

# **LDZ Shrinkage Factors Final Estimates Gas Year 2006/7**

**Wales & West House  
Spooner Close  
Celtic Springs  
Newport, NP10 8FZ**

**[www.wwutilities.co.uk](http://www.wwutilities.co.uk)**

## Table of Contents

1	LDZ Shrinkage Factor Proposals for Gas Year 2006/7 .....	3
1.1	Purpose of Proposal .....	3
1.2	Summary of Proposal .....	3
1.3	Component Analysis .....	4
1.3.1	Leakage .....	4
1.3.2	Distribution Mains (and Services) Leakage .....	4
1.3.3	AGI Emissions .....	5
1.3.4	Other Losses .....	6
1.3.5	Total Leakage .....	6
1.4	Own Use Gas .....	7
1.5	Theft of Gas .....	7
1.6	LDZ Shrinkage Factor Summary .....	8
1.7	Detailed Analysis .....	8
1.7.1	Leakage .....	8
1.7.2	Own Use Gas .....	8
1.7.3	Theft of Gas .....	8
1.8	Extent to which the Proposal would better facilitate the relevant objectives .....	9
1.9	The implications for Wales & West Utilities of implementing the Proposal including: ..	9
1.10	The implications of implementing the Proposal for Users .....	9
1.11	Analysis of any advantages or disadvantages on implementation of the Proposal .....	10
1.12	Summary of the representations (to the extent that the import of those representations are not reflected elsewhere in the Proposal) .....	10
1.13	Programme of works required as a consequence of implementing the Proposal .....	10
1.14	Proposed implementation timetable (including timetable for any necessary information system changes .....	10
1.15	Recommendation concerning the implementation of the Proposal .....	10
1.16	Wales & West Utilities Proposal .....	10
	Appendix 1. LP Pipe and Service Leakage Analysis 2004 to 2005 .....	11
	Appendix 2. Flow-weighted Average Calorific Values (CVs) for each LDZ for 2004 & 2005 .....	12

# 1 LDZ Shrinkage Factor Final Estimates for Gas Year 2006/7

## 1.1 Purpose of Estimate

The purpose of this paper is to present Wales & West Utilities' estimates in respect of LDZ Shrinkage Factors for the Gas Year 2006/7 as required under section N of the Uniform Network Code.

In section N of 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 has been calculated using previous defined methodology. Gas used in the operation of the system has been determined using a revised factor derived by Advantica. The calculations used to derive the Shrinkage Factors and a summary of the underlying information are set out in this estimate.

The Shrinkage Factors are to be used as the basis for WWU's LDZ shrinkage gas procurement during the 2006/7 Gas Year.

As in Gas Year 2005/6 the Shrinkage Factors set out in these estimates do not include Pressure or Temperature correction.

<b>LDZ</b>	<b>Proposed Shrinkage Factor 2006/7</b>
Wales North	0.798
Wales South	0.475
South West	0.916

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

Since June 2005, WWU have carried out a data validation exercise leading to a reallocation of the assets between Wales North and Wales South. This has an impact on the tonnes of gas lost from these LDZs as can be seen by comparing this proposal with the factors used for the 2005/6 Gas Year. In carrying out this exercise it was also apparent that a number of consumer pressure regulation installations (PRIs) had been included in the Network figures and these have now been removed from the calculations.

### **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 2006/7.

#### **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 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 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<sup>1</sup> specific information:

- Projected (financial year end 2006/7) records of pipe asset;
- The annual average system pressure in each network; and,
- The measured concentration of Monoethylene Glycol (MEG) joint treatment chemical in the gas.

Where applicable (i.e. cast iron mains only) the Pipe Leakage Factors are adjusted to take into account the measured concentration of MEG.

---

<sup>1</sup> Network in this context relates to physical interconnected pipe systems, not administrative structure.

The table below shows the Low Pressure leakage on an LDZ basis

LDZ	Low Pressure Leakage	
	Tonnes	GWh
Wales North	2839	42.6
Wales South	7547	112.9
South West	18868	282
<b>Total</b>	<b>29254</b>	<b>437.5</b>

The table below shows the Medium Pressure leakage on an LDZ basis

LDZ	Medium Pressure Leakage	
	Tonnes	GWh
Wales North	253	3.8
Wales South	788	11.8
South West	1644	24.6
<b>Total</b>	<b>2684</b>	<b>40.1</b>

### 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 on an LDZ basis

LDZ	AGI Emissions <sup>2</sup>	
	Tonnes	GWh
Wales North	1481	22.25
Wales South	1458	21.8
South West	2140	32
<b>Total</b>	<b>5079</b>	<b>76</b>

As mentioned previously, leakage associated with PRIs at consumer premises has been removed from the calculations.

<sup>2</sup> 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 2005 have been used for the analysis together with emergency personnel response times from the first quarter of 2006).

The table below shows the amount of gas lost as a result of other losses for the WWU LDZs.

