

Shrinkage and Leakage Model Review

Consultation on Gas Distribution Networks (GDNs)
Shrinkage and Leakage Model Review 2014/15

November 2014

Date of Publication: 7 November 2014

Deadline for Response: 5 December 2014

Target Audience: Gas Shippers, and any other parties with an interest in the estimation of emissions from gas distribution systems

Table of Contents

Summary	3
1. Introduction	4
1.1 Background	4
1.2 Responding to this consultation	4
2. Components of the Shrinkage and Leakage Model	5
2.1 Leakage Components	5
2.1.1 Low Pressure (LP) mains leakage	5
2.1.2 Low Pressure Service Calculation	6
2.1.3 Medium Pressure (MP) Leakage	6
2.1.4 AGI Leakage	7
2.1.5 AGI Venting	7
2.1.6 Interference Damage	7
2.2 Theft of Gas	8
2.3 Own Use Gas	8
3. Smart metering.....	9
4. Outcome of SLM Review	10
5. Consultation Responses	11

Summary

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 the SLM Review is to assess how the SLM can better achieve the objectives set out in Special Condition 1F.13 of the Licence. This requires the SLM to be designed to facilitate the accurate calculation and reporting of gas shrinkage and gas leakage in, or from each, GDN operated by a Licensee.

This document provides the details of the GDN's review of the SLM.

The outcome of the GDN's 2014/15 SLM review is:-

- GDNs completed a consultation on a change to the modelling of low pressure services during 2014 and the Authority approved this change on 16 September 2014 to apply from reporting year 2014/15
- GDNs have initiated site surveys in support of the proposed modification consultation initiated by National Grid in respect of Above Ground Installation (AGI) Venting
- National Grid intends to raise a modification in respect of Interference Damage in late 2014 or early 2015
- National Grid intend to raise an Network Innovation Allowance (NIA) project to investigate the relationship between pressure and leakage on Medium Pressure systems and to identify the most appropriate methodology for estimating leakage from the UK's Medium Pressure gas supply networks
- SGN in conjunction with other GDNs have initiated a trial of pipe remediation techniques to repair gas mains in situ. If successfully introduced, GDNs will consider if revised categories of material types are required in the SLM
- Northern Gas Networks are investigating Low Carbon Gas Preheating technologies which may allow the Own Use Gas calculation to be reviewed
- GDNs completed the first biennial Shrinkage and Leakage Smart Metering Report in July 2014

The outcome of this consultation will be submitted to the Authority on 31 December 2014.

1. Introduction

1.1 Background

GDNs have an obligation under Special Condition 1F Part E of their Licences to review the Shrinkage and Leakage Model (SLM) on an annual basis, and to consult on the outcome of that review with 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 Special Condition 1F.13 of the Licences. This requires the SLM to be designed to facilitate the accurate calculation and reporting of gas shrinkage and gas leakage in, or from each, distribution network operated by a Licensee.

This document provides the details of the GDN's 2014/15 review of the SLM and the outcome of this consultation will be shared with Ofgem. Interested parties have the opportunity to review and comment on the details of the SLM Review.

In 2013/14, each GDN produced their own review of the SLM. However, it was agreed that for subsequent reports that GDNs would work together and produce a joint annual review of the SLM. This makes it easier for all interested parties to provide their comments to a single source on common issues that are applicable to all GDNs.

1.2 Responding to this consultation

GDNs would welcome comments on all aspects raised within this consultation document, although specific questions have been identified within section 5 of this document.

