

LDZ Shrinkage Initial Proposals Gas Year 2008/09

**National Grid
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National Grid LDZ Shrinkage Initial Proposals - Gas Year 2008/09

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National Grid LDZ Shrinkage Proposal for Gas Year 2008/09

1. Purpose of Proposal

The purpose of this paper is to present our proposals in respect of the National Grid LDZ Shrinkage for the Gas Year 2008/09 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 Gas Year and to present these to Users for consultation.

On 1 April 2008, Distribution Networks became subject to revised Licence Conditions covering the period 1 April 2008 to 31 March 2013. The revised Licence Conditions regarding Shrinkage, Special Condition E8, significantly changed the manner in which Shrinkage was to be calculated. UNC Modification Proposal 0203V was raised to align the UNC Shrinkage process to the new Gas Transporter Licences; this has now been approved by Ofgem.

The most significant change to the Shrinkage process is that Shrinkage is no longer considered to be throughput dependant and, therefore, is to be procured on a flat daily basis throughout the year. The National Grid Initial LDZ Shrinkage Proposal for 2008/09 Gas Year has been determined in accordance with this principle.

Following representations from Users, a further paper will be issued, by 1 September 2008, 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

This proposal has been produced in line with the recent changes to the Shrinkage Proposal process within UNC¹. The major difference between the new regime and the old is that Shrinkage is to be procured as a fixed daily LDZ Shrinkage Quantity throughout the Gas Year rather than a fixed proportion of daily throughput (formerly, the LDZ Shrinkage Factor)

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 Quantity values have been determined are included in this paper. The structure of the paper follows the format of a Network Code Modification report.

LDZ	Existing Shrinkage Quantities 2007/08 (GWh)				Proposed Shrinkage Quantities 2008/09 (GWh)			
	Leakage	OUG	Theft	Total	Leakage	OUG	Theft	Total
Eastern	303	6	10	320	250	5	10	265
East Midlands	379	10	16	404	359	8	15	382
North Thames	341	8	13	362	363	7	13	382
North West	508	10	17	535	471	9	17	496
West Midlands	412	7	12	431	408	6	11	425
National Grid	1,944	41	68	2,052	1,850	36	65	1,951

Table 1. Proposed LDZ Shrinkage Quantity values for the 2008/09 Gas Year

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

¹ UNC Modification Proposal 0203V

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 Gas Year in question.

LDZ	Daily Shrinkage Quantity (kWh)
Eastern	726,479
East Midlands	1,046,687
North Thames	1,046,960
North West	1,359,379
West Midlands	1,164,510
National Grid	5,344,016

Table 2. Proposed LDZ Daily Shrinkage Quantity Values

For purposes of comparison only, Table 3 below shows the LDZ Shrinkage Factors for the 2007/08 Gas Year and the equivalent factors for 2008/09.

LDZ	Existing Shrinkage Factors 2007/08²				Comparative Shrinkage Factors 2008/09			
	Leakage	Theft	OUG	Overall ³	Leakage	Theft	OUG	Overall
Eastern	0.59	0.02	0.012	0.63	0.51	0.02	0.011	0.55
East Midlands	0.48	0.02	0.012	0.51	0.48	0.02	0.011	0.51
North Thames	0.52	0.02	0.012	0.55	0.58	0.02	0.011	0.61
North West	0.60	0.02	0.012	0.63	0.57	0.02	0.011	0.60
West Midlands	0.70	0.02	0.012	0.73	0.73	0.02	0.011	0.76
National Grid	0.57	0.02	0.012	0.60	0.57	0.02	0.011	0.60

Table 3. Comparative LDZ Shrinkage Factors for 2007/08 and 2008/09

3. Component Analysis

This section of the document presents an analysis of the components of LDZ shrinkage that make up the estimates for the Gas Year 2008/09 proposal.

3.1 Leakage

Leakage represents the largest component of the LDZ Shrinkage Quantity

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.

² The values shown in the table are the equivalent Shrinkage Quantities expressed as a percentage of LDZ consumption, i.e. 0.63 (as shown in the table) is 0.63% of the appropriate LDZ's consumption for the appropriate Gas Year.

³ Overall LDZ Shrinkage Factors were applied to four decimal places (or 2d.p. as a percentage) due to system restrictions.

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 network⁴ specific information:

- Pipe asset data⁵
- Annual average system pressure in each network
- Measured concentration of Monoethylene Glycol (MEG) joint treatment chemical in the gas.

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, which accounts for approximately 80% of leakage, from last year's proposal is included in Appendix 1.

