Final Allocation of Unidentified Gas Statement (For Gas Year 2023-2024)

Prepared for: Industry Stakeholders	**Date:** 25th April 2023
	Version: 1.5
	Status: For publication

engage
ELECTRICITY | GAS | INDUSTRY EXPERTS

www.engage-consulting.co.uk

1 Executive Summary

INTRODUCTION

This document is the final Allocation of Unidentified Gas (AUG) Statement for the Gas Year 2023-2024. It provides the final Weighting Factors in the AUG Table for this Gas Year and sets out how we determined them.

KEY UPDATES

This year, an additional contributor to Unidentified Gas (Dead Sites) has been quantified. At the same time, one previous contributor (LDZ Meter Errors) has been discounted as no longer a material UIG impact.

The rest of our investigations have led to no update to our contributors or methodology:

- We have concluded that the quality of read history at a supply point could not be used as a reasonable indicator of propensity for theft – either as well as or instead of using meter type;
- Our further investigations into potential Unidentified Gas (UIG) at sites with a meter bypass have not allowed us to make any stronger assumptions as to the operation of meter bypasses generally, or the accuracy of the CDSP's records of affected supply points; and
- Our approach to allocating undetected theft to smart meters has not changed, although we do now see a relatively beneficial impact of the detected theft data for this population.

Overall, our estimate of total UIG for the target Gas Year is reduced relative to the current Gas Year, driven largely by a falling Consumption Forecast. The updated datasets used for our analysis of the individual contributors to UIG have driven some minor redistribution in the Weighting Factors, principally between sites in the non-domestic Matrix Positions in EUC Bands 1 and 2 as well the implementation of Modification 0840 which has equalised the Weighting Factors for prepayment and credit customers in EUC Bands 1 and 2.

OUR APPROACH

The AUGE undertakes detailed analysis of the potential causes of UIG each year and produces a set of Weighting Factors that are used to allocate UIG between Shippers equitably and transparently.

Our overarching methodology is founded on three key principles. These are:

- **Bottom-up Determination**: we quantify UIG for each identified contributor and add these together, rather than estimating the overall UIG and apportioning it or using it as a means of differencing;

- **'Polluter Pays'**: we interpret "fair and equitable" to mean that UIG should be allocated in the same proportions as it is created. As the UNC does not permit the allocation of UIG at a Supply Point level, the best current attainment of this principle is that each position on the matrix of EUC Band and Class attracts its appropriate proportion; and
- **Line in the Sand**: we only include in our calculation of Weighting Factors the UIG that will exist at the Code Cut-off Date or as it is commonly referred to, Line in the Sand. This will be the 'permanent' UIG present at the final Settlement position, and not UIG that exists temporarily prior to this.

Each year, we review our approach in light of the availability of new data sources, external developments, and feedback from stakeholder consultation. This includes a full reassessment of all identified potential UIG contributors, whether or not they have been subject to a previous detailed investigation. The intention is that our methodology does not remain static; reflecting instead the ongoing developments in gas Settlement and incorporating, with each iteration, a reasonable amount of additional investigation and refinement.

RESULTS

We have quantified total UIG at the Line in the Sand for the target Gas Year 2023-2024 as **8,497 GWh**.

In size order, the share of each contributor to that total is as follows[1]:

Contributor	2022-2023 Gas Year UIG Volume	Change	2023-2024 Gas Year UIG Volume
Theft of Gas	7,602 GWh	⬇	6,823 GWh
Average Temperature Assumption	1,220 GWh	⬇	1,021 GWh
Average Pressure Assumption	359 GWh	⬇	326 GWh
No Read at the Line in the Sand	861 GWh	⬇	162 GWh
Incorrect Correction Factors	53 GWh	➡	53 GWh
Unregistered Sites	35 GWh	⬆	53 GWh
Isolated Sites	47 GWh	⬇	19 GWh
Dead Sites	-	⬆	19 GWh
IGT Shrinkage	18 GWh	➡	19 GWh
Shipperless Sites	26 GWh	⬇	17 GWh
Consumption Meter Error	432 GWh	⬇	-15 GWh
Total	**10,652 GWh**	⬇	**8,497 GWh**

[1] Movement in UIG noted in the table (Gas Year 2022-2023 vs the target Gas Year) is based on a tolerance threshold of more than 1% and 1 GWh change.

Total UIG is broken down across Matrix Positions in the AUG Table as shown below (with figures rounded to the nearest GWh).[2]

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	-	-	559	3,455
	1PD	-	-	27	1,194
	1NI	0	0	71	945
	1PI	-	-	0	5
	2ND	-	-	3	165
	2PD	-	-	0	6
	2NI	-	0	124	681
	2PI	-	-	0	0
	3	0	0	53	112
	4	0	4	103	165
	5	0	3	54	104
	6	0	16	33	118
	7	1	35	29	126
	8	9	62	31	147
	9	52	0	0	2

AUG TABLE

The AUG Table containing the final Weighting Factors is shown below.

The numbers have been normalised around an average of 100 so that they are comparable year-on-year. Doing this does not impact the relative proportions in any way.

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	56.61	56.61	56.61	111.87
	1PD	56.61	56.61	56.61	111.87
	1NI	5.74	844.42	155.89	615.26
	1PI	5.74	844.42	155.89	615.26
	2ND	73.33	73.33	73.33	145.41
	2PD	73.33	73.33	73.33	145.41
	2NI	5.74	294.31	85.15	297.90
	2PI	5.74	294.31	85.15	297.90
	3	5.74	55.35	47.93	54.72
	4	5.74	57.43	58.67	62.88
	5	5.74	66.28	57.44	61.96
	6	5.74	67.88	55.17	63.76
	7	5.74	69.29	55.09	70.34
	8	5.74	59.76	54.86	57.90
	9	5.74	29.73	26.32	27.73

[2] Note that a simple aggregation of the stated individual Matrix Position values may not equal total UIG value, due to rounding of those individual values. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

Table of Contents

1 EXECUTIVE SUMMARY 2
- INTRODUCTION 2
- KEY UPDATES 2
- OUR APPROACH 2
- RESULTS 3
- AUG TABLE 4

2 DOCUMENT CONTROL 8
- PUBLICATION 8
- VERSION HISTORY 8

3 INTRODUCTION AND KEY UPDATES 9
- BACKGROUND 9
- AUGE SCOPE 10
- THE ANNUAL AUG CYCLE 10
- STRUCTURE OF THIS DOCUMENT 10
- KEY UPDATES FOR THE GAS YEAR 2023-2024 11
- COPYRIGHT AND DISCLAIMER 12

4 OVERARCHING METHODOLOGY 13
- SUMMARY 13
- IDENTIFICATION AND INITIAL ASSESSMENT OF CONTRIBUTORS 14
- SELECTION OF CONTRIBUTORS TO PROGRESS 15
- CONTRIBUTOR MODEL 15
- CONSUMPTION FORECAST 16

5 INVESTIGATIONS 21
- 140 - METERS WITH A BY-PASS FITTED (2023-2024 INVESTIGATION) 22
- 011 - THEFT - QUALITY OF READ HISTORY 25
- 012 - THEFT - SMART ROLLOUT IMPACT 28
- 200 - DEAD SITES 31

6 UIG CONTRIBUTORS 32

010 THEFT OF GAS 33
- DASHBOARD 33
- DESCRIPTION 33
- METHODOLOGY 35
- CALCULATION 35
- RESULTS 38
- NOTABLE OBSERVATIONS 39

020 – UNREGISTERED SITES 40
- DASHBOARD 40
- DESCRIPTION 40
- METHODOLOGY 41
- CALCULATION 42
- RESULTS 44

NOTABLE OBSERVATIONS ... 45

025 – SHIPPERLESS SITES ... 46

DASHBOARD ... 46
DESCRIPTION ... 46
METHODOLOGY ... 47
CALCULATION ... 48
RESULTS ... 50
NOTABLE OBSERVATIONS ... 51

040 – CONSUMPTION METER ERRORS – INHERENT BIAS ... 52

DASHBOARD ... 52
DESCRIPTION ... 52
METHODOLOGY ... 53
CALCULATION ... 54
RESULTS ... 56
NOTABLE OBSERVATIONS ... 57

060 – IGT SHRINKAGE ... 58

DASHBOARD ... 58
DESCRIPTION ... 58
METHODOLOGY ... 59
CALCULATION ... 59
RESULTS ... 61
NOTABLE OBSERVATIONS ... 62

070 – AVERAGE PRESSURE ASSUMPTION ... 63

DASHBOARD ... 63
DESCRIPTION ... 63
METHODOLOGY ... 65
CALCULATION ... 66
RESULTS ... 67
NOTABLE OBSERVATIONS ... 68

080 – AVERAGE TEMPERATURE ASSUMPTION ... 69

DASHBOARD ... 69
DESCRIPTION ... 69
METHODOLOGY ... 71
CALCULATION ... 72
RESULTS ... 73
NOTABLE OBSERVATIONS ... 74
FURTHER BACKGROUND ... 75

090 – NO READ AT THE LINE IN THE SAND ... 78

DASHBOARD ... 78
DESCRIPTION ... 78
METHODOLOGY ... 79
CALCULATION ... 80
RESULTS ... 83
NOTABLE OBSERVATIONS ... 84

100 – INCORRECT CORRECTION FACTORS ... 85

DASHBOARD ... 85
DESCRIPTION ... 85

METHODOLOGY 87
CALCULATION..... 88
RESULTS 89
NOTABLE OBSERVATIONS 90

160 – ISOLATED SITES 91
DASHBOARD..... 91
DESCRIPTION 91
METHODOLOGY 92
CALCULATION..... 93
RESULTS 95
NOTABLE OBSERVATIONS 95

200 – DEAD SITES (NEW) 97
DASHBOARD..... 97
DESCRIPTION 97
ANALYSIS AND RESULTING METHODOLOGY 98
METHODOLOGY 101
CALCULATION..... 102
RESULTS 103
NOTABLE OBSERVATIONS 104

7 RESULTS 105
TOTAL UIG FOR 2023-2024 105
UIG BY CONTRIBUTOR 105
UIG BY MATRIX POSITION 106
COMPARISON TO OBSERVED LEVELS OF UIG 106
COMPARISON OF RESULTS TO BENCHMARK 108

