Shrinkage and Leakage Model Review 2013/14 Consultation Report

Report on all DN's consultation on the 2013/14
Shrinkage and Leakage Model Review

Version 1.0

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Overview:

Gas Distribution Networks (GDNs) have an obligation under Special Condition 1F Part E of the Licence to review the Shrinkage and Leakage Model (SLM) on an annual basis and to consult on the outcome of that review with other DN Operators, gas shippers and other interested parties.

The purpose of this review, 'the SLM Review', is to assess how the SLM can better achieve the objectives set out in paragraph 1F.13 of the Licence, "The Shrinkage and Leakage Model must be designed to facilitate the accurate calculation and reporting of gas Shrinkage and gas Leakage in or from each Distribution Network operated by the Licensee."

In November/December 2013 each GDN published its consultation on the outcome of its SLM Review; this document is the report on those consultations.

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Associated Documents

The GT Licence can be found on the Ofgem website; all other documents can be found on the Joint Office website.

GT Licences, Special Condition 1F

National Grid SLM Review Consultation 2013/14	-	National Grid Gas Distribution
SGN SLM Review Consultation 2013/14	-	Scotia Gas Networks
NGN SLM Review Consultation 2013/14	-	Northern Gas Networks
WWU SLM Review Consultation 2013/14	-	Wales and the West Utilities
Scottish Power Representation to National Grid's SLM Review Consultation	-	Scottish Power Representation
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Summary

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The purpose of this review, 'the SLM Review', is to assess how the SLM can better achieve the objectives set out in paragraph 1F.13 of the Licence, "The Shrinkage and Leakage Model must be designed to facilitate the accurate calculation and reporting of gas Shrinkage and gas Leakage in or from each Distribution Network operated by the Licensee."

GDNs issued their 2013/14 SLM Review Consultation in November/December 2013. This was the first formal consultation on the annual review of the SLM. Two responses to the Consultation were received, from Scottish Power and British Gas. It is clear from these two responses that they would like more detailed information from the review to be incorporated within the Consultation.

GDNs are committed to working with the industry to develop the level of information and understanding in all aspects of the Shrinkage process; however, the Consultation process has raised the specific areas for attention, identified below, which we will be looking to address with the industry via the Shrinkage Forum:

i) The level of detail included within the SLM Review;

ii) The requirement to review the low pressure leakage rates, and in particular whether this would be cost-effective;

iii) Continued development of Theft of Gas detection and resolution;

iv) Further clarification of the Own Use Gas estimation;

v) How the industry deals with CSEP Shrinkage;

vi) The level of detail provided regarding the 'activity factors' driving the shrinkage estimation, e.g. mains replacement and pressure management.

1. Introduction

1.1 Background

Gas Distribution Networks have an obligation under Special Condition 1F Part E of their Licence to review the Shrinkage and Leakage Model (SLM) on an annual basis and to consult on the outcome of that review with other DN Operators, gas shippers and other interested parties.

The purpose of this review, 'the SLM Review', is to assess how the SLM can better achieve the objectives set out in paragraph 1F.13 of the Licence, "The Shrinkage and Leakage Model must be designed to facilitate the accurate calculation and reporting of gas Shrinkage and gas Leakage in or from each Distribution Network operated by the Licensee."

GDNs issued their 2013/14 SLM Review Consultations in November/December 2013.

1.2 Purpose of this Document

This document is the report on GDNs' 2013/14 SLM Review Consultations. The SLM review process was discussed at the 22 January 2014 Shrinkage Forum where the GDNs and Shippers present indicated a preference for SLM reviews to be carried out as a joint GDN process. Generally, comments indicated in this document represent the view of all GDNs; however, some comments have been attributed to a specific GDN, where appropriate.

2. Outcome of the Consultation

2.1 Representations

The Consultation set out the findings of GDNs' reviews of the Shrinkage and Leakage Model.

Responses to the consultations were received from two respondents, Scottish Power and British Gas, the details of which, and the GDNs' response, are outlined below.