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

LDZ	Low Pressure Leakage	
	Tonnes ⁶	GWh
Eastern	13,078	195
East Midlands	18,420	275
North Thames	19,975	297
North West	26,806	400
West Midlands	22,738	339
National Grid	101,016	1,505

Table 4. Estimated 2008/09 LDZ Low Pressure Leakage

Table 5 below shows the Medium Pressure leakage on an LDZ basis:

LDZ	Medium Pressure Leakage	
	Tonnes	GWh
Eastern	1,030	15
East Midlands	2,871	43
North Thames	1,834	27
North West	1,319	20
West Midlands	1,657	25
National Grid	8,711	130

Table 5. Estimated 2008/09 LDZ Medium Pressure Leakage

⁴ Network in this context relates to physically interconnected pipe systems, not National Grid's regionally based administrative structure.

⁵ Actual asset data as at 31 March 2008 adjusted for completed and planned iron replacement to 31 March 2009 thus giving a mid gas year indication.

⁶ 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.

3.1.2 AGI Leakage

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 has already been shared with Users and Ofgem; consequently, it is not proposed to include significant detail in this paper.

Table 6 below shows AGI leakage on an LDZ basis:

LDZ	AGI Emissions ⁷	
	Tonnes	GWh
Eastern	2,650	39
East Midlands	2,667	40
North Thames	2,495	37
North West	3,299	49
West Midlands	2,885	43
National Grid	13,996	208

Table 6. Estimated 2008/09 AGI Emissions

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 as a result of these events. (For the purpose of this paper the number of events in 2007 has been used for the analysis together with emergency personnel response times.)

In addition to the routine events in 2007, there were 110 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 lost as a result of these events was 1.7 GWh.

Table 7 below shows the amount of gas lost because of other losses on a LDZ basis, which is proposed as the estimate for 2008/09:

LDZ	Interference Damage	
	Tonnes	GWh
Eastern	54	1
East Midlands	107	2
North Thames	130	2
North West	102	2
West Midlands	73	1
National Grid	466	7

Table 7. 2007/08 (and estimated 2008/09) Interference Damage

⁷ Includes leakage and routine equipment venting

3.1.4 Total Leakage

Table 8 below shows the total amount of estimated leakage for Gas Year 2008/09 on an LDZ basis with the leakage expressed in Tonnes, GWh, as a flat daily Quantity in kWh and, for purposes of comparison to previous years only, as a percentage of 2008/09 17 Year Seasonal Normal LDZ consumption.

LDZ	Leakage			
	Tonnes per annum	GWh per annum	kWh per day	% of Consumption
Eastern	16,812	250	685,197	0.51%
East Midlands	24,065	359	983,313	0.48%
North Thames	24,434	363	993,843	0.58%
North West	31,526	471	1,289,171	0.57%
West Midlands	27,353	408	1,117,193	0.73%
National Grid	124,189	1,850	5,068,716	0.57%

Table 8. Estimated 2008/09 LDZ Leakage Summary

3.2 Own Use Gas

Under the new UNC regime for Shrinkage, Own Use Gas is treated differently to the previous regime in that, rather than being considered as a factor of daily throughput to be procured on a daily basis it is treated as a consolidated Quantity, calculated as a factor of 17 year 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 17 year 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 which has been applied since the 2005/06 Gas Year.

The estimated 2008/09 Own Use Gas Quantity values are shown in Table 9 below.

LDZ	17 Year Seasonal Normal LDZ Consumption	OUG GWh per annum	OUG kWh per day
Eastern	48,607	5	14,649
East Midlands	74,618	8	22,488
North Thames	62,542	7	18,848
North West	82,664	9	24,913
West Midlands	55,712	6	16,790
National Grid	324,143	36	97,687

Table 9. Estimated 2008/09 LDZ OUG Quantity Values

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, under the new UNC regime for Shrinkage, Theft of Gas is treated differently to the previous regime in that, rather than being considered as a factor of daily

throughput to be procured on a daily basis it is treated as a consolidated Quantity, calculated as a factor of 17 year 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.

The statistics for confirmed Theft of Gas for 2007 are detailed in Table 10 below.

	2007	
	Total	Transporter Responsible
Reported incidents of Theft	726	73

Table 10.2007 Theft of Gas Statistics

The statistics for 2007 indicate that, of the cases of confirmed theft made known to National Grid, 10.1% was identified as being the responsibility of the Transporter.

Prior to 2005/06 Gas Year, Transporter responsible theft had been considered to be 10% of overall theft; however, in recent years, Transporter Responsible theft has been estimated, consistently, at 5% or below of total theft⁸. This led to the negotiation and, ultimately, adoption of a lower national ToG factor of 0.02% of throughput, which is equivalent to 6.67% of overall theft. Clearly, the Transporter / Shipper responsible split of actual theft will vary year-on-year and recent history indicates much lower levels of Transporter theft than the 2007 statistics. Therefore, we do not propose at this time to recommend a change to last year's agreement; consequently, we believe that it is appropriate for National Grid to assume responsibility for Theft of Gas equal to 0.02% of LDZ Consumption. The estimated 2008/09 Theft of Gas Quantity Values are shown in Table 11 below.

