to the load band throughput.

Category	Load band kWh	Meter reading frequency	Estimated* load band throughput over period TWh	Reported stolen (Includes network theft)			Relative theft per unit throughput compared to average for whole system
				GWh	% of total reported stolen	% of load band throughput	
SSP	<73,200	Annual	1698	149.3	92.76%	0.0088%	1.57
LSP NDM (1)	73,200 to 293,000	Annual	–	7.7	4.80%	–	–
LSP NDM (2)	293,000 to 732,000	Monthly	–	0.6	0.39%	–	–
Total LSP NDM (1) + LSP NDM (2)	73,200 to 732,000	–	257	8.4	5.19%	0.0033%	0.59
LSP NDM (3)	732,000 to 58,600,000	Monthly	373	3.3	2.05%	0.0009%	0.16
DM	>58,600,000	Daily	548	0.0	0.00%	0.0000%	0.00
LDZ			**2876**	**160.9**	**100.00%**	**0.0056%**	**1.00**

*Estimated using load band throughput percentages derived from load band throughput data for the period

6.21. Reported theft as a percentage of band throughput shows a clear trend of decrease with increasing meter read frequency and increasing load size. Relative theft rates are far higher for the SSP sector than for the larger load bands, and there is a decreasing trend with site size.

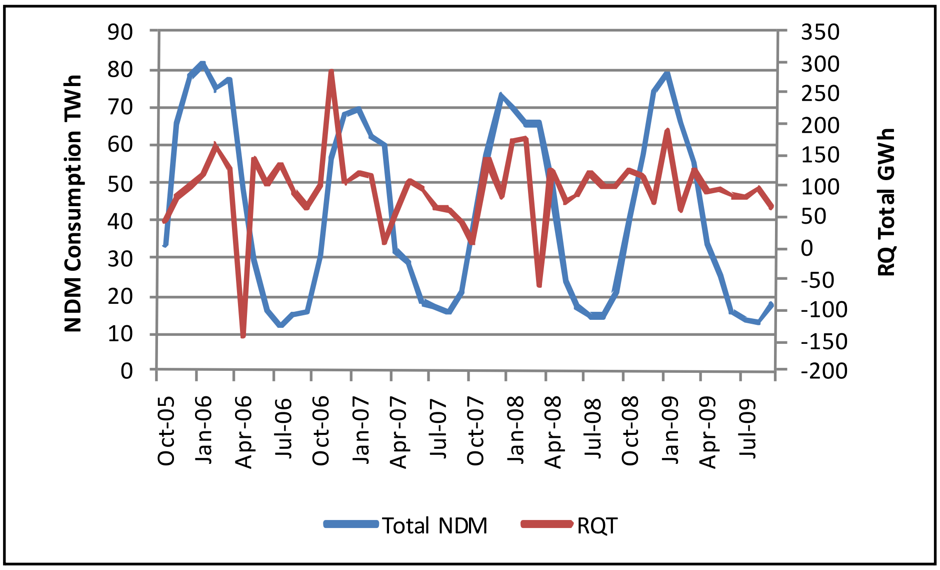
6.22. These trends suggest that more frequent meter reading and/or site visits for the purposes of meter reading, together with more stringent credit checks, may act as a deterrent to theft at larger sites.

