



Leakage Model Modification No 3 Report

Report on the Consultation on Proposed Modifications to the Leakage Model

June 2012

Overview

Gas Distribution Network Operators (GDNs) have an obligation under Special Condition E9 of the Gas Transporters Licence to “establish and thereafter maintain a Leakage Model which shall be approved by the Authority and modified from time to time”. The Leakage Model comprises a spreadsheet model and methodology documentation.

Under Special Condition E9 GDNs are required to annually review the Leakage Model to ensure it continues to achieve the objectives set out in the licence, namely the accurate calculation and reporting of gas leakage. They are also required to consult shippers and other interested parties to seek their views. Having given proper consideration to any representations raised the GDN can then propose any modification necessary to ensure the Leakage Model continues to meet the objectives.

Special Condition E9 requires that any modification to the Leakage Model follows the process set out under paragraphs 7 to 13. Paragraph 11 requires the licensee to appoint an independent expert to review the Leakage Model and provide a report which shall include their opinion on the extent to which the Leakage Model or modification better facilitates the objectives and maintains the incentive properties under the environmental emission incentive.

Pursuant to the requirements under Special Condition E9 Scotland and Southern Gas Networks (together known as Scotia Gas Networks (SGN)) proposed and consulted in March 2012 on improvements to the calculation of service leakage within the Leakage Model to facilitate the accurate calculation of gas leakage. This document fulfils SGN's obligation to produce a report on the outcome of the consultation, the independent expert review and the proposed modification to the Leakage Model.

Context

The 2008 to 2013 Gas Distribution Price Control Review introduced new controls around the estimation of emissions from gas distribution systems; these controls being brought in to support the introduction of the Environmental Emissions Incentive.

Special Condition E9 of the Gas Transporters Licence introduced a number of obligations on Gas Distribution Network Operators (GDNs), including:

- Establishment of a Leakage Model;
- Annual reporting of actual leakage volumes;
- Consultation on modifications to the Leakage Model.

Associated Documents

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

Gas Transporters Licence, Special Condition E9

Leakage Model Modification Consultation No.3 March 2012	-	Scotia Gas Networks Consultation
Independent Review of Amendment to Leakage Model Modification No. 3	-	GL Industrial Services UK
Leakage Model Modification Consultation No. 3 Representation – British Gas	-	British Gas Representation
Leakage Model Modification Consultation No. 3 Representation – National Grid Distribution	-	National Grid Distribution Representation

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Summary

Special Condition E9 of the Gas Transporter Licence requires Scotland and Southern Gas Networks to establish and maintain a Leakage Model. Part of the obligation to maintain this model is to review the accuracy of the leakage calculation. Scotia Gas Networks has identified an area of inaccuracy within the current Leakage Model associated with the calculation of Low Pressure Service leakage.

A further obligation of Special Condition E9 is that Scotland and Southern Gas Networks consult with Shippers, and any other interested parties, on any proposed modifications to the Leakage Model. Scotia Gas Networks issued a consultation on the proposed modification to its Leakage Model on 28 March 2012.

Special Condition E9 also requires Scotland and Southern Gas Networks to appoint an independent expert to review the Leakage Model and the proposed new leakage volumes and provide a report of that review.

This document provides a report on the consultation initiated by SGN in March 2012 on improvements to the Leakage Model, the proposed modification and includes the review by the independent expert.

1. Introduction

1.1 Background

The 2008 to 2013 Gas Distribution Price Control Review (GDPCR1) introduced new controls around the estimation of emissions from gas distribution systems, these controls being brought in to support the introduction of the new Environmental Emissions Incentive. The new regime created an incentive for GDNs to reduce leakage.

Ofgem requested GDNs to provide an estimate of leakage for the five-year period covered by the GDPCR. Ofgem used the GDNs' submissions as a basis for setting the Environmental Emissions Leakage baselines for the five years of the GDPCR. .

Special Condition E9 of the Gas Transporters Licence sets out provisions relating to Distribution Network environmental emissions incentive revenue and compliance with the Leakage Model. In particular, Special Condition E9 covers leakage estimation and provides a control mechanism on the leakage model to ensure that it accurately calculates leakage and, where reasonably practical, is consistent across DN Operators. Furthermore, E9 requires GDNs to review the model to ensure it achieves the objectives, consult on changes to the leakage model, to ensure that changes preserve incentives, to appoint an independent expert to review the model and to submit a report to the Authority.

