

Northern Gas Networks Limited

Shrinkage Forum

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Shrinkage

Leakage from the system

Amount dependant on mains population, average system pressure and MEG saturation levels.

Theft of gas

NGN responsibility if stolen before emergency control valve on customer premises.

Own use gas

Gas is used in some pressure reduction installations to maintain outlet gas temperatures above zero Celsius.

Leakage

Leakage can be determined for the following components of the transportation system:

- Low pressure mains (includes LP services)
- Medium pressure mains (includes MP services)
- Above ground installations
- Specific identifiable gas release events

Leakage

Low pressure mains leakage is gas lost from joints, tapings, corrosion holes and sections of porous main.

Leakage is the product of...

- The length of each type of main
- The material type
- The operating pressure
- The leakage rates
- The concentration of MEG

Length of Main

The length of each type of main has been extracted from TEAR the Transco Engineering Asset Repository database.

In the twelve months following publication of the Northern Gas Networks shrinkage proposals for the 2005/06 Gas Year.

- 508km of metallic low pressure gas mains and associated metal gas services have been replaced
- 24.5km of metallic medium pressure gas mains and services have been replaced

Operating Pressure

The mean annual operating pressure of each network is determined by network analysis, itself validated from physical measurements of pressure taken by dataloggers which record network pressures as they vary during the year.

- There was an decrease of 0.03mbar in overall Average System Pressure for North East LDZ between 2004 and 2005
- There was an decrease of 0.20mbar in overall Average System Pressure for Northern LDZ between 2004 and 2005

Leakage Rates

Leakage rates are used to distinguish between the leakage characteristics of different types of gas main.

At the request of shippers a very comprehensive and externally validated testing programme to determine leakage rates was undertaken during 2002 and 2003.

Shippers and Ofgem were provided with reports relating to the tests, the results obtained and the statistical significance of those results.

Mono Ethylene Glycol

- MEG is injected into gas to reduce leakage
- MEG only affects cast iron pipes which have lead yarn joints
- The effectiveness of MEG varies in relation to it's concentration
- The measured concentration of MEG is used in the analysis of leakage
- Replacement policy reduces the amount of MEG used

In 2005 there was an increase in MEG saturation levels of 10.57% in North East LDZ and 1.42% in Northern LDZ.

Medium Pressure Leakage

As with low pressure mains leakage medium pressure mains leakage is the gas lost from joints, tapings, corrosion holes and sections of porous main.

It does not include releases of gas from broken mains or damaged mains, these are assessed separately.

Medium Pressure Leakage

Medium pressure main leakage is calculated in the same manner as low pressure main leakage.

The main difference is the size and nature of the mains population.

- There is less medium pressure main
- A far smaller percentage of main is old
- There is a high proportion of steel and PE

Conversely, pressures are higher than those in low pressure networks.

AGI Leakage

Above ground Installations comprise

- NTS Offtakes
- LTS Offtakes
- Gas Holder Stations
- District Governors
- Service Regulators

NG metering sites have been excluded from the calculations.

AGI Leakage

The leakage from each of type of AGI was measured by an externally validated AGI testing programme that was undertaken in 2003.

- A sample of each type of installation had their rate of leakage measured
- Shippers received reports relating to all aspects of the testing programme together with reports from the external auditing bodies

The number of installations within each LDZ is used to assess the overall amount of AGI leakage in the LDZ.

AGI Working Losses

Leakage from AGIs occurs from flanges, connections and other fittings.

There are also emissions from vents and controllers. These have been excluded within the AGI Leakage element of the shrinkage calculations and reported separately even though they could be considered as own use gas.

Other Losses

Specific identifiable gas release events comprise

- Broken mains (i.e. where a main fractures giving rise to a public reported escape)
- Damages (i.e. 3rd party interference to a pipe)

The number and approximate duration of these events is recorded.

From an assessment of the damage and a knowledge of the gas pressure the amount of gas lost from the system can be estimated.

Leakage

<u>Total Network</u>	<u>Tonnes</u>	<u>GWh</u>
Low Pressure Leakage	24466	428 (437)
Medium Pressure Leakage	1989	31 (31)
AGI Leakage	4465	49 (71)
Other Losses	882	15 (2)

2004/5 figures in brackets

Leakage

<u>Total LDZ</u>	<u>Tonnes</u>	<u>GWh</u>	<u>Leakage % Throughput</u>
North East	17042	299 (308)	0.591 (0.609)
Northern	15182	225 (233)	0.526 (0.548)

Throughput = Calendar Year 2005 actuals. 17 year SNT weather corrected

2004/5 figures in brackets

Own Use Gas

Own Use Gas is the gas used by the LDZ.

It is predominantly the amount of gas used in pressure reduction installations for gas pre-heating.

The existing OUG model includes assumptions which overstate the amount of energy necessary to compensate for the pressure expansion/cooling effect.

Transco highlighted this situation in their 2004 presentation, stating that the true figure for Own Use Gas is likely to be 50% of that predicted by the existing model.

Own Use Gas

Northern Gas Networks agree, that the following assumptions are pessimistic.

- A 50% heater efficiency
- All gas enters the LDZ through one offtake
- Pressure differentials and ground temperatures used are not actual
- Gas is pre-heated throughout the year

In 2002 an Advantica report concluded that OUG in 2000 was 0.0113% of throughput. Further work is currently being carried out to address concerns identified during last years negotiations.

NGN will make their final proposals for gas year 2006/7, based on the outcome of this work. Until then NGN propose the status quo figure of 0.035%

Theft of gas

Historically total theft is assumed to be 0.3% of LDZ throughput of which 10% is deemed to be a NGN responsibility.

Cases of Confirmed Theft

	Total	DN Responsible
2005	268	10 (3.7%)
2004	1316	53 (4.0%)
2003	419	5 (1.2%)

NGN propose a national figure of 0.02%%. i.e. 6.67% of 0.3% of LDZ throughput.

Pressure and Temperature Correction

Consistent with 2005/6 methodology pressure and temperature correction is not included.

Conclusion

2006/07 shrinkage factors proposed are

LDZ	North East %	Northern %
Leakage	0.591	0.526
Own use	0.035	0.035
Theft	0.020	0.020
	0.646	0.581