

**LDZ Shrinkage Quantity
Initial Proposals
Formula Year 2015/16**

National Grid LDZ Shrinkage Quantity Initial Proposals - Formula Year 2015/16

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National Grid LDZ Shrinkage Quantity Initial Proposal for Formula Year 2015/16

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 2015/16, 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 2015, 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 owned by National Grid and as defined by Uniform Network Code.

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. The current shrinkage volumes are shown for comparison purposes.

Table 1. Proposed 2015/16 LDZ Shrinkage Quantities

LDZ	Existing Shrinkage Quantities 2014/15 Formula Year (GWh)				Proposed Shrinkage Quantities 2015/16 Formula Year (GWh)			
	Leakage	OUG	Theft	Total	Leakage	OUG	Theft	Total
Eastern	204	5	8	217	191	5	8	204
East Midlands	243	6	11	260	230	6	11	247
North Thames	241	6	10	256	226	6	10	242
North West	342	8	14	364	324	8	14	345
West Midlands	293	5	9	307	282	5	8	295
National Grid	1,323	29	51	1,403	1,253	29	52	1,334

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

This year's shrinkage proposal reflects a reduction of 69GWh in estimated leakage compared to that estimated for the current year. There are two major contributing factors to the leakage reduction; approximately 41 GWh is associated with the forecast mains replacement in 2015/16 and approximately 24 GWh is associated with a forecast reduction in assumed operating pressures and improved MEG saturation levels; the remainder of the difference being associated with the variance in asset details between the assumptions in the 2014/15 proposal and the outturn/forecast¹. In the previous price control period, National Grid made significant investment in pressure management systems, the impact of which has been a year-on-year improvement in operating pressures. In order to reflect this in our leakage projections, we developed a methodology for estimating pressure on a rolling 12 month basis. We have used this methodology to base our shrinkage proposals and will continue to do so year on year. A benefit of this methodology is that it reduces the potentially distortional impact on the forecast of an individual warm or cold year. The impact of any variation between the actual and assumed factors underpinning these Shrinkage Proposals will be picked up in the post year Shrinkage Assessment and Adjustment process in July 2016.

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

¹ For example, the 2014/15 Proposals made some assumptions regarding the level of mains replacement for 2013/14 and 2014/15; however, these proposals take account of the outturn asset details for 2013/14 and use the latest forecast for 2014/15.

Table 2. Proposed LDZ Daily Shrinkage Quantity Values for 2015/16 Formula Year

LDZ	Daily Shrinkage Quantity (kWh)
Eastern	557,632
East Midlands	675,541
North Thames	661,948
North West	943,670
West Midlands	805,782
National Grid	3,644,572

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 2015/16 proposal. Gas Distribution Networks (GDNs) have an obligation under Special Condition 1F Part E of the Licence to review the Shrinkage and Leakage Model on an annual basis and to consult on the outcome of that review with other DN Operators, gas shippers and other interested parties. The Shrinkage Quantity Proposals are calculated using the methodology contained within the Shrinkage and Leakage Model. The Shrinkage and Leakage Model Review was published on the Joint Office website on 7 November 2014 and received no comments.

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 1F of the GDN Licences. Under paragraph 1F.17 Distribution Networks have the obligation to annually review the leakage model to ensure that it meets the obligation, specified under paragraph 1F.13, of:

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

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.

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 network² specific information:

² Network in this context relates to physically interconnected pipe systems, not National Grid's regionally based administrative structure.

- Pipe asset data³
- Annual average system pressure (ASP) 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.

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 emissions 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 2015/16 leakage assessment; equating to approximately 3,580km of iron main from April 2014.

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

Table 3. Estimated LDZ Low Pressure Leakage for 2015/16 Formula Year

LDZ	Low Pressure Leakage	
	Tonnes ⁴	GWh
Eastern	9,270	138
East Midlands	10,012	150
North Thames	11,733	174
North West	17,606	263
West Midlands	14,827	221
National Grid	63,447	946

³ Actual asset data as at 31 March 2014 adjusted for completed and planned iron replacement to 31 March 2016.

⁴ 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.