1.2 Purpose of this Document

This report fulfils Scotia Gas Network's obligations under the Special Condition E9 paragraph 9(b), to "...make publicly available and submit to the Authority a report setting out:

- (i) the modifications originally proposed;
- (ii) the revised allowed leakage volumes (LBt, i) proposed;
- (iii) the representations made by relevant shippers or other interested parties (if any) to the licensee and not withdrawn;
- (iv) any changes to the modifications and allowed leakage volumes (LBt, i) proposed as a result of such representations;
- (v) the independent expert's report;
- (vi) how the proposed modifications would better facilitate the objectives set out in paragraph 4 above; and
- (vii) a timetable for the implementation of the modification originally proposed or any alternative modification developed in the light of any representations made by relevant shippers or other interested parties, including the date with effect from which such modification (if made) is to take effect..."

1.3 Independent Review

Scotia Gas Networks is required under Special Condition E9 to appoint an independent expert to review the Leakage Model and provide a report of that review, including the implications of the proposed changes, following the close of the consultation.

1.4 Baselines

Annex P of Special Condition E9 sets out the allowed leakage volume, used to calculate the environmental emissions incentive revenue, for the 5 year period commencing 1st April 2008 for each LDZ. Proposed revisions to these baselines for the period 2011/12 and 2012/13, as a result of the proposed modification to the Leakage Volume are set out in Appendix A.

Appendix A shows proposed leakage volumes for year t=4 and t=5 for the Scotland, Southern and South East LDZ. A comparison against existing allowed leakage volumes is also shown in Appendix B. They show allowed leakage volumes for the Scotland and Southern LDZs reducing by 36GWh across the two year period and the allowed leakage volume for the South East LDZ increasing by 12GWh across the two year period.

For the avoidance of doubt, these amendments to the allowed leakage volumes set out in Annex P of Special Condition E9 are required to ensure the incentive properties for the environmental emissions incentive are retained at the same level as applicable prior to the proposed change to the Leakage Model, as required under paragraph 8 of Special Condition E9, such that there will be no windfall gain or loss under the environmental emissions incentive.

2.0 Outcome of the Consultation

2.1 Representations

During the period of the consultation, SGN received representations from British Gas and National Grid with regard to the proposed modification. These representations are set out below.

2.2 British Gas

1. Thank you for the opportunity to respond to the Leakage Model Consultation No. 3; the proposed revision of low pressure service leakage calculation for SGN's LDZs. This is a non-confidential response on behalf of British Gas. Our main points are covered in this letter which is consistent with our letter to National Grid in February as your consultation is broadly similar to NGGD's consultation number 2.

2. British Gas believes that the shrinkage calculations and incentive targets are too low, as the amount of unaccounted for gas is considerable and the gas networks need to pay their share of this cost and be incentivised to help the industry improve.

3. British Gas also feels the leakage model is not fit for purpose given the age of the assumptions (all linking back to at least the leakage survey of 2002/03, if not 1992, when the model was created or older) and the use of national averages which are no longer relevant following DN sales. We urge a wholesale review of shrinkage, including the leakage model and incentives on theft.

4. Whilst British Gas welcomes improvements to the leakage model we cannot support an asymmetric change to the leakage calculations, which will only reduce the shrinkage measured by the GDNs, effectively transferring cost from the networks to shippers. Particularly knowing that the AGI venting assumptions are much older and should increase the leakage calculated.

5. British Gas also wants to ensure consistency with the other GDNs and the incentive regime is aligned with any methodology or model changes. With this in mind, we expect any changes to the leakage model will not commence before all GDNs have carried out their regional analysis, discussed with Shippers at the Shrinkage Forum and updated the incentives. Just to clarify, the incentive targets must move on a consistent basis with the changed model output to ensure consumers are not overcharged, i.e. from windfall gains by the GDNs in the allowed revenue.

6. We thank the GDNs for the improved visibility of the leakage model over the past year and consider the processes outside of the leakage model to be robust. However there are significant assumptions within the leakage model that are at least ten years old and based on national averages, which are no longer appropriate following DN sales in 2005 as they do not enable benchmarking or challenge the GDNs to improve.

7. Whilst we understand SGN wanting to update the service pipe material mix assumptions, it is just one of many assumptions within the leakage model that is based on the national leakage tests carried out in 2002/03. If any assumptions are changed to regional characteristics we would expect all national assumptions to be

regionally set, thereby giving each GDN and their individual LDZs the most accurate picture of leakage.

8. We consider using the last three years of mains replacement data to calculate the proportion of metallic services as reasonable and expect all GDNs to use the same years, namely 2008/09, 2009/10 and 2010/11 and the equivalent source of data.