8 WEIGHTING FACTOR DETERMINATION 109
WEIGHTING FACTOR CALCULATION 109
SMOOTHING 110

9 AUG TABLE 111
YEAR-ON-YEAR COMPARISON OF FACTORS..... 112
CHANGES TO WEIGHTING FACTORS: COMMENTARY..... 113

10 GLOSSARY..... 114

APPENDIX 1 – COMPLIANCE WITH THE GENERIC TERMS OF REFERENCE 118

APPENDIX 2 – LIST OF DATA SOURCES 121

APPENDIX 3 – ACTUAL ANNUAL QUANTITIES AND SUPPLY METER POINTS 127

APPENDIX 4 – FUTURE CONSIDERATIONS 128

APPENDIX 5 – CHANGES MADE AFTER CONSULTATION ON THE DRAFT STATEMENT 132

2 Document Control

PUBLICATION

Version	Issue Date	Author	Reviewer
0.1	13 December 2022	David Speake, James Hill	Andy Grace
1.0	29 December 2022	David Speake, James Hill	Andy Grace, Richard Cullen
1.1	6 January 2023	David Speake, James Hill	Andy Grace, Richard Cullen
1.2	16 January 2023	David Speake, James Hill	Andy Grace, Richard Cullen
1.3	3 March 2023	David Speake, James Hill	Andy Grace
1.4	31 March 2023	David Speake, James Hill	Andy Grace
1.5	25 April 2023	James Hill, Sophie Dooley	David Speake

VERSION HISTORY

Version	Reason
0.1	Issued for initial review to CDSP
1.0	**Draft Statement** Issued for review to AUG Sub-Committee via the Joint Office of Gas Transporters
1.1	Minor update to table on page 108 to correct transposition error
1.2	Theft contributor updated with latest TRAS data resulting in updated Weighting Factor table and accompanying comparison and commentary
1.3	**Proposed Final Statement**, incorporating feedback from consultation process and outputs of updated datasets
1.4	**Final Statement** containing Weighting Factors for Gas Year 2023 - 2024
1.5	**Revised Final Statement** to reflect the implementation of Modification 0840 ('Equalisation of prepayment and non-prepayment AUG factors')

3 Introduction and Key Updates

This document is the final AUG Statement for the Gas Year 1st October 2023 to 30th September 2024. It presents the final Weighting Factors and explains the analysis undertaken and methodologies used to derive them.

We have produced this Statement in our capacity as the Allocation of Unidentified Gas Expert (AUGE) in line with our generic terms of reference described in Appendix 1.

BACKGROUND

UNIDENTIFIED GAS

Gas exits the National Transmission System (NTS) network and enters[3] Local Distribution Zone (LDZ) networks. Some of it flows into Independent Gas Transporter (IGT) networks. Gas exits LDZ and IGT networks at customer Supply Meter Points. The gas entering LDZ networks is metered; as is gas exiting the LDZ and IGT networks at Supply Meter Points.

The gas taken from the NTS does not equal the gas metered at Supply Meter Points. Some of the difference is attributable to gas lost in the pipes of the LDZ networks and this is termed 'shrinkage'. The remainder of the difference is Unidentified Gas (UIG).

UIG is caused by a range of issues. These include theft, meter errors, incorrectly classified sites, the impact of localised variation in pressure and temperature and the means of correcting for this, and missing meter readings.

WEIGHTING FACTORS

Settlement attributes the gas measured at Supply Meter Points to the registered Shipper. In order that all gas is accounted for, Settlement allocates UIG across Shippers, based on the Supply Meter Points to which they are each registered. It does this using a set of Weighting Factors.

These Weighting Factors define the proportion of total UIG allocated to:

- Different Classes of Supply Meter Point (relating to the metering in place and the meter reading arrangements); and
- Different End User Categories (EUC) of Supply Meter Point (relating to the type of customer and characteristics of use).

The Weighting Factors are determined annually by the AUGE. The objective is to determine factors that allocate UIG as fairly and equitably as possible. The AUGE undertakes detailed analysis of the causes of UIG each year and produces a set of Weighting Factors that they believe will best achieve this objective for the target Gas Year.

[3] Along with a relatively small amount from sources embedded within LDZ networks.

AUGE SCOPE

The scope of the AUGE includes:

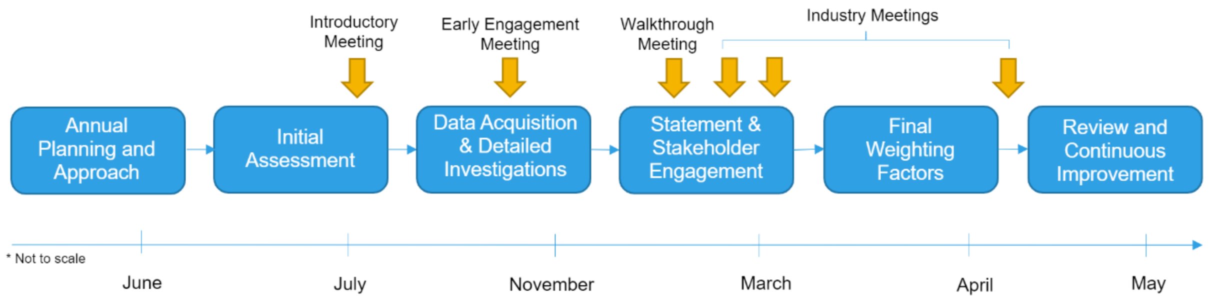
- Developing a methodology for determining annual Weighting Factors;
- Determining data sources for use in the calculation of the Weighting Factors; and
- Documenting the methodology and the Weighting Factors in the Statement and presenting these to industry.

The scope does not include:

- LDZ shrinkage errors;
- Determining the daily levels of UIG; and
- Implementing any performance assurance techniques.

THE ANNUAL AUG CYCLE

The production of the Statement is an annual cycle, with the AUGE consulting with industry in relation to the development of the Weighting Factors. The timeline below shows the stages in this process.



STRUCTURE OF THIS DOCUMENT

The remainder of this document is structured as follows:

- Section 4 - Overarching Methodology: Details the stages we follow in our overarching methodology to determine the Weighting Factors for the target Gas Year;
- Section 5 - Investigations: Describes the areas we have considered that were not previously identified as a contributor to UIG (New Investigations) and those existing contributors for which we have looked into extended or alternative methodologies (Refinement Investigations);
- Section 6 - Contributors: Describes the analysis undertaken and modelled output for all identified contributors to UIG for the target Gas Year. Rationale is as originally described in the 2021-2022 and 2022-2023 Statements, and so some of the additional contextual description has now been omitted;
- Section 7 - Results: Provides a summary of the results and the process we undertook to validate them;

- Section 8 - Weighting Factor Determination: Explains the calculation and the process of smoothing the Weighting Factors;
- Section 9 - AUG Table: Sets out the final Weighting Factors for the target Gas Year;
- Section 10 - Glossary: Explains terms and acronyms used in this Statement;
- Appendix 1 - Compliance with the Generic Terms of Reference (per UNC);
- Appendix 2 – List of Data Sources;
- Appendix 3 – Actual Annual Quantities and Supply Meter Points;
- Appendix 4 – Future Considerations; and
- Appendix 5 – Changes made following Consultation on the draft Statement (placeholder).

KEY UPDATES FOR THE GAS YEAR 2023-2024

Each year we consider broadly the potential additional contributors to UIG as part of our initial assessment process. This has resulted in additional UIG being identified. We also undertake a detailed critical review of our contributor methodologies, including all assumptions. On occasion, newly available data allows us to take an approach that was not previously possible.

All of the above can result in minor changes in approach where we believe it can be justified, and we document this under the relevant contributor. A short summary of key updates is presented for quick reference in the table below:

	UPDATE for Gas Year 2023-2024
Impacting UIG scale or allocation	
Dead Sites: additional contributor	An additional contributor to UIG quantified and added to the model to determine the Weighting Factors.
LDZ Meter Errors: no longer considered	Removal of this contributor from the model given its inconsequential year-on-year UIG value, and assumption that large errors will always be identified.
Consumption meter errors: change to number averaging	Adjustment to the methodology used to average the meter errors detected for each year. This will bring more year-on-year stability as the dataset expands.
No Read at the Line in the Sand	Improved accuracy in calculation thanks to collection of more detailed dataset.
Isolated Sites	Adjusted the assumptions around sites with limited read data but no meter present.
Implementation of Mod 0840	As of a result of this Modification being implemented more Weighting Factors have been combined across Matrix Positions than previous years.

Not impacting UIG	
Meter by-pass UIG methodology	Further investigation into assumptions with no conclusions drawn to justify a UIG methodology.
Theft: quality of read history	Investigated quality of read history as an indicator of theft, concluding that this would not be useful.
Theft: Smart Rollout	Considered whether there is a justifiable alternative to allocating smart theft according to detected theft data. We concluded that there is not owing to limited useful alternative data sources.

COPYRIGHT AND DISCLAIMER

4 Overarching Methodology

SUMMARY

The overall approach we have taken in producing the Weighting Factors is founded on the principles of openness and transparency. We have sought to draw out the key issues in quantifying and apportioning UIG and to be very clear about what we have done and why. We have drawn on our knowledge and expertise throughout the process and exercised our balanced judgement to produce Weighting Factors that we believe will allocate UIG in a fair and equitable manner.

Our overarching methodology is founded on three key principles. These are:

- **Bottom-up Determination**: we quantify UIG for each identified contributor and add these together, rather than estimating the overall UIG and apportioning it or using it as a means of differencing;
- **'Polluter Pays'**: we interpret "fair and equitable" to mean that UIG should be allocated in the same proportions as it is created. As the UNC does not permit the allocation of UIG at a Supply Point level, the best current attainment of this principle is that each position on the matrix of EUC Band and Class attracts its appropriate proportion; and
- **Line in the Sand**: we only include in our calculation of Weighting Factors the UIG that will exist at the Code Cut-off Date or as it is commonly referred to, Line in the Sand. This will be the 'permanent' UIG present at the final Settlement position, and not UIG that exists temporarily prior to this.