LDZ	17 Year Seasonal Normal LDZ Consumption	ToG GWh per annum	ToG kWh per day
Eastern	48,607	10	26,634
East Midlands	74,618	15	40,887
North Thames	62,542	13	34,270
North West	82,664	17	45,296
West Midlands	55,712	11	30,527
National Grid	324,143	65	177,613

Table 11. Estimated 2008/09 LDZ Theft of Gas Quantity Values

⁸ Transporter Responsible Theft: 2002 – 4.4%, 2003 – 1.2%, 2004 – 4.0%, 2005 – 3.1%, 2006 – 5.4%

3.4 LDZ Shrinkage Quantity Summary

The proposed LDZ Shrinkage Quantity Values for the Gas Year 2008/09, in GWh per annum, are presented in Table 12 below.

LDZ	Leakage (GWh)	OUG (GWh)	Theft (GWh)	Total (GWh)
Eastern	250	5	10	265
East Midlands	359	8	15	382
North Thames	363	7	13	382
North West	471	9	17	496
West Midlands	408	6	11	425
National Grid	1850	36	65	1951

Table 12. Estimated 2008/09 LDZ Shrinkage Quantity Values

The estimated Daily Shrinkage Quantity values in kWh per day applicable for the 2008/09 Gas Year are shown in Table 13 below:

LDZ	Leakage (KWh)	OUG (KWh)	Theft (KWh)	Total (KWh)
Eastern	685,197	14,649	26,634	726,479
East Midlands	983,313	22,488	40,887	1,046,687
North Thames	993,843	18,848	34,270	1,046,960
North West	1,289,171	24,913	45,296	1,359,379
West Midlands	1,117,193	16,790	30,527	1,164,510
National Grid	5,068,716	97,687	177,613	5,344,016

Table 13. Estimated 2008/09 LDZ Daily Shrinkage Quantity Values

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 and have formed the basis of our Shrinkage Proposals since 2003.

We believe that the recent test programmes still provide a firm basis for assessing the leakage from both the distribution mains and AGIs; 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.

In the twelve months since we published our proposals for the 2007/08 Gas Year, we have seen the replacement of around 1800km of metallic gas mains and associated metal gas services with a plan to replace an additional 1842km via the mains replacement programme by 31 March 2009.

There has been very little change in overall average system pressure within three LDZs with significant reductions in the other two. The net effect of the ASP changes is a decrease of 0.9mbar.

Set against this, a 4% reduction in measured MEG concentration⁹ has been recorded.

The net effect of these significant elements has been to reduce the amount of leakage that has been occurring.

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 Gas Year 2008/09. 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 It should be expected that MEG concentration would reduce year on year as gas treatment becomes less economic because the length of cast iron main to treat reduces as it is replaced by PE mains.

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 September 2008.

Users wishing to discuss any matter can do so in private or at the proposed Shrinkage Forum 11 July 2008.

It would be appreciated if Users could let us have any feed-back that they would like to share with us before 1 August 2008¹⁰ to enable us to better respond to any concerns.

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 September 2008 to request that Ofgem issue a Condition 7(4) 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 October 2008.

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 October 2008.

13. National Grid's Proposal

This report contains our Initial Proposal for the LDZ Daily Shrinkage Quantity values for the Gas Year 2008/09.

¹⁰ Due to the pressure of time, it will be difficult to respond to any points that might be raised during August because the Uniform Network Code requires National Grid to publish its proposals on 1 September.

Appendix 1: LP Pipe and Service Leakage Analysis 2007 to 2008 proposals by LDZ

This section of the document provides a comparison of the assessed levels of LP pipe and service leakage by LDZ. Users have requested more detail with regard to leakage assessment to be presented within National Grid LDZ Shrinkage Factor proposals.

Details of leakage in energy quantity, annual average system pressures (ASP) and Monoethylene Glycol (MEG) levels are presented for 2008 with 2007 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.

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

A1.1 Eastern LDZ

	2007 Proposal	2008 Proposal
Leakage (GWh)	240	195
Annual Average System Pressure (mbar)	33.9	33.4
ASP (All-PE systems excluded) (mbar)	32.9	32.5
MEG Saturation Level	7%	0%

Table A1.1 Eastern LDZ

A historic misallocation of mains asset was identified last year, affecting Eastern and North Thames LDZs. The resulted in a transfer of approximately 30GWh of leakage, associated with the Outer Metropolitan area of London, from North Thames to Eastern LDZ. However, to be consistent with the methodologies used to determine the new Licence Conditions impacting Shrinkage, it is proposed to consider the Outer Met area to be within North Thames and, therefore, this has been reversed for the 2008/09 proposals.