2.2 Representation from Scottish Power

This section presents the Scottish Power (SP) representation to the consultation and the GDNs' (GDN) response; comments relating to specific DNs are attributed appropriately as National Grid (NG) and Northern Gas Networks (NGN):

SP: We welcome initiatives that seek to introduce increased transparency and improve the estimation of the value of shrinkage, theft and own use gas within the leakage model. However we remain concerned that a full re-evaluation of the Shrinkage and Leakage model assumptions has not been undertaken for over 10 years. While we acknowledge that the estimated costs of re-creating the model appear to be high, we would challenge National Grid and indeed other Transporters to find a more cost effective means of undertaking this exercise and thereby providing assurance to the industry that shrinkage levels are accurate. Indeed we believe that there are probably new means/techniques to undertake a similar leakage survey, as was undertaken in the past, but at a considerably less cost.

The industry is currently experiencing an increased level of scrutiny to in relation to costs with increased transparency and accountability of costs required. Current estimates of the value of unidentified gas could be in excess of £200m. However in recent years the overall estimated volume of network shrinkage coming from the model has been reducing. It is therefore vitally important to Shippers and their customers that assurance can be given that network shrinkage estimations which determine this reduction are correct and if necessary can stand up to verification by an independent auditor. Within their consultation National Grid themselves recognise that more can be done to more accurately estimate the volume of shrinkage, however have said that any extensive revision to the leakage model would be costly. From a Shipper, and ultimately customer, perspective and in the interest of increasing overall accuracy in settlements, we believe it is not acceptable that improvements which could be made to the estimation model are not fully explored. We find it difficult to justify why National Grid would not have provided details of how much such an exercise would cost, to allow Ofgem and Shippers to determine if undertaking a revision to the model was feasible and value for money. Instead the consultation just talks of any revision being cost-prohibitive, without justifying or explaining how much the exercise would cost.

As mentioned previously we believe that Transporters should be challenged to find a more economic means of carrying out leakage testing and in particular on LP and MP mains. It has been highlighted that the cost of undertaking the Low Pressure (LP) mains leakage (60% of leakage) testing exercise in 2002/03 was £10m and that to now carry such an extensive leakage survey would be significantly more expensive. However we would question whether or not a similar exercise would be as costly, when technology and techniques have improved over time. Scottish Power believe that the previous cost was associated with undertaking this exercise based on full UK coverage. With the sale of Distribution Networks to other parties, the costs of undertaking such tests would now be shared with other network owners and therefore National Grid would only see a portion of the cost.

Scottish Power believes that given the volume and cost associated with the unidentified gas problem, undertaking an excessive revaluation of the leakage model is warranted. At the very least we believe that the Transporters, including National Grid should get quotes for this exercise and allow a more informed consideration of whether or not it would be beneficial for the industry and customers.

GDN: The GDNs review the Shrinkage and Leakage model on an annual basis. Each element of the leakage model is assessed and modifications proposed where it is believed that these can be achieved cost effectively. Although the leakage rates underpinning the calculations were last carried out over ten years ago, the GDNs believe that the benefits from repeating these tests would not outweigh the costs involved.

The GDNs are always looking for ways of reducing costs and takes a keen interest in industry developments in both leakage estimation and reduction.

NG: There have been a number of papers issued that have reviewed the techniques in use across, mainly, Europe for estimation of leakage from gas distribution sources, many of which National Grid has contributed to; perhaps the most relevant of these being the Marcogaz/Eurogas publication "Reduction Of Methane Emissions In The European Gas Industry: Practices and Technologies", which was compiled during 2006/07. In addition, at the end of 2012, National Grid commissioned a feasibility study to look at the possibility of improving the Medium Pressure calculation, part of which was to look at current practices for leakage measurement for gas distribution systems across the world. The general outcome from each of these reviews was that although there are a number of different methodologies employed for estimating losses from gas distribution systems, the pressure decay method (PDM) is considered to be the best method available; however, it is also recognised as being amongst the most costly. The PDM was used for both the 1992 and 2002/03 NLT programmes. In order to carry out these tests it is necessary to isolate the section of main being tested, disconnect and reconnect all services attached to the main and re-lay any metallic services with PE. The majority of the cost of the test programme is carrying out these physical works and it is on this basis that we believe that the cost to achieve a repeat of the 2002/03 test would be significantly more expensive. We are not aware of any non-invasive leakage measurement techniques that could be employed to determine leakage rates for the UK distribution systems to the accuracy of the PDM. The other advantage of the PDM over most of the other techniques is that it facilitates a pressure related leakage rate to be determined, which enables the impact of pressure management to be reflected in the leakage calculation. Therefore, although it may be possible to use a less expensive methodology, this would have a significant impact on the accuracy of the calculation and the ability of the model to reflect changes to significant 'activity factors' and, therefore, we believe this would negate the benefits of carrying out the tests.

