Leakage Model Modification Consultation No. 01

Proposed Revision of AGI Working Losses and
Low Pressure Service Leakage Calculations

Version 1.0

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

Overview:

Gas Distribution Network Operators (DNOs) have an obligation under *Special Condition E9.3* of the 2008-13 GT Licences to "establish a leakage model". The National Leakage Assessment Model (*leakage model*) comprises a spreadsheet model and methodology documentation. In addition, under *Special Condition E9*, any modifications to the *leakage model*, once established, have to go through the modification process defined within *Special Condition E9.7-13*. Within this modification process is the obligation to consult with relevant shippers and any other interested parties.

Special Condition E9.4(a) specifies that the *leakage model* shall facilitate the achievement of the accurate calculation of gas leakage from LDZs. Pursuant to this requirement, the DNOs are proposing improvements to two areas of the *leakage model* to improve the accurate calculation of gas leakage.

This document fulfils the DNOs obligation to consult with relevant shippers and other interested parties on proposed modifications to the leakage model.

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Context

The 2008-2013 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 Shrinkage Incentive and the introduction of the new Environmental Emissions Incentive.

Special Condition E9 of the GDN Licences introduced a number of obligations on Distribution Network Operators (DNOs), including:

- establishment of a leakage model;
- annual report of emissions;
- consultation on modifications to the leakage model

Associated Documents

GDN Licences, Special Condition E9.

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Summary

Special Condition E9 of the GDN Licence requires DNOs to establish and maintain a leakage model. Part of the obligation to maintain this model is to review the accuracy of the leakage estimation. The DNOs have identified two areas of inaccuracy within the current leakage model, AGI Working Losses and Low Pressure Service Leakage calculations.

A further obligation of Special Condition E9 is that DNOs consult with Shippers, and any other interested parties, on any proposed modifications to the leakage model. This document fulfils this obligation.

Special Condition E9 also requires DNOs to appoint an Independent Expert to review the Consultation and report on this review. The review is to be published within 28 days of the close of the consultation.

This document consults on improvements to the leakage model in the two areas of inaccuracy identified. We propose to appoint Advantica as an independent expert to review the proposed modifications and would be interested in receiving any views on this choice.

1. Introduction

1.1 Background

The 2008-2013 Gas Distribution Price Control Review (GDPCR) introduced new controls around the estimation of emissions from gas distribution systems; these controls being brought in to support the Shrinkage Incentive and the introduction of the new Environmental Emissions Incentive. The objective of the incentives is to provide an appropriate incentive to DNOs to reduce shrinkage and leakage respectively.

The establishment of baselines for gas distribution leakage was a fundamental part of the GDPCR in respect of the Environmental Emissions and Shrinkage Incentives. Ofgem requested GDNs to provide an estimate of leakage for the five-year period covered by the GDPCR; this estimate was to include the impact of any initiatives for which specific funding would be available through the PCR settlement. For example, GDNs adjusted the leakage estimates to account for the impact of the mains replacement programme for which they can recover costs through Transportation Charges. Ofgem used the GDNs' submissions as a basis for setting the Environmental Emissions Leakage baselines for the five years of the GDPCR.

GDN Licence Special Condition E8 & E9 cover the Shrinkage and Environmental Emissions Incentives, respectively. 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 DNOs. Furthermore, E9 requires DNOs to review the model to ensure it achieves these objectives, to 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 The current leakage model

The current leakage model has been used to estimate leakage since 1992[1] and is the model made available to all Distribution Network Operators at the time of separation in 2005. The leakage model estimates emissions in the following categories:

i) Low Pressure Mains

ii) Low Pressure Services

iii) Medium pressure Mains and Services

iv) Above Ground Installation (AGI) Leakage

v) Above Ground Installation Working Losses (Routine Venting)

vi) Interference Damage

This Consultation proposes changes to the Low Pressure Service and AGI Working Loss calculations.

