

Shrinkage Gas Report

Report to CRU
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1 Introduction

1.1 Shrinkage

In order to ensure the safe and efficient operation of the system, Shrinkage gas is bought by Gas Networks Ireland (GNI). Shrinkage Gas consists of:

- **Own Use Gas:** Own Use Gas is gas used to run compressors in Scotland and at Middleton to manage pressures within the gas transmission system; and
- **Unaccounted for Gas (UAG):** UAG remaining quantity of gas which is unallocated after taking into account all measured inputs and outputs from the system.

GNI purchases Shrinkage using the Shrinkage Gas Contract and recovers the Shrinkage Gas costs from Shippers, pro-rata to throughput, via the Disbursements Account. The Disbursements Account is used for the purpose of discharging such payments and charges associated with the use of the Transportation System by Shippers. As GNI are cash neutral, the balance in any one year can be a credit or an invoice.

1.2 Code Provisions

The Code of Operations, specifically Part E – Section 2, contains the provisions relating to Shrinkage, including how Shrinkage Gas is purchased via Shrinkage Gas Contracts, recovery of Shrinkage Costs, the estimation of Shrinkage Gas requirements as well as Apportionment and Attribution of Shrinkage Gas.

The Code proscribes that Transmission Shrinkage shall be calculated separately for the Onshore Scotland System (to enable allocation of Shrinkage costs at the Twynholm point to PTL on a pro-rata to throughput basis) and for the remainder of the Transmission System including the Isle of Man offtake.

Section 2.4.4 of Part E specifies that where there is a difference between the *“Estimated Transmission System Shrinkage Gas and the Initial Transmission Shrinkage Gas Attribution then the difference will be deemed to have been provided through increasing or decreasing System Stock.”* Section 2.5 of Part E specifies that GNI should invoice Shrinkage costs incurred on a monthly basis to Shippers and other costs are charged to Disbursements.

1.3 Document Structure

This report outlines the background to an issue that arose with the purchase and charging for Shrinkage over Gas Years 2016/17 and 2017/18, the proposed resolution of this issue and actions designed to prevent a similar issue arising in the future. The report is structured as follows:

- **Section 2: Overview of Shrinkage Processes** outlines the processes for the forecasting, purchase and charging of Shrinkage;
- **Section 3: Recent Developments** summaries the issue that arose in 2016 and continued into 2018;
- **Section 4: Proposal for Credit** sets out the GNI proposal to address the under purchase of Shrinkage; and
- **Section 5: Remedial Actions** provides on update on the steps GNI is taking to ensure the issue does not reoccur.

2 Overview of Shrinkage Processes

2.1 Calculation and Purchase of Forecasted Shrinkage Volume

The key influencing factors on Shrinkage are:

- Aggregate Entry Point demand, the level of which will impact the utilisation of the Compressor Stations and hence fuel gas usage;
- Use of Water Bath Heaters which are required to change the temperature of the gas;
- Transmission Unaccounted for GAS (UAG), which by its nature is unpredictable because any known issues are addressed; and
- Large Meter Data Cleanse adjustments that impact metered quantities when GNIs seeks to correct for identified metering inaccuracies.

While Entry Point Demand can be estimated with reasonable confidence, the random nature of Transmission UAG and Data Cleanses present challenges in the forecasting of Shrinkage.

Up to June 2016, the Shrinkage gas requirement calculation process occurred weekly and was based on the following two figures:

- a Monthly Shrinkage Throughput Ratio: This is an estimate of the proportion of Shrinkage in the overall throughput based upon the average of the previous 24 months; and
- An Estimated Average Daily Entry Point allocation: This is an estimate of the expected Entry allocations for the week ahead, based upon the average of the previous 8 days (not including weekends.)

The Monthly Shrinkage Throughput Ratio was calculated each month by summing the 'Metered Fuel Gas' and the 'Transmission Calculated UAG' and dividing that number by the total entry point monthly allocations. The Monthly Shrinkage Throughput Ratio applied to the Estimated Average Daily Entry Point Allocation results in the forecast Shrinkage Volume for each day of the following week. These values have a maximum and minimum limit of 4.154Ghwr and 0GWhr respectively.

Once the forecasting is completed, GNI purchases Shrinkage gas based on these forecasts each day.

2.2 Shipper Invoicing and Disbursements

2.2.1 Purchased Shrinkage

The amount of Shrinkage purchased by GNI in a given month is charged to Shippers in the following month pro-rata to the Shippers throughput in that month. The value charged is the actual cost of the Shrinkage purchases.