GDN: We would invite all interested parties to present to the Shrinkage Forum details of any specific technology improvements that they believe would enable a leakage test programme to be carried out at considerably less cost, whilst maintaining the level of accuracy associated with the current methodology.

The GDNs share the respondent's interest in improving the accuracy of the assessment of losses and ultimately the reduction in these. As such, we would ask that Scottish Power share the details of their assessment of the cost of unidentified gas at a Shrinkage Forum so that we can investigate how all parties' individual assessments and reduction initiatives can be coordinated to both improve the accuracy of the assessment and to reduce the amount of Shrinkage and non-shrinkage related losses.

The level of Shrinkage is expected to reduce year-on-year as 'leakier' metallic mains are replaced by less 'leaky' polyethylene mains. In addition, the methodology employed within the leakage assessment enables the impact of system pressure to be reflected in the calculation; this, together with the Licence incentive mechanisms, has enabled the GDNs to make significant investment in pressure management systems leading to a reduction in shrinkage and environmental emissions.

As indicated in the consultation, we look at all elements of the leakage model to determine where improvements can be made. Unfortunately, these initiatives take time to develop and implement; for instance, National Grid first proposed the low pressure service modification in 2011. Despite general agreement that this modification is an improvement to the leakage modelling, and having obtained independent verification of this and that the modification impacts had been calculated correctly, this has yet to be approved.

We welcome feedback on the level of detail sought regarding the cost of the leakage test programme for low pressure leakage. At present, we are not in a position to be able to provide an estimate of the cost of leakage tests for medium pressure systems; however, should the same methodology be used, we would expect the unit costs per test to be higher, as:

- It is not always possible to isolate a medium pressure main without having to install a bypass to maintain supplies, which would incur significant extra cost.
- There is likely to be additional costs associated with developing the testing equipment such that it is suitable for operating at higher pressures.

NG: As indicated in our consultation, the 2002/03 NLT cost in the order of £10m for 850 tests, i.e. approximately £12,000 per test. Applying a simple RPI uplift to this (45% from 2002/03 to 2014/15) leads to an updated value of £17,000 per test. Assuming that we would have to carry out an equivalent number of tests to achieve the same level of accuracy, this would suggest a total cost of £15m (for our analysis we assumed half the cost for National Grid networks at £7.3m). It is very difficult to determine the value of the accuracy of the losses assessment; however, for our analysis we assumed that the impact of an inaccuracy of the leakage calculation was whether energy was considered in the domestic RbD adjustment or in the Transporters shrinkage and, therefore, the costs being recovered through the transportation charge. As the domestic population provides approximately 80% of the transportation revenue but currently pays for 100% of the RbD volume, we estimated that the maximum value of any accuracy improvement would be 20% of the wholesale price of gas. For our analysis we assumed a wholesale value of gas of £22,000/GWh giving an 'accuracy' value of £4,400/GWh.

Carrying out a NPV calculation over a ten year period and taking account of the reducing metallic mains population[1] we estimate that a revised leakage test programme would need to result in a 23% change in calculated leakage in order to be considered cost effective. We do not believe that this level of change is likely. The average age of cast iron pipes, which contribute most to the leakage estimation, is 84 years and it is not credible to expect a 23% increase in leakage in a ten year period representing only one eighth of its life on average. Evidence from the comparison of the 1992 and 2002/03 NLT programmes suggests that a sustained mains replacement programme leads to a reduction in average leakage rate across the population, which could be expected to offset some or all of any increase in leakage due to any deterioration in the remaining mains population.

We would be happy to share full details of our NPV calculation.

As both the costs and benefits of a new leakage test programme would apply on a national basis, we do not believe the sale of Distribution Networks to be a relevant issue.

SP: Within the electricity market, the use of half hourly metering provides participants with clear view of network losses. We would encourage Distribution Network Owners to further explore additional measures for estimating/monitoring shrinkage (in particular own use and vented gas), including the evaluation of other leakage techniques and models utilised by Gas Network operators' outwith the UK.