Our overarching methodology progressed through the stages below, described further under the headings that follow:

- Identifying the potential UIG contributors, and undertaking an initial assessment of each one;
- Selecting the set of contributors to be subject to our analysis, including any not investigated in detail before and any refinements to previous contributor methodologies;
- Determining a reasonable Consumption Forecast for the target Gas Year;
- Acquiring data to support the investigations as well as the quantification and allocation of UIG;
- Investigating the selected contributors:
    - Considering justifiable methodologies for quantifying and allocating UIG in relation to contributors which have not previously been subject to a detailed investigation; and
    - Undertaking additional analysis and augmenting the methodology for those previously investigated contributors identified for refinement;
- Updating the model inputs to all contributors with no material changes to their methodologies;

- Combining the outputs of each contributor's sub-model with the Consumption Forecast to quantify and allocate UIG;
- Determining the initial Weighting Factors using the harness model, based on the aggregated results from each sub-model along with our Consumption Forecast; and
- Smoothing and normalising these Weighting Factors to produce the AUG Table.

IDENTIFICATION AND INITIAL ASSESSMENT OF CONTRIBUTORS

For this year's AUG Statement we identified 23 candidate contributors and refinements for assessment based on:

- Topics identified in previous Statements;
- Topics identified by expert industry stakeholders; and
- Topics that we identified ourselves, based on our own expertise, knowledge and experience.

We scored the candidate contributors based on:

- The likely level of UIG created by that contributor;
- The current degree of uncertainty (based on data, methodology and knowledge) in relation to the level and source of UIG for that contributor; and
- The potential ability to increase the degree of certainty in relation to the level and source of UIG for that contributor.

We ranked the contributors and refinements by their overall score as shown below. A higher score indicates greater adherence to the above three criteria and thus an increased prioritisation for investigation:

Contributor ID	Contributor	Score
012	Theft of Gas (Allocation - Quality of Read History)	59
011	Theft of Gas (Allocation - Smart Rollout)	50
140	Meters with By-Pass Fitted	38
200	Dead Sites	32
130	Consumption Adjustments	22
160	Isolated Sites	19
170	Incorrect Meter Technical details on UK Link	18
041	Consumption Meter Errors (Faulty Meter)	18
010	Theft of Gas (Total Theft)	17
042	Consumption Meter Errors (Extremes of Use)	14
070	Average Pressure Assumption	13
180	Unfound Unidentified Gas Contributors	13
120	Meter Exchanges	12
080	Average Temperature Assumption	11
040	Consumption Meter Errors (Inherent Bias)	11
090	No Read at the Line in the Sand	10
150	Meterless Sites	9
100	Incorrect Correction Factors	9
110	CV Shrinkage	5
050	LDZ Meter Errors	4
060	IGT Shrinkage	3
020	Unregistered Sites	2
025	Shipperless Sites	2

SELECTION OF CONTRIBUTORS TO PROGRESS

We used the output of the initial assessment to determine the following approach to defining the Weighting Factors for the target Gas Year. We presented this to the AUG Sub-Committee, taking into account any feedback received. The outcome was as follows:

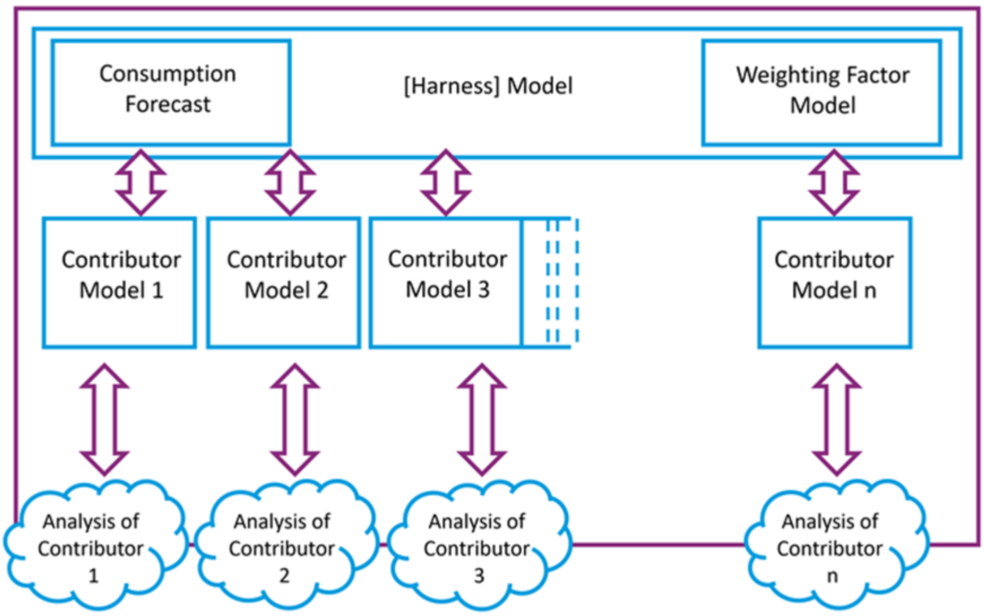
- The four contributors receiving the highest scores were designated for investigation:
  - The three without an existing methodology would be subject to a new investigation into data sources and methodology options; and
  - One which was investigated last year would be subject to further investigation with the intention of progressing towards a justifiable methodology.

Those contributors that have existing methodologies from last year’s AUG Statement had their data refreshed and UIG calculated.

CONTRIBUTOR MODEL

We continued with our contributor-based model originally developed for the 2021-2022 Gas Year. This comprises an overarching harness model, which calculates the Weighting Factors by linking the separate contributor sub-models with our Consumption Forecast.

Each sub-model provides UIG energy values and characteristics for the relevant contributor and has a common interface with the harness model, namely the UIG by Matrix Position in the AUG Table. This model structure is detailed in the diagram below.



CONSUMPTION FORECAST

A forecast of the consumption in the target Gas Year is a key data input for several of our UIG calculations and an essential component in the calculation of the Weighting Factors.

We forecast Seasonal Normal consumption nationally for the target Gas Year based on trends in the numbers of Supply Meter Points in each class, AQs for each Class and new and lost Supply Meter Points in each Class including movements between Classes.

INPUTS

We used the following data inputs in the construction of the Consumption Forecast:

- AQ Snapshot reports from the CDSP; and
- Annual Load Profiles from the CDSP.

FORECAST METHODOLOGY

We used CDSP data from June 2017 to February 2023 to forecast consumption, including the actual Class and EUC bands with which Supply Meter Points are associated for Settlement purposes. Data older than October 2019 needed to have EUC bands 01 and 02 split to take account of UNC Modification 0711. We did this using backwards trends and apportioning so that all of our forecasting data had the same dimensions.

We used an Exponential Triple Smoothing (ETS) algorithm to forecast future AQ and Supply Meter Point counts for each Matrix Position and month in the target Gas Year. This algorithm smooths minor deviations in past data trends by detecting seasonality patterns and confidence intervals. We prevented any consumption forecasts from going negative as a result of this smoothing process.

For each Matrix Position:

- We used the monthly AQ forecast, together with the sum of the Annual Load Profiles over each month to forecast the annual consumption in the target Gas Year;
- We used the monthly Supply Meter Point forecast, and then take an average, to forecast the annual Supply Meter Point count in the target Gas Year; and
- We split the annual Consumption Forecast across LDZs based on current AQ proportions to obtain the LDZ specific consumption forecasts for the target Gas Year.

We then made the following updates to the Consumption Forecast after analysis of the initial results.

- Class 1 EUC Bands 1-8: we only went back to April 2018 (rather than June 2017) to account for the fact that immediately after Project Nexus Implementation there were some materially different total AQs in this Class compared to today.
- Class 1 EUC Band 9: we only went back to April 2021 (rather than June 2017) as the early AQs were significantly higher compared to the more recent data and would have given an unreasonably high estimate of the future state if included.
- Class 2 EUC 9: we only went back to January 2021 for the same reason as Class 1 EUC 9.
- Class 3 EUC 1ND: we only went back to October 2019 (rather than June 2017) as this was a new product class following Project Nexus Implementation. This Class was used rarely to begin with and then underwent mass migrations to bring it up to the level seen today. We expect no similar mass migration activity before the Target Year.

RESULTS

The output from the forecast detailed above is shown in the tables below. Actual snapshots for February 2022 and February 2023 are provided in Appendix 3 by way of comparison.

Forecast Number of Supply Meter Points[4] in the target Gas Year:

	CLASS				
		1	2	3	4
EUC BAND	1ND	-	-	5,048,341	17,211,888
	1PD	-	-	79,580	1,485,215
	1NI	-	11	95,648	412,457
	1PI	-	-	46	2,811
	2ND	-	-	2,095	54,136
	2PD	-	-	27	1,493
	2NI	-	18	51,282	86,034
	2PI	-	-	7	83
	3	1	56	18,105	24,146
	4	1	246	7,842	9,765
	5	8	60	1,705	2,471
	6	40	111	454	954
	7	43	113	190	379
	8	124	96	66	257
	9	360	2	6	19
					24,598,794

Forecast Consumption in the target Gas Year (GWh):

	CLASS				
		1	2	3	4
EUC BAND	1ND	-	-	53,623	208,054
	1PD	-	-	798	10,290
	1NI	-	2	2,406	8,076
	1PI	-	-	1	34
	2ND	-	-	224	6,041
	2PD	-	-	3	156
	2NI	-	3	7,685	12,006
	2PI	-	-	4	10
	3	0	29	7,996	10,929
	4	2	316	9,250	11,796
	5	34	222	5,741	8,445
	6	421	1,096	4,009	8,590
	7	920	2,386	3,904	8,065
	8	5,809	4,052	2,590	10,079
	9	50,578	239	295	1,297
					468,505

It is worth highlighting that there is significantly more uncertainty over this consumption forecast than in recent years driven by a material reduction in gas usage because of the economic climate. This is evidenced by AQs at the time of writing reducing at a faster rate than previously seen and the continuing negative levels of UIG being seen at allocation. We saw a 6% drop in our

[4] Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

overall forecast between the draft Statement and this Final Statement which is a very significant change compared to similar periods in previous years. The smoothing algorithm used does keep extrapolating these recent trends as well as taking into account the historic data, but future customer behaviour is unknown and may be different to past behaviour.