Responses to this document should be received no later than 5 December 2014 and may either be provided via the Joint Office or directly to:

David Simpson
Network Support Manager
SGN
Axis House
5 Lonehead Drive
Newbridge
Edinburgh
EH28 8TG

Or email : david.simpson@sgn.co.uk

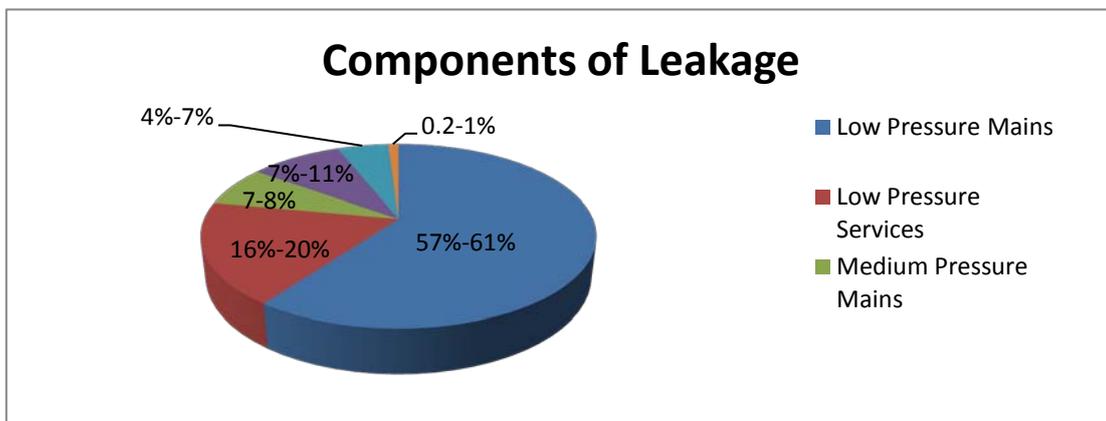
2. Components of the Shrinkage and Leakage Model

The shrinkage output from the SLM is comprised of three elements:

- Leakage (95%)
- Theft of Gas (3%)
- Own Use Gas (2%)

These are discussed in more detail below. The percentage figures in brackets indicate how much each component contributes to overall leakage. The range reflects the variation between GDNs.

2.1 Leakage Components



2.1.1 Low Pressure (LP) mains Leakage (57%-61% of leakage)

Leakage from low pressure mains is estimated by applying the leakage rates determined from the National Leakage Test (NLT) programme carried out in 2002/03 to the mains asset records. The 2002/03 NLT, which was a repeat of an earlier testing programme carried out in 1991/92, applied the 'pressure-decay' method of measuring leakage from mains. The 'pressure-decay' method is recognised as being one of the most accurate methods available for the purposes of determining leakage from gas distribution systems; however, the associated cost is usually considered prohibitive¹.

In order to improve the estimation of LP mains leakage, it would be necessary to repeat the testing procedure and GDNs do not believe there would be sufficient value to customers in undertaking this activity.

SGN in conjunction with other GDNs are currently trialling a number of pipe remediation technologies which would allow pipes of a certain material and diameter to be repaired in situ avoiding costly replacement. These technologies include Robotic Cast Iron Joint Sealing (CISBOT) and Cured In Place Pipe (CIPP) Lining and it is expected that they would significantly reduce leakage.

¹ The 2002/03 tests cost in the order of £10m to complete and it would cost significantly more to repeat the tests now

The SLM does not currently make provision for remediated pipes. If the current trials are successful and these technologies are introduced then it may be necessary to include a new category of pipe material in the SLM to reflect the reduced leakage in these pipes.

2.1.2 Low Pressure Service Calculation (16%-20% of leakage)

As with low pressure mains, leakage from low pressure services is estimated using the leakage rates determined from the 2002/03 NLT, which provided an average leakage rate for each of four service categories².

This element of the leakage model has been subject to two modification proposals, one of which was implemented in 2009 and the other has been consulted upon during 2014 and approved by Ofgem on 16 September 2014.

Historic records of service populations are not as comprehensive as those of mains and, accordingly, it is necessary to estimate these. Until 2008/09, the leakage model did not have the facility to update service populations. In 2008/09 the model was modified to enable the impact of service replacement to be reflected in the modelling assumptions.

However, this did not correct for the service replacement that had gone unaccounted for from when the model was originally established (early 1990's).

As a result, a further modification was proposed and consulted upon that sought to address the issue of unaccounted for historic service replacement. This change was approved by Ofgem on 16 September 2014 to apply from reporting year 2014/15.

