LDZ Shrinkage Factors
Final Estimate
Gas Year 2007/8

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1 LDZ Shrinkage Factor Estimate for Gas Year 2007/8

1.1 Purpose of Estimate

The purpose of this paper is to present Wales & West Utilities' estimate in respect of LDZ Shrinkage Factors for the Gas Year 2007/8 as required under Section N of the Uniform Network Code (UNC) Transportation Principal Document (TPD).

In Section N of TPD UNC, the Transporter has an obligation to set a LDZ Shrinkage Factor to provide for the gas that is used by each of its LDZs or lost from its systems.

1.2 Summary of Estimate

The LDZ Shrinkage Factors, which are set out in the following table, reflect the losses associated with leakage, theft of gas and gas used in the operation of the system. Details of how these factors have been determined are included in this paper. The structure of the paper follows the format of a UNC Modification Report.

Fugitive emissions of gas have been calculated on an LDZ basis. Theft of gas, and gas used in the operation of the system, has been calculated using previous defined methodology. The calculations used to derive the Shrinkage Factors and a summary of the underlying information are set out in this document.

The Shrinkage Factors are to be used as the basis for WWU's LDZ shrinkage gas procurement during the 2007/8 Gas Year.

As in Gas Year 2006/7 the Shrinkage Factors set out in these estimate do not include Pressure or Temperature correction.

LDZ	Shrinkage Factor 2007/8
Wales North	0.796
Wales South	0.563
South West	0.886

Note: The Shrinkage Factors shown in the table are expressed as a percentage of LDZ consumption.

1.3 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 2007/8..

1.3.1 Leakage

Leakage represents the largest component of the LDZ Shrinkage Factor.

For the purpose of analysis, leakage is split into three categories which are:

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

Distribution mains and service leakage is an unavoidable consequence of normal system operation.

AGI leakage includes the routine venting of control equipment. Routine venting of gas by control equipment at AGIs could also be said to be Own Use Gas, however, for the purpose of this paper it is included within AGI leakage.

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

1.3.2 Distribution Mains (and Services) Leakage

The leakage of gas from the Distribution mains system (which includes service pipe leakage) is calculated by applying the results of the 2002/3 National Leakage Testing programme to the following network[1] specific information:

- Projected (financial year end 2007/8) records of pipe asset;
- The annual average system pressure in each network[1] for calendar year 2006; and,
- Where applicable (i.e. certain cast iron mains only) the Pipe Leakage Factors are adjusted to take into account the measured concentration of Monoethylene Glycol (MEG).

[1] Network in this context relates to physical interconnected pipe systems, not administrative structure.

The table below shows the Low Pressure leakage by LDZ.

LDZ	Low Pressure Leakage	
	Tonnes	**GWh**
Wales North	2,401	42.1
Wales South	7,902	137.2
South West	14,936	259.8
Total	**25,239**	**439.1**

The table below shows the Medium Pressure leakage by LDZ.

LDZ	Medium Pressure Leakage	
	Tonnes	**GWh**
Wales North	217	3.8
Wales South	611	10.6
South West	1,315	22.9
Total	**2,143**	**37.3**

The Medium pressure leakage figures have altered slightly from the initial proposal due to an error in the calculation process that has been identified on the shrinkage model by NG. This error goes back to the creation of the spreadsheet version of the model, in 2003, and as such, was also in the spreadsheets provided at the time of DN separation.
In the current model, the medium pressure Pit Cast Iron mains incorrectly reference the low pressure Pit Cast mains leakage rates. To be consistent with the method used to calculate MP leakage prior to the spreadsheet model, MP Pit Cast should refer to Spun Cast leakage rates; the argument being that MP pit cast, unlike LP, tends not to be lead yarn jointed and, therefore, Spun Cast rates are more appropriate. In terms of MP leakage for WWU, correction of this error represents a 5% reduction in Medium Pressure leakage or a 0.4% reduction in overall Leakage. The leakage model has now had this error corrected and hence would explain the variance in shrinkage factors between our initial and final proposals.

1.3.3 AGI Emissions

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

The table below shows AGI Leakage by LDZ.

