# Final proposal of shrinkage quantity for the North East and North LDZs

Formula year 2023/24

**Northern Gas Networks**

**1st January 2023**

## LDZ shrinkage quantity final proposal for formula year 2023/24

### 1. Purpose of proposal

The purpose of this paper is to present NGN's proposals in respect of LDZ shrinkage quantities for the North East and Northern LDZs for the formula year 2023/24 as required under Section N of the Network Code.

In Section N of the Network Code, Northern Gas Networks has an obligation to submit an estimated shrinkage quantity for each LDZ to provide for the gas that is used or is lost from its LDZ systems.

### 2. Summary of proposal

The LDZ shrinkage quantities, set out within the table below, reflect the losses associated with leakage, theft of gas and gas used in the operation of the system. Details of how these quantities have been determined are provided later in this paper. This report has been prepared in accordance with the UNC arrangements implemented from 29th December 2008 as a consequence of Mod 0225.

Fugitive emissions of gas have been calculated on an LDZ basis using a forecasted mains population as of 31st March 2024 omitting NG Metering sites. NGN have used a figure for own use gas supported by a review carried out by DNV-GL (formerly Advantica). To calculate theft of gas, NGN propose to use the same factor as last year. The calculations that were used to derive the shrinkage quantities and a summary of the underlying information are set out in this proposal.

The quantities, illustrated in the table below, are those proposed for the formula year commencing 1st April 2023.

Proposed LDZ Shrinkage Quantity values for the 2023/24 formula year

| | Existing Shrinkage Quantities 2022/23 Formula Year (Gwh) | | | | Proposed Shrinkage Quantities 2023/24 Formula Year (Gwh) | | | |
|---|---|---|---|---|---|---|---|---|
| LDZ | Leakage | OUG | TOG | Total | Leakage | OUG | TOG | Total |
| North East | 143.61 | 4.32 | 7.65 | 155.59 | 137.32 | 4.09 | 7.23 | 148.64 |
| North | 128.90 | 3.65 | 6.47 | 139.02 | 119.77 | 3.50 | 6.19 | 129.46 |
| **Total** | 272.51 | 7.98 | 14.12 | 294.61 | 257.09 | 7.58 | 13.42 | 278.10 |

Table 1: Proposed LDZ Shrinkage Quantity values for the 2023/24 formula year

The table below summarises NGN's daily shrinkage quantity values for the formula year 2023/24 in kilowatt hours and therms.

| LDZ | Proposed Daily Shrinkage Quantity (KWh) 2023/24 | Proposed Daily Shrinkage Quantity (Therms) 2023/24 |
|---|---|---|
| North East | 406,128 | 13,858 |
| North | 353,706 | 12,069 |
| **Total** | **759,834** | **25,927** |

Table 2: Proposed Daily Shrinkage Quantity (KWh & Therms)

## 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 2023/24 proposal.

### 3.1 Leakage

Leakage represents the largest component of LDZ shrinkage. Leakage may be split into the following three categories:

- Distribution mains (including service pipes)
- Above ground installations (AGIs)
- 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 due to interference damage and broken mains. These losses are not continuous and are caused by specific events outside the control of NGN.

#### 3.1.1 Distribution mains and services leakage

The leakage of gas from the distribution mains system (including service pipe leakage) is calculated by using the industry approved leakage rates in the Shrinkage and Leakage Model (SLM) for different materials and diameters. These are derived from the results of the 2002/03 'National Leakage Testing Programme', with the following network[1] specific information:

- forecasted mains populations up to 31st March 2024
- forecasted annual average system pressure in each network
- forecasted Mono ethylene glycol (MEG) joint treatment chemical in the gas

Leakage is calculated by multiplying the annual average mains pressure in each network by the leakage factors derived from the 2002/03 national leakage test programme and the relative lengths of mains / number of services in each network. Where applicable (i.e. cast-iron mains only) the pipe leakage factors are adjusted to account for MEG concentration and coverage.

Information relating to the 'National Leakage Testing 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.

[1] Network in this context relates to physical interconnected pipe systems

The table below shows the low-pressure leakage on an LDZ basis.

| LDZ | Proposed Low Pressure Leakage | |
|---|---|---|
| | Tonnes of Natural Gas[2] | GWh |
| North East | 5,936 | 91.48 |
| North | 5,213 | 80.14 |
| **Total** | **11,149** | **171.62** |

Table 3: Proposed Low Pressure Leakage

The table below shows the medium pressure leakage on an LDZ basis.

| LDZ | Proposed Medium Pressure Leakage | |
|---|---|---|
| | Tonnes of Natural Gas | GWh |
| North East | 1,033 | 15.92 |
| North | 574 | 8.82 |
| **Total** | **1,607** | **24.74** |

Table 4: Proposed Medium Pressure Leakage

### 3.1.2 AGI leakage

The figures for leakage from AGIs have been taken from the industry approved shrinkage and leakage model and are based on the findings of the Transco 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.

The table below shows AGI leakage and routine venting associated with these sites on an LDZ basis.

| LDZ | Proposed AGI Emissions[3] | |
|---|---|---|
| | Tonnes of Natural Gas | GWh |
| North East | 1,885 | 29.04 |
| North | 1,965 | 30.21 |
| **Total** | **3,850** | **59.26** |

Table 5: Proposed AGI Emissions

### 3.1.3 Other losses

Gas may be lost from LDZ equipment due to specific events, namely broken mains and interference damage to plant. 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 of the amount of gas lost through each type of incident to derive the total amount of gas lost due to these events.

