

**LDZ Shrinkage Quantity
Initial Proposals
Formula Year 2012/13**

National Grid LDZ Shrinkage Quantity Initial Proposals - Formula Year 2012/13

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National Grid LDZ Shrinkage Quantity Initial Proposal for Formula Year 2012/13

1. Purpose of Proposal

The purpose of this paper is to present our proposals in respect of National Grid LDZ Shrinkage for the Formula Year 2012/13, as required under Section N of the Uniform Network Code.

Under Section N of the Uniform Network Code, National Grid has an obligation to estimate the LDZ Shrinkage Quantity values for the coming Formula Year and to present these to Users for consultation.

Following representations from Users, a further paper will be issued, by 1 March 2012, in which National Grid will set out its final estimate of its LDZ Shrinkage Quantity values.

For the purposes of this document, 'LDZ' refers to LDZs, as defined by Uniform Network Code, owned by National Grid.

2. Summary of Proposal

The LDZ Shrinkage Quantity values, which are set out within Table 1 below, reflect the losses associated with Unaccounted for Gas (leakage & theft of gas) and Own Use Gas (gas used in the operation of the system). Details of how these Quantities have been determined are included in this paper.

Table 1. Proposed LDZ Shrinkage Quantity values for the 2012/13 Formula Year

LDZ	Existing Shrinkage Quantities 2011/12 Formula Year (GWh)				Proposed Shrinkage Quantities 2012/13 Formula Year (GWh)			
	Leakage	OUG	Theft	Total	Leakage	OUG	Theft	Total
Eastern	221	5	9	235	211	5	9	225
East Midlands	304	7	13	325	297	7	13	317
North Thames	339	6	11	356	322	6	11	339
North West	406	8	14	428	388	8	14	410
West Midlands	334	5	10	349	319	5	9	333
National Grid	1,603	32	58	1,692	1,537	31	56	1,624

The calculations that were used to derive the Shrinkage Quantity values and a summary of the underlying information are set out in this proposal.

In addition to forecast mains replacement for 2012/13, the reduction in leakage also reflects the impact of improved pressure management and improved MEG saturations.

The reduction in Own Use Gas and Theft of Gas is due to lower forecast demand levels.

The Daily Shrinkage Quantity values, in Table 2 below, will be used as the basis for National Grid's LDZ Shrinkage gas procurement during the Formula Year in question.

Table 2. Proposed LDZ Daily Shrinkage Quantity Values for 2012/13 Formula Year

LDZ	Daily Shrinkage Quantity (kWh)
Eastern	617,711
East Midlands	867,769
North Thames	928,722
North West	1,123,038
West Midlands	912,838
National Grid	4,450,078

3. Component Analysis

This section of the document presents an analysis of the components of LDZ Shrinkage that make up the estimates for the Formula Year 2012/13 proposal.

3.1 Leakage

Leakage represents the largest component of the LDZ Shrinkage Quantity. Leakage is estimated using the agreed leakage model, which is controlled under Special Condition E9 of the GDN Licences. Under Special Condition E9 (7), Distribution Networks have the obligation to annually review the leakage model to ensure that it meets the obligations, specified under section 4, 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.

Any proposed modifications to the leakage model would be subject to consultation with the industry, be independently assessed and submitted to Ofgem for approval.

DNs also have an obligation by 31 July each year to assess and publish the leakage volume for the previous financial year; the latest approved model is used for this assessment.

Two areas of the leakage model have been identified where the leakage estimate could be improved. The DNs are preparing a Consultation paper proposing these modifications and a Shrinkage Forum has been arranged for 6 January 2012 to discuss this. As the consultation process is in its early stages and we have not had the opportunity to discuss the proposed modifications and their potential implementation timescales with the users, the impact of the proposed modifications has not been included within these Shrinkage initial proposals.

For the purpose of analysis, leakage may be conveniently split into three categories:

- Distribution Mains (including service pipes),
- Above Ground Installations (AGIs) and
- Other losses

Distribution mains and services leakage is a feature of normal system operation.

AGI leakage includes the routine venting of control equipment.

Other losses include gas lost as a result of interference damage and broken mains. These losses are caused by specific events and are not continuous.