GDN: As far as the GDNs are aware, the UK leakage modelling methodology is almost certainly the most developed methodology used in the world. It is our belief that a losses estimation process similar to that in the electricity industry is not likely to be practical for the gas distribution system. Gas distribution shrinkage is typically in the order of 0.6% of gas throughput, whereas the average electricity DNO losses are of the order of 6% of distributed energy[2]. The accuracy of the annual assessment of the DNO losses settlement process was estimated to be in the order of 0.15%-0.3%; however, it is unlikely that an equivalent process for the gas distribution system could achieve this level of accuracy given that there are additional significant sources of error such as

[1] Metallic mains leak more than PE mains
[2] This is based on data published during the Electricity DNO price control review DPCR5

pressure & temperature correction and flow weighted average calorific values. We believe that the magnitude of the error of an equivalent methodology, i.e. 25%-50%[3] of the losses being estimated, would make an equivalent approach unworkable for the gas distribution system.

SP: We would also suggest that more needs to be done on considering leakage on PE mains, as presently this is assumed to be zero, but with no substantiation.

GDN: We believe there may be some confusion on the part of the respondent in this respect; leakage from PE mains is not assumed to be zero. Ninety-two PE mains were tested in the 2002/03 NLT and a leakage rate determined; however, twenty-nine of the PE mains were found not to be leaking. As indicated in the consultation, the 2002/03 National Leakage Tests found that service connections to PE mains did not leak.

SP: CSEP Shrinkage - There is a clear obligation within the CSEP NExA for iGTs to provide a record of annual Shrinkage values to Large Transporters by 1st August each year. As previously communicated, we would request that National Grid along with the other large Transporters formally write to iGTs requesting that they provide the required shrinkage values as obliged under the CSEP NExA.

GDN: CSEP Shrinkage, which is not included within the SLM, has been discussed at the UNC Modification 0440 Workgroup. Currently GDNs have no obligation to measure or manage this activity and there is no mechanism within the GDN licence or the billing systems to facilitate it. Under Mod 0440, the CSEP NExA is being incorporated within the Independent Gas Transporter Arrangements Document (ITAD) of which CSEP Shrinkage forms Section C. The current legal drafting of the text for Section C[4], as agreed by the Industry, states:

1.2.1 At the Nexus Implementation Date there are no arrangements for the identification or estimation of IGTS Shrinkage or for its allocation as among CSEP Users.

1.2.2 It is acknowledged that, as a result, IGTS Shrinkage will be counted as and treated as forming part of Unidentified Gas for the relevant LDZ pursuant to TPD Section H2.6.

However, we will continue to work with the Industry on this issue, as required by the Industry.

SP: Theft - A number of UNC Modifications have been introduced to reduce the number of unregistered and Shipperless sites. While it is important that Shippers are held accountable where customers are being billed by a Supplier and the Meter Point is not registered, we believe that increased Transporter responsibilities are required to investigate illegal connections and take all appropriate measures to ensure that instances of theft are identified and the perpetrators prosecuted. We welcome Transporter involvement within theft discussions and Ofgem's proposed introduction of changes to legislation which incentivise theft detection and investigation.

GDN: As indicated in the Consultation, GDNs are working closely with the Ofgem and other industry parties to establish a regime that incentivises theft detection and investigation.

SP: We believe that the installation of smart metering within customer premises will improve theft detection rates. Smart metering data should be made available to Transporters to assist in the determination of leakage levels. However we believe that it will be some considerable time before sufficient volumes of data become available which can be realistically used in the assumption of leakage.

GDN: The GDNs welcome Scottish Power's support for the provision of smart metering data to the Transporters and hope that other industry parties share their understanding of the importance of this data to industry. We agree that immediate use of any smart meter data is not practical.

[3] Assuming losses being 0.6% of throughput and an energy assessment accuracy of 0.15%-0.3%

[4] ITAD Section C

2.3 Representation from British Gas

This section presents the British Gas (BG) representation in respect of all GDNs' consultations and the GDNs' (GDN) response:

BG: The SLM has a significant impact on Suppliers' energy allocation and as such we feel that the SLM processes, which although have improved in transparency over recent years, could be improved further to ensure that ultimately end consumers are not overpaying for their network charges or energy via reconciliation.

GDN: We are keen to receive feedback on specific improvements to the process that could improve transparency.

