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Independent Review of Amended Leakage Model relating to proposed Modification No.3

GL Noble Denton
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Executive Summary

Distribution Network Operators (DNOs) utilise a spreadsheet based leakage model to estimate leakage from their networks, and the establishment of this model is an obligation within the 2008 – 13 Gas Transporters' Licences. The outputs from this model have an impact on DN performance under both the Shrinkage and Environmental Emissions incentives.

Special Condition E9 specifies that the Leakage Model shall facilitate the achievement of the accurate calculation of gas leakage from LDZs. Pursuant to this requirement, SGN are proposing improvements to the Leakage Model to more accurately reflect actual system configuration and leakage rates in relation to Low Pressure Services. Specific details relating to this proposal are contained within the document 'Consultation on Proposed Modifications to the Leakage Model (No.3).

Special Condition E9 also requires that when Leakage Model changes are proposed, an Independent Expert is appointed to review the Leakage Model and the proposed allowed leakage volumes and report on this review.

GL Noble Denton completed a review of the SGN Leakage Model Version 1.4 associated with this consultation, the details of which are contained within Report No.12572 entitled 'Independent Review of Leakage Model Modification No.3.' This report identified an issue relating to data duplication that had the potential to impact upon the proposed allowed leakage volumes, together with some minor observations relating to the leakage model spreadsheet. Subsequent to this report, SGN has amended the Leakage Model in relation to the observations identified and has confirmed revised data to address the data duplication issue.

This report has been produced following a review of SGN's updated Leakage Model Version 1.5 and an assessment of the revised proposed allowed leakage volumes.

Following completion of the review, the following opinions can be stated:

A] Tests undertaken on formulae contained within Version 1.5 of the Leakage Model spreadsheet in relation to the proposed revised service leakage estimation methodology have not identified any inconsistency with the methodology.

B] Observations identified within Report No.12572 and outlined in Section 2.1 regarding Version 1.4 of the leakage model have been actioned and are considered to have been resolved satisfactorily.

C] An asset data duplication issue identified within Report No.12572 and outlined in Section 3.1 has been reviewed and is considered to have been resolved.

D] The proposed baseline service leakage volumes for 2010/11 as identified within Appendix A are considered to have been estimated correctly in accordance with the proposed revised methodology for establishing service populations.

E] The proposed baseline leakage volumes for 2011/12 and 2012/13 as identified within Appendix A are considered to have been estimated correctly in accordance with the proposed revised methodology for estimating the change in service leakage associated with service transfers.

F] As the proposed modification is purely a change to the leakage modelling process, revision of the environmental emissions baselines as defined within Annex P of SGN's DN Operator's Gas Transporter Licence is considered to be appropriate in the event that the proposed modification is to be implemented.

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1 Introduction

Distribution Network Operators (DNOs) utilise a spreadsheet based leakage model to estimate leakage from their networks, and the establishment of this model is an obligation within the 2008 – 13 Gas Transporters' Licences. The outputs from this model have an impact on DN performance under both the Shrinkage and Environmental Emissions incentives.

Special Condition E9 specifies that the Leakage Model shall facilitate the achievement of the accurate calculation of gas leakage from LDZs. Pursuant to this requirement, SGN are proposing improvements to the Leakage Model to more accurately reflect actual system configuration and leakage rates in relation to Low Pressure Services. Specific details relating to this proposal are contained within the document 'Consultation on Proposed Modifications to the Leakage Model (No.3).

Special Condition E9 also requires that when Leakage Model changes are proposed, an Independent Expert is appointed to review the Leakage Model and the proposed allowed leakage volumes and report on this review.

GL Noble Denton completed a review of the Leakage Model associated with this consultation, the details of which are contained within Report No.12572 entitled 'Independent Review of Leakage Model Modification No.3.' This report included the following conclusions in relation to the proposed modification:

A] The proposal to use mains replacement data for the period 2008/09, 2009/10 and 2010/11, to determine the proportion of remaining steel and PE service connections to metallic mains is considered to be a reasonable methodology for identifying these populations that would produce a more accurate reflection of service leakage.

B] The proposal to use data from the 2002/03 National Leakage Tests to estimate the service populations within the 'Steel services connected to PE mains' and 'PE services connected to PE mains' categories is considered to be a reasonable methodology for identifying these populations.

C] The proposal to take account of service transfers within the leakage model by subtracting the number of service transfers from the 'PE service connections to metallic mains' category is considered to be an effective method for establishing this category change, that would produce a more accurate reflection of service leakage within the service leakage estimate.

D] With the exception of some minor observations identified within Section 7, tests undertaken on formulae contained within Version 1.4 of the Leakage Model spreadsheet in relation to the proposed revised service leakage estimation methodology have not identified any inconsistency with the methodology.

E] The identification of data duplication within the 'Spun Iron D1' and 'Ductile Iron D1' columns of the current 2010/11 SGN leakage model spreadsheet and the proposed Version 1.4 of the model, does not enable an opinion to be stated regarding the proposed allowed leakage volumes until this data has been confirmed.

Subsequent to this report, SGN has amended the Leakage Model in relation to the observations identified within D] and has confirmed revised data associated with E].

This report has been produced following a review of SGN's updated Leakage Model Version 1.5 and an assessment of the proposed allowed leakage volumes.