LDZ	AGI Emissions[2]	
	Tonnes	**GWh**
Wales North	1,274	22.3
Wales South	1,254	21.8
South West	1,841	32.0
Total	**4,369**	**76.1**

[2] Includes leakage and routine equipment venting

1.3.4 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 broken mains and damages are used in conjunction with calculations on 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 numbers of events in 2006 have been used for the analysis).

The table below shows the amount of gas lost as a result of other losses by LDZ.

LDZ	Tonnes	GWh
Wales North	8.5	0.2
Wales South	23.7	0.4
South West	49.5	0.9
Total	**81.6**	**1.4**

1.3.5 Total Leakage

The table below shows the total amount of predicted leakage for Gas Year 2007/8 by LDZ with the leakage expressed in tonnes, GWh and as a percentage of LDZ consumption.

LDZ	Leakage		
	Tonnes	GWh	Leakage as a % of Consumption
Wales North	3,901	68.4	0.765
Wales South	9,791	170.0	0.532
South West	18,142	315.6	0.854
Total / Weighted Average	**31,834**	**554.0**	**0.712**

1.4 Own Use Gas

Natural gas is a compressible fluid; as a direct result of this property, it experiences a drop in temperature when it undergoes an isenthalpic expansion. When gas has its pressure reduced (at an NTS Offtake or Local Transmission System PRI) the gas on the downstream side of the pressure reduction apparatus is colder than the gas on the upstream side. To avoid the gas leaving a site at below freezing point of water, and causing damage to the downstream pipeline, pre-heating may be applied. Pre-heating is only needed to maintain gas above 0 deg C and if the gas enters the site at a sufficiently high temperature, e.g. during the summer, or if the pressure reduction is small, then pre-heating may not be required).

Pre-heating requires a small proportion of the gas passing through the site to fuel the pre-heating equipment. The amount of fuel required for pre-heating is estimated by applying industry standard thermodynamic equations, LDZ throughput and system pressures together with assumptions about the efficiency of the pre-heating equipment.

In future years, WWU intends to use actual, metered gas consumed for AGI pre-heating rather than a calculated factor. Metering equipment is installed at a number of sites although this will require validation and in some cases replacement. Until this information has been collated WWU propose to apply the factor of 0.0113% to its LDZ consumption following studies carried out by Advantica and reported to the Shrinkage Forum.

For the Gas Year 2007/08 the factor for Own Use Gas is estimated as 0.0113% of LDZ consumption.

1.5 Theft of Gas

UNC TPD Section N 1.3.2 states that LDZ Shrinkage shall include, and WWU 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.

There is a current consensus agreement that unidentified theft is assumed to be 0.2% of LDZ consumption, of which 10% is deemed to be Transporters responsibility, resulting in a theft of gas factor of 0.02%.

WWU will therefore use the Theft of Gas factor of 0.02% for the Gas Year 2007/08.

1.6 LDZ Shrinkage Factor Summary

The estimated LDZ Shrinkage Factors for the Gas Year 2007/08 are presented in the following table.

LDZ	Leakage	Own Use Gas	Theft of Gas	Proposed Shrinkage factor 2007/08
Wales North	0.765	0.0113	0.02	0.796
Wales South	0.532	0.0113	0.02	0.563
South West	0.854	0.0113	0.02	0.886
Weighted Average	**0.712**	**0.0113**	**0.02**	**0.743**

Note: All factors are expressed as percentages of LDZ consumption

1.7 Detailed Analysis

1.7.1 Leakage

In May 2003, Advantica, on behalf of Transco, completed an extensive programme of Leakage Tests. 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. The nature of theses tests and their findings were described in previous proposals, and will not be included in this paper.

1.7.2 Own Use Gas

The 2007/08 estimate utilises the methodology applied in previous years and incorporates the conclusions of studies carried out by Advantica, whereby Own Use Gas is indicated as being 0.0113% of LDZ consumption.

1.7.3 Theft of Gas

As a result of previous discussions at the Shrinkage Forum, it was concluded that 0.2% of LDZ consumption would be used as the overall level of theft until better information becomes available.