1.3 Purpose of this Document

This Consultation fulfils the Distribution Network Operators' obligation, under the GT Licence Special Condition E9 paragraph 9(a), to "consult relevant shippers and other interested parties about the proposed modification to the Leakage Model and whether the allowed leakage volumes ($LB_{t,i}$) should be revised…".

[1] The fundamentals of the Low Pressure mains and service leakage calculation, which accounts for approximately 80% of the current leakage estimation, have been unchanged since 1992. An estimate of Medium Pressure leakage and Interference Damage were added in the late 1990s. In 2003, the leakage rates were updated and an estimate of AGI Leakage and Working Losses incorporated. In 2006, the Interference Damage calculation was updated to incorporate specific large gas release events. The last two updates were communicated to the Shippers and Ofgem via the Shrinkage Forum.

1.4 Responding to this Document

We would welcome comments on all aspects raised within this consultation document, although specific issues have been identified within the document.

Responses to this document should be received no later than 28 April 2009 and be addressed to:

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1.5 Independent Review

DNOs have an obligation, in line with Special Condition E9 paragraph 11 – 13, to appoint an Independent Expert to review the Leakage Model and the proposed allowed leakage volumes and provide a report of that review, including the implications of the proposed changes, within 28 days[2] of the close of the consultation.

The DNOs are proposing to engage Advantica as the Independent Expert, as they have previously had significant involvement in the creation of the leakage model and its application. However, respondents' views are sought on the choice Independent Expert.

[2] Special Condition E9 paragraph 9(b)

2. Overview of Regulatory Regime

2.1 Environmental Emissions Incentive

Under Special Condition E9, DNOs are obliged to establish a leakage model[3] that achieves the objectives of "(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.[4]"

This Special Condition also requires that any modification to the established leakage model be approved by the Authority and subject to a consultation process with shippers and any other interested parties. The consultation shall establish the "…the proposed modification to the Leakage Model and whether the allowed leakage volumes ($LB_{t,i}$) should be revised and allow them a period of not less than 28 days in which to make representations[5]"

In addition to the consultation process, DNOs have an obligation to appoint an independent expert who "…shall review the Leakage Model and the proposed allowed leakage volumes and provide a report of that review.[6]"

The Environmental Emissions Incentive is subject to a 10% cap and collar regime around the leakage baselines, which limits the gains and losses that the DNOs are exposed to.

2.2 Shrinkage Incentive

Ofgem used the leakage volumes established for the environmental emissions incentive to form the basis of the allowed LDZ Shrinkage Volumes in Annex O within Special Condition E8; these volumes include an allowance for Own Use Gas (OUG) and Theft of Gas (ToG) in addition to leakage.

Unlike the Environmental Emissions Incentive, the Shrinkage Incentive is not subject to a 10% cap and collar regime.

2.3 Baselines

The baselines applicable for these two incentives, for each year from 2008/09 to 2012/13 and for each LDZ, are set out in the relevant Gas Transporter Licence. If there are to be any changes to the leakage model, the preference of both Ofgem and DNOs would be to implement those changes so as, if possible, to avoid changes to the baselines and hence to the Licence, provided that this could be achieved without windfall gains or losses arising.

[3] Special Condition E9 paragraph 3
[4] Special Condition E9 paragraph 4
[5] Special Condition E9 paragraph 9(a)
[6] Special Condition E9 paragraph 11

3. Proposed Leakage Model Modifications

3.1 AGI Working Losses

The current leakage model may not accurately assess the impact of changes in AGI asset numbers in respect of the estimation of Working Losses, i.e. the routine venting of gas under normal operation. In addition, the methodology for the estimation of AGI Working Losses differs between the DNOs. In particular, DNOs have used different values for the working losses from an AGI when setting their baselines, although it should be noted that DNOs have used these same estimates of AGI working losses to set their shrinkage volumes and consequently have not achieved windfall gains (or losses).

As part of the 2002/03 AGI Leakage Tests, Advantica provided a single estimate of emissions on a national basis for AGI Working Losses; however, the report did not provide the breakdown of these losses by asset type. Ofgem have indicated that they would require greater transparency of working loss assumptions before any change in associated emissions could be included within the leakage model.