<b>LDZ</b>	<b>Tonnes</b>	<b>GWh</b>
Wales North	10.03	0.15
Wales South	32.12	0.48
South West	78.96	1.18
<b>Total</b>	<b>121.11</b>	<b>1.81</b>

### 1.3.5 Total Leakage

The table below shows the total amount of predicted leakage for Gas Year 2006/7 on an LDZ basis with the leakage expressed in tonnes, GWh and as a percentage of LDZ consumption.

<b>LDZ</b>	<b>Leakage</b>		
	<b>Tonnes</b>	<b>GWh</b>	<b>Leakage as a % of Consumption</b>
Wales North	4583	68.8	0.766
Wales South	9825	146.9	0.443
South West	22731	339.7	0.884
<b>Total / Weighted Average</b>	<b>37139</b>	<b>555.4</b>	<b>0.689</b>

#### **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.

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.

In future years, WWU intends to use 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. Currently WWU propose to apply the factor of 0.012% to its LDZ consumption following studies carried out by Advantica and reported to the Shrinkage Forum.

For the Gas Year 2006/7 the factor for Own Use Gas is estimated as 0.012% of LDZ consumption.

#### **1.5      *Theft of Gas***

UNC 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 confirm that the Theft of Gas factor be set at 0.02% for the Gas Year 2006/7.

## 1.6 **LDZ Shrinkage Factor Summary**

The estimated LDZ Shrinkage Factors for the Gas Year 2006/7 are presented in the following table.

<b>LDZ</b>	<b>Leakage</b>	<b>Own Use Gas</b>	<b>Theft of Gas</b>	<b>Estimated Shrinkage factor 2006/7</b>
Wales North	0.766	0.012	0.02	0.798
Wales South	0.443	0.012	0.02	0.475
South West	0.884	0.012	0.02	0.916
<b>Weighted Average</b>	<b>0.689</b>	<b>0.012</b>	<b>0.02</b>	<b>0.721</b>

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 these tests and their findings were described in previous estimates, and will not be included in this paper.

### 1.7.2 **Own Use Gas**

The 2006/7 estimates utilise the methodology applied in previous years and incorporating the conclusions of studies carried out by Advantica, whereby Own Use Gas is indicated as being 0.012% 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 confirm the 90:10 Shipper: Transporter split in responsibility for theft of gas. We believe that it is appropriate that WWU 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 provides an accurate estimate of LDZ Shrinkage factors for the Gas Year 2006/7. 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:**

WWU 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 estimate would have on price regulation**

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

### **1.10      *The implications of implementing the Estimate for Users***

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

### ***1.11 Analysis of any advantages or disadvantages on implementation of the Estimate***

- **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 Estimate)***

This paper outlines our final estimate

### ***1.13 Programme of works required as a consequence of implementing the estimate***

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

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

Users have until 15<sup>th</sup> September 2006 to request that Ofgem issues a Condition 7(4) disapproval of this estimate. This provision is in the UNC 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 1<sup>st</sup> October 2006.

### ***1.15 Recommendation concerning the implementation of the Estimate***

We recommend the estimated LDZ Shrinkage Factors be implemented with effect from 06:00 hrs on 1<sup>st</sup> October 2006.

### ***1.16 Wales & West Utilities Estimate***

This report contains our estimate for the LDZ Shrinkage Factors for the Gas Year 2006/07.

## **Appendix 1**

### **LP Pipe and Service Leakage Analysis 2004 to 2005**

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 estimates.

Details of leakage quantities in tonnes and energy quantities, annual average system pressures (ASP) and Monoethylene Glycol (MEG) levels are presented for 2005 with 2004 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**

	<b>2004</b>	<b>2005</b>
Leakage (GWh)	44	42.6
Annual Average System Pressure	42.11 mbarg	42.72 mbarg
ASP (All-PE systems excluded)	41.93 mbarg	41.29 mbarg
MEG Saturation Level	0%	0%

**Table 2 Wales South LDZ**

	<b>2004</b>	<b>2005</b>
Leakage (GWh)	117	112.9
Annual Average System Pressure	31.20 mbarg	31.75 mbarg
ASP (All-PE systems excluded)	30.87 mbarg	31.07 mbarg
MEG Saturation Level	0%	0%

**Table 3 South West LDZ**

	<b>2004</b>	<b>2005</b>
Leakage (GWh)	286	282
Annual Average System Pressure	36.29 mbarg	36.37 mbarg
ASP (All-PE systems excluded)	35.84 mbarg	35.78 mbarg
MEG Saturation Level	8.02%	8.11%

## **Appendix 2**

### **Flow-weighted Average Calorific Values (CVs) for each LDZ for 2004 & 2005**

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 2005. 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 2004 for comparison purposes.

<b>LDZ</b>	<b>Average Calorific values (MJ/cum)</b>	
	<b>2004</b>	<b>2005</b>
Wales North	39.08	39.43
Wales South	39.23	39.30
South West	39.22	39.28