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

Table 4. Estimated LDZ Medium Pressure Leakage for 2015/16 Formula Year

LDZ	Medium Pressure Leakage	
	Tonnes	GWh
Eastern	1,049	16
East Midlands	2,811	42
North Thames	1,431	21
North West	1,037	16
West Midlands	1,449	22
National Grid	7,778	116

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 2015/16 Formula Year

LDZ	AGI Emissions ⁵	
	Tonnes	GWh
Eastern	2,468	37
East Midlands	2,542	38
North Thames	1,998	30
North West	2,957	44
West Midlands	2,547	38
National Grid	12,512	187

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'.

For the purpose of the 2015/16 estimate the quantities used are reflective of those determined in the 2013/14 final assessment.

Table 6 below shows the amount of gas lost because of other losses on a LDZ basis, which is proposed as the estimate for 2015/16:

⁵ Includes leakage and routine equipment venting

Table 6. Estimated 2015/16 Interference Damage

LDZ	Interference Damage	
	Tonnes	GWh
Eastern	46	0.7
East Midlands	65	1.0
North Thames	39	0.6
North West	77	1.1
West Midlands	47	0.7
National Grid	274	4.1

3.1.4 Leakage Reduction Initiatives

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 2015/16, and that used for these proposals, is 27.8mbarg. This represents a 5.2% reduction in ASP resulting in a significant reduction in leakage.

3.1.5 Total Leakage

Table 7 below shows the total amount of estimated leakage for Formula Year 2015/16 on an LDZ basis with the leakage expressed in GWh.

Table 7. Estimated 2015/16 Formula Year LDZ Leakage Summary

LDZ	Leakage (GWh per annum)
Eastern	191
East Midlands	230
North Thames	226
North West	324
West Midlands	282
National Grid	1,253

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 0.0113% of seasonal normal LDZ consumption. This factor represents the estimated National average (to four decimal places as a percentage) that was determined by Advantica in 2002 and has been applied since the 2005/06 Gas Year.

The estimated 2015/16 Own Use Gas quantity values are shown in Table 8 below.

Table 8. Estimated 2015/16 LDZ OUG Quantity Values

LDZ	Seasonal Normal LDZ Consumption GWh/annum	OUG GWh/annum	OUG kWh/day
Eastern	41,925	5	12,944
East Midlands	53,696	6	16,578
North Thames	51,907	6	16,026
North West	67,938	8	20,975
West Midlands	42,447	5	13,105
National Grid	257,913	29	79,629

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 2015/16, National Grid proposes to retain a Theft of Gas factor equal to 0.02%. Table 9 below shows the estimated 2015/16 Theft of Gas Quantity Values:

Table 9. Estimated 2015/16 LDZ Theft of Gas Quantity Values

LDZ	Seasonal Normal LDZ Consumption GWh/annum	ToG GWh/annum	ToG kWh/day
Eastern	41,925	8	22,910
East Midlands	53,696	11	29,342
North Thames	51,907	10	28,365
North West	67,938	14	37,125
West Midlands	42,447	8	23,195
National Grid	257,913	52	140,936

3.4 LDZ Shrinkage Quantity Summary

Table 10 below shows the proposed LDZ Shrinkage Quantity Values for the Formula Year 2015/16 in GWh per annum:

Table 10. Estimated 2015/16 LDZ Shrinkage Quantity Values

LDZ	Leakage (GWh)	OUG (GWh)	Theft (GWh)	Total (GWh)
Eastern	191	5	8	204
East Midlands	230	6	11	247
North Thames	226	6	10	242
North West	324	8	14	345
West Midlands	282	5	8	295
National Grid	1,253	29	52	1,334

Table 11 below shows the estimated Daily Shrinkage Quantity values applicable for the 2015/16 Formula Year in kWh per day:

Table 11. Estimated 2015/16 LDZ Daily Shrinkage Quantity Values

LDZ	Total (kWh)
Eastern	557,632
East Midlands	675,541
North Thames	661,948
North West	943,670
West Midlands	805,782
National Grid	3,644,572

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

This proposal provides a robust estimate of LDZ Shrinkage Quantity values for the Formula Year 2015/16. 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.

5. 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.

6. The implications of implementing the Proposal for Users

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

7. 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.

8. 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 2015.

It would be appreciated if Users could let us have any feedback that they would like to share with us before 1 February 2015⁶ to enable us to better respond to any concerns.

