**Quantification and Apportionment of "Unidentified" Gas**

**February 2010**

## Summary

As part of the assessment of Mod.228/228A, ICoSS has attempted to quantify and apportion the volumes and costs within RbD that might more appropriately be borne by the LSP sector. It should be noted that owing to the quality of data available to undertake this task, this work should be treated with confidence and not distributed without ICoSS approval.

We identified theft and orphaned sites as potential sources of gas volumes within RbD which might be more appropriately apportioned across market sectors and the shrinkage account. Other potential sources were considered but discounted for lack of evidence. We also identified four key parameters that would drive the amounts of gas to be apportioned, and developed "High", "Central" and "Low" cases for each, based on available theft and orphaned sites information:

| Parameters and assumptions | | High | Central | Low |
|---|---|---|---|---|
| 1 | Aggregate theft (% throughput) | 0.6% | 0.15% | 0.06% |
| 2 | "Non-network" theft (% aggregate theft)<br>"Network" theft (% aggregate theft) | 96.9%<br>3.1% | 81.1%<br>18.9% | 62.2%<br>37.8% |
| 3 | LSP theft proportion (% "non-network" theft)<br>SSP theft proportion (% "non-network" theft) | 7.4%<br>92.6% | 3.4%<br>96.6% | 1.7%<br>98.3% |
| 4 | Orphaned sites quantity and LSP proportion | 67.9GWh<br>77% LSP | 22.6 GWh<br>60% LSP | 0 GWh |

These parameters were used in conjunction with 2008/9 throughput and RbD data to determine apportionments arising from various combinations of "High", "Central" and "Low" case assumptions. The calculation methodology accounts for the "network" theft already included in shrinkage and apportions gas to (or from) the shrinkage account as well as to LSP and SSP sectors. The results are summarised overleaf.

The wide variation in results is driven by the wide range of aggregate theft and "network" theft assumptions, which themselves vary by a factor of 10 or more. There is an interesting interaction between SSP/LSP sector apportionments and shrinkage at higher assumed aggregate and "network" theft levels, as gas is shunted between the accounts. The absolute value of the LSP apportionment is constrained by the relatively low assumed LSP theft proportions, which are capped off at 7.4%. The LSP maximum apportionment (high/high case) is some £4.9m, and the central/central case is only £0.6m.

We emphasise how strongly the results are influenced by our aggregate theft and "network" theft assumptions, which are not underpinned with sound data. We believe that more high quality information and data is required before an apportionment methodology of this type could be used in practice.

| Results Table | | Secondary assumptions | High case | Central case | Low case |
|---|---|---|---|---|---|
| | | "Non-network" theft (% aggregate theft) | 96.9% | 81.1% | 62.2% |
| | | “Network theft” proportion (% aggregate theft) | 3.1% | 18.9% | 37.8% |
| | | LSP theft proportion (% "non-network" theft) | 7.4% | 3.4% | 1.7% |
| | | SSP theft proportion (% "non-network" theft) | 92.6% | 96.6% | 98.3% |
| | | Orphaned sites quantity and LSP proportion | 67.9GWh 77% LSP | 22.6 GWh 60% LSP | 0 GWh |
| **Primary aggregate theft assumption** | **High case** 0.60% throughput | **Total apportioned %RbD** | 29.9% | 29.5% | 29.3% |
| | | Additional network theft apportionment value/ £m | -0.13 | 8.89 | 19.69 |
| | | LSP theft and orphaned sites apportionment value/ £m | 4.94 | 1.77 | 0.60 |
| | | SSP theft and orphaned sites apportionment value/ £m | 51.55 | 44.98 | 35.00 |
| | **Central case** 0.15% throughput | **Total apportioned %RbD** | 7.1% | 6.8% | 6.6% |
| | | Additional network theft apportionment value/ £m | -1.46 | 0.79 | 3.49 |
| | | LSP theft and orphaned sites apportionment value/ £m | 1.85 | 0.60 | 0.15 |
| | | SSP theft and orphaned sites apportionment value/ £m | 13.07 | 11.35 | 8.75 |
| | **Low case** 0.06% throughput | **Total apportioned %RbD** | 2.5% | 2.1% | 2.0% |
| | | Additional network theft apportionment value/ £m | -1.73 | -0.85 | 0.21 |
| | | LSP theft and orphaned sites apportionment value/ £m | 1.22 | 0.37 | 0.06 |
| | | SSP theft and orphaned sites apportionment value/ £m | 5.27 | 4.53 | 3.43 |