3.1.1 Distribution Mains (and Services) Leakage

The leakage of gas from the Distribution Mains system, which includes service pipe leakage, is calculated by combining the results of the 2002/03 National Leakage Test programme with the following network¹ specific information:

- Pipe asset data²
- Annual average system pressure in each network
- Measured concentration of Monoethylene Glycol (MEG) joint treatment chemical in the gas
- Annual metallic service replacement

Leakage is calculated by multiplying the annual average mains pressure in each network by the Main and Service Pipe Leakage Factors determined by the 2002/03 National Leakage Test programme and the relative lengths of mains / numbers of services in each network. Where applicable, i.e. cast iron mains only, the Pipe Leakage Factors are adjusted to take into account the measured concentration of MEG.

Information relating to the National Leakage Test programme, the application of the results to calculate leakage and the external validation of the results has already been shared with Users and Ofgem; consequently, it is not proposed to include additional details in this paper.

A detailed comparison of changes in low-pressure leakage from last year's proposal is included in Appendix 1.

Table 3 below shows the Low Pressure leakage on an LDZ basis:

¹ Network in this context relates to physically interconnected pipe systems, not National Grid's regionally based administrative structure.

² Actual asset data as at 31 March 2011 adjusted for completed and planned iron replacement to 31 March 2013.

Table 3. Estimated LDZ Low Pressure Leakage for 2012/13 Formula Year

LDZ	Low Pressure Leakage	
	Tonnes ³	GWh
Eastern	10,445	156
East Midlands	14,222	214
North Thames	17,531	263
North West	21,565	322
West Midlands	17,012	255
National Grid	80,774	1,209

Table 4 below shows the estimated Medium Pressure leakage on an LDZ basis:

Table 4. Estimated LDZ Medium Pressure Leakage for 2012/13 Formula Year

LDZ	Medium Pressure Leakage	
	Tonnes	GWh
Eastern	996	15
East Midlands	2,836	43
North Thames	1,631	24
North West	1,177	18
West Midlands	1,542	23
National Grid	8,181	123

3.1.2 AGI Leakage and Venting

The figures for leakage from Above Ground Installations have been taken from the findings of the 2003 Above Ground Installation Leakage Test programme.

Information relating to the programme was shared with Users and Ofgem at the Shrinkage Forums held in 2003; consequently, it is not proposed to include significant detail in this paper.

Table 5 below shows the estimated AGI leakage and venting on an LDZ basis:

Table 5. Estimated AGI Emissions for 2012/13 Formula Year

LDZ	AGI Emissions ⁴	
	Tonnes	GWh
Eastern	2,658	40
East Midlands	2,667	40
North Thames	2,270	34
North West	3,210	48
West Midlands	2,712	41
National Grid	13,518	202

3.1.3 Other Losses

Gas may be lost from LDZ equipment as a result of specific events, namely broken mains and interference damage to plant, in addition to ongoing leakage. These losses are known collectively as 'other losses'.

Statistics in respect of the number of routine broken mains and damages are used in conjunction with calculations of the amount of gas lost through each type of incident to derive the total amount of gas lost from these events. (For the purpose of this paper, the number of

³ Leakage figures in Tonnes are provided for information; it is not used in respect of Shrinkage Quantity calculations. Conversion to Tonnes is based on a gas density of 0.73kg/m³.

⁴ Includes leakage and routine equipment venting

events in 2010/11 has been used for the analysis together with emergency personnel response times.)

In addition to the routine events in 2010/11, there were 17 gas release events where the total gas released was greater than 500kg. For these, the specific volume released, where calculated, was used. In total for National Grid, the energy loss resulting from these events was 0.1 GWh. Table 6 below shows the amount of gas lost because of other losses on a LDZ basis, which is proposed as the estimate for 2012/13:

Table 6. 2010/11 (and estimated 2012/13) Interference Damage

LDZ	Interference Damage	
	Tonnes	GWh
Eastern	30	0
East Midlands	60	1
North Thames	29	0
North West	62	1
West Midlands	38	1
National Grid	219	3

3.1.4 Leakage Reduction Initiatives

National Grid recognises that climate change is possibly one of the greatest challenges facing society in the 21st century. Natural Gas is composed primarily of Methane, which as a Greenhouse Gas is twenty-one times worse than carbon dioxide. National Grid has a climate change strategy that targets an 80% reduction in greenhouse gas emissions by 2050.