2.2.2 Stock Statements

In any given month the actual volume of Shrinkage will be different to the volume forecasted and purchased by GNI (as described in 2.1 above). Actual Shrinkage is calculated on a monthly basis and a simplified version of the formula is:

$$\text{Total Shrinkage Volume} = \text{Inputs} - \text{Outputs} - (\text{Change in Physical Stock})$$

Where:

- Inputs represents the sum of all injections into the network;
- Outputs represents the sum of all withdrawals, including Metered Own use, over the month; and
- The Change in Physical Stock is calculated from the GNI Stock Model which estimates the amount of gas in the network based on pressures in the network.

A total notional value for the Shrinkage gas that has been left on, or taken from, the network is calculated by applying the weighted average price of Shrinkage purchases in the month to the under/over purchase of the Shrinkage Volume calculated. The under/over purchase volume is the Total Shrinkage Volume minus the Forecasted Shrinkage Volume.

This notional value, which can be positive or negative, is allocated to Shippers based upon their throughput in the month. GNI issue “Stock Statements” to Shippers each month notifying them of the Shrinkage credit/debit that has been allocated to them in the month arising from the under/over purchase of Shrinkage.

Once the audit of the Disbursements account is completed each gas year, the Stock Statements are settled as part of the annual disbursements cash out process.

3 Recent developments

3.1 Forecast of Shrinkage Volume

The Shrinkage forecast methodology for June 2016 onwards was altered to reflect the coming online of Bellanaboy at full flow, and the consequent expected reduction in flow through Onshore Scotland. The previous methodology outlined above relied upon 24 months of comparable data which was no longer available because of the introduction of Bellanaboy. Given this change a static forecast was developed which was based upon the following assumptions:

- Beattock fuel gas requirements estimated to be c. 80% of previous years monthly fuel usage;
- Brighthouse Bay fuel gas requirements estimated to be c.70% of fuel for corresponding month of previous year;
- Kinsale Energy not expected to store gas offshore in Summer 2016 so Midleton Compressor Station monthly fuel gas estimate to be approx. 30% of same month for previous year; and
- Transmission UAG monthly forecast to be zero. This was based on long term trends whereby although there was month to month variation in Transmission UAG, the historical average figure was approximately zero.

Based on these assumptions an estimate of daily Shrinkage Volume of 1.6GWhr/d was developed and this amount of Shrinkage was purchased.

The daily estimate of 1.6GWhr/d remained as the forecast from June 2016 until March 2018. However, Transmission UAG increased dramatically over 2016/17 and 2017/18. As a result, the level of Shrinkage purchased was insufficient to cover the volumes of Shrinkage that materialised.

The amount of Shrinkage purchased and the Total Shrinkage Volume is shown in the table below.

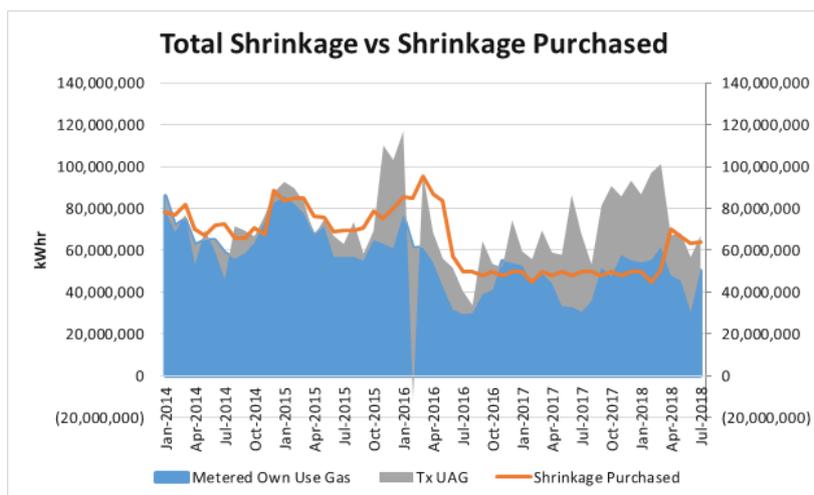


Table: Total Shrinkage vs Shrinkage Purchases.

3.2 Impact on Stock Statements and Disbursements

For the Gas Year 2016/17 Stock statements were issued to the Shippers throughout the year in the amount of c. €3.1m. These stock statements became invoices and credits during the annual disbursement account reconciliation process and were settled as part of that cash out process.

For the Gas Year 2016/17, Stock statements were issued to the shippers throughout the gas year in the amount of c. €6.1m. These stock will become invoices/ credits after the annual audit is complete in Q1/Q2 2019 and will be due to be settled as part of the annual disbursement reconciliation process.