Note: Calculations made using these figures may be affected by rounding

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## *Introduction*

1. ICoSS has attempted to assess whether there were volumes (and hence costs) within RbD that it was inappropriate for the SSP sector solely to bear, and if so, to quantify the annual volumes and costs that might be more appropriately borne by the LSP sector in future.
2. Given the paucity of reliable information relating to these issues, we were reluctant to conduct analysis that could become publicly available. However, we agreed to undertake the assignment on the basis that the results would remain confidential as between ourselves and Ofgem.
3. Building on our earlier assessment, we considered the potential for the existence of volumes of "unidentified" gas in various categories within the allocation process, which under current arrangements would become part of the RbD volumes and be fully attributed to the SSP sector.
4. We also considered the extent to which "unidentified" gas in various categories might be more appropriately apportioned across the SSP sector, the LSP sector, the DM sector and the shrinkage account.
5. This document describes our detailed approach to this task and the range of results obtained.

## *Potential sources of "unidentified" gas*

*Gas measurement and shrinkage errors*

6. In our previous assessment we looked at errors in gas measurement and shrinkage estimation as potential sources of "unidentified" gas and, whilst we believe these areas are worthy of further investigation, no strong evidence of undetected errors was immediately apparent.

7. For the purposes of this exercise we have not therefore considered errors in gas measurement (LDZ inputs, DM consumption and LSP consumption) or errors in shrinkage quantity estimates (other than the "network" theft element – see later) as potential sources of "unidentified" gas.

*Late/ Unregistered/ Orphaned sites and IGT issues*

8. In both these areas, it remains unclear to us the extent to which there is only a transient problem, whereby contributions to RbD are reversed at a later stage. We have seen no clear evidence (other than for orphaned sites – see below) that there are significant volumes of "unidentified" gas arising from these processes that are not ultimately, when data becomes available, properly accounted for.

9. We also note that the transporters' shrinkage quantities include an element covering unregistered sites within the "network" theft component. We consider "network" theft as an element within the overall theft levels below.

10. We also note, however, that xoserve has presented statistics on orphaned sites and quantified the associated enduring contribution to RbD. We believe it is inappropriate for the SSP sector solely to bear the costs of gas consumed at orphaned sites.

11. We have therefore included orphaned sites as a potential source and category of "unidentified" gas in our analysis. Other than this, we have not included Late/Unregistered sites or IGT issues, for the reasons given above.

*Theft of gas*

12. A minimum level of theft from the system is indicated by xoserve detected theft statistics, and we believe that the true level of theft is likely to be somewhat greater.

13. We also note that the network operators assume an aggregate level of theft, and the proportion of this which is "network" theft, in determining the "network" theft contribution to shrinkage.

14. We have therefore included theft (as "network" and "non-network" theft categories) as a potential source of "unidentified" gas in our analysis.

***Levels and apportionment of "unidentified" gas***

15. Having identified theft and orphaned sites as potential sources of "unidentified" gas we sought in each case to identify the parameters affecting both the overall level of "unidentified" gas, and its apportionment. For each parameter we identified "High", "Central" and "Low" cases to give a range of outcomes.

### *Orphaned sites*

16. The xoserve analysis[1] indicated the orphaned sites (non-reversible) contribution to RbD in MWh for various AQ bands over a 29 month period (January 2006 – May 2008):

| | | Supply Point AQ Band | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 to 73,200 | 73,201 to 293,000 | 293,001 to 732,000 | 732,001 to 2,196,000 | 2,196,001 to 5,860,000 | 5,860,001 to 14,650,000 | 14,650,001 to 29,300,000 | 29,300,001 to 58,600,000 | >58,600,000 | TOTAL |
| Time (Months) To Confirm | 0 to 2 | 6 | | | | | | | | | 6 |
| | 3 to 5 | 6 | | | | | | | | | 6 |
| | 6 to 11 | 345 | | | | | | | | | 345 |
| | 12 to 17 | 7,812 | 11,238 | 11,834 | | | | | | | 30,884 |
| | 18 to 23 | 964 | 3,264 | 3,444 | 1,316 | | | | | | 8,988 |
| | 24 to 35 | 6,558 | 9,611 | 10,195 | 950 | | | | | | 27,313 |
| | >=36 | 22,470 | 50,040 | 18,682 | 2,065 | | 3,378 | | | | 0 |
| | TOTAL | 38,161 | 74,154 | 44,155 | 4,330 | 0 | 3,378 | 0 | 0 | 0 | 164,178 |