There are a number of initiatives being employed across the Company to achieve this aim, one of which has had a direct impact on the leakage from low pressure gas distribution systems. Leakage from low pressure gas distribution systems contributes approximately 80% of all gas distribution leakage and the major controllable influence on this is the pressure at which the systems operate. Replacing old metallic pipe with plastic pipe will help reduce emissions; however, in order to achieve this in the most economic way, mains insertion techniques are used where possible and the impact of this is to drive operating pressures upwards. National Grid embarked upon a programme of installing pressure profiling equipment, with the aim of lowering average system operating pressures. In addition to installing additional pressure management equipment, National Grid has also upgraded its pressure control management system, which will enable improved monitoring, recording and reporting of system pressures.

Historically, there has been minimal change in Average System Pressures (ASP) from year-to-year; typically ASP had been in the order of 30mbarg. However, with the increased focus on pressure management, the installation of profiling equipment and system upgrade there has been a significant reduction in average system pressure in National Grid's mixed material networks. The calculated ASP in 2007/08 was 29.3mbarg and the forecast ASP for 2011/12, and that used for these proposals, is 27.6mbarg. This represents a 6% reduction in ASP resulting in a significant reduction in leakage in the current price control period.

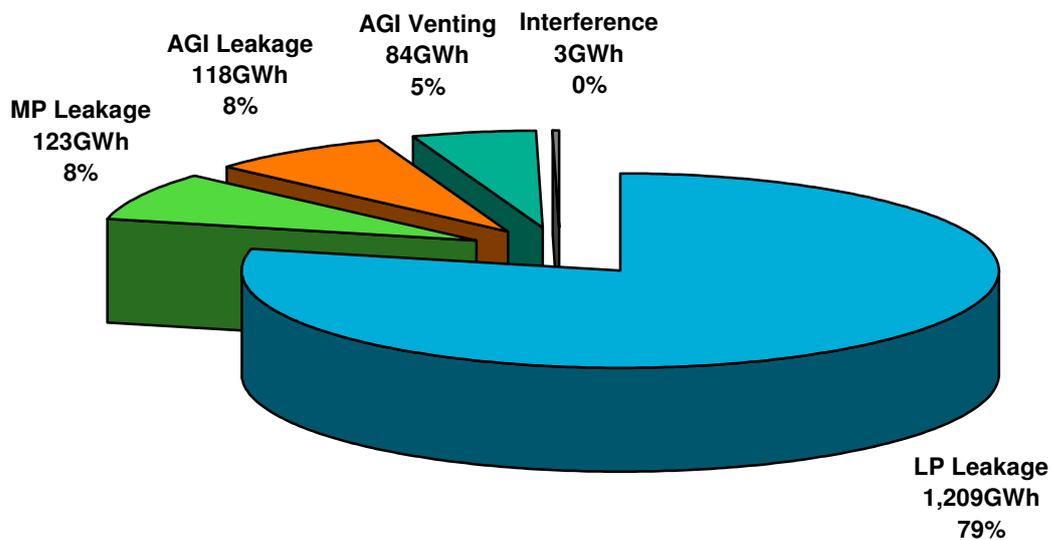
3.1.5 Total Leakage

Table 7 below shows the total amount of estimated leakage for Formula Year 2012/13 on an LDZ basis with the leakage expressed in Tonnes, GWh and as a flat daily Quantity in kWh.

Table 7. Estimated 2012/13 Formula Year LDZ Leakage Summary

LDZ	Leakage		
	Tonnes per annum	GWh per annum	kWh per day
Eastern	14,129	211	579,032
East Midlands	19,784	297	814,641
North Thames	21,462	322	880,863
North West	26,013	388	1,062,788
West Midlands	21,304	319	873,959
National Grid	102,693	1,537	4,211,283

The diagram below illustrates the relative proportions of the various elements that make up the leakage estimation for the 2012/13 Shrinkage proposals.



3.2 Own Use Gas

Own Use Gas is treated as a consolidated Quantity, calculated as a factor of seasonal normal annual LDZ consumption, to be procured on a flat daily basis.

In line with this methodology, National Grid proposes to apply a fixed LDZ Specific daily Quantity for OUG equivalent to 0.011% of seasonal normal LDZ consumption. This factor represents the estimated National average (to three decimal places as a percentage) that was determined by Advantica in 2002 and has been applied since the 2005/06 Gas Year.

The estimated 2012/13 Own Use Gas Quantity values are shown in Table 8 below.

Table 8. Estimated 2012/13 LDZ OUG Quantity Values

LDZ	Seasonal Normal LDZ Consumption	OUG GWh per annum	OUG kWh per day
Eastern	45,541	5	13,725
East Midlands	62,554	7	18,852
North Thames	56,350	6	16,982
North West	70,939	8	21,379
West Midlands	45,776	5	13,796
National Grid	281,159	31	84,734

3.3 Theft of Gas

UNC Section N 1.3.2 states that LDZ Shrinkage shall include, and National Grid is therefore responsible for, gas illegally taken upstream of the customer control valve and downstream where there is no shipper contract with the end-user.