The leakage model that has been 'established' does not allow the AGI Working Losses to vary from those used in setting the leakage baselines. This agreement satisfies Special Condition E9 paragraph 4(b), consistency of leakage model between DNOs[7], and ensures that there are no windfall gains against the incentive baselines. However, this does lead to an inaccuracy in the leakage estimate, as there is inconsistency across DNOs in their AGI working loss assumptions.

The proposal is that Advantica be engaged to provide appropriate working loss rates for specific AGI asset types and thus enable the real environmental benefit of removing them to be realised. It is the proposers' view that this change will improve the accurate calculation of gas leakage in accordance with Special Condition E9 paragraph 4(a). The proposed implementation of these working losses, once established, is given below:

i) The working loss rates established by Advantica to be applied directly to the change in the number of AGI assets from those used to set the leakage baselines. Thus, a reduction in the number of AGI assets would reduce the leakage calculation (and an increase in the number of AGI assets would result in a higher leakage calculation). It is the Proposers' view that this method would not require a change to the incentive baselines as it only applies to changes in asset numbers from those used in setting the baseline values and, hence, no change in AGI Asset numbers from baseline would mean no change in the leakage assessment.

The scale of these changes cannot be determined until the 'new' working loss rates have been established.

An example of the proposed implementation of this modification is included in Appendix B.1.

[7] In terms of consistency of calculation method; however, this results in DNOs having different AGI Working Loss 'rates'.

Respondents' views are sought on the following:

i) Do respondents agree that Advantica should be appointed to establish the AGI working loss rates to be applied and that these rates should be used to assess changes from the AGI working loss rates in the baseline?

3.2 Low Pressure Service Leakage

There are a number of assumptions within the current leakage model regarding the population split of metallic and plastic services:

- one-third of all services on a mixed material network are metallic;
- the proportion of metallic services attached to plastic mains is 0.187097; and
- PE services are assumed to be evenly distributed between PE and metallic mains, by length (this assumption has no real impact on the leakage calculation as the 2002/03 National Leakage Tests identified the leakage rate for all PE services to be zero)

It is believed that these assumptions date back to the creation of the leakage model in 1992 and are, therefore, significantly out-of-date leading to an inaccurate assessment of service leakage.

Historically, the replacement, rather than reconnection, of metallic services following work on a main has been Policy. It is believed that this has been the case since mains replacement programme began in 1976. This has led to a significant reduction in the number of metallic services, which is not being reflected in the leakage model, and is, therefore, resulting in an over estimation of actual leakage.

To allow for the inclusion within the leakage model of the reduction in emissions associated with service replacement, it is proposed to 'fix' the number of metallic services assumed at the time of the baseline and subtract from this the cumulative number of services replaced from when the baseline numbers were applicable (31 March 2007). It is the Proposers' view that this method provides no windfall gains against the Shrinkage and Environmental Emissions Incentives, as it only applies to services replaced after the baselines were set. Furthermore, it is the Proposers' view that this change improves the accurate calculation of gas leakage in accordance with Special Condition E9 paragraph 4(a).

An example of the proposed implementation of this modification is included in Appendix B.2.

Respondents' views are sought on the following:

i) Changes in emissions due to changes in Low Pressure service populations should be correctly accounted for in the leakage model using the methodology outlined above.

ii) The proposed implementation of this change within the model does not constitute a requirement to adjust the Shrinkage and Environmental Emissions incentives' baselines.

4. Impact of Modifications on Relevant Objectives

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

i) 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.

Implementation of this Proposal will better facilitate this relevant objective, in particular the accurate calculation and reporting of gas leakage. The proposed modifications address areas of the leakage model where actual leakage change is not currently being assessed correctly.

ii) Standard Special Condition A11.1 (d): so far as is consistent with sub-paragraphs (a) to (c) the securing of effective competition: (i) between relevant shippers; (ii) between relevant suppliers; and/or (iii) between DN operators (who have entered into transportation arrangements with other relevant gas transporters) and relevant shippers;

Implementation of this Proposal will better facilitate this relevant objective, in particular the securing of effective competition between relevant shippers. Implementation of this Proposal will improve the accuracy of the leakage estimation, leading to a more reflective distribution of costs under the RbD process.