MODIFICATIONS AND REVIEW GROUPS

Throughout the application of our overarching methodology, we considered any relevant output from modifications that have been approved or are in the process of being considered and output from recently closed or ongoing Review Groups that could impact our target Gas Year. These include:

- 0734S - **Reporting Valid Confirmed Theft of Gas into Central Systems** – The imminent implementation of this modification will remove any unreported theft and so this element has been removed from our estimate in Theft of Gas (010);
- 0763R – **Review of Gas Meter By-Pass Arrangements** – This has been considered as part of the review for Meters with a By-pass Fitted (140);
- 0664VS - **Transfer of Sites with Low Valid Meter Reading Submission Performance from Classes 2 and 3 into Class 4** – This will be implemented before the target Gas Year, however due to the low number of potentially impacted Supply Meter Points, this will have no significant impact on the Consumption Forecast for the target Gas Year;
- 0819 - **Establishing/Amending a Gas Vacant Site Process** – This modification came from review group 0778R – Gas Vacant Sites Process review. If implemented, it will have an impact on the allocation process and consequently on UIG. There is potential for sites flagged as vacant to contribute to UIG in the future in the same way isolated and dead sites are considered to by our methodology. We believe that the number of impacted sites will be low in advance of the target Gas Year;
- 0816S – **Update to AQ Correction Processes** – This modification seeks to amend the AQ correction process and so we will need to consider its impact on the volume of AQ corrections processed by the CDSP. AQ Correction data is analysed as part of various contributors’ methodologies;
- 0828R - **Introduction of an Independent Shrinkage Expert** – While shrinkage is outside of the AUGE's scope, we want to understand the output of this review group to assess impact on iGT shrinkage and broader potential UIG impacts. Due to this review group being at very early stages, impact on the target Gas Year is very unlikely;
- 0812R - **Review of Alternatives to Must Read Arrangements** – Any modifications arising from this review group might impact how some sites are read in the future which might change the amount of UIG attributable to No Read at the line in the Sand (090). Must read data is assessed from time to time as part of various contributors or investigations and so is worth considering in future years if changes happen; and
- 0831 & 0831A - **Allocation of LDZ UIG to Shippers Based on a Straight Throughput Method** –Despite their fundamental impact on AUGE processes, there is currently no indication of implications for the target Gas Year. This remains a watching brief only.

- 0840 – **Equalisation of prepayment and non-prepayment AUG factors** –Following implementation of this modification just before publication of this Final Statement we updated the Weighting Factors to reflect the intent of the modification. The Weighting Factors for 2024-2025 now reflect an equalisation of Weighting Factors for prepayment and credit customers in EUC Bands 1 and 2.

This list is non-exhaustive. Further information on these Modifications can be obtained from the Joint Office of Gas Transporters website.

5 Investigations

Each year, we assess all identified potential contributors to UIG, including those previously investigated, on the basis of the likely level of UIG and the likely availability of data. This section details the investigations that have been undertaken alongside the repeat analysis for existing contributors.

During this year's assessment process, two new potential contributors to UIG were selected for detailed investigation (Dead Sites and Meter By-pass). A further two topics were selected for consideration as potential refinements to an existing methodology.

Details of these investigations and outcomes, are found in this Section 5, except in the case where we have been able to calculate UIG, in which case details are found in Section 6 of this Statement:

200 DEAD SITES

Our investigation identified cases where sites are recorded as 'Dead' but there is evidence of consumption. We have proposed a methodology and quantified UIG for this contributor. See Section 6: UIG Contributors.

140 METERS WITH A BY-PASS FITTED

We have been unable to source the required alterative assumptions necessary to propose a methodology. Our investigation is recorded in this section.

012 THEFT: QUALITY OF READ HISTORY

We have been able to conclude based on available data that the quality of read history would not be an appropriate alternative or additional means of allocating UIG from theft. We describe how we reached this conclusion in this section.

011 THEFT: SMART ROLLOUT

Having explored alternatives, we conclude that allocating UIG to smart meter populations in a manner other than detected theft is currently not justifiable given the lack of robust data on the impact of smart meters on theft. However, we do note that the data we use does in fact now show a beneficial impact for smart meters, in contrast to our starting hypothesis in this investigation.

140 - METERS WITH A BY-PASS FITTED (2023-2024 INVESTIGATION)

SETTLEMENT CONTEXT

For gas to be recorded at a Supply Meter Point it must flow through a functioning meter. When this meter requires maintenance or replacement, the gas to the Supply Meter Point will be interrupted. In a small number of cases, for example industrial process sites reliant on a continuous gas supply, the meter installation includes additional pipework which can be used to bypass the meter and maintain gas flow.

If the by-pass is operated (opened), and if for the period it is in operation the gas consumed at the Supply Meter Point is likely to have exceeded 10,000 kWh, then a Consumption Adjustment is required once the by-pass has been closed again[5]. This is done by notifying the CDSP of an estimate of consumption for the period that the meter was not recording, to ensure that the correct energy is reflected within Settlement. If the site is estimated to have consumed less than 10,000 kWh while the by-pass was open, there is no obligation on the Shipper to submit a Consumption Adjustment.

DEFINITION

This contributor relates to occasions when a meter by-pass has been opened at a Supply Meter Point, and the actual energy consumed while the by-pass was open has not entered Settlement by way of a Consumption Adjustment. To be clear, this also includes those cases where no Consumption Adjustment is required under UNC rules.

UIG IMPACT

Gas consumed at Supply Meter Points with a by-pass fitted creates positive UIG when the by-pass is operated, gas is consumed whilst open and this consumption is not entered in Settlement. If this consumption is not identified and accounted for in time, this UIG remains at the Line in the Sand.

LAST YEAR'S INVESTIGATION

For the 2022-2023 Statement we proposed a methodology which sought to identify:

1. The operation (opening) of a meter by-pass; and
2. A Consumption Adjustment *not* being made to accompany that by-pass operation in advance of the Line in the Sand.

With the data available to us, we were unable to identify those occasions on which a meter by-pass had been operated at the Supply Meter Points in our dataset. With no reasonable output from this fundamental first step in our methodology, we could not progress to subsequent steps, including estimating the extent (if any) of missing Consumption Adjustments.

At the highest level, the obstacles were:

- **The meter by-pass status indicator is not properly maintained**. This indicator was the primary means by which our methodology sought to identify completed meter by-pass operations that might be giving rise to unadjusted-for consumption (UIG);

[5] In accordance with UNC Section M 2.4.4(b)

- **There is no reason given when a Consumption Adjustment is submitted**, and we were unable to identify any reasonable alternative approach to matching Consumption Adjustments with completed meter by-pass operations. We therefore had no way to identify the frequency of the 'missing' Consumption Adjustments that would contribute to positive UIG; and
- **The validity of the meter by-pass population data held on the CDSP system is questionable** with reasonable evidence of it not being properly maintained.

Given the above, we concluded that the following requisites to a robust UIG output were missing:

1. Justifiable assumption(s) on frequency of by-pass operation; and
2. A credible portfolio of sites to which those assumptions can be applied.

ANALYSIS FOR TARGET GAS YEAR

We did not believe that the usefulness of the CDSP data available would improve with a further year of industry operation. We have now tested this assumption and proved it correct. An alternative approach is therefore necessary using alternative data that we did not request last year.

The renewed investigation for the 2023-2024 Gas Year was considered in two strands, specifically addressing the two requisites above:

1. Sourcing justifiable assumptions as to the operation of meter by-passes that cannot be built using CDSP data; and
2. Further detailed validation of the CDSP by-pass data to identify a credible baseline portfolio.

SOURCING JUSTIFIABLE ASSUMPTIONS

With no reliable CDSP data available, our intended approach was to gain operational insights from industry experts close to managing sites with by-passes. Our expectation was that this would be MAMs or Supplier siteworks teams.

Our hope was that this would enable us to establish some more robust assumptions to be used in calculating UIG.

Despite ongoing engagement with a number of parties and the 0763R workgroup, we were unfortunately unable to undertake a detailed discussion with anyone from a Shipper or a MAM who could confirm or expand our understanding and so this line of investigation had to be closed down.

FURTHER VALIDATION OF THE CDSP BY-PASS DATA

Extra data items were requested from the CDSP to see if it could shed any light on some of the surprising results that were seen last year in the by-pass data and to see if it could inform the decisions on who to talk to in the first part of this investigation.

We requested the following data from the CDSP:

- The population of Supply Meter Points with a by-pass fitted with various data items relating to meter type, market sector code;

- The recorded status of the meter by-pass – whether it is currently set to 'open' (in operation with gas by-passing the meter) or 'closed' (not in operation with gas flowing via the meter);
- Historical changes to the status of the meter by-pass; and
- AQ history for sites with a by-pass fitted.

By looking at previous AQ data combined with more information on meter type we would be able to question whether some of those domestic looking sites are or were a type of premises which would require a by-pass. We also asked for anonymised Shipper and MAM IDs to get a feel for the spread of Shippers and MAMs who manage these by-passes. It was also an opportunity to review the changes to the portfolio following the conclusion of the 0763R Review Group and the resulting corrective actions.

RESULTS

Our additional validation of CDSP by-pass portfolio is inconclusive. While recent industry focus on cleansing 'Open' by-pass statuses was relatively successful, it did not address the broader data validity question, i.e. whether the sites recorded in the CDSP system with a by-pass do indeed have by-pass equipment with the potential to be used.

Some of the more interesting outputs of our analysis are highlighted below, however, we remain unable to perform a sufficiently robust validation of the portfolio to allow a credible methodology to be applied.

- 97% of by-pass statuses have not been amended in the last five years showing that this isn't a very actively managed attribute;
- 60% of MPRNs with by-passes have all the attributes of a domestic meter (standard meter type, market sector code = "D", and AQ history shows an average domestic usage);
- 92% of all recorded by-passes sit with 1 MAM – suggesting the knowledge and activity levels probably sit within one organisation; and
- 50% of all recorded by-passes sit with two Shippers – suggesting the knowledge and experience is not widespread in the Shipper community.

CONCLUSIONS

As set out above we have been unable to achieve the required combination of:

- Justifiable assumptions on frequency of by-pass operation; and
- A credible portfolio to which those assumptions can be applied.