It is not expected that there will be any further development of the leakage model in respect of low pressure services in the near future.

2.1.3 Medium Pressure (MP) Leakage (7%-8% of leakage)

MP leakage is estimated by applying the LP leakage rates at 30mbarg to the MP mains asset profile. The rationale for this is that the number of public reported escapes (PRE) per km of MP main is of a similar order to that of the LP system. Therefore, it is inferred that the mains must be leaking at a similar rate³. Also, systems operating at higher pressures are constructed and tested to an appropriately higher level of integrity.

² Steel and PE service connections to PE or Metallic mains. However, the 2002/03 NLT determined a zero leakage rate for connections to PE mains

³ If the LP rates were to be applied at actual MP system pressures, the amount of leakage calculated would be in the order of 30-40 times higher; if this were actually the case, there would be far more PREs/km on the MP system.

Ideally, it would be better to have a pressure related calculation of leakage from the MP system, which would facilitate a more accurate calculation and provide a mechanism for achieving and reflecting leakage reduction through pressure management. To achieve this, it would be necessary to establish MP specific leakage rates. However, isolating sections of the MP system to undertake pressure decay tests is often not possible due to the strategic importance of these mains to security of supply, even under low demand periods.

As such, National Grid intend to raise an Network Innovation Allowance (NIA) project to investigate the relationship between pressure and leakage on Medium Pressure systems and to identify the most appropriate methodology for estimating leakage from the UK's Medium Pressure gas supply networks.

2.1.4 AGI Leakage (7%-11% of leakage)

The leakage from AGIs was determined via a national testing programme in 2002/03, which established average leakage rates for five types of AGI. The most likely improvement to the AGI leakage calculation would be to carry out another leakage survey. This would be expensive (the last survey cost in the order of £1m) and so is not considered cost effective at present. However, new technology for identifying and measuring leakage is being developed, which could potentially be used to achieve a cheaper surveying methodology in the future.

2.1.5 AGI Venting (4%-7% of leakage)

The current estimate of AGI Venting is based on a national figure quoted in a Watt Committee report from 1994. The derivation of this value is unknown and as it is a single fixed value for each LDZ, it remains unchanged.

GDNs have initiated site surveys in support of a project raised by National Grid to review venting rates of the most common pieces of equipment used to pneumatically control AGIs. The aim is to improve the AGI venting estimation by making it an activity based calculation.

It was expected that a revision to the AGI Venting calculation, based on the outcome of the study, would have been subject to a formal consultation later in 2014/15.

However, the outcome from the initial surveys has indicated that further survey work is required and formal consultation is not now expected until late 2015 at the earliest.

2.1.6 Interference Damage (0.2%-1% of leakage)

Interference damage is split into two categories, above and below 500kg of gas released and calculated using assumed leakage rates per incident together with an average response and repair time (for below 500kg incidents).

Although it would be feasible to update the time element and reassess average leakage rates, given this is such a small amount of the overall leakage estimate the time, effort and cost of doing so is not considered to be of value to our customers.

The issue of the Interference Damage calculation and, in particular, its impact in respect of the shrinkage and environmental emissions incentives was raised with

Ofgem during the RIIO-GD1 price control review. Although it is recognised that the GDNs can, perhaps, influence the number of incidents occurring via engagement with relevant industry bodies, advertising campaigns and robust internal processes, the magnitude of any one incident is out of the GDNs control. Ofgem referred to this issue in the Final Proposals⁴:

“2.26. We recognise that revenues under the rolling incentive will be strongly influenced by companies’ performance in the last year of RIIO-GD1. This performance could be influenced by factors outside GDNs control such as third party damage to gas mains. To mitigate for this, we welcome modifications to the shrinkage model (used by GDNs to calculate and report shrinkage and leakage) which addresses this issue whilst continuing to place the right incentives on companies to manage shrinkage and leakage.”