Appendix A Proposed Revision to Baselines

This section is to include any revision to the Shrinkage and Environmental Emissions Incentive Baselines as result of the proposed modification.

A.1 No revision of Baselines required

The modifications proposed within this consultation do not require the Shrinkage and Environmental Emissions incentives' baselines to be revised.

Appendix B Supporting Analysis

B.1 AGI Working Losses Calculation Example

The table below shows an example of the implementation of the proposed AGI Working Losses modification. The unit rates, which in this example are hypothetical, are applied only to the change in asset numbers from those used in setting the Baselines:

	Ref	Holders	LTS Offtakes	NTS Offtakes	Working Losses m^3/annum
2006/07 Baseline Asset Numbers	(a)	55	125	4	1,500,000
2009/10 Asset Numbers	(b)	45	126	4	
Change	(c)=(b)-(a)	-10	+1	0	
Unit Rate (m^3/annum/asset)[8]	(d)	10,000	7,300	8,000	
Change in Working Losses	(e)= (c) x (d)	-100,000	+7,300	0	-92,700
2009/10 Working Losses				**(a)+Σ(e)**	**1,407,300**

B.2 Low Pressure Service Calculation

Low Pressure (LP) service leakage rates are split into four categories. The table below shows the results from the 2002/03 National Leakage Tests for LP services:

Service Material	Mains Material	Rate m^3/annum/service @ 30mbar
Metal	Metal	10.59
Metal	PE	2.19
PE	Metal	0
PE	PE	0

The current LP Service methodology has two critical assumptions in it; one-third of all services on mixed material networks are metallic and the proportion of metallic services attached to plastic mains is 0.187097. These assumptions are used to calculate the number of services in each of the four categories[9] as shown below.

Assume that, in the baseline year (2006/07) an individual Low Pressure network has:

- 3,000 consumers on it, the model assumes one service per consumer; and
- the total length of pipe is 30km, 15km of which is PE

The number of services is calculated as:

1. Number of metallic services = 3000/3 = 1000 (one-third assumption)
2. Number of PE services = 3000 – 1000 = 2000
3. Number of metallic services connected to PE = 0.187097 x 1000 = 187 (metal service to PE assumption)
4. Number of metallic services connected to metallic pipe = 1000 – 187 = 813
5. Number of PE services to PE =15km/30km x 2000 = 1000

[8] These unit rates are to be determined by further research and are, therefore, hypothetical.

[9] The split in each of the four categories is included for completeness; however, as the leakage rate for all PE services is zero, the split between those attached to PE mains and those to metallic is immaterial in the final leakage estimate.

6. Number of PE services to metallic pipe = 2000 – 1000 = 1000

This calculation is carried out for each LP network in an LDZ.

The proposed methodology to capture actual service replacement is as follows:

Assume that:

- the total number of services in the LDZ for the baseline year (2006/07) is 2,100,000 calculated using the methodology above, 700,000 Metallic & 1,400,000 PE;
- 20,000 metallic services are replaced in 2007/08 and 25,000 in 2008/09, i.e. 6.4% of metallic services have been replaced from when the baselines were applicable (20,000+25,000)/700,000;
- there are still 3,000 consumers attached to the network; and
- 1km of metallic main has been replaced with PE.

The number of services for 2009/10 would be calculated as:

1. Number of metallic services = Baseline No. – Number Assumed Replaced
   = 1000 – 1000 x (20,000 + 25,000) / 700,000
   = 936
2. Number of PE services = 3000 – 936 = 2064
3. Number of metallic services connected to PE = 0.187097 x 936 = 175
4. Number of metallic services connected to metallic pipe = 936 – 175 = 761
5. Number of PE services to PE =(15+1)km/30km x 2064 = 1101
6. Number of PE services to metallic pipe = 2064 – 1101 = 963