Therefore it was not possible to come up with a methodology to be applied to enable us to calculate either the amount of UIG or a proposed allocation for this contributor.

011 - THEFT - QUALITY OF READ HISTORY

SUMMARY

We investigated the potential for the read history at a supply point to provide an indication of the likelihood of gas theft to occur. We did this by studying the number of reads at supply points where theft has been detected and comparing to the general population of non-theft identified sites.

We have concluded there is no robust correlation in the available data between a limited (or entirely missing) read history at a site and the likelihood that theft will take place.

BACKGROUND

During industry discussions of the Statement for the 2022-2023 Gas Year, it was suggested that supply points where theft takes place have often not been read or provided a read for several years, making it much easier for theft to take place and subsequently endure. There may also be a deliberate withholding of reads by consumers at these sites.

From this suggestion we developed a hypothesis for testing:

- Sites at which there is a good or full read history recorded on CDSP systems are less likely to have been subject to theft than sites for which there is patchy or no read history.

If this is true, then we might be able to use the completeness of read history as a proxy for likelihood for theft to take place, and so develop a possible alternative to the current method for allocating theft UIG (which is based on meter types from the available data on detected theft).

APPROACH

Our high-level steps for investigation were to:

- Analyse complete read history for detected theft sites;
- Determine the best proxy for quality of read history; and
- If robust correlation identified, determine how to reflect this in existing allocation methodology:
    - Replace existing allocation methodology based on meter type; or
    - Reflect read history as an additional measure.

METHODOLOGY

Updated detected theft data was not yet available at the time of the investigation. Instead, we used last year's combined TRAS and TOG[6] dataset, considering this adequate to test the hypothesis. (The dataset contains a variety of supply meter points with thefts spanning a ten-year period.)

To define a proxy for quality of read history, we considered that:

- The number of reads submitted is more important than the number accepted – to discount the impact of system- or process-driven rejection reasons. We therefore include accepted and rejected reads data;

[6] TOG: Theft of Gas - details of theft provided to the CDSP within CMS.

- A 'high quality' read history was one with more reads rather than less. This could also be thought of as 'density of submitted reads' i.e. the number of reads submitted in a defined period; and
- The theft start date was a better anchor than the theft detection date – in order that we might better identify a change in read density before and during theft occurrences.

DATA INPUTS

- TOG dataset;
- Accepted Reads for TOG and TRAS dataset (complete set for the 1st April 2014 onwards);
- Rejected Reads for TOG and TRAS dataset (complete set for the 1st April 2014 onwards); and
- Last Read data for the full meter population.

Note that the detected theft records used for this investigation are limited compared to the overall theft dataset used for the Theft of Gas contributor. CDSP reads data is incomplete for the period before April 2014, meaning we exclude detected theft records from before 2016, given the need for a data in the two-year window pre-theft start date. Records from August 2020 onwards may also be excluded where because there is not yet a read history spanning at least two years for the purposes of our analysis.

RESULTS

We decided to determine the proportion all of sites in the detected theft dataset which had a read in the year before and after the theft start date. Where there was no read in this period, we extended the window to two years, three years, and so on. We carried out similar analysis for all sites for general comparison – going back two years from the date of the latest read file.

The results are below – rows are mutually exclusive.

Time from assumed theft start date	Pre-Theft Start (No. of Sites)	Post-Theft Start (No. of Sites)	Full Population (No. of Sites)
Read within 1 year	88%	80%	94%
Read within 2 years	8%	14%	4%
Read within 3 years	2%	4%	1%
Read within 4 years	1%	1%	0%
4+ years	1%	0%	0%
No read	0%	1%	0%

We also determined the average number of reads submitted for sites in our theft dataset:

- On average, these sites have **7 reads** submitted in the two years before theft was assumed to start; and
- On average, these sites have **13 reads** in the two years following theft starting.

We consider that this suggests that there is not a tendency for consumers to 'suppress' reads in an attempt to conceal theft (assuming that the theft start date is generally reliable).

BIAS

When discussing results it was suggested that because meter reads are often used as a means to identify potential cases of theft, there may be unavoidable bias in the detected theft dataset, favouring detection at sites with a relatively high number of reads. We investigated this.

Recognising that there are multiple sources of theft investigations, some of which are agnostic to the quality of read history (e.g. public 'tip off'), we repeated the analysis above, but this time split out according to the source of the investigation:

Pre-Theft Start	Crimestoppers	Field Agent	MRA	Other	Police	Supplier	TRAS
Read within 1 year	86%	88%	89%	88%	93%	88%	89%
Read within 2 years	8%	8%	8%	7%	0%	8%	8%
Read within 3 years	3%	2%	2%	3%	0%	2%	2%
Read within 4 years	1%	1%	1%	1%	7%	1%	0%
4+ years	1%	1%	0%	1%	0%	1%	0%
No read	1%	1%	1%	0%	0%	0%	0%

OBSERVATIONS

- Most sites on our theft dataset have a read within a year of the assumed theft start date;
- In our view, sites where theft has occurred show no meaningful difference in quality of read history, when compared to the general population of sites;
- Almost all sites show reads submitted over a two year period;
- The proportion of theft sites with a very poor read density (nothing for 4 years) is insignificant;
- The difference between theft and non-theft sites is not sufficiently marked to justify a robust methodology in predicting the likelihood of theft; and
- There is no material difference in read history quality between the various triggers for theft investigation;
- The initial analysis was conducted including estimated reads in the reads extracts, however when estimated reads were removed from the dataset, there was no material difference in the findings.

Given the outcome of our investigations, we do not intend to pursue a refinement to our theft UIG allocation methodology to consider the quality of read history at a site.

FUTURE CONSIDERATIONS

This refinement will remain on our list for initial assessment. Each year, we will consider whether additional or newly available data would allow additional analysis or extension of this potential refinement.

012 - THEFT - SMART ROLLOUT IMPACT

BACKGROUND

Our methodology allocates undetected theft to Matrix Positions based on meter type. The proportions allocated to each meter type are derived from a data-led analysis of detected theft, based heavily on TOG and TRAS records provided by industry.

In the past, these data-led assumptions do not seem to have reflected the perceived benefits of smart meters, i.e. a reduction in theft at these sites relative to traditional meters. This investigation was proposed on the back of this perception (and the related assumptions in the Government benefits case for smart meters), asking whether there are justifiable alternatives to the current theft UIG allocation approach which might better reflect the assumed benefits of smart meters.

Two questions are core to this investigation:

1. In the absence of data, are we convinced that smart meters reduce gas theft?; and
2. Can we propose a credible alternative set of assumptions?

APPROACH

- Review of latest data to confirm (or otherwise) continued absence of expected benefits;
- Desk-based review of allocation methodology, alternative assumptions and data sources (originally to include the RECCo Theft Estimation Methodology, but it was published too late in the AUGE calendar); and
- Consideration of the benefits and viability of alternative approaches (if identified).

We assumed no change to the methodology to calculate the total (undetected and detected) theft UIG level.

REVIEW OF LATEST DATA

Our starting hypothesis that we were not seeing a material impact from smart meters. With refreshed data we looked at the way that smart meter populations were reflected in cases of confirmed theft (in our updated consolidated detected theft data).

Dealing with the fact that we are still in a nationwide meter exchange programme is a challenge. Changing meter types part way through long-duration thefts are not accurately identified in the detected theft data. Because the exchanges are only moving in one direction – from traditional to smart – the effect of this will be to exaggerate the smart meter population in the detected theft data. To counteract this, we split all multi-year thefts (equally) between the years over which they occur and apply our own judgement as to the likelihood that a meter was smart in each year of that recorded theft.

Using the latest detected theft data for the last ten years we identity thefts over time at smart metered sites. Importantly, we also compare this against progress in smart rollout. (2017 is the first year with meaningful allocation of detected theft to smart.)

- If the smart share of total detected theft is equal to the smart share of total meters (smart penetration), we might argue that the perceived theft related benefits of smart meters are not showing in the data available to us.

- If the smart share of theft is greater than penetration, we might argue that smart meters are actually more likely to be subject to theft, or perhaps that the availability of data gives rise to bias in theft detection activity
- If the smart share of theft is lower than penetration, we could argue that it is more difficult to steal from smart meters, or that theft detection practices have not yet adapted to the new technology

Year theft took place	2017	2018	2019	2020	2021	2022
Smart share of total detected theft	3%	7%	11%	15%	22%	29%
Smart rollout penetration	19%	29%	37%	42%	50%	54%

The data shows that the share of total detected theft coming from smart meters is increasing year-on-year. However, this does not mean that smart meters are not showing theft-related benefits. When we show this year-on-year increase against smart penetration in the market, we see that the *relative* share of detected theft at smart meters is lower than for traditional meters.

We therefore conclude that the working hypothesis was incorrect – whilst the amount of theft detected at smart meters is increasing year-on-year, it remains some way lower than the proportion of total meters that are smart. It can be argued then, that either the smart meters do have an impact on theft, or there is a lag in the data, or there is a bias towards theft detection activities at traditional meters. All of these may be true.

The Government benefits case for smart meters states an estimate of 10% reduction in overall theft owing to smart[7]. The impact showing in our data suggests a much greater benefit than 10%, which may be indicative of a lag in the data.

ASSESSMENT OF ALTERNATIVE APPROACHES

Although a beneficial impact from smart is evident in our updated consolidated theft data, it is still worth considering alternatives to the existing theft allocation methodology.

We identified three alternative methods and their likely impact.

1. Using only recent theft data for the forecast
   The forecast for smart share of theft allocation is based on a rolling average over ten years (accounting for years before any material smart installation took place). This limits volatility in the forecast for the relevant Gas Year, but may also exaggerate the suspected lag effect in the data. Using more recent data only (say, previous two years) may give a better reflection of current incidence of theft, more relevant to the coming Gas Year.
2. Smart Rollout – x
   With an assumption that there is indeed a theft-related benefit attributable to smart meters, we would allocate theft based on the forecast smart penetration for the relevant Gas Year, minus a fixed percentage representing that benefit over traditional meters.
3. AMR allocation profile as baseline
   There is a lag in theft data owing to the time it takes to detect and record theft (which can often be measured in years), and a paucity of data during and since COVID which has resulted in the amount of detected theft being a fraction of that seen in 2013-2019

[7] Note this is a final outcome at full smart penetration – and so we might assume that current benefit would be roughly 5%.

records. In recognition of this lag, and the impact it has on how smart meter rollout reflects in the records, we could use evidence from the earlier AMR rollout as a proxy for what we might expect for smart rollout.