Historically, unidentified theft has been assumed to be 0.3% of LDZ Consumption.

As with Own Use Gas, Theft of Gas is treated as a consolidated Quantity calculated as a factor of seasonal normal annual LDZ consumption to be procured on a flat daily basis.

The responsibility for Theft of Gas is split between Gas Transporters and Shippers. In recent years, Transporter Responsible Theft has been deemed 0.02% of LDZ Consumption. For 2012/13, National Grid proposes to retain a Theft of Gas factor equal to 0.02%. Table 9 below shows the estimated 2012/13 Theft of Gas Quantity Values:

Table 9. Estimated 2012/13 LDZ Theft of Gas Quantity Values

LDZ	Seasonal Normal LDZ Consumption	ToG GWh per annum	ToG kWh per day
Eastern	45,541	9	24,954
East Midlands	62,554	13	34,276
North Thames	56,350	11	30,877
North West	70,939	14	38,870
West Midlands	45,776	9	25,083
National Grid	281,159	56	154,061

3.4 LDZ Shrinkage Quantity Summary

Table 10 below shows the proposed LDZ Shrinkage Quantity Values for the Formula Year 2012/13 in GWh per annum:

Table 10. Estimated 2012/13 LDZ Shrinkage Quantity Values

LDZ	Leakage (GWh)	OUG (GWh)	Theft (GWh)	Total (GWh)
Eastern	211	5	9	225
East Midlands	297	7	13	317
North Thames	322	6	11	339
North West	388	8	14	410
West Midlands	319	5	9	333
National Grid	1537	31	56	1624

The diagram below illustrates the relative proportions of the individual elements that make up the 2012/13 Shrinkage Quantity proposals.

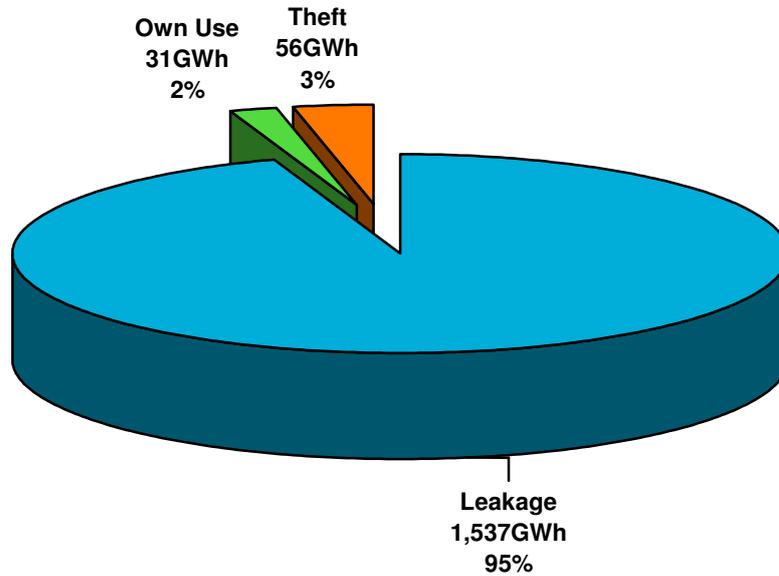


Table 11 below shows the estimated Daily Shrinkage Quantity values applicable for the 2012/13 Formula Year in kWh per day:

Table 11. Estimated 2012/13 LDZ Daily Shrinkage Quantity Values

LDZ	Leakage (KWh)	OUG (KWh)	Theft (KWh)	Total (KWh)
Eastern	579,032	13,725	24,954	617,711
East Midlands	814,641	18,852	34,276	867,769
North Thames	880,863	16,982	30,877	928,722
North West	1,062,788	21,379	38,870	1,123,038
West Midlands	873,959	13,796	25,083	912,838
National Grid	4,211,283	84,734	154,061	4,450,078

4. Detailed Analysis

4.1 Leakage

In 2003, Advantica – on behalf of Transco – completed an extensive programme of Leakage Tests. The leakage tests were carried out on above ground installations and distribution mains and services. The results of the leakage tests and details of their verification have been shared with Users through the Shrinkage Forum; these have formed the basis of our Shrinkage Proposals since 2003.