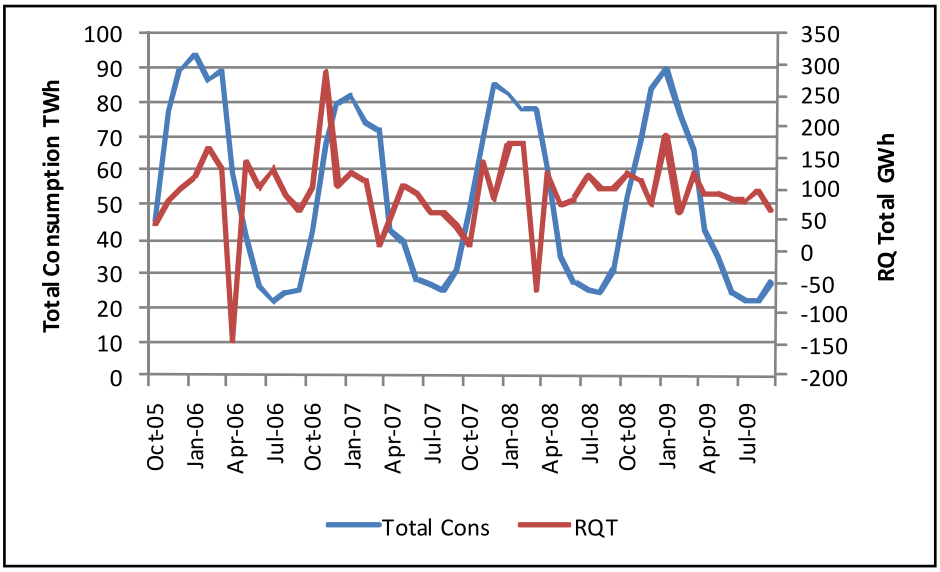
6.23. Although xoserve did not provide load band theft data with "network" theft excluded, xoserve have previously provided to ICoSS details of all the individual detected theft events excluding the network theft. This shows that there was only one item of valid theft for sites with an AQ above 293,000 kWh and there was no associated theft amount shown. This would appear consistent with results presented previously indicating that incidence of theft in the LSP sector reduces (with a corresponding increase for the SSP sector) when "network" theft is excluded.

Theft and consumption relationship

6.24. The Mod.228/228A methodology assigns more than 76% of RbD volumes (almost 9 TWh) to theft. If these volumes were broadly correct we believe it would be a reasonable assumption that the amount of reconciliation should in some way be linked to throughput of either the NDM sector or total throughput, as theft will be closely related to the consumption profile of typical gas customers. There is no evidence that we are aware of to suggest that the behaviour of customers that steal gas will necessarily be any different to that of other customers.

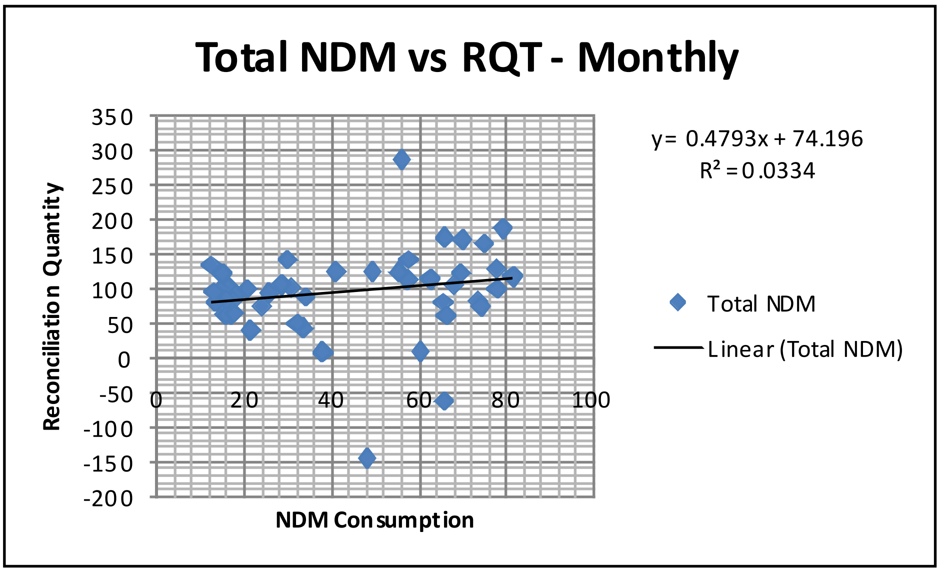
6.25. We have tested this hypothesis using plots of monthly reconciliation against NDM consumption and total consumption:

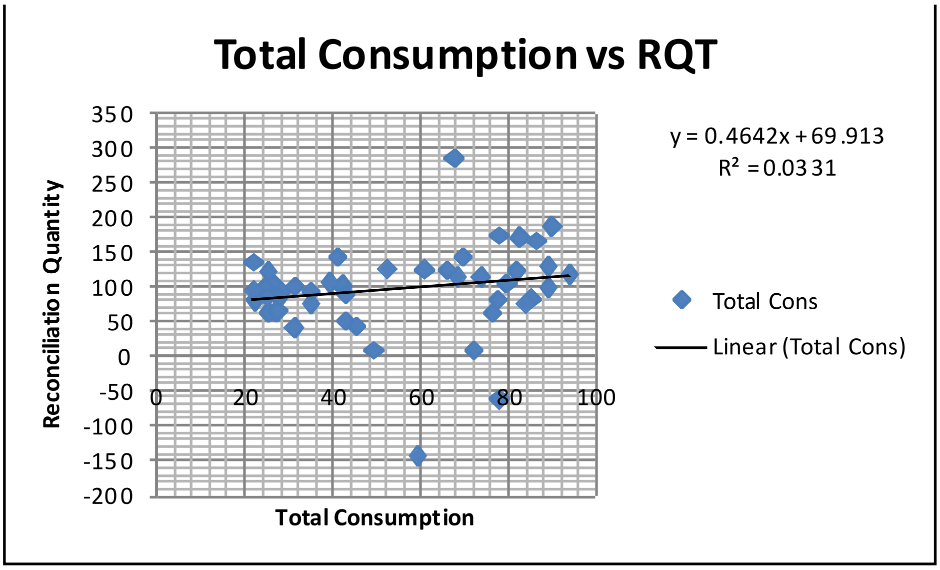




6.26. It is difficult to say if there is any clear pattern emerging from these graphs, especially as the spikes in reconciliation occur before the changes in demand. If there was a link between reconciliation and theft one would expect the changes to be in line or lagged a month possibly.

6.27. The following graphs show the same data but plotted against each other with linear regression applied to provide a simple test of the statistical relationship between the data sets:





6.28. As can be seen from the extremely low R squared value (the nearer to 1 the greater the fit) the relationship between the monthly RQ Total and monthly consumption (and by inference monthly theft) is statistically insignificant.

6.29. Similar analysis assuming theft levels to be flat throughout the year gave the same results.

6.30. In conclusion, we believe that one of the key elements of the Mod.228/228A methodology – that the reconciliation quantities largely comprise theft – is undermined by the fact that there is no correlation between reconciliation quantities and demand.

Approach to theft analysis

6.31. We recognise that the available data on theft is somewhat limited, and we welcome initiatives that might improve the situation – for example Mod.274 proposes that an independent agent could determine strategies to improve the investigation, detection and prevention of theft in the GB gas market.

6.32. We also recognise that theft levels are, in reality, going to be greater than the detected theft levels reported by xoserve, which should be regarded as an absolute minimum. However, in the absence of additional substantiated evidence we have been restricted in our analysis. We believe the approach we have adopted, involving a straightforward analysis of the available data, to be reasonable in the circumstances.

6.33. Turning now to theft analysis underpinning the Mod.228/228A methodology, we have grave reservations as to its validity. We are particularly concerned that the theft as "balancing factor" concept gives theft levels more than two orders of magnitude greater than the detected theft levels indicated by available data. In our view it would be inappropriate to implement an allocation process involving such high levels of assumed theft without further robust evidence that the theft levels are broadly correct.

6.34. We are also particularly concerned at the Mod.228/228A theft apportionment methodology, which does not take account of "network" theft and calculates SSP/LSP theft proportions which are very different from those derived via basic analysis of the available data, to the benefit of the SSP sector and the detriment of the LSP sector. Again, we believe it would be inappropriate to implement a theft allocation process which relies on this analysis.

7. IGT issues

7.1. It has been argued that CSEPs contribute to RbD volumes an understatement of IGT energy, as a result of problems with the connections process between the IGT and the DNO combined with poor updates of AQs and reads into the IGTs.

7.2. The Mod.228/228A methodology apportions 5.708% of RbD volumes to IGT issues, but we have been unable to link this figure with data provided by xoserve. Mod.228 quotes this figure as a maximum and, even if it could be substantiated, we believe it inappropriate to use a maximum figure in the apportionment methodology.

7.3. We are also unable to validate the proposed apportionment based on IGT throughput (88%SSP, 12% LSP). However we note that these figures correspond to the respective SSP and LSP sector AQ proportions.

7.4. The table below shows CSEP AQ and RQ data for the last three years:

	AQ	RQ	RQ as % AQ
2008/9	18,090,405,887	619,674,561	3.43%
2007/8	18,020,435,809	417,932,125	2.32%
2006/7	15,122,245,769	37,289,312	0.25%
2005/6	14,245,584,945	–	–

7.5. CSEPs, in contrast to other sectors of the market, are clearly a growth area, with a significant step change evident in 2007/8. The increase in AQ for this year was accompanied by an increase in the relative amount of reconciliation. Reconciliation quantities, expressed as a percentage of AQ, are now somewhat higher than the national average (2.32%) perhaps indicating an underlying problem with CSEP data. The aggregate LDZ RQs as a percentage of AQ show some significant variability year on year as illustrated by the table below. It is noted that some LDZs exhibit similar levels of RQ as a percentage of AQ as the aggregate levels for CSEPs.