We reviewed these approaches, considering in each case the availability and robustness of data, and the likely impact on the level of theft allocated to smart meters in our methodology. The table below summarises:

Alternative to existing approach	Benefits/drawbacks	Likely impact vs current allocation methodology
1. Recent theft data only Reduce the span of the rolling dataset	Adds volatility to forecast, with ebb and flow depending on recent detection activity and performance.	Increased allocation of theft to smart meters.
2. Smart rollout – x Forecast smart penetration minus a fixed percentage to reflect assumed benefit	This might address the issue of the increasing burden on shrinking traditional population. No obvious source for data-driven fixed percentage, except the BEIS benefits case assumption of 10%. This remains unproven.	Depends on chosen percentage, but likely increased allocation to smart meters vs current approach.
3. AMR profile Derive an allocation profile based on comparable earlier rollout	Addresses perceived lag in data. Limited dataset for this population. Arguably quite different customer base and motivations, and theft detection activities creating the dataset.	Reduced allocation to smart given low incidence of theft at AMR.

None of the three alternative methods were considered preferable to the existing data-led approach for the reasons set out above. Changing approach would need to be well-justified based on robust evidence which we have not been able to identify.

CONCLUSIONS

We do not intend to alter our approach to theft allocation for smart meters on the back of our investigations.

The proportion of undetected theft allocated to smart meters is increasing year-on-year. This is as expected given that smart penetration is increasing. However, the proportion of total theft allocated to smart in our methodology remains below market share. So, the inputs to our allocation methodology are in fact relatively beneficial to Matrix Positions with smart meters.

We also note that this benefit remains materially greater than the prudent BEIS estimate of 10% theft reduction. This is likely due to:

- Lag in theft detection (and impact of COVID seen in recent updates)
- Lack of clarity and completeness of detected theft data
- The influence of other factors on detected theft data

FURTHER CONSIDERATIONS

We will continue to monitor closely the share of total detected theft from smart meters. Given the lag in theft data, it is not unreasonable to expect that the gap between smart share and smart penetration will continue to close. If it does not, then the logical outcome is an increasing majority share of theft allocated to a shrinking minority of traditional meters. This would need to be addressed, possibly by looking at the total theft UIG methodology end to end, rather than just the allocation methodology in isolation.

We note that the question of total theft UIG remains current, particularly with the publication of RECCO's Theft Estimation Methodology. There was insufficient time to consider the outputs of that work in relation to the 2023 – 2024 Weighting Factors, but further analysis of its findings will be assessed as a potential area of focus for next year.

200 - DEAD SITES

We were able to propose a methodology and quantify UIG through this investigation. Please see 200 – DEAD SITES (NEW) in Section 6.

6 UIG Contributors

Each year, we assess previously identified contributors in light of new information, including suggestions made during industry consultation and the availability of potential additional data inputs. Dataset refreshes have occurred for all previous contributors. In some cases, small improvements have been made to a step in the methodology or calculations, and we highlight these instances.

We have included one additional contributor: Dead Sites.

For contributors analysed in previous years, any detailed description of supporting analysis and rationale remains unchanged, and so has not been reproduced in the body of this Statement. Instead, we refer you to the Statements from the previous two years held on the Joint Office website if needed.

Each of these contributors is described with the following structure:

- **Dashboard**: charts showing the UIG for the contributor split by Class and then by market sector, and a table summarising any minor updates made to methodology. Also compares this year's UIG to last year's;
- **Description**: details of the Settlement context, the definition of the contributor and how the contributor impacts UIG;
- **Methodology**: how we determined the level of UIG associated with the contributor and allocated this across Matrix Positions;
- **Calculation**: a detailed description of the data inputs, the calculation steps, and the data output;
- **Results**: the calculated UIG value, the value split by Matrix Position and a chart showing the UIG as a percentage of throughput; and
- **Notable Observations**: our observations, including a comparison to the output of the Statement for Gas Year 2022-2023, with our considered reasons.

REMOVAL OF 050 LDZ METER ERRORS

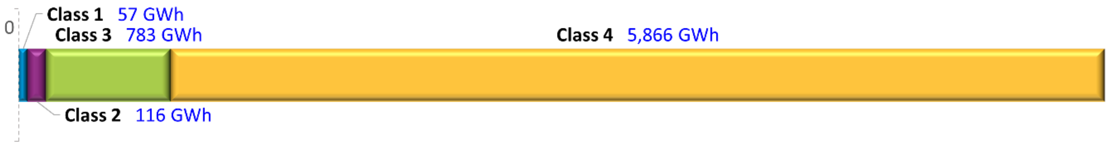
Note that the contributor 050 LDZ Meter Errors has been removed from our UIG model this year. Having validated this year's updated input data, we made a change to our methodology to discount all errors above 50 GWh on the belief that such large LDZ meter errors will inevitably be detected and accounted for in Settlement.

The adjusted outcome of quantified UIG based on smaller LDZ meter errors only is not material, with cases of over-recording cancelled out by cases of under-recording. For this reason, we see no justification for continuing to quantify UIG for this contributor.

010 Theft of Gas

DASHBOARD

UIG split by Class



UIG split by Sector

Gas Year 2023 – 2024 Updates

Some existing data inputs have been updated and refreshed as well including an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
010 Theft of Gas	7,602 GWh	**6,823 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Introduction

Theft is the use of gas from the LDZ or IGT gas networks, where steps have been taken to deliberately avoid paying for it. There are many ways in which gas is stolen – ranging from the elaborate to the rudimentary.

In many cases, the stolen gas is not metered. These cases include: bypassing the meter so that the gas used is not recorded, interfering with the meter so that it stops or under-records, and swapping out the correct meter for an alternative for a part of the period between meter readings. In all these situations, the stolen gas is not allocated to a Shipper in Settlement and appears as UIG.

In other cases, the stolen gas is metered, but steps are deliberately taken to avoid paying for it. These cases are termed 'Fiscal Theft' and include fraudulent vends for pre-payment meters. In these situations, the stolen gas is correctly allocated to a Shipper in Settlement and does not appear as UIG.

Gas is also stolen from the mains network. For LDZ networks this is estimated and accounted for in the determination of Shrinkage and does not appear as UIG (subject to the accuracy of the estimate).

Detection of Theft

There have been several industry schemes in place to identify theft in recent years. These are:

- The Theft Risk Assessment Service (TRAS) which enables Suppliers to assess the risk of energy theft at consumer premises to help target theft investigations. The service uses data provided by Suppliers and augments it with third-party data such as credit history to derive potential consumption outliers;
- The Energy Theft Tip Off Service (ETTOS), previously operated by Crimestoppers. This service allows tip offs about suspected energy theft, received from the general public, to be sent to the relevant Supplier or DNO for investigation; and
- The Gas Theft Detection Incentive Scheme (GTDIS) which sets targets for identifying theft and rewards Suppliers based on the number they detect.

All three schemes have now been incorporated under Retail Energy Code (REC) arrangements, (with data available up to March 2022).

Whilst these schemes are undoubtedly highly beneficial, they do not always result in the highest amounts of theft being detected. For example, the detection of certain types of theft is time-consuming and expensive, requiring site visits and access warrants to be obtained. This can lead to a disproportionate focus on detecting fiscal theft, which can be undertaken more readily as an office-based activity. Another example is that the GTDIS scheme is incentivised based on the number of thefts detected rather than the amount of gas stolen, which results in a disproportionate focus on the easier to detect cases. Another consideration, more generally, is that the consequence of a Shipper detecting theft is that the stolen gas is attributed to them rather than being shared across all Shippers via UIG. This does not in itself provide a compelling incentive to detect theft.

Settlement Adjustments

Where Shippers or DNOs become aware of theft, they are required to report this and, where possible, adjust for it in Settlement. They do this via the Theft of Gas (TOG) regime provided by the CDSP. This mandates an investigation by the Shipper or DNO to determine the amount of theft and the period over which it took place. It also includes an adjustment being made in Settlement such that the stolen gas is attributed to the correct Shipper. In these cases, it ceases to appear as UIG (subject to the accuracy of the estimate).

Settlement Impacts

Despite the range of arrangements in place to identify theft, it is broadly accepted that only a small fraction is detected. This means that only a small fraction is adjusted for in Settlement via the TOG regime.

All non-fiscal theft that is not detected, or is detected and not adjusted for, remains as UIG at the Line in the Sand.

DEFINITION

For the purposes of this Statement, theft of gas is considered to have taken place where any person deliberately tampers with (including removing) the gas metering equipment so that the amount of gas consumed is incorrectly measured at the Supply Meter Point.

Specifically excluded from this definition are:

- Theft of gas upstream of the Emergency Control Valve (ECV), including illegal connections to the mains network. This is accounted for within the relevant Transporter's Shrinkage calculations; and
- Fiscal theft from Pre-Payment meters, whereby the meter records the correct amount and the energy flows into Settlement, even though the Supplier does not receive payment.

UIG IMPACT

Theft of Gas (as defined above) creates positive UIG. If this is not identified and adjusted for in time (via the TOG regime), it remains at the Line in the Sand.

METHODOLOGY

The overall approach to calculating UIG associated with Theft of Gas remains as per last year:

- Estimate the total theft for the target Gas Year based on an assessment of the available information on retail theft in various like sectors;
- Determine the levels of detected theft, from TOG and TRAS data, and the proportion of this that is adjusted for in Settlement. Use this to determine a forecast for the detected theft that will be adjusted for in the target Gas Year and the detected theft that will not;
- Determine the level of undetected theft in the target Gas Year and the proportion of this that is typical (akin to detected theft) and the proportion that is sophisticated (more likely to be undertaken by organised criminals); and
- Allocate these different categories of theft to the Matrix Positions using the selected allocation approach.

CALCULATION

INPUTS

- TOG Theft Information from the CDSP;
- TRAS Theft Information report[8] (now provided annually by RECCo via the CDSP);
- Theft Data report provided by Energy UK (obtained from a sub-set of their members);
- Overall theft percentage determined as described in the Setting a Level for Total Theft section in Appendix 5 of the previous year's Statement;

[8] Available data covers thefts detected in the period June 2015 to September 2022.