9. 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.

⁶ 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. Proposed implementation timetable (inc timetable for any necessary information system changes)

Following publication of our Final Proposals, Users will have until 15 March 2015 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 2015.

11. 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 2015.

12. National Grid's Proposal

This report contains our Initial Proposals for the LDZ Daily Shrinkage Quantity values for the Formula Year 2015/16.

Appendix 1: LP Leakage Analysis 2014 to 2015 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 2015/16 with 2014/15 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 and enables the identification and resolution of any potential issues. 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

	2014 Proposal	2015 Proposal
Leakage (GWh)	151	138
Annual Average System Pressure (mbar)	29.7	29.2
ASP (All-PE systems excluded) (mbar)	28.1	27.5
MEG Saturation Level	0%	0%

In comparison to last year's anticipated leakage performance, there is an anticipated decrease of 0.5mbar in overall ASP for Eastern LDZ and a 0.6mbar decrease in ASP for mixed material networks. Historically, EA LDZ did not treat mains with MEG. From 2013, the Outer Metropolitan area, which is treated with MEG, is being considered as part of EA LDZ and this resulted in a reported MEG saturation; however, work on the London MP system, from which the MEG is supplied to the Outer Met, has resulted in no MEG entering this part of the system, hence the zero MEG Saturation expected for 2015/16. This, together with anticipated mains replacement, is expected to deliver a comparative leakage reduction of 13.0GWh.

A1.2 East Midlands LDZ

Table A1.2 East Midlands LDZ

	2014 Proposal	2015 Proposal
Leakage (GWh)	162	150
Annual Average System Pressure (mbar)	30.1	29.9
ASP (All-PE systems excluded) (mbar)	28.7	28.3
MEG Saturation Level	22%	24%

In comparison to last years anticipated leakage performance, there is an anticipated decrease of 0.2mbar in overall ASP for East Midlands LDZ, a 0.4mbar decrease in ASP for mixed material networks and 2% increase in MEG Saturations. This, together with anticipated mains replacement, is expected to deliver a comparative leakage reduction of 12GWh.

A1.3 North Thames LDZ

Table A1.3 North Thames LDZ

	2014 Proposal	2015 Proposal
Leakage (GWh)	188	174
Annual Average System Pressure (mbar)	25.4	25.0
ASP (All-PE systems excluded) (mbar)	25.4	25.0
MEG Saturation Level	18%	17%

In comparison to last years anticipated leakage performance, there is an anticipated decrease of 0.4mbar in ASP for North Thames LDZ, 0.4mbar decrease in ASP for mixed material networks and 1% decrease in MEG Saturations. This, together with anticipated mains replacement, is expected to deliver a comparative leakage reduction of 14GWh.

A1.4 North West LDZ

Table A1.4 North West LDZ

	2014 Proposal	2015 Proposal
Leakage (GWh)	281	263
Annual Average System Pressure (mbar)	28.0	27.8
ASP (All-PE systems excluded) (mbar)	27.7	27.4
MEG Saturation Level	35%	35%

In comparison to last years anticipated leakage performance, there is an anticipated decrease of 0.2mbar in overall ASP for North West LDZ and a 0.3mbar decrease in ASP for mixed material networks. This, together with anticipated mains replacement, is expected to deliver a comparative leakage reduction of 18GWh.

A1.5 West Midlands LDZ

Table A1.5 West Midlands LDZ

	2014 Proposal	2015 Proposal
Leakage (GWh)	232	221
Annual Average System Pressure (mbar)	26.6	26.6
ASP (All-PE systems excluded) (mbar)	26.2	26.0
MEG Saturation Level	29%	28%

In comparison to last years anticipated leakage performance, there is an anticipated decrease of 0.2mbar decrease in ASP for mixed material networks and a 1% decrease in MEG saturation. This, together with anticipated mains replacement, is expected to deliver a comparative leakage reduction of 11GWh.

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

The table below shows the Calorific Values applied for these proposals; however, the actual daily average CV values over the period will be used for the assessment of the 2015/16 Formula Year:

Table A2.1 Assumed Calorific Values

LDZ	Average Calorific Values (MJ/m³)
Eastern	39.11
East Midlands	39.25
North Thames	39.08
North West	39.30
West Midlands	39.22