We believe that these test programmes still provide a firm basis for assessing the leakage from both the distribution mains and AGIs and, consequently, National Grid has utilised the information as the basis for these proposals.

The results of the leakage testing programmes have been used in conjunction with our mains and other plant records, measurements of MEG concentration and system pressures to derive total leakage by LDZ.

As part of National Grid's endeavour to reduce greenhouse gas emissions, real-time estimation of leakage management performance, ASP and MEG, has been introduced; this keeps the focus on the emissions issue and enables any potential problems to be identified and addressed quickly. The output of this monitoring of ASP and MEG performance has been used as the basis for these proposals.

There has been, and will continue to be, significant replacement of iron mains, in line with National Grid's mains replacement policy. These proposals assume an estimated amount of mains replacement applicable for the 2012/13 leakage assessment; equating to approximately 4000km of iron main from April 2011, i.e. approximately 2000km per annum.

5. Extent to which the Proposal would better facilitate the relevant objectives

This proposal provides an accurate estimate of LDZ Shrinkage Quantity values for the Formula Year 2012/13. As a result, the gas usage and loss in transportation within the LDZs will be reflective of actual conditions. This in turn facilitates the achievement of efficient and economic operation of the system through effective targeting of costs.

It will also lead to better targeting of costs to Users through the RbD process and this is consistent with securing effective competition.

6. The implications for National Grid of implementing the Proposal

a) Implications for the operation of the System:

We are not aware of any such implications that would result from implementing this proposal.

b) Development and capital cost and operating cost implications:

The proposed LDZ Shrinkage Quantity values lead to a fair allocation of operating costs between LDZ systems.

c) Extent to which it is appropriate for National Grid to recover the costs, and proposal for the most appropriate way for National Grid to recover the costs:

It is appropriate for each LDZ to incur a share of the overall Shrinkage Energy dependent upon the actual shrinkage in that LDZ.

d) Analysis of the consequences (if any) this proposal would have on price regulation

None identified.

7. The implications of implementing the Proposal for Users

This proposal improves the equability and accuracy of cost targeting across all Users.

8. Analysis of any advantages or disadvantages of implementation of the Proposal

- **Advantages:** Better reflective of the actual system usage and losses with improved cost targeting.
- **Disadvantages:** National Grid is not aware of any disadvantages.

9. Summary of the representations (to the extent that the import of those representations are not reflected elsewhere in the Proposal)

This paper outlines our Initial Proposals. We appreciate hearing the views of Ofgem and Users; these views will help inform our Final Proposals, which are due to be published on 1 March 2012.

Users wishing to discuss any matter can do so either in private or at the Shrinkage Forum scheduled for 6 January 2012.

It would be appreciated if Users could let us have any feedback that they would like to share with us before 1 February 2012⁵ to enable us to better respond to any concerns.

⁵ Due to the pressure of time, it will be difficult to respond to any points that might be raised during February because the Uniform Network Code requires National Grid to publish its proposals on 1 March.

10. Programme of works required as a consequence of implementing the Proposal

The only required modification is the input of LDZ Daily Shrinkage Quantity values into GEMINI.

11. Proposed implementation timetable (inc timetable for any necessary information system changes)

Following publication of our Final Proposals, Users will have until 15 March 2012 to request that Ofgem issue a Standard Special Condition A11 (18) disapproval of this proposal; this provision is in the Uniform Network Code Section N 3.1.8.

If no disapproval notice is issued beforehand, it will be our intention to implement revised LDZ Daily Shrinkage Quantity values from 06:00 hrs on 1 April 2012.

12. Recommendation concerning the implementation of the Proposal

We recommend the proposed LDZ Daily Shrinkage Quantity values be implemented with effect from 06:00 hrs on 1 April 2012.

13. National Grid's Proposal

This report contains our Initial Proposals for the LDZ Daily Shrinkage Quantity values for the Formula Year 2012/13.

Appendix 1: LP Pipe and Service Leakage Analysis 2011 to 2012 proposals by LDZ

This section of the document provides a comparison of the estimated levels of LP pipe and service leakage by LDZ; LP Leakage accounts for approximately 80% of total leakage.

Details of leakage in energy quantity, annual Average System Pressures (ASP) and Monoethylene Glycol (MEG) levels are presented for 2012/13 with 2011/12 estimates for comparison purposes. The levels quoted are only those attributable to low pressure mains and service leakage; MEG Levels relate to the length weighted average saturation in low pressure networks where MEG is used.