National Grid have indicated their intention to raise a modification to the SLM, in late 2014 or early 2015, designed to mitigate any distortion of the incentive outcomes due to factors outside the GDNs’ control in respect of Interference Damage.

2.2 Theft of Gas

Shrinkage includes an element of theft deemed ‘transporter responsible’. This is currently estimated by applying a fixed 0.02% factor to throughput and this definition was formally approved by the Authority on 16 September 2014.

However, the absolute level of theft, by its nature, is impossible to establish.

GDNs are proactively engaging with Ofgem and other industry parties to establish a way of addressing certain elements of theft, namely gas offtaken at ‘unregistered’ and ‘shipperless’ sites.

2.3 Own Use Gas (OUG)

OUG refers to gas used by the transporter for operational purposes, primarily pre-heating, but which does not pass through a meter. This is currently estimated by applying a fixed 0.0113% factor to throughput, which was established by a study carried out in 2002 and this definition was formally approved by the Authority on 16 September 2014.

Northern Gas Networks are currently undertaking a network innovation project investigating Low Carbon Gas Preheating which involves installing and monitoring the operational efficiency of a representative sample of preheating technologies. It is anticipated that by December 2014 live data from 8 sites with different pre-heater technologies will be available. This will allow a comparison of the system efficiency of each site/technology to be undertaken.

⁴ <https://www.ofgem.gov.uk/ofgem-publications/48155/2riiogd1fpoutputsincentivesdec12.pdf>

3. Smart metering

In accordance with Part G of Special Licence Condition 1F of the gas transporters Licence, GDNs jointly consulted and reported on the first biennial Shrinkage and Leakage Smart Metering (SLSM) Report, the final report being published on 31 July 2014.

Subsequent to the publication of this report, Ofgem indicated on 3 September 2014 a requirement for more detailed information. GDNs are currently undertaking a review of the SLSM Report with a view to providing an updated report for January 2015.

4. Outcome of SLM Review

The table below summarises the reviews of the SLM currently proposed by GDNs for each leakage component.

Leakage Component	Development Proposed Y/N	Comments
Low Pressure Mains	Y	GDNs are trialling pipe remediation technologies – if successful it is proposed to include separate mains categories in the SLM to reflect the reduced leakage in these mains
Low Pressure Services	N	Service modification approved September 2014 – no further development of SLM planned
Medium Pressure Mains	Y	National Grid intend to raise a network innovation project to investigate the relationship between pressure and leakage on Medium Pressure systems and to identify the most appropriate methodology for estimating leakage from the UK's Medium Pressure gas supply networks
AGI Leakage	N	No development of SLM planned although GDNs will continue to evaluate new technologies and the potential for updating leakage rates
AGI Venting	Y	GDNs have initiated site surveys to review venting rates of the most common pieces of equipment used to pneumatically control AGIs. The aim is to improve the AGI venting estimation by making it an activity based calculation
Interference Damage	Y	National Grid intend to raise a modification in late 2014/early 2015 to the SLM designed to mitigate windfall gains or losses, in respect of Interference Damage, under the incentive mechanisms
Theft of Gas	N	No development of SLM planned but GDNs continue to proactively engage with Ofgem and other industry parties to establish a way of addressing certain elements of theft, namely gas offtaken at 'unregistered' and 'shipperless' sites
Own Use Gas	Y	Northern Gas Networks are currently undertaking a network innovation project investigating Low Carbon Gas Preheating technologies which will allow a comparison of the system efficiency of each site/technology to be undertaken

All GDNs actively participated in five Shrinkage Forums during 2014, which included presentations to shippers on the methodology behind the SLM and the process of calculating forecast shrinkage together with an explanation of the reasons behind any variations against actual performance.

5. Consultation Responses

Respondents' views are sought on all issues set out within this consultation but in particular on the following:

1. The areas of the SLM that GDNs have identified for development within this consultation.
2. Any other areas of the SLM that can be cost effectively developed to improve the accuracy of the assessment.
3. The potential for smart metering data to be used to facilitate or improve the shrinkage and leakage estimation process.