Transco statistics confirmed that the 90:10 – Shipper: Transporter split in responsibility for theft of gas. WWU believe that it is appropriate that it should assume responsibility for Theft of Gas equal to 0.02% of LDZ consumption

1.8 Extent to which the Estimate would better facilitate the relevant objectives

This paper provides an accurate estimate of LDZ Shrinkage factors for the Gas Year 2007/08. 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 accurate targeting of costs to Users through the Reconciliation by Difference process and this is consistent with securing effective competition.

1.9 The implications for Wales & West Utilities of implementing the Estimate including:

a) Implications for operation of the System:

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

b) Development and capital cost and operating cost implications:

The estimated LDZ Shrinkage factors (which have been prepared without Pressure and Temperature correction) lead to a fair allocation of operating costs between LDZ systems.

c) Extent to which it is appropriate for Wales & West Utilities to recover the costs, and proposal for the most appropriate way for Wales & West Utilities to recover the costs:

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

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

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

1.10 The implications of implementing the Proposal for Users

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

1.11 Analysis of any advantages or disadvantages on implementation of the Proposal

- **Advantages:** Good representation of the actual system usage and losses leading to improved cost targeting.
- **Disadvantages:** WWU are not aware of any disadvantages.

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

No further representations are to be put forward as part of our final estimates.

1.13 Programme of works required as a consequence of implementing the Proposal

The only required modification is to the LDZ Shrinkage Factor values entered into UK Link Systems.

1.14 Proposed implementation timetable (including timetable for any necessary information system changes

Users have until 15th September 2007 to request that Ofgem issues 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 Shrinkage Factors from 06:00 hrs on the 1st October 2007.

1.15 Recommendation concerning the implementation of the Proposal

We recommend the proposed LDZ Shrinkage Factors be implemented with effect from 06:00 hrs on 1st October 2007.

1.16 Wales & West Utilities Proposal

This report contains our proposal for the LDZ Shrinkage Factors for the Gas Year 2007/08.

Appendix 1

LP Pipe and Service Leakage Analysis 2005 to 2006

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 LDZ Shrinkage Factor proposals.

Details of leakage quantities in tonnes and energy quantities, annual average system pressures (ASP) and Monoethylene Glycol (MEG) levels are presented for 2005 with 2006 for comparison purposes. The levels quoted are only those attributable to low pressure mains and service leakage.

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

Table 1 Wales North LDZ

	2005	**2006**
Leakage (GWh)	42.6	42.1
ASP (All LP systems)	42.72 mbarg	42.42mbarg
ASP (All-PE systems excluded)	41.29 mbarg	42.29mbarg
MEG Saturation Level	0.00%	0.00%

Table 2 Wales South LDZ

	2005	**2006**
Leakage (GWh)	112.9	137.2
ASP (All LP systems)	31.75 mbarg	38.3 mbarg
ASP (All-PE systems excluded)	31.07 mbarg	38.10mbarg
MEG Saturation Level	0.00%	0.00%

Table 3 South West LDZ

	2005	**2006**
Leakage (GWh)	282	259.8
ASP (All LP systems)	36.37 mbarg	34.33 mbarg
ASP (All-PE systems excluded)	35.78 mbarg	33.97 mbarg
MEG Saturation Level	8.11%	4.48%

Explanation for increase in ASP in Wales South LDZ

The main reason for the increase in average system pressure in Wales South LDZ was the instability of the Closed Loop central computer which was installed in the 1980s. This lead to a number of system failures during 2006.

When the control system fails the pressure management equipment on site operates in safe mode. This delivers a pressure of 65mb to the Network that it is controlling. The frequency of such failures during 2006 has had a significant impact on the Average System Pressure which has resulted in an increase in comparison to previous years.

A new central computer and operating system is now in place and will be fully operational during the summer of 2007.

Appendix 2

Flow-weighted Average Calorific Values (CVs) for each LDZ for 2005 & 2006

The daily flow weighted average calorific values for each LDZ, determined in accordance with The Gas (Calculation of Thermal Energy) Regulations 1996, have been used to determine flow-weighted averages for 2006. These values have been applied to convert leakage estimates in volume terms to energy quantities for each LDZ. The values are presented in the table below with 2005 for comparison purposes.

LDZ	Average Calorific values (MJ/m^3)	
	2005	2006
Wales North	39.43	39.65
Wales South	39.30	39.26
South West	39.28	39.33