	2006/7	**2007/8**	**2008/9**
EA	1.28%	2.64%	2.74%
EM	2.36%	2.58%	2.59%
NE	1.61%	2.54%	2.63%
NO	1.36%	1.67%	2.28%
NT	1.74%	3.09%	2.59%
NW	1.75%	0.80%	1.91%
SC	2.11%	1.35%	1.67%
SE	4.94%	2.33%	1.88%
SO	1.79%	2.37%	1.98%
SW WM	0.58% 2.54%	1.91% 2.24%	2.13% 3.30%
WN	3.93%	4.75%	3.21%
WS	0.44%	1.09%	2.00%
TOTAL	2.08%	2.11%	2.33%

7.6. A contributory factor may be the fact that CSEP AQs are rising quite rapidly whilst the total national AQs are falling. The application of the algorithms, which have been designed to represent typical behaviour, may be unsuitable for parts of the network exhibiting different behaviour, and give rise to greater RbD volumes as a result.

7.7. We have not sought to establish whether or not CSEP energy is under-stated, and we believe that to the extent it may be it would make only a relatively minor contribution to RbD – even Mod.228/228A only attributes 5.7% of RbD to IGT issues.

7.8. If there is evidence that IGT energy is understated, and thereby contributing inappropriately to RbD, the mechanism of any correcting adjustment would require careful consideration, so that it is properly targeted to provide incentives for improvement. It is apparent that data issues are not solely the responsibility of shippers – there is a strong transporter involvement both at the CSEP connection stage and on an ongoing basis.

7.9. It might be appropriate therefore to consider part adjustments via the transporter shrinkage accounts. In addition, it might be appropriate to consider CSEP specific adjustments. This would target adjustments at those using CSEPs rather than apportioning it across all shippers.

8. Late and Unregistered Sites

8.1. The Mod.228/228A methodology apportions 2.9 % of RbD volumes to late and unregistered sites. The proposed apportionment across sectors is 24% SSP, 74% LSP and 2% DM. We have been unable to link these figures with data provided by xoserve. We note however that the proposed apportionment figures are significantly different from the sector AQ proportions (60% SSP: 23% NDM LSP: 17% DM LSP).

8.2. Having reviewed the material provided by xoserve to the Mod.194 Development Workgroup it remains unclear to us the extent to which this is a transient problem, whereby contributions to RbD are reversed at a later stage. Where this is the case, there is no rationale in our view for any additional correction of the type proposed.

8.3. Xoserve data indicates that about 164 GWh of RbD quantities over a 29 month period (Jan 06 to May 08) was attributable to unregistered site issues and these contributions were not later corrected. This equates to 68GWh or about 0.5% of RbD volumes – much lower than the Mod.228/228A proposed level. We have not separately sought to establish the contribution to RbD.

8.4. We note in this context the transporters' shrinkage quantities include an element covering unregistered sites within the "network" theft component. It is unclear to us whether this "allowance" for unregistered sites has been taken into account in determining the RbD treatment for unregistered site volumes.

8.5. In our view it remains far from clear the extent to which inappropriate contributions to RbD arising from late and unregistered sites are a problem. To the extent it can be shown that there is a significant issue it might be more appropriate to address the cause of errors at source, through process improvements at and after the meter installation stage, with responsibilities for gas offtake clearly specified. As with IGTs, this is clearly an industry issue that requires involvement of transporters as well as shippers to deliver an appropriate solution.

9. Shrinkage

Levels of shrinkage and RbD

9.1. There have been some changes to the shrinkage factors each year. However the scale of the change has been relatively low compared to the level of reconciliation. The amount of LDZ shrinkage in 2004 was 5 TWh falling to 3.8 TWh by 2008. The intervening years figures are 2005 4.4 TWh, 2006 4.2 TWh and 2007 3.9 TWh. Therefore there has been a decline in shrinkage quantities of 1.2 TWh over 4 years, representing around 2 to 3% of annual reconciliation quantities. It is possible that if the reductions in assumed shrinkage do not reflect reality, then the reductions could be viewed as a contributor to the slightly rising trend in reconciliation quantities.