[2] The conversion from GWh to tonnes is based on a Gas Density of 0.73
[3] Includes leakage and routine equipment venting

The table below shows the forecast amount of gas lost due to 'Other Losses' by LDZ actual 'Other losses' for the period 2023/24 Despite continuous efforts to reduce such incidents, other losses are outside the control of NGN and therefore fluctuate somewhat from year to year so are difficult to forecast.

| LDZ | Proposed Other Losses | |
|---|---|---|
| | Tonnes of Natural Gas | GWh |
| North East | 57 | 0.88 |
| North | 39 | 0.60 |
| **Total** | **96** | **1.48** |

Table 6: Proposed Other Losses

### 3.1.4 Total leakage

The table below shows the total amount of leakage for the formula year 2023/24 expressed in tonnes and GWh.

| LDZ | Proposed Total Leakage | |
|---|---|---|
| | Tonnes of Natural Gas | GWh |
| North East | 8,911 | 137.32 |
| North | 7,791 | 119.77 |
| **Total** | **16,702** | **257.09** |

Table 7: Proposed Total Leakage

## 3.2 Own use gas

Natural gas is a compressible fluid. As a direct result of this property, it experiences a reduction in temperature when it undergoes an isenthalpic expansion. This means that when gas has its pressure reduced (at an NTS offtake or Local Transmission System regulator site) 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 the freezing point of water, pre-heating may be applied. Pre-heating is only needed to maintain gas above 0°C and if the gas enters the site at a sufficiently high temperature (e.g. during the summer) or 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[4].

A report published in 2002 proposed 'Own use' gas figures of 0.0113% of throughput nationally and this represents the overall level of gas used by the GDN for purposes of pre-heating at pressure reduction installations. The model used to assess the own use gas component applies thermodynamic principles with a range of conservative assumptions. These include the supposition that all gas into an LDZ passes through one offtake and is subject to a two-stage pressure reduction process with a plant efficiency assumed to be 50%.

[4] A minority of smaller pre-heaters use electricity instead of gas as the fuel.

NGN propose the own use gas factor for 2023/24 remains unchanged at 0.0113% which equates to the following Leakage figures:

| LDZ | Proposed Own Use Gas Quantity (GWh) 2023/24 |
|---|---|
| North East | 4.09 |
| North | 3.50 |
| **Total** | **7.58** |

Table 8: Proposed Own Use Gas Quantity (GWh)

### 3.3 Theft of Gas

Network Code Section N1.3.2 states that; LDZ unaccounted for gas shall include, and Northern Gas Networks 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.

The available statistics imply that transporters are responsible for between 1% and 4% of theft. However, NGN recognises the limitations of the current methodology and the concerns of shippers considers that the proportion of theft attributed to the transporter should remain at 6.67%, resulting in a theft of gas factor of 0.02% of throughput in line with the 2008 figure. This represents the overall level of transporter responsible theft as defined in UNC Section N1.3.2 which equates to the following leakage figures:

| LDZ | Proposed Theft Of Gas Quantity (GWh) 2023/24 |
|---|---|
| North East | 7.23 |
| North | 6.19 |
| **Total** | **13.42** |

Table 9: Proposed Theft of Gas Quantity (GWh)

## 4 Extent to which the proposal would better facilitate the relevant objectives

This proposal provides a robust estimate of LDZ leakage and a conservative estimate of LDZ theft of gas and own use gas for the formula year 2023/24. As a result, the gas usage and loss in transportation within the LDZs is expected be reflective of actual conditions. This facilitates the achievement of efficient and economic operation of the system as NGN is incentivised to identify opportunities to reduce shrinkage in future years.

It will also lead to better targeting of costs to users through the reconciliation by difference process and this is consistent with securing effective competition.

## 5 The implications for NGN of implementing the proposal include:

### 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 quantities (which do not include pressure and temperature correction) lead to a fair allocation of operating costs between LDZ systems.

**c) Extent to which it is appropriate for NGN to recover the costs, and proposal for the most appropriate way for NGN 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), that this proposal would have on price regulation**

The continued removal of temperature and pressure correction greatly facilitates the establishment and operation of the distribution network specific transportation charging formula (which is an Ofgem objective). For this reason, NGN propose to continue the regime that does not include temperature and pressure correction.

In the longer term this proposal offers the prospect of real savings for consumers through the operation of the principle of comparative regulation.

## 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:** Improved allocation of the actual system usage and losses with improved cost targeting and appropriate incentivisation for future shrinkage reduction.

- **Disadvantages:** Purchasing shrinkage gas on a flat daily profile throughout the year may cause some very minor inconsistencies on Unidentified Gas (UIG). During summer where gas demand is lower, Shrinkage gas would make up a greater proportion of UIG whilst during the winter, the proportion would be smaller.

## 8 Summary of the representations (to the extent that the import of those representations is not reflected elsewhere in the proposal)

N/A

## 9 Programme of works required due to implementing the proposal

UK LINK system changes are required to enable NGN to nominate a fixed daily quantity.

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

When we publish our final proposals, users have until the 15th of March 2023 to request that Ofgem issue a condition disapproval of this proposal. (This provision is in the Network Code Section N 3.1.8.)

If no disapproval notice is issued, it is our intention to implement revised LDZ shrinkage quantity from 05:00 hrs. on the 1st of April 2023.

## 11 Recommendation concerning the implementation of the proposal

We recommend the proposed LDZ shrinkage quantity be implemented with effect from 05:00 hrs. on the 1st April 2023.

## 12 Northern Gas Networks proposal

This report contains our proposal for the LDZ shrinkage quantity for the formula year 2023/24. The report is based on data sourced from the SLM version 1.4 which was approved by Ofgem in September 2014 (modification to low pressure service calculations). Because of the number of decimal places within the formula in the SLM, the rounding differences may result in immaterial changes to the overall values.