17. For the purposes of our analysis we converted the figures to an annual equivalent and calculated the sector proportions:

| Orphaned sites contribution to RbD | Units | SSP | LSP | Total |
|---|---|---|---|---|
| January 2006 – May 2008 | MWh | 38,161 | 126,016 | 164,177 |
| Equivalent annual quantity | kWh | 15,790,759 | 52,144,552 | 67,935,310 |
| Sector proportions | % | 23.24% | 76.76% | 100.00% |

18. Our analysis assumes that it is not appropriate to apportion RbD volumes arising from orphaned sites to the shrinkage account. Our analysis also assumes that there are no volumes associated with DM sites within the xoserve data. If there were, sector proportions for SSP, LSP and DM sectors would theoretically need to be calculated.

19. However, we note that if DM load was included in the apportionment, the occasional instance of a large DM load contributing to orphaned sites volumes would strongly influence the apportionment drivers. We would be extremely reluctant to develop apportionment methodologies for market sectors as a whole, based on single instances such as this.

20. We believe process improvements, including assigning direct responsibility for gas offtaken from meter installation onwards, would prove a more effective means of addressing this issue than market sector apportionment, and we have reflected this in our "Central" and "Low" case scenarios (see below).

[1] Xoserve presentation "Orphaned Sites Analysis", to Development Work Group 194 meeting 30 June 2008

21. The key parameters on which the "High", "Central" and "Low" cases are based are the total annual quantity and the LSP proportion.

| Orphaned sites assumptions | Units | LSP | SSP | Total |
|---|---|---|---|---|
| **Low Case**<br>Process improvements reduce orphaned sites volumes to zero | kWh | 0 | 0 | 0 |
| **Central Case**<br>Process improvements significantly reduce volumes and LSP proportion | kWh | 13,587,062 | 9,058,041 | 22,645,103 |
| | % | 60.0% | 40.0% | 100% |
| **High Case**<br>As per orphaned sites statistics Jan 06 to May 08 converted into per annum figures | kWh | 52,144,552 | 15,790,759 | 67,935,310 |
| | % | 76.8% | 23.2% | 100% |

22. For our "High" case we have used the annualised xoserve figures and the associated sector proportions. For our "Central" case we have assumed that process improvements reduce volumes by 67%, and that the focus on the fewer number of LSP sites reduces the LSP proportion from 77% to 60%. For our "Low" case we have assumed that process improvements can eradicate orphaned sites volumes in full.

***Theft of gas***

23. For theft, we identified a more complex set of three interlinking parameters. These are (1) the level of aggregate theft (2) the relative proportions of "non-network" and "network" theft level within the aggregate and (3) the proportion of "non-network" theft that the LSP sector might be responsible for. Some "network" theft is already accounted for as part of shrinkage and we explain later how our methodology deals with this.

*Aggregate theft*

24. We found during our previous assessment that there was only a limited amount of data relating to aggregate theft levels. For this analysis, we used xoserve detected theft statistics[2] over the period 01/07/03 to 31/03/08 as a starting point, and took account of the network operators' aggregate theft assumption[3] (used in determining the "network" theft contribution to shrinkage) to develop a range of potential levels, from which "High", "Central" and "Low" cases could be considered:

[2] Xoserve presentation, "Theft of Gas Statistics", to Development Work Group 194 meeting 9 June 2008

[3] The National Grid presentation to the Mod.194 Development Workgroup, 9 June 2008, indicated the following assumed levels of "network" theft (as a proportion of aggregate theft) used in the calculation of the "network" theft contribution to shrinkage: 10% (previously used); 6.7% (currently used); 3.1% (network operators claim). Network operators assume aggregate theft is 0.3% of throughput.

| Potential aggregate theft range | % throughput | x detected theft | x central case |
|---|---|---|---|
| Detected theft (including network theft) from xoserve statistics | 0.0059% | 1 | 0.039 |
| 2 x detected theft level | 0.0117% | 2 | 0.078 |
| **Low case**<br>10 x detected theft level | 0.0587% | 10 | 0.39 |
| **Central case**<br>½ x network operator assumption | 0.15% | 26 | 1 |
| Network operator assumption | 0.30% | 51 | 2 |
| **High case**<br>2 x network operator assumption | 0.60% | 102 | 4 |
| Around Mod.228/228A levels | 1.00% | 170 | 7 |

25. The table covers an extremely wide range of potential aggregate theft levels and our choices for "High", "Central" and "Low" cases were necessarily somewhat arbitrary, but we believe we have erred on the side of higher aggregate theft levels in making these choices.