BG: We are aware that customers will either pay for higher shrinkage costs within the price control or via energy allocation, i.e. Reconciliation by Difference or the Allocation of Unidentified Gas processes. Therefore we feel more information needs to be shared with gas shippers, suppliers and ultimately consumers, to aid understanding in what actions the gas transporters have taken to receive their incentive payments. At the moment neither the new Shrinkage and Leakage Model report nor the initial / final proposals help to inform the industry on what has been achieved in the year or what was expected to be achieved in terms of mains replacement, pressure management or innovative engineering, for example.

GDN: We are happy to provide more information on actions taken in managing shrinkage. The provision of additional information was discussed at the August 2013 Shrinkage Forum at which British Gas took an action to provide an indication as to what type and level of information is required. We believe that the best reporting mechanism for this type of information is the post year Assessment and Adjustment process rather than the SLM Review or the Shrinkage Proposal process. We will work with the industry, via the Shrinkage Forum, to develop the level of detailed information provided.

BG: We note that some assumptions within the SLM date back almost 20 years and feel that the SLM report should list and review each and every assumption within the shrinkage and leakage model, specifying what the current assumptions are and when each assumption was last reviewed. The report should then build on this information by helping users understand what would be involved in checking each assumption and the sensitivity around changes using a specified range.

For example, what are the current assumptions around venting rates by type of equipment, when was that assumption decided, when last reviewed and what impact does this assumption have on shrinkage, if flexed by +/- 10%? A timetable for reviewing each assumption could then be agreed within the Shrinkage Forum and Gas Shippers / Suppliers could help with prioritising items.

GDN: Full details of the assumptions behind the SLM have been shared with the industry via the Shrinkage Forum, most recently in June 2011. In the review of the SLM we looked at each element and the assumptions underpinning the estimation. However, we will include more detail in future reviews.

With regard to AGI Venting, as indicated in National Grid's presentation to the Shrinkage Forum in June 2011, the estimation was taken from a value quoted in a Watt Committee report from 1994 and we do not know how this value was determined. As outlined in the Consultation, recognising the weakness in this particular area of the leakage estimation, National Grid has initiated a project to review venting rates of the most common pieces of equipment used for pneumatic control of AGIs, with the intention of improving the AGI venting estimation by making it an activity based calculation. In addition, each GDN is in the process of establishing a full inventory of venting equipment at AGIs.

BG: We would also like to know more about Own Use Gas (OUG), such as what other equipment, buildings etc. are covered by the percentage. For example, within OUG are all the depots metered, reconciled and correctly paid for? Perhaps we could discuss at the next Shrinkage Forum in January.

NG: The estimation of OUG is based purely on an assessment of the amount of gas used for pre-heating at pressure reduction stations. We are happy to discuss the details of this assessment at the Shrinkage Forum.

NGN: NGN's successful NIC Low Carbon Gas Preheating Project includes within its scope the proposal to install and monitor the operational efficiency of a representative sample of preheating technologies currently employed. The results of this element of the project are intended to improve the accuracy of the data that exists on the efficiency of current preheating technology and feed into and inform discussions on the OUG calculation in the shrinkage model. It is planned that this data will be made available from early 2015.

BG: We feel that more transparency is required from the Shrinkage and Leakage model and the new report, and hope to work with the gas community, via the Shrinkage forum to bring about the required changes, ensuring customers receive value for money and environmental emissions are managed.

GDN: The GDNs are committed to expanding the industry's understanding of the SLM, having made a number of presentations to the Shrinkage Forum on the details of the SLM and shared a copy of the spreadsheet model. The GDNs will work with the industry to develop the content of the SLM Review and provide greater clarity and understanding of the workings of the SLM via the Shrinkage Forum.

3. Summary of Consultation

This is the first formal consultation on the annual review of the Shrinkage and Leakage Model used by the Gas Distribution Networks for the purposes of estimating Shrinkage. Two responses to the Consultation were received, from Scottish Power and British Gas. It is clear from these responses that, in general, they would like more detailed information from the review to be incorporated within the Consultation.

The GDNs are committed to working with the industry to develop the level of information and understanding in all aspects of the Shrinkage process; however, the Consultation has raised specific areas for attention identified below, which we will be looking to address with the industry via the Shrinkage Forum:

i) The level of detail included within the SLM Review;

ii) The requirement to review the low pressure leakage rates, and in particular whether this would be cost-effective;

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vi) The level of detail provided regarding the 'activity factors' driving the shrinkage estimation, e.g. mains replacement and pressure management.