



## **Shrinkage and Leakage Model Review**

### **Consultation on Scotia Gas Networks Shrinkage and Leakage Model Review 2013/14**

**November 2013**

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

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## Summary

Scotia Gas Networks (SGN) is the holding company of Scotland Gas Networks plc and Southern Gas Networks plc. SGN therefore has an obligation under Special Condition 1F Part E of its Licence to review the Shrinkage and Leakage Model (SLM) on an annual basis and to consult on the outcome of that review with other gas distribution networks (GDNs), 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.

Scotia Gas Networks, in conjunction with the other GDNs, has completed a consultation on a change to the modelling of low pressure services and is awaiting approval for implementation from Ofgem. SGN has also undertaken site surveys in support of the proposed modification consultation initiated by National Grid in respect of Above Ground Installation (AGI) Venting.

An initial assessment on the relevance of smart metering to the shrinkage and leakage estimation process is to be delivered by 31 July 2014.

At this time, SGN has not identified any other areas of the SLM that could be improved, in a cost effective way, such that it better achieves the SLM objective of facilitating the accurate calculation and reporting of gas shrinkage and gas leakage, and as specified in Special Condition 1F.13. However, we will continue to review these areas and technology developments that may facilitate improvement.

## **1. Introduction**

### **1.1 Background**

Scotia Gas Networks Limited is the holding company of Scotland Gas Networks plc and Southern Gas Networks plc.

Scotland Gas Networks and Southern Gas Networks 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 other GDNs, 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 SGN's 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 future, SGN propose to work with other GDN's and produce a joint annual review of the SLM. This will make it easier for all interested parties to provide their comments to a single source on common issues such as this and that is applicable to all GDNs.

### **1.2 Responding to this consultation**

We 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 27 December 2013 and may either be provided via the Joint Office or directly to:

Stuart Forrest  
Network Planning Manager  
Axis House  
5 Lonehead Drive  
Newbridge  
Edinburgh  
EH28 8TG

Or email : [stuart.forrest@sgn.co.uk](mailto:stuart.forrest@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.

### **2.1 Leakage Components**

#### **2.1.1 Low Pressure (LP) mains leakage (62% 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 prohibitive<sup>1</sup>.

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

#### **2.1.2 Low Pressure Service Calculation (18% 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 categories<sup>2</sup>.

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 and is awaiting Ofgem approval.

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). Subsequent to the earlier model change, a further modification has been proposed and consulted upon that seeks to address the issue of unaccounted for historic service replacement. This change is awaiting Ofgem approval for implementation.

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

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

<sup>2</sup> 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

### **2.1.3 Medium Pressure (MP) Leakage (7% of leakage)**

MP Leakage is estimated by applying the LP leakage rates at 30mbar 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 rate<sup>3</sup>. The LP system typically operates at an average system pressure of around 30mbar. In addition, studies have shown that gas supply systems tend to leak at similar rates per km of pipe. This may be because there is a maximum leakage concentration that would go unreported.

Clearly, 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. To achieve this, it would be necessary to establish MP specific leakage rates.

The best method of achieving an improved MP calculation would be to carry out a testing programme similar to that carried out for the LP system. However, testing the MP system would be very difficult and expensive due to the difficulties of isolating the mains and testing at higher pressures.

An alternative methodology that is used elsewhere in the world is to monitor the increase in flow associated with a deliberate increase in pressure at a period of low, and assumed stable, demand with any increase in flow being deemed due to pressure related leakage. However, this methodology may be difficult to achieve with the complex MP systems in the UK.

Neither of these potential methodology changes is considered to be cost effective at present. However, as this is a significant source of leakage it is an area we would be looking to explore in greater detail in the near future.

### **2.1.4 AGI Leakage (9% of leakage)**

The leakage from AGI's 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% 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.

Scotia Gas Networks have completed site surveys in support of a project initiated by National Grid to review venting rates of the most common pieces of equipment used to pneumatically control AGI's. The aim of this is to improve the AGI venting estimation by making it an activity based calculation.

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<sup>3</sup> 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, which, if this were actually the case there would be far more PREs/km on the MP system.

It is expected that a revision to the AGI Venting calculation, based on the outcome of the study, will be subject to a formal consultation later in this formula year.

### **2.1.6 Interference Damage (0.2% 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.

## **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. The absolute level of theft, by its nature, is impossible to establish.

However, SGN is 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. This may involve expanding the shrinkage theft of gas definition and associated incentive. The full scope of this work and its potential impact on the determination of shrinkage are yet to be established.

## **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. There has been very little change to Scotia Gas Networks pre-heating equipment since the original study was carried out and, therefore, it is unlikely that the amount of pre-heating will have changed significantly.

## **3. Smart metering**

In accordance with Part G of Special Licence Condition 1F of our gas transporters Licence, SGN, in conjunction with the other GDNs, will be assessing the relevance of the smart meter roll-out programme, and associated data, to the shrinkage and leakage estimation process. The initial report on this is to be delivered by 31 July 2014. To this end, we will be approaching shippers/suppliers in future for information to support the report to Ofgem.

#### **4. 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 SGN has 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.