26. We felt the xoserve detected theft levels, whilst based on hard data, were just too low to be realistic, so we assumed a true level of theft ten times this as a "Low" case. At the upper end we assumed a "High" case of twice the network operator assumption – a figure approaching the levels generated by Mod.228/228A methodology (which we felt were unrealistic due to the theft "balancing factor" approach). To compensate for this perhaps unrealistic "High" case figure we took a "Central" case of half the network operator assumption.

*"Non-network" and "network" theft proportions*

27. We developed a potential range for the relative proportions of "non-network" and "network" theft using as benchmarks (1) xoserve detected theft statistics and (2) the value currently used by network operators. The two benchmark levels differ by more than a factor of four so the potential proportion range, within which we consider "High", "Central" and "Low" cases, is necessarily wide:

| "Non-network" and "network" theft proportions | % of aggregate theft | |
|---|---|---|
| | "Non-network" theft | "Network" theft |
| Network theft 2x detected theft statistics level | 37.8% | 62.2% |
| **Low case**<br>Network theft 2x Central Case | 62.2% | 37.8% |
| Detected theft statistics | 68.9% | 31.1% |
| **Central case**<br>Mid-point between detected theft statistics and network operator current assumption | 81.1% | 18.9% |
| Network operator previous assumption | 90.0% | 10.0% |
| Network operator current assumption | 93.3% | 6.7% |
| **High case**<br>Network operator claim | 96.9% | 3.1% |

28. For our "High" case we chose the proportions claimed by network operators – we felt that "network" theft was unlikely to be any lower than the 3.1% figure (and therefore "non-network" theft any higher than 96.9%). For our "Central" case we took the mid-point between the proportions currently used by network operators and those indicated by the detected theft statistics. For our "Low" case we assumed "network" theft was twice the level in the "Central" case.

29. The fact that a fixed level of "network" theft is already accounted for by network operators as a contribution to shrinkage affects the calculations we conduct later. The fixed level is 0.02% of throughput, calculated as 6.7% of aggregate theft, assumed by network operators to be 0.3% of throughput.

*LSP and SSP sector proportions of "non-network" theft*

30. Consistent with industry views, we have assumed there is negligible theft in the DM sector. For LSP and SSP sector proportions, our potential range includes figures derived from analysis of detected theft statistics, analysis of alleged (and detected) theft statistics, and from AQ and throughput data:

| SSP and LSP proportions | LSP | SSP |
|---|---|---|
| **Low case**<br>½ x detected theft statistics (excluding network theft) | 1.7% | 98.3% |
| **Central case**<br>Detected theft statistics (excluding network theft) | 3.4% | 96.6% |
| Alleged and detected theft statistics (excluding network theft) | 7.1% | 92.9% |
| **High case**<br>Detected theft statistics (including network theft) | 7.4% | 92.6% |
| Alleged and detected theft statistics (including network theft) | 12.7% | 87.3% |
| Throughput (actual 2008/9) | 26.2% | 73.8% |
| AQ proportions (2008/9) | 27.6% | 72.4% |
| Alleged and detected theft statistics (Mod 288/228A) | 29.4% | 70.7% |

31. For analysis based on alleged (and detected) theft statistics we believe that the key premise – that allegations are a good indicator of relative theft levels – is unsound. We therefore discount the derived figures.

32. We also discount proportions based on AQs and throughput on the basis that our previous assessment indicated evidence of a decreasing incidence of theft with increasing site size and meter reading and/or site visit frequency. We have conducted further analysis relating to theft in various load bands based on xoserve detected theft statistics. This indicates that detected theft rates per unit load band throughput are actually better in the annually read LSP sector than in the SSP sector:

| Read frequency | Type | Load band | Estimated band throughput | Reported stolen | |
|---|---|---|---|---|---|
| | | | | GWh | % of band throughput |
| Annual | SSP | <73,200 | 1698 | 149.3 | 0.0088% |
| Annual | LSP | 73,200-293,000 | 51 | 7.7 | 0.0150% |
| Monthly | LSP | 293,000-732,000 | 206 | 0.6 | 0.0003% |
| Monthly | LSP | 732,000-58,600,000 | 373 | 3.3 | 0.0009% |
| Daily | LSP | >58,600,000 | 548 | 0 | 0.0000% |
| LDZ total | – | – | 2876 | 160.9 | 0.0056% |

33. In our view this tends to undermine the case made in the Mod.228/228A proposal that theft detection rates for LSP sector were lower because of

a lack of incentive, rather than reflecting a trend of decreasing theft with increasing site size and meter reading and/or site visit frequency.