There was a decrease of 0.5mbar in overall ASP for Eastern LDZ, but more significantly, a decrease in ASP of 0.45mbar for mixed material networks.

This LDZ does not treat lead yarn jointed cast iron mains with MEG; however, the Outer Metropolitan area is treated, hence the 7% MEG Saturation level reported for 2007.

It should be noted that mains replacement has also affected leakage by substituting new, better performing PE pipes for older metallic ones.

The benefits of the mains replacement, decreased ASP and transfer of the Outer Metropolitan have led to a decrease in leakage equivalent to 45GWh.

A1.2 East Midlands LDZ

	2007 Proposal	2008 Proposal
Leakage (GWh)	289	275
Annual Average System Pressure (mbar)	35.3	34.0
ASP (All-PE systems excluded) (mbar)	33.0	32.1
MEG Saturation Level	26%	22%

Table A1.2 East Midlands LDZ

There was a decrease of 1.3mbar in overall Average System Pressure for East Midlands LDZ and also, more significantly, a 0.9mbar decrease in ASP for mixed material systems. There was a decrease of 4% in MEG Saturation levels; however, this was more than offset by the ASP changes and the mains replacement programme, which has affected leakage by substituting new, better performing PE pipes for older metallic ones leading to an overall decrease in leakage equivalent to 14GWh

A1.3 North Thames LDZ

	2007 Proposal	2008 Proposal
Leakage (GWh)	275	297
Annual Average System Pressure (mbar)	26.0	26.1
ASP (All-PE systems excluded) (mbar)	26.0	26.1
MEG Saturation Level	15%	12%

Table A1.3 North Thames LDZ

A historic misallocation of mains asset was identified last year, affecting Eastern and North Thames LDZs. The resulted in a transfer of approximately 30GWh of leakage, associated with the Outer Metropolitan area of London, from North Thames to Eastern LDZ. However, to be consistent with the methodologies used to determine the new Licence Conditions impacting Shrinkage, it is proposed to consider the Outer Met area to be within North Thames and, therefore, this has been reversed for the 2008/09 proposals.

There was an increase of 0.1mbar in Average System Pressure for North Thames LDZ and a decrease of 3% in MEG Saturation levels. Together with the transfer of the Outer Metropolitan area of London, this more than offset the impact of the mains replacement programme, which has affected leakage by substituting new, better-performing PE pipes for older metallic ones, leading to an overall increase in leakage equivalent to 22GWh.

A1.4 North West LDZ

	2007 Proposal	2008 Proposal
Leakage (GWh)	430	400
Annual Average System Pressure (mbar)	30.0	27.9
ASP (All-PE systems excluded) (mbar)	29.4	27.6
MEG Saturation Level	12%	3%

Table A1.4 North West LDZ

There was a decrease of 2.1mbar in overall Average System Pressure for North West LDZ and also, more significantly, a 1.8mbar decrease in ASP for mixed material systems. However, this was offset by a decrease of 9% in MEG Saturation levels. In addition, the mains replacement programme, which has affected leakage by substituting new, better-performing PE pipes for older metallic ones leading to an overall decrease in leakage equivalent to 30GWh.

A1.5 West Midlands LDZ

	2007 Proposal	2008 Proposal
Leakage (GWh)	338	339
Annual Average System Pressure (mbar)	30.6	30.9
ASP (All-PE systems excluded) (mbar)	28.7	29.1
MEG Saturation Level	8%	3%

Table A1.5 West Midlands LDZ

There was an increase of 0.3mbar in overall Average System Pressure for West Midlands and a 0.4mbar increase in ASP for mixed material networks. There was a decrease of 5% in MEG Saturation levels. These factors have led to an increase in leakage in West Midlands LDZ of 1GWh, despite one year's additional mains replacement.

Appendix 2: Flow-Weighted Average Calorific Values (CVs) for each LDZ for 2006 and 2007

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 determine flow-weighted averages for 2007. These values have been applied to convert leakage estimates in volume terms to energy quantity for each LDZ. The values are presented in the table below with 2006 for comparison purposes.

LDZ	Average Calorific Values (MJ/m ³)	
	2006/07	2007/08
Eastern	39.5	39.1
East Midlands	39.6	39.2
North Thames	39.3	39.0
North West	39.5	39.2
West Midlands	39.4	39.2