National Grid has introduced real-time estimation of leakage management performance, ASP and MEG, in its endeavour to reduce greenhouse gas emissions; this keeps the focus on the emissions issue and enables the identification and resolution of any potential. These proposals utilise the output of this monitoring of ASP and MEG performance.

We have supplied specific information relating to the average pressure experienced by networks that contain metallic pipes, which excludes the all-PE networks that often operate at higher pressures but have very low leakage because of their superior performance. This should enable Users to better compare the effective operating pressures of the different LDZs.

A1.1 Eastern LDZ

Table A1.1 Eastern LDZ

	2011 Proposal	2012 Proposal
Leakage (GWh)	165	156
Annual Average System Pressure (mbar)	30.1	30.2
ASP (All-PE systems excluded) (mbar)	28.8	29.0
MEG Saturation Level	0%	0%

In comparison to last years anticipated leakage performance, there is an anticipated increase of 0.1mbar in overall ASP for Eastern LDZ and a 0.2mbar increase in ASP for mixed material networks. This, together with anticipated mains replacement, is expected to deliver a leakage reduction of 9GWh.

A1.2 East Midlands LDZ

Table A1.2 East Midlands LDZ

	2011 Proposal	2012 Proposal
Leakage (GWh)	222	214
Annual Average System Pressure (mbar)	32.2	31.8
ASP (All-PE systems excluded) (mbar)	30.4	30.0
MEG Saturation Level	23%	28%

In comparison to last years anticipated leakage performance, there is an anticipated decrease of 0.4mbar in overall ASP for East Midlands LDZ, a 0.4mbar decrease in ASP for mixed material networks and 5% increase in MEG Saturations. This, together with anticipated mains replacement, is expected to deliver a leakage reduction of 8GWh.

A1.3 North Thames LDZ

Table A1.3 North Thames LDZ

	2011 Proposal	2012 Proposal
Leakage (GWh)	276	263
Annual Average System Pressure (mbar)	26.1	25.6
ASP (All-PE systems excluded) (mbar)	26.1	25.6
MEG Saturation Level	9%	12%

In comparison to last years anticipated leakage performance, there is an anticipated decrease of 0.5mbar in ASP for North Thames and a 3% increase in MEG Saturation. This, together with anticipated mains replacement is expected to deliver a net leakage reduction of 13GWh.

A1.4 North West LDZ

Table A1.4 North West LDZ

	2011 Proposal	2012 Proposal
Leakage (GWh)	339	322
Annual Average System Pressure (mbar)	27.8	27.9
ASP (All-PE systems excluded) (mbar)	27.4	27.5
MEG Saturation Level	12%	18%

In comparison to last years anticipated leakage performance, there is an anticipated increase of 0.1mbar in overall ASP for North West, a 0.1mbar increase in ASP for mixed material networks and a 6% increase in MEG saturation. This, together with anticipated mains replacement, is expected to deliver a leakage reduction of 17GWh.

A1.5 West Midlands LDZ

Table A1.5 West Midlands LDZ

	2011 Proposal	2012 Proposal
Leakage (GWh)	273	255
Annual Average System Pressure (mbar)	28.3	28.9
ASP (All-PE systems excluded) (mbar)	26.7	26.3
MEG Saturation Level	21%	27%

In comparison to last years anticipated leakage performance, there is an anticipated increase of 0.6mbar in overall ASP for West Midlands, a 0.4mbar decrease in ASP for mixed material networks and a 6% increase in MEG saturation. This, together with anticipated mains replacement, is expected to deliver a leakage reduction of 18GWh.

Appendix 2: Assumed Daily Weighted Average Calorific Values (CVs) for each LDZ

The daily flow weighted average Calorific Values for each LDZ, determined in accordance with the Gas (Calculation of Thermal Energy) Regulations, have been used to estimate daily weighted averages for 2011/12 to date. These values have been applied to convert leakage estimates in volume terms to energy quantity for each LDZ for these proposals; however, the actual daily average CV values over the period will be used for the assessment of the 2012/13 Formula Year. The table below shows the values applied for these proposals and those used for the 2011/12 proposals, for comparison purposes.

Table A2.1 CV Comparison

LDZ	Average Calorific Values (MJ/m³)	
	2011/12 Proposals	2011/12 to-date
Eastern	39.4	39.3
East Midlands	39.5	39.5
North Thames	39.4	39.4
North West	39.1	39.2
West Midlands	39.3	39.3