34. We therefore believe that, of the data available to us, detected theft statistics provide the only reliable benchmark for determining the relative LSP and SSP sector proportions. For our "Central" case we took the proportions indicated by detected theft statistics, excluding network theft. For our "Low" case we halved the LSP "Central" case proportion. Our "High" case is based on detected theft statistics, including network theft.

***Calculation methodology***

35. The calculation methodology is described below using the worked example (with central case assumptions) shown overleaf.

36. The calculation starts with the central case assumed level of aggregate theft, 0.15% throughput. This (as with all other parameters) is also expressed in the columns to the right as kWh, % RbD and value in £ using the following 2008/9 data for conversion:

| | |
|---|---|
| Total LDZ actual throughput / TWh | 609.3 |
| RbD reconciliation quantity / TWh | 12.0 |
| RbD gas reconciliation value / £m | 188.4 |

37. We then deal with "network" theft using the assumed 18.9% proportion of aggregate theft to establish quantities. The fixed level of "network" theft already accounted for is deducted (0.2% throughput) leaving the additional apportionment to "network" theft (i.e. shrinkage).

38. "Non-network" theft is dealt with next, and the quantities established are apportioned to LSP and SSP sectors using the assumed sector theft proportions.

39. Finally the assumed orphaned sites quantity is apportioned using the assumed sector proportions for orphaned sites.

40. The second table summarises the overall apportionments to "network" theft (shrinkage) and the LSP and SSP sectors.

## Theft and orphaned sites apportionment

| | Assumptions | | | % throughput | kWh | % RbD | Value |
|---|---|---|---|---|---|---|---|
| **Aggregate theft level** | **Central** | **0.15** | **% throughput** | **0.150%** | **913,936,425** | **7.59%** | **£14,300,331** |
| **"Network" theft level** | **Central** | **18.9** | **% aggregate theft** | **0.028%** | **172,557,654** | **1.43%** | **£2,700,004** |
| Network theft already accounted for | Fixed | 0.02 | % throughput | 0.020% | 121,858,190 | 1.01% | £1,906,711 |
| Additional network theft apportionment | – | – | – | 0.008% | 50,699,464 | 0.42% | £793,293 |
| **"Non-network" theft level** | **Central** | **81.1** | **% aggregate theft** | **0.122%** | **741,378,771** | **6.16%** | **£11,600,328** |
| LSP theft proportion | Central | 3.4 | % "non-network" theft | 0.004% | 24,930,315 | 0.21% | £390,084 |
| SSP theft proportion | Central | 96.6 | % "non-network" theft | 0.118% | 716,448,456 | 5.95% | £11,210,244 |
| **Orphaned sites annual quantity** | **Central** | **22,645,103** | **kWh** | **0.004%** | **22,645,103** | **0.19%** | **£354,327** |
| LSP orphaned sites proportion | Central | 60.00 | % annual quantity | 0.002% | 13,587,062 | 0.11% | £212,596 |
| SSP orphaned sites proportion | Central | 40.00 | % annual quantity | 0.001% | 9,058,041 | 0.08% | £141,731 |

## Aggregate theft and orphaned sites apportionments

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Additional network theft apportionment (shrinkage) | Central | – | – | 0.008% | 50,699,464 | 0.42% | £793,293 |
| LSP theft and orphaned sites apportionment | Central | – | – | 0.006% | 38,517,377 | 0.32% | £602,680 |
| SSP theft and orphaned sites apportionment | Central | – | – | 0.119% | 725,506,497 | 6.02% | £11,351,975 |
| **Total apportionment** | **Central** | – | – | **0.134%** | **814,723,338** | **6.77%** | **£12,747,948** |

***Results***

41. We used the methodology to derive results using different combinations of "High", "Central" and "Low" case assumptions. We treated aggregate theft as the primary assumption, and the other three parameters as secondary, as shown in the results table overleaf.