- Undetected Sophisticated Theft percentage as described in the Undetected Theft section in Appendix 5 of the previous year's Statement;
- Our Consumption Forecast (as described in Section 4 of this Statement); and
- AMR Supply Meter Point information from CDSP.

ASSUMPTIONS

- Ongoing development in industry theft arrangements will not affect the number of thefts identified by Suppliers in advance of the Line in the Sand;
- Detected theft trends are a reasonable indicator of typical undetected theft;
- There is a proportion of undetected theft that is sophisticated and undertaken by organised criminals operating across all market sectors; and
- The imminent implementation of Modification 0734S[9] will increase the amount of reported theft and eliminate unreported detected theft.

CALCULATION

Calculate the total theft forecast for the target Gas Year

1. Obtain the overall theft percentage, as described in the Setting a Level for Total Theft section in Appendix 5 of the previous year's Statement; and
2. Apply this to the total Consumption Forecast for the Gas Year to get the total theft for the Gas Year.

Combine TOG and TRAS data and rationalise to obtain a comprehensive theft dataset

3. Combine TOG and confirmed theft TRAS data to obtain a single superset of theft data;
4. Rationalise instances in both datasets (eliminating duplicates) by matching on Supply Meter Points, theft size and duration; then matching based on size only; then based on duration only;
5. For each instance of theft in the dataset record whether it was in TOG only, TRAS only or both TOG and TRAS; and
6. Remove all records of fiscal theft.

Determine a forecast of detected (non-fiscal) theft for the target Gas Year.

7. Determine the relationship between the theft period and the detection taking place, from the combined and rationalised TOG and TRAS dataset;
8. Apply this relationship to the TOG and TRAS dataset to determine the theft:
    a. Already detected by theft year; and
    b. Yet to be detected by theft year;
9. Aggregate theft detected and theft to be detected by theft year;
10. Forecast the detected theft that will take place in 2023 and 2024 using trend extrapolations of the aggregate data;
11. Establish the theft reported in the Energy UK dataset that was not in the TOG or TRAS dataset and determine what proportion this was of the TOG and TRAS reported theft; and

[9] 0734S: "Reporting Valid Confirmed Theft of Gas into Central Systems".

12. Increase the forecast of the detected theft that will take place in 2023 and 2024 by this proportion.

Determine a forecast of undetected theft for the target Gas Year

13. Obtain the overall theft forecast for the target Gas Year from step 2; and
14. Difference this to the forecast of detected theft for the target Gas Year from step 12 to get a forecast of the undetected theft for the target Gas Year.

Categorised undetected theft for the target Gas Year

15. Take the Undetected Sophisticated Theft percentage, as determined in the Setting a Level for Total Theft section in Appendix 5 of the previous year's Statement;
16. Apply this to the undetected theft to obtain a forecast of Undetected Sophisticated Theft for the target Gas Year; and
17. Difference this to the forecast of undetected theft for the target Gas Year from step 14 to obtain a forecast of Typical Undetected Theft for the target Gas Year.

Allocate detected Unadjusted For Theft, Undetected Typical Theft and Undetected Sophisticated Theft to the Matrix Positions

18. Allocate Typical Undetected Theft and Undetected Sophisticated Theft across Matrix Positions on the basis described in the table below:

Type of Theft	Sub type	Basis of Matrix Allocation
Undetected Theft	Undetected Typical Theft	**Traditional Meters** The forecast quantity of Undetected Typical Theft, less the amount of this attributable to smart meters and AMR meters (see below). Allocated across sub-EUC bands in proportion to the combined TOG and TRAS data over the last 10 years, excluding theft attributable to smart meters, considering EUC bands 03-08 together because of the limited data for these. Then sub-allocated across Classes as in proportion to our Consumption Forecast for traditional meters (as described in Appendix 5). **Smart Meters** The forecast quantity of Undetected Typical Theft attributable to smart meters (as described in Appendix 5). Allocated in proportion to our Consumption Forecast for smart meters. **AMR Meters** The forecast quantity of Undetected Typical Theft attributable to AMR. Allocated in proportion to identified AMR theft.

Type of Theft	Sub type	Basis of Matrix Allocation
Undetected Theft	Undetected Sophisticated Theft	The forecast quantity of Undetected Sophisticated Theft. Allocated in proportion to throughput for all Matrix Positions.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **6,823 GWh**. This excludes the detected 111 GWh adjusted for theft which will enter Settlement.

Total undetected theft was calculated to be 6,823 GWh, split as follows:

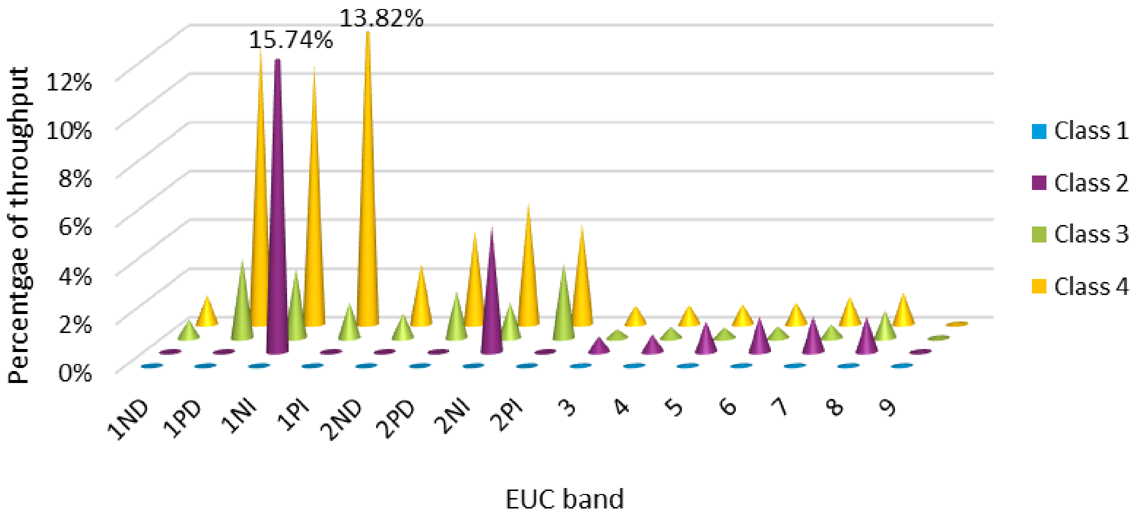
- Undetected Typical Theft (theft akin to detected theft): 6,360 GWh; and
- Undetected Sophisticated Theft (theft using sophisticated techniques that are very difficult to detect): 462 GWh.

The total theft is allocated across Matrix Positions as follows[10]:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	409	2,496
	1PD	-	-	26	1,189
	1NI	-	0	69	863
	1PI	-	-	0	5
	2ND	-	-	2	150
	2PD	-	-	0	6
	2NI	-	0	113	604
	2PI	-	-	0	0
	3	0	0	29	84
	4	0	2	41	94
	5	0	3	24	69
	6	0	16	19	78
	7	1	35	22	93
	8	6	59	29	132
	9	50	0	0	1

[10] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

The graph below shows UIG as a percentage of throughput for each Matrix Position:



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

The Statement for Gas Year 2022-2023 quantified the UIG for this contributor as 7,602 GWh (compared to this year's quantification of 6,823 GWh).

This difference is due to the relative decrease in Consumption Forecast for the target Gas Year compared to the Statement for Gas Year 2022-2023. The difference in allocation of UIG between Matrix Positions is a result of the updates done to the theft dataset removing a year's worth of old data, reviewing EUC sub bands of thefts before Oct 2019 and the latest updates we have received from the CDSP of TRAS and TOG data and AMR portfolios.

ONGOING CHANGES TO THE THEFT DETECTION AND REPORTING REGIME(S)

Some changes to ongoing theft detection and reporting arrangements are likely as a result of the focus now given to them under the REC. We also note the work now completed under the REC to establish a theft estimation methodology for electricity and gas.

These developments do not impact the theft UIG methodology used in this Statement but may affect both the information available for consideration, and ultimately the actions that Suppliers take to investigate theft. We have now reviewed RECCo's theft estimation methodology but it was not available sufficiently in advance of publication of this AUG Statement to consider in any depth. Given that it is material new information it will inform our thinking for the annual assessment process for Gas Year 2024 - 2025.

In general, the merits of all developments will be assessed in line with available information, and our methodologies may be refined where appropriate.

020 – UNREGISTERED SITES

DASHBOARD

UIG split by Class

UIG split by Sector

Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
020 Unregistered Sites	35 GWh	**53 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

For gas consumed at a Supply Meter Point to be correctly allocated in the Settlement process, the Supply Meter Point must be registered to a Shipper in the UK Link central industry database.

If this is not the case, any gas consumed at the Supply Meter Point will not be directly allocated to a Shipper and will instead contribute to UIG. Unregistered Sites are the sub-set of these Supply Meter Points that have never been registered to a Shipper.

There are several industry processes to identify such Unregistered Sites. This is so the CDSP can back bill the appropriate Shipper for the gas consumed before the Line in the Sand is reached. There are circumstances where the CDSP cannot do this. In these cases, the UIG remains at the Line in the Sand.

DEFINITION

This contributor relates to Supply Meter Points that have never been registered to a Shipper but where gas is being consumed.

There are situations where Supply Meter Points are not registered to a Shipper but have been at some point in the past. These can also create UIG but are not considered here. They are dealt with under the Shipperless Sites (025) contributor instead.

It is also worth noting that there are several situations where Supply Meter Points are legitimately unregistered, such as when new premises have been built and the service has yet to be physically installed. These do not create UIG as they do not consume any gas.

The cases considered as part of this contributor are Supply Meter Points that:

- Have never had a Shipper registered; and
- Are consuming gas.

UIG IMPACT

Gas consumed at such Unregistered Sites creates positive UIG. If this is not identified and accounted for in time, this UIG remains at the Line in the Sand.