Potential shrinkage errors

9.2. To get a feel for the potential contribution of shrinkage errors to RbD we have estimated the scale of error that would be required to account for the full RbD quantities – this would be about 2% of LDZ throughput.

9.3. The current shrinkage levels are typically in the range 0.5% to 0.8% (although these are converted into fixed volumes for application in the allocation process) so these figures would have to be substantially in error to account for the additional 2% of throughput.

Fixed daily shrinkage quantities

9.4. The introduction of a fixed daily shrinkage adjustment from 1st October 2008 may create a within-year impact on RbD as there are some LDZs that demonstrate a linkage between leakage and throughout, which may mean that shrinkage is understated in winter and overstated in summer. There is an insufficient period of data to analyse this but it may be worth re-visiting in future.

Shrinkage adjustments via RbD

9.5. At the end of each year an assessment of shrinkage in the previous year is made and compared to the forecast at the beginning of the year (forecasts are the basis on which the shrinkage quantities within the LDZ allocation process are set). An RbD adjustment between the SSP sector and the shrinkage account is made to reflect the difference. Apparently these have been very small – Mod.228 quotes 0.0004% of RbD which would equate to around 50 MWh 0.001% of shrinkage.

9.6. The Mod.228/228A methodology proposes apportioning these quantities to the market 62%SSP, 24%LSP and 14% DM, on the basis of sector throughput. Whilst the quantities involved are insignificant, there are two important issues concerning the methodology.

9.7. Firstly, it is inappropriate to apportion shrinkage reconciliation quantities to DM and LSP sectors which have measured consumptions – the reconciliation should purely be between the SSP sector and the shrinkage account. If shrinkage quantities have been too low during the year SSP quantities will have been too high (and vice versa) and reconciliation simply corrects this. Any increase or decrease in shrinkage account quantities will feed through to the transportation charges payable. The Mod.228/228A treatment of shrinkage reconciliation, if (for example) extended to DM reconciliation, would require apportionment of DM errors across LSPs and shrinkage as well as the SSP sector. This would clearly be absurd.

9.8. Secondly, even if it were appropriate to apportion shrinkage reconciliation across sectors, we do not believe sector throughput proportions to be an appropriate driver. As we understand it, shrinkage costs are recovered through a transportation charging methodology which takes accounts of the costs of the system tiers used by sites of various size (typically the larger the site the fewer tiers used). We suspect that this would give different results from a pure throughput driven apportionment of cost.

9.9. We conclude that the proposed Mod.228/228A methodology for treatment of shrinkage reconciliation is inconsistent with reconciliation principles in attempting to apportion the quantities across sectors, and furthermore that the proposed apportionment driver (throughput) is inconsistent with the transportation charging methodology.

10. Measurement errors

10.1. We have not reviewed the accuracy of LDZ, DM and LSP measurements in detail as there are other industry processes to do this. However, to get a feel for the potential contribution of these errors to RbD we have estimated the scale of error that would be required to account for the full RbD quantities (which are about 2% of LDZ throughput).

10.2. LDZ meter reads would have to show a 2% error across the whole network, which if this was the case there would be clear indications of this in NTS shrinkage, which there has not been in recent years.

10.3. We note that Ofgem[11] has raised concerns over the lower standards of metering at LDZ entry compared to NTS entry. It

[11] Ofgem paper dated 22nd September 2009 presented to the 1st October 2009 Transmission Workstream under agenda item "Metering Standards and Impact on Shrinkage"

will be interesting to see if work in this area sheds light on the potential for RbD impacts.

10.4. DM meter reading would have to be in error by 11TWh in total which is equivalent to around 9% of DM consumption, which is again quite unlikely to go undetected, particularly given that they are also daily read.

10.5. LSP Meter reads would have to be in error by above 8% which is also unlikely to go undetected and there is a minimum metering standard that requires a much better level of accuracy.

10.6. It is conceivable that there could be a combination of errors with a specific bias (LDZ metering under-reading in combination with DM and LSP meter under-reads) but would be quite unlikely.

10.7. It is important to recognise that measurement errors which are subsequently identified are corrected through a reverse adjustment to RbD. Therefore only undetected measurement errors in a particular direction can make permanent contributions to RbD – this would appear unlikely in significant quantities.