42. For any given aggregate theft (primary) assumption the amount to be apportioned drops slightly moving across the table, for example in the high case 29.9%⇨29.5%⇨29.3%RbD. This is because, whilst the level of assumed theft remains the same, the relatively low quantity associated with orphaned sites falls.

43. However, the value apportioned as additional "network" theft increases appreciably moving across the table, e.g. for the high case £–0.13m⇨£8.89m⇨£19.69m. This is because the assumed "non-network" theft proportion falls (and the "network" theft proportion rises correspondingly). Negative values result in cases where the assumed level of "network" theft is less than the fixed amount (0.2% throughput) already accounted for as an element in shrinkage, so some "payback" from the shrinkage account is required.

44. The decrease in "non-network" theft has in turn an impact on the LSP and SSP value apportionments which both also fall moving across the table:

    LSP £4.94m⇨£1.77m⇨£0.60m and SSP £51.55m⇨£44.98m⇨£35.00m

45. However, the LSP apportionments fall proportionately more because the assumed LSP theft proportion also decreases moving across the table.

46. Moving down the table the total quantities apportioned decrease, ~29%⇨ ~7%⇨ ~2%RbD, as the assumed aggregate theft level falls, and the values apportioned decrease accordingly.

| Results Table | | Secondary assumptions | High case | Central case | Low case |
|---|---|---|---|---|---|
| | | "Non-network" theft (% aggregate theft) | 96.9% | 81.1% | 62.2% |
| | | “Network theft” proportion (% aggregate theft) | 3.1% | 18.9% | 37.8% |
| | | LSP theft proportion (% "non-network" theft) | 7.4% | 3.4% | 1.7% |
| | | SSP theft proportion (% "non-network" theft) | 92.6% | 96.6% | 98.3% |
| | | Orphaned sites quantity and LSP proportion | 67.9GWh 77% LSP | 22.6 GWh 60% LSP | 0 GWh |
| **Primary aggregate theft assumptions** | **High case** 0.60% throughput | **Total apportioned %RbD** | 29.9% | 29.5% | 29.3% |
| | | Additional network theft apportionment value/ £m | -0.13 | 8.89 | 19.69 |
| | | LSP theft and orphaned sites apportionment value/ £m | 4.94 | 1.77 | 0.60 |
| | | SSP theft and orphaned sites apportionment value/ £m | 51.55 | 44.98 | 35.00 |
| | **Central case** 0.15% throughput | **Total apportioned %RbD** | 7.1% | 6.8% | 6.6% |
| | | Additional network theft apportionment value/ £m | -1.46 | 0.79 | 3.49 |
| | | LSP theft and orphaned sites apportionment value/ £m | 1.85 | 0.60 | 0.15 |
| | | SSP theft and orphaned sites apportionment value/ £m | 13.07 | 11.35 | 8.75 |
| | **Low case** 0.06% throughput | **Total apportioned %RbD** | 2.5% | 2.1% | 2.0% |
| | | Additional network theft apportionment value/ £m | -1.73 | -0.85 | 0.21 |
| | | LSP theft and orphaned sites apportionment value/ £m | 1.22 | 0.37 | 0.06 |
| | | SSP theft and orphaned sites apportionment value/ £m | 5.27 | 4.53 | 3.43 |

Note: Calculations made using these figures may be affected by rounding

***Key outcomes and drivers***

47. In the absence of robust data, we have used a wide range of assumed aggregate theft levels, and "network" theft proportions, which both vary by a factor of ten or more. These assumptions in combination drive the wide range of outcomes in terms of the total amounts apportioned and the additional "network" theft (shrinkage) apportionment:

| | | Low | High |
|---|---|---|---|
| **Assumptions** | Aggregate theft (% throughput) | 0.06% | 0.6% |
| | "Network" theft (% aggregate theft) | 3.1% | 37.8% |
| **Outcomes** | Amount apportioned (% RbD) | 2.0%RbD | 29.9%RbD |
| | Additional "network" theft (shrinkage) apportionment | – £1.7m | £19.7m |

48. On the other hand we have, quite legitimately we believe, used a narrow range of LSP theft proportions, capped off at 7.4%, based on detected theft statistics. The cap limits the highest LSP apportionment value to less than £5m, despite the wide range of outcomes (the low is £0.06m) driven by the factors above:

| | | Low | High |
|---|---|---|---|
| **Assumptions** | LSP theft proportion (% "non-network" theft) | 1.7% | 7.4% |
| | SSP theft proportion (% "non-network" theft) | 92.6% | 98.3% |
| **Outcomes** | LSP apportionment value | £0.06m | £4.9m |
| | SSP apportionment value | £3.4m | £51.6m |

49. The SSP sector, due to its high (>90%) theft proportion, generally picks up the majority of the total to be apportioned.