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is determined by:

- Using trend analysis to forecast the number of Supply Meter Points per main EUC band that could consume gas whilst they are unregistered (as defined above) in the target Gas Year, along with the sum of their AQs, including a proportion from the Less than 12 months report;
- Using trend analysis of AQ changes subsequent to registration, scale the unregistered AQs to reflect the likely post-registration AQs more accurately;
- Using trend analysis to forecast the number of these Supply Meter Points that are legitimately unregistered or non-issues/data errors and discounting these from the dataset;
- Using trend analysis to forecast the number of remaining Supply Meter Points that will be registered to a Shipper and be capable of being back billed (thereby eliminating the associated UIG) before the Line in the Sand occurs for the target Gas Year and discounting these from the dataset; and
- Determining the UIG per main EUC band at the Line in the Sand for the target Gas Year by applying a national annual load profile to the sum of the AQs per main EUC band in the residual dataset.

MATRIX ALLOCATION

The forecast UIG for each main EUC band is split across the associated Matrix Positions, in proportion to the consumption for these Matrix Positions in our Consumption Forecast for the target Gas Year.

ASSUMPTIONS

- The back bill rules are applied to Unregistered Sites as per modification 0410A[11].

CALCULATION

INPUTS

- Orphaned Sites report from the CDSP;
- Legitimate Unregistered Sites Details report from the CDSP;
- Connection Details for Orphaned Sites report from the CDSP;
- Less than 12 months report from the CDSP;
- Annual Load Profiles for the West Midlands (WM) LDZ from the CDSP, aggregated to monthly level, as a proxy for the national profile;
- Our Consumption Forecast (as described in Section 4 of this Statement); and
- Unregistered AQ History Report from CDSP.

CALCULATION

The detailed calculation is described below.

Forecast the number of Supply Meter Points that have never been registered to a Shipper and have an indication of meter activity (suggesting the meter is consuming) along with the sum of their AQ, for each month in the target Gas Year.

1. For each successive month's Orphaned Sites report over the last three years, identify the number of:
    a. Supply Meter Points and the sum of their AQ per main EUC band;
    b. Supply Meter Points added to the report (compared to the previous month) and the sum of their AQ per main EUC band; and
    c. Supply Meter Points removed[12] from the report (compared to the previous month) and the sum of their AQ per main EUC band.
2. From step 1, forecast the number of Supply Meter Points and the sum of their AQ for each main EUC band that will meet the criteria for being on the Orphaned Sites report for each month of the target Gas Year. Estimate a proportion of sites from the Less than 12 months report that will ultimately appear on the Orphaned Sites report. This can be calculated by tracking what proportion of sites in these reports end up on the Orphaned Sites report after a year. (Do this as an annual sample rather than month on month). This is the base dataset to take forward.

Determine the likely actual AQs subsequent to registration

3. Using the Unregistered AQ History Report, determine the post-unregistered scaling factor by dividing final registered AQ by initial unregistered AQ. Do this for three bands:

[11] UNC Modification 0410A: "Responsibility for gas off-taken at Unregistered Sites following New Network Connections".
[12] These are likely either to have been registered by the CDSP or a Shipper, or confirmed to be legitimate Unregistered Sites.

a. Sites with an AQ of 1;
b. Sites with an AQ greater than 1 and less than 73,200; and
c. Sites with an AQ greater than 73,200 (median for unregistered).

4. Apply the post-unregistered scaling factor to the Supply Meter Points determined in step 2.

Determine composition of records removed because they were deemed to be legitimate, or were deemed to be non-issues.

5. Sites that are removed from the monthly Unregistered reports and do not appear on the legitimate unregistered site details report or connection details report, are deemed to be non-issues (i.e. they were not Unregistered Sites at all and have been cancelled and so do not contribute UIG). From this determine the percentage of Unregistered Sites deemed to be 'valid unregistered' sites.
6. Using the Legitimate Unregistered Site Details reports, determine the percentage of the removed Supply Meter Points identified in the last three years in step 1c that are due to those Supply Meter Points being deemed to be legitimate. Do this for each main EUC band.

Note that the remainder of removed Supply Meter Points are due to registration by a Shipper.

Adjust the dataset to remove those that are legitimate

7. Adjust the dataset in step 4 by removing the percentage of Supply Meter Points determined in step 6.

Determine the composition of those removed because they were registered by a Shipper

8. Using Connection Details for Orphaned Sites reports from the last two years, determine the percentage of removed Supply Meter Points in step 1c that are not legitimate (as determined in step 6) and that can be back billed. Do this for each main EUC band. The Supply Meter Points that can be back billed are those that are registered by the Shipper that first requested the Supply Meter Point, where the meter reading at the effective point of this registration is zero.

Note that the remainder of the removed Supply Meter Points cannot be back billed and create UIG at the Line in the Sand.

Adjust the dataset to remove those that are back billed

9. Adjust the dataset created in step 7 by removing the percentage of Supply Meter Points determined in step 8.

Determine the UIG at the Line in the Sand for each sub-EUC band

10. Note that the dataset in step 9 now represents the number of Supply Meter Points, broken down by main EUC band, that are forecast to create UIG at the Line in the Sand for each month in the target Gas Year, along with the sum of their AQs;
11. Sum the product of these monthly AQs and the respective month's annual load profile for the West Midlands LDZ, over the target Gas Year, for each main EUC band, to determine the UIG for each of these EUC bands over the target Gas Year;

12. Split these annual UIG values for each main EUC band into the respective Matrix Positions. Use the annual ratio of consumption in these Matrix Positions in our Consumption Forecast of the target Gas Year to do this; and
13. Sum these values across Matrix Positions to get the overall UIG for this contributor for the target Gas Year.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

RESULTS

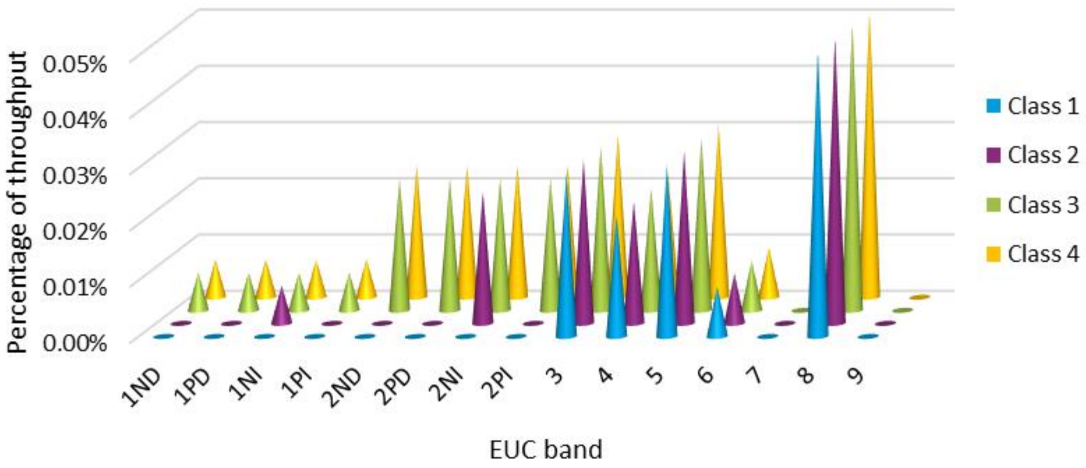
The forecast UIG associated with this contributor at the Line in the Sand for the target Gas year is: **53 GWh**.

It is broken down[13] across the sub-EUC bands as follows:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	4	14
	1PD	-	-	0	1
	1NI	-	0	0	1
	1PI	-	-	0	0
	2ND	-	-	0	1
	2PD	-	-	0	0
	2NI	-	0	2	3
	2PI	-	-	0	0
	3	0	0	2	3
	4	0	0	2	3
	5	0	0	2	3
	6	0	0	0	1
	7	-	-	-	-
	8	3	2	1	5
	9	-	-	-	-

[13] Note that due to rounding the sub-EUC band values in aggregate may not equal main EUC band values. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

The graph below shows UIG as a percentage of throughput for each Matrix Position:



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

The Statement for Gas Year 2022-2023 quantified the UIG for this contributor as 35 GWh (compared to this year's quantification of 53 GWh). The increase is due to the increased probability of a Supply Meter Point in almost all Matrix Positions where there are populations creating UIG at Line in the Sand in the target Gas Year based on current trends.

025 – SHIPPERLESS SITES

DASHBOARD

UIG split by Class

UIG split by Sector

Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
025 Shipperless Sites	26 GWh	**17 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

For gas consumed at a Supply Meter Point to be correctly allocated in the Settlement process, the Supply Meter Point must be registered to a Shipper in the UK Link central industry database.

If this is not the case, any gas consumed at the Supply Meter Point will not be directly allocated to a Shipper and will instead contribute to UIG. Shipperless Sites are the sub-set of these Supply Meter Points that have been registered to a Shipper at some point in the past.

Supply Meter Points are left without a Shipper when the registered Shipper records the meter as being removed and the supply isolated in the central industry UK Link system and withdraws from the registration. It is in situations where the supply has not actually been isolated that the issue of Shipperless Sites occurs. Such issues are often identified during the relevant Transporter's Gas Safety Regulations (GSR) visit which happens approximately 12 months after an isolation has been recorded.

If the same meter is found on site (and the supply is not isolated), the Supply Meter Point is "Passed to Shipper" (PTS), defined as a PTS Shipperless Site, and the previous Shipper is asked to register it using the reading at the recorded isolation date. This ensures that all the consumption can be accounted for. If the Shipper fails to do this and the recorded isolation date is after 1st

April 2013, the CDSP re-registers it to the previous Shipper, using the reading at the recorded isolation date.

If a different meter is found on site (and the supply is not isolated), the Supply Meter Point is defined as a "Shipper Specific rePort (SSrP) Shipperless Site" and is reported to all Shippers, so that the relevant Shipper can register it using a reading that is reflective of the point in time that they should have registered it (so that all the consumption they are liable for can be accounted for).

UIG created after the recorded isolation date is back billed if the next Shipper registration uses the meter reading at this recorded isolation date. Otherwise, the UIG created between the recorded isolation date and the date of the meter reading used in the next Shipper registration cannot be back billed and remains in place at the Line in the Sand.

DEFINITION

This contributor relates to Supply Meter Points that are not currently registered to a Shipper but have been at some point in the past, where gas