3.3 Identification of current issue

The processes in relation to the Shrinkage Volume forecast, Shrinkage purchasing, and charging have been in place since the introduction of the Code of Operations. Over this period the processes have been substantially fit for purpose with small variances related to Shrinkage under/over purchase being accommodated within the “Stock Statements” cash out.

The first indication of an emerging issue arose in 2016/17 with a large charge to Shippers in the Disbursements account from Stock Statements. At the time GNI believed that this was an anomaly attributable to an exceptional high level of UAG, which would not be repeated.

Although GNI was under purchasing Shrinkage, and hence not replacing gas that was unaccounted for in the system, pressures in the network were maintained by:

- GNI Balancing Actions: GNI purchases or sells Balancing Gas as and when required to maintain the appropriate pressures in the network: and
- Shipper imbalances: Since the removal in 2015 of the requirement on Shippers to maintain a Zero Imbalance Position, there has been an emerging trend of Shippers leaving the system with gas.

As a result of the above, the physical operation of the network was not impacted by the under purchase of Shrinkage.

As the gas Year 2017/18 progressed it became clear that Transmission UAG was remaining at a high level and not reverting to its historical level. In early 2018, GNI recognised the need to update its forecast of Shrinkage Volume and reverted to the methodology used prior to June 2016. A working group with representatives from Grid Control, Finance and Regulatory Affairs was also established at this time to:

- review potential drivers of the increasing Transmission UAG; and
- review the end to end process and propose a method to “unwind” the charges accruing to Shippers.

The outputs from this working group are given in the following sections.

4 Proposal for Credit

At the Code Modification Forum in September 2018, GNI presented on this issue and reported that it had under purchased its Shrinkage Gas requirements in 2016/17 and 2017/18. As outlined earlier, this under purchase had been alleviated by Shipper Imbalances and GNI balancing actions. As a result GNI notionally had c. €9.2m available to purchase Shrinkage gas which was not required by the Network.

GNI proposed, and the CMF meeting agreed, to credit Shippers this amount through the Disbursements Account.

At the CMF meeting there was discussion on whether the credit to individual Shippers should be calculated based on the Shippers annual throughput or on the debits in the Shippers Stock statements. GNI has considered this further and proposes to credit Shippers based on their annual throughput as this is the normal basis for debits/credits to the Disbursements account.

At the end of November 2018, GNI issued letters to each Shipper advising them of the estimate of the credit due to them.

5 Remedial Actions

5.1 Update of Shrinkage Estimation

The random nature of Transmission UAG makes it difficult to accurately forecast Transmission UAG and hence difficult to forecast overall Shrinkage. The changes to the network, in terms of the new entry point at Corrib, increased variability in gas demand due to increased wind generation and aging of the network mean that extrapolating from historical trends is less reliable than previously was the case.

In March 2018, GNI decided to revert to the method previously used to estimate Shrinkage. Following a review in November 2018, this methodology was further refined to use 12 months of data rather than 24 months.

The Shrinkage forecast methodology will be kept under review on a monthly basis and any future changes to the model will undergo a full impact assessment.

5.2 Code Modification

GNI had begun work to develop a Code Modification to change the Code provision related to forecasting and purchase of Shrinkage. However, this work will now need to consider the CRU proposals contained in its recent Network Code Tariff consultation to include Shrinkage in the tariff process rather than the Disbursements process. It is too early to provide a view on the potential Code modification that would be required.

5.3 Stock Model

The current gas stock model used by GNI is a bespoke application which requires manual input and contains a simplistic model of the transmission network. GNI has sought to identify and test an alternative system to assist in giving a more accurate indication of gas stock in the transmission network. GNI identified the Honeywell Linepack product as a potential model and a proof of concept version was installed to run in parallel with a GNI's current Stock modelling system. Preliminary indications from the proof of concept modelling used by the Linepack product are more accurate than the current in house calculations.

As a result of the successful proof of concept trial of the Honeywell Linepack product, GNI are looking to roll out this stock model across its entire Transmission network. GNI has commenced the necessary procurement process to progress the implementation of a new Stock Model by June 2019.

5.4 CV Shrinkage

CV Shrinkage refers to the potential loss of accounted for energy in the calculation and averaging of CV across flows and zones in a network. On the National Grid system in the UK, CV Shrinkage amounts to approximately c. 7% of overall Shrinkage on an annual basis. GNI are assessing whether or not there may be a requirement to introduce CV Shrinkage as a component of overall Shrinkage.