50. There is however, an interesting interaction and exchange of value, largely between the SSP sector and shrinkage, as the assumed "network" theft proportion varies, as the following excerpt from the main results table shows:

| | | | |
|---|---|---|---|
| "Network theft" proportion (% aggregate theft) | 3.1% | 18.9% | 37.8% |
| Additional network theft (shrinkage) apportionment value | £-0.1m | £8.9m | £19.7m |
| SSP apportionment value | £51.6m | £45.0m | £35.0m |

51. We took a sub-set of the results, moving diagonally across and down the table, as this gives the full range of outcomes in absolute terms. The results are expressed as % of total gas apportioned and %RbD, as well as value in £m:

| Primary assumption | High | | | Central | | | Low | | |
|---|---|---|---|---|---|---|---|---|---|
| Secondary assumptions | High | | | Central | | | Low | | |
| | % total | % RbD | Value £m | % total | % RbD | Value £m | % total | % RbD | Value £m |
| **Additional network theft (shrinkage) apportionment** | 0% | -0.1% | -0.1 | 6% | 0.4% | 0.8 | 6% | 0.11% | 0.21 |
| **LSP apportionment** | 9% | 2.6% | 4.9 | 5% | 0.3% | 0.6 | 2% | 0.03% | 0.06 |
| **SSP apportionment** | 91% | 27.4% | 51.5 | 89% | 6.0% | 11.4 | 93% | 1.82% | 3.43 |
| **Total apportioned** | **100%** | **29.9%** | **56.4** | **100%** | **6.8%** | **12.7** | **100%** | **1.96%** | **3.69** |

52. The SSP apportionments as % total apportioned remain relatively stable at ~90% whilst the equivalent figures for LSP decrease and shrinkage increase in moving high-central-low. However, this sub-set excludes cases (as noted previously) where SSP stability is significantly affected by increasing apportionment to the shrinkage account – for example in moving from high/high to high/low cases (not shown in table above) the SSP apportionment falls from 91% to 63% whilst the shrinkage apportionment rises from 0% to 36% of the total.

***Conclusions***

53. We were asked by our clients whether there were volumes (and hence costs) within RbD that it was inappropriate for the SSP sector solely to bear, and if so, to quantify the annual volumes and costs that would be more appropriately borne by the LSP sector in future.

54. Having performed our analysis we can say that, yes we believe there is some level of "unidentified" gas within the allocation system, the costs of which under current RbD arrangements are borne solely by the SSP sector, and furthermore that an equitable apportionment of these costs across SSP, LSP and possibly DM sectors and the shrinkage account should be considered in future.

55. As for quantification, we can say that, based on the assumptions we have used, we have calculated a range of LSP apportionments as follows:

| LSP apportionment | % of total apportioned | %RbD | Value |
|---|---|---|---|
| **High/High case** | 9% | 2.6% | £4.9m |
| **Central/Central case** | 5% | 0.3% | £0.6m |

| | | | |
|---|---|---|---|
| **Low/Low case** | 2% | 0.03% | £0.06m |

56. We emphasise how strongly the results are influenced by our assumptions, and that our assumptions in many cases, in particular aggregate theft levels and "network" theft proportions, were not underpinned with sound data. The results should be viewed in this light.

57. For example, if our central case aggregate theft level is too low and the "network" theft proportion too high, this could quite conceivably move the outcome to the high/high case, where the absolute LSP value at £5m is almost an order of magnitude higher than the our £0.6m central/ central case outcome.

58. We believe that more high quality information and data on aggregate theft levels and the "network" theft proportion is required before an apportionment methodology of the type described here could be used in practice.

59. Finally, we note the strong interaction that our analysis has demonstrated between apportionment to market sectors and the shrinkage account, which is particularly evident at high assumed aggregate theft and "network" theft levels. This feature appears not to have been subject to industry consideration previously, and should certainly be factored into future discussions.