2 Validation of leakage model spreadsheet

2.1 Review of observations relating to Leakage Model Version 1.4

Within Section 7 of Report No.12572, the following observations were made regarding the Leakage Model spreadsheet:

A) Rounding was observed within the baseline calculations in relation to the calculation of the number of service connections to PE mains. Whilst the modification methodology example (See Appendix A) calculates that the number of PE connections to PE mains is 22,395 and the number of steel connections to PE mains is 411, at many stages within the baseline calculation the number has been rounded off to 0 decimal places. This can eventually compound into an error. Recalculating and only rounding at the last stage leads to a result of 22,388 PE service connections to PE mains, and 418 steel service connections to PE mains, where the percentage of steel service connections to PE mains is 1.8% and the percentage of PE service connections to PE mains is 98.2% exactly.

However, as both of these service categories have a zero leakage rate, there would be no impact on the leakage or baseline calculations as a result of this discrepancy.

B) Within Sheet LDZ1 AGI Venting, there was an inconsistency in the titles 'Original Steady-state Leakage' and 'Replacement Steady-state Leakage' compared with the same titles within LDZ2 and LDZ3.

C) Within Sheet LDZ3 Low Pressure, the data entered within the 'Network Name' and 'DDF LFZ ID' columns has been transposed.

The observations outlined above have been examined within Version 1.5 of the Leakage Model and the issues associated with these observations have been actioned and are considered to have been resolved satisfactorily.

2.2 Review of Leakage Model Version 1.5

Following a number of implementation tests undertaken on Version 1.5 of the leakage model spreadsheet, the formulae are considered to accurately reflect the revised service leakage methodology as outlined within the documents 'Leakage Model Modification Consultation No.3' and 'Proposed Revision of Low Pressure Service Leakage Calculations Version 0.1'.

During testing, an observation was made within the 'Service Populations' sheet of the Baseline Model that some values for 'No. of Steel Services' and 'No. of PE Services' connected to PE mains appeared as negative values. This is a result of the calculations being based upon average values for relays/transfers per kilometre, while the 'Total No. of service connections to PE mains' is calculated by subtracting the 'Total No. of service connections to metallic mains' from this averaged value.' Since an average value is being used, it would be expected that both higher and lower values would be produced within the 'Service connections to PE mains' categories, and it is considered that this would not impact adversely on the implementation of the revised service leakage methodology and proposed allowed leakage volumes.

3 Modification Impact Assessment

3.1 Data Duplication within previous Baseline Model

Within Section 8 of Report No.12572, the following observation was made:

During the impact assessment process, an examination of mains length data within the various material and diameter categories within the 3 LDZs was undertaken for the current 2010/11 SGN leakage model spreadsheet and the proposed Version 1.4 of the model. This examination identified that the 'Mains Asset Length' columns for 'Spun Iron D1' and 'Ductile Iron D1' contained identical data, which indicated that there was a potential data error within one of these columns.

A review of the revised data that was now included within the current 2010/11 SGN leakage model spreadsheet and the proposed Version 1.5 of the baseline model identified that there was now no duplication of data within the 'Mains Asset Length' columns for 'Spun Iron D1' and 'Ductile Iron D1'.

3.2 Review of proposed allowed leakage volumes

Following the resolution of the asset data referenced within Section 3.1, a revised table of proposed baseline volumes was provided by SGN, and this has been included within Appendix A.

On the basis that the methodology for determining service populations as defined within the documents 'Leakage Model Modification Consultation No.3' and 'Proposed Revision of Low Pressure Service Leakage Calculations Version 0.1', is considered to be a reasonable process that will improve the accuracy of the service leakage calculation within the Leakage Model, and that the methodology has been implemented correctly within Version 1.5 of the Leakage model spreadsheet, the updated service leakage volumes for 2010/11 as identified within Appendix A are considered to have been calculated correctly in accordance with the proposed revised methodology.

With regard to the proposed baseline leakage volumes for 2011/12 and 2012/13 as outlined within Appendix A, these are considered to have been calculated correctly in accordance with the proposed revised methodology. The actual impact may vary depending upon the mains replacement workload and service transfer activity undertaken within each LDZ. However, it is perceived that any potential variation would be unlikely to be significant due to the low volumes involved.

As the proposed modification is purely a change to the leakage modelling process, revision of the environmental emissions baselines as defined within Annex P of SGN's DN Operator's Gas Transporter Licence is considered to be appropriate in the event that the proposed modification is to be implemented.

4 Conclusions

Following completion of the review of SGN's updated Leakage Model Version 1.5 and an assessment of the proposed allowed leakage volumes, the following opinions can be stated:

A] Tests undertaken on formulae contained within Version 1.5 of the Leakage Model spreadsheet in relation to the proposed revised service leakage estimation methodology have not identified any inconsistency with the methodology.

B] Observations identified within Report No.12572 and outlined in Section 2.1 regarding Version 1.4 of the leakage model have been actioned and are considered to have been resolved satisfactorily.

C] An asset data duplication issue identified within Report No.12572 and outlined in Section 3.1 has been reviewed and is considered to have been resolved.

D] The proposed baseline service leakage volumes for 2010/11 as identified within Appendix A are considered to have been estimated correctly in accordance with the proposed revised methodology for establishing service populations.

E] The proposed baseline leakage volumes for 2011/12 and 2012/13 as identified within Appendix A are considered to have been estimated correctly in accordance with the proposed revised methodology for estimating the change in service leakage associated with service transfers.

F] As the proposed modification is purely a change to the leakage modelling process, revision of the environmental emissions baselines as defined within Annex P of SGN's DN Operator's Gas Transporter Licence is considered to be appropriate in the event that the proposed modification is to be implemented.

Appendix A Proposed Revised Baseline Volumes

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			