9. British Gas welcomes the updating of assumptions of the Above Ground Installations venting methodologies and urges all the GDNs to investigate their portfolios and present their findings at the next Shrinkage Forum. This is another example where the national averages (and significant assumptions) from the 2002/03 shrinkage survey are now inappropriate. We expect significant improvements in leakage measurement could be made in the next price control, GD1, from decommissioning the beyond use AGIs which still vent and leak gas.

10. We are disappointed that the AGI changes have not progressed further within this consultation as we would expect all assumption changes to occur simultaneously with the impact of each assumption made clear.

11. We hope the comments prove useful and please do not hesitate to contact me if there are any queries, my telephone number is 07789 571365.

2.3 National Grid

1. National Grid supports your proposal to establish an estimate of current service populations by utilising recorded mains and service replacement data. The current low pressure service leakage estimate is based on an estimation of national service populations dating back to the early 1990s. Adoption of the proposed methodology would provide a more accurate assessment of current leakage from low pressure services that is based on regionally aligned data.

2. National Grid supports the amendment to the leakage model to take account of the impact of service transfer activity. The inclusion of this element would provide for a more accurate assessment of leakage from low pressure services going forward.

3. National Grid supports your proposal to amend the Environmental Emissions baselines.

4. National Grid supports your recommendation for implementation of the proposed modifications with immediate effect, i.e. for the leakage and shrinkage assessments in respect of 2011/12.

5. The proposed modifications to the leakage model have been discussed at a Shrinkage Forum, held 6 January 2012, at which they were considered reasonable. In addition, National Grid has consulted on the adoption of the same methodologies and this view was supported by the appointed independent expert.

3. The Modification

3.1 Low Pressure Service Leakage

Following review of the Leakage Model and discussion at the Shrinkage Forum in January 2012, SGN set out in its consultation document in March 2012 proposals to amend the data contained within the Leakage Model for each of the 3 LDZs owned and operated by Scotland and Southern Gas Networks in relation to Low Pressure Services to more accurately reflect system configuration and hence leakage rates.

The proposed modifications to the model:

- provides a better estimate of the current Low Pressure Service population for each of SGN's LDZs, particularly in relation to the relative volume of steel and PE services; and
- takes account of the reduction in leakage rates associated with service transfers.

The modification to the model allows mains replacement data for the period 2008/09, 2009/10 and 2010/11 to be used to determine the proportion of remaining steel and PE service connections to metallic mains. Data collected regarding the proportion of service re-lays and service transfers carried out over this period is deemed to be representative of the overall population of service connections to metallic mains and it is proposed the Leakage Model will be amended accordingly. For completeness, existing assumptions already incorporated in the model regarding service leakage rates will be retained.

It is proposed the assessment described above will be used to establish new values for the base year 2010/11 for the four service categories:

- Steel service connections to metallic mains
- PE service connections to metallic mains
- Steel service connections to PE mains
- PE service connections to PE mains

For subsequent years, the population values will be derived using known year-on-year service replacement and relay numbers, in the same manner as at present.

While the current Leakage Model takes account of re-laid services each year by reducing the number of steel service connections to metallic mains, it does not take into account transferred services. The proposed methodology will in future also adjust the number of steel service connections to take into account transfers by subtracting the number of service transfers from the PE service connections to metallic mains leakage category. The number of service re-lays and transfers will then be added to the PE service connections to PE mains leakage category.

We believe the changes proposed will more accurately reflect current service populations and give a more accurate leakage calculation.

A full description of the proposed change and a hypothetical worked example can be found in Appendix B.

4. Independent Expert Review

GL Industrial Services UK Ltd was appointed as an independent expert for the purpose of this Leakage Model modification consultation. Alan Brown from GL, who carried out the review, has a long history of leakage estimation within the Gas Industry, having worked in this area for British Gas West Midlands, Transco and Advantica. Alan also carried out the review of the previous model modification proposal in June 2009.

The independent expert's review can be found on the [Joint Office Website](#), along with this document.

The review is supportive of SGN's proposal to establish current service populations based on the last three years mains and service replacement data and confirmed that this had been correctly implemented within the revised leakage model.

The review confirmed that the proposed modification would improve the accuracy of the leakage model and calculations and that this had been correctly implemented within the proposed revised Leakage Model. The review also confirmed it is appropriate for the environmental emissions baselines to be revised in the event that the proposed modifications are to be implemented and confirmed that the proposed revision to the baselines outlined have been estimated correctly in accordance with the proposed methodology.

5. Facilitation of the Objectives in Special Condition E9 Paragraph 4

Extent to which implementation of this Modification Proposal would better facilitate the achievement (for the purposes of each Transporters' Licence) of the Relevant Objectives:

Special Condition E9.4: The Leakage Model shall facilitate the achievement of the following objectives –

(a) the accurate calculation and reporting of gas leakage from each of the LDZs operated by the licensee; and

(b) being consistent with, and where reasonably practicable, identical to Leakage Models used by other DN Operators.

The modification proposal facilitates the objectives of Special Condition E9 paragraph 4(a). The Independent Expert's review of the modification proposal supported SGN's assertion that the implementation of the revised Low Pressure Service methodology would provide a better assessment of leakage and the impact of service transfer activity on the leakage calculation.

6. Proposed Implementation Timetable

Subject to Ofgem approval, Scotia Gas Networks proposes to implement the revision to the Leakage Model as follows:

Purpose	Applicable Period	Application Date
Environmental Emissions Incentive	1 April 2011 to 31 March 2012 and subsequent years	From July 2012
Shrinkage Assessment and Adjustment ^[1]	1 April 2011 to 31 March 2012 and subsequent years	From July 2012
Greenhouse Gas Reporting	1 April 2011 to 31 March 2012 and subsequent years	From July 2012
2013/14 Shrinkage Initial Proposal ^[2] s	1 April 2013 to 31 March 2014 and subsequent years	From Jan-Mar 2013

7. Summary of Consultation

Having considered the representations to the consultation, as outlined in Section 2 and the independent expert's report SGN continues to believe that as the proposed modification to the Low Pressure Service methodology provides a better assessment of leakage, it is appropriate for the Leakage Model to be amended to more accurately reflect the system configuration and reflect the proposed modifications outlined in the consultation document. SGN believes that implementation of this modification would facilitate the objectives set out in Special Condition E9 paragraph 4(a).

In summary, implementation of this proposal would:

- i) Establish an estimate of current service populations using mains and service replacement data from the 2008/09, 2009/10 and 2010/11 formula years;
- ii) Amend the leakage model calculations to facilitate the inclusion of the impact of service transfer activity; and
- iii) Amend the Environmental Emissions Incentive baseline values, as proposed in Appendix A.

It is proposed that, subject to Ofgem approval, SGN will implement the revised Low Pressure service methodology from July 2012 in respect of calculating leakage for the period 2011/12 and subsequent formula years.

Appendix A Proposed Revised Allowed Leakage Volumes for Environmental Emissions Incentive

The table below shows the proposed revised allowed leakage volumes for the Environmental Emissions Incentive in relation to Annex P of Special condition E9. These values are consistent with the proposed modification.

Details of the derivation of these values can be found in Appendix B.3.

GDN	LDZ	Revised Baseline (Gwh)	
		2011/12	2012/13
Scotia Gas Networks	SO	271	265
	SE	402	389
	SC	239	232

Appendix B Supporting Analysis

B.1 Determination of service populations for new base year (2010/11)

B.1.1 Proposed methodology for application within the Leakage Model

Each year, GDNs replace in the order of 3500km of metallic main. When replacing a main, it is policy to not reconnect steel services, i.e. any steel service connections to the original main are replaced, or 're-laid', with PE services. Any PE services that were connected to the original main are transferred to the new main. Data regarding the level of mains replacement and any associated service 're-lays' or 'transfers' is included within the regulatory reports submitted to Ofgem. It is proposed to use this data to estimate the relative service populations over the past three years (2008/09, 2009/10 and 2010/11^[3]) thereby setting a new baseline from which the forward replacement and transfer of services can be taken into account in the same way as that in the current methodology.

The table below shows a summary the mains replacement data for the last ^[4]three years:

GDN	Length of main replaced (km)	Number of Relays	Number of Transfers	Relays /km	Transfers /km
Scotland	880	38,878	47,967	44	55
South of England	852	46,710	22,829	55	27
South East of England	1,195	79,711	36,133	67	30

To determine the relative populations of service connections to PE mains, we propose to use data relating to PE mains from the 2002/03 National Leakage Tests:

Number of Tests	Length of Main Tested (km)	Number PE Services	Number Steel Services	Total number Services	PE Service %	Steel Service %
81	7,039	770	14	784	98.20%	1.80%

To determine the baselines:

- i) the number of steel services per km of metallic main = service 're-lays' / length of main replaced
- ii) the number of PE services per km of metallic main = service 'transfers' / length of main replaced
- iii) the number of steel services in each low pressure network = the number of steel services per km of metallic main x the length of metallic main in the network
- iv) the number of PE services in each low pressure network = the number of PE services per km of metallic main x the length of metallic main in the network

- v) the number of service connections to PE mains¹ in each low pressure network = total number of services – number of steel services
- vi) the number of PE service connections to PE mains = the number of service connections to PE mains x PE Services %
- vii) the number of steel service connections to PE mains = the number of service connections to PE mains x steel services %

B.1.2 Worked Example

For the Dundee network in Scotland (SC) LDZ;

Metallic Length = 211.813km; Total Number Services = 43,708

Number Steel Service Connections to Metallic Mains	=	Relays/km x Metallic Length
	=	44.177 x 211.813
	=	9,357
Number PE Service Connections to Metallic Mains	=	Transfers/km x Metallic Length
	=	54.505 x 211.813
	=	11,545
Total no. service connections to metallic mains	=	9,357+11,545
	=	20,902
Total no. service connection to PE mains	=	43,708-20,902
	=	22,806
Number PE service connections to PE mains	=	22,806 x 98.2%
	=	22,395
Number steel service connections to PE mains	=	22,806 x 1.8%
	=	411

In summary:

No. Steel service connections to metallic mains	No. PE service connections to metallic mains	Total no. Service connections to metallic mains	No. PE service connections to PE mains	No. steel service connections to PE mains
9,357	11,545	20,902	22,395	411

B.2 Calculating the Impact of Service Population Movement

The annual service workload activity is recorded, on an LDZ basis, and reported to Ofgem through the regulatory reporting process. The leakage model currently uses this information to estimate the impact of replacement of steel services with PE. It achieves this by apportioning the total LDZ service replacement workload by the proportion of steel services within each constituent network within the LDZ. It is proposed to extend this methodology to take account of the impact of the service transfer activity. The proposed revised methodology to capture the leakage reduction for both service transfers and replacement activity is shown in the worked example below.

B.2.1 Worked Example

Assume that:

- the total number of steel and PE services connections to metallic mains in Scotland LDZ for the baseline year (2010/11) are 264,564 & 326,415, respectively, calculated using the methodology above for each network within the LDZ;

¹ The current leakage model identifies the leakage associated with service connections to both metallic and PE mains. However, the 2002/03 National Leakage Tests determined the leakage from service connections to PE mains to be zero. For completeness, it is proposed to maintain the service connections to PE mains within the current leakage model, albeit that this will return zero leakage.

- 20,000 steel services are replaced in 2011/12 and 25,000 in 2012/13, i.e. 45,000 in total by 2012/13;
- 25,000 PE services are transferred in 2011/12 and 30,000 in 2012/13, i.e. 55,000 in total by 2012/13; and
- there are now 60,000 consumers attached to the Dundee network

The number of services in 2012/13 for the Dundee network, using the service populations calculated in B.1.2 above, would be calculated as:

- i) Number of steel services connections to metallic mains
 = Baseline No. – No. Replaced in LDZ x % of Service Category
 = 9,357 – 45,000 x 9,357 / 264,564
 = 9,357 – 45,000 x 3.53%
 = 9,357 – 1,588
 = 7,769
- ii) Number of PE service connections to metallic mains
 = Baseline No. – No. Transferred in LDZ x % of Service Category
 = 11,545 – 55,000 x 11,545 / 326,415
 = 11,545 – 55,000 x 3.53%
 = 11,545 – 1,941
 = 9,604
- iii) Number of steel service connections to PE mains
 = Base year number
 = 411
- iii) Number of PE service connections to PE mains
 = Total no. connections – All other service connections
 = 60,000 – (7,769 + 9,604 + 411)
 = 60,000 – 17,784
 = 42,216

B.3 Impact of Changes to the Low Pressure Service Calculation

GDN	LDZ	2010/11 - Service Leakage (Gwh)			Impact of taking account of Service transfers (Gwh)		Combined Impact (Gwh)	
		Current Model	Revised Model	Change	2011/12	2012/13	2011/12	2012/13
Scotia Gas Networks	SO	46.0	41.6	4.5	0.17	0.34	4.7	4.8
	SE	72.0	78.5	-6.5	0.26	0.52	-6.2	-6.0
	SC	47.4	35.1	12.3	0.36	0.72	12.6	13.0

GDN	LDZ	Original Baseline (Gwh)		Revised Baseline (Gwh)	
		2011/12	2012/13	2011/12	2012/13
Scotia Gas Networks	SO	276	270	271	265
	SE	396	383	402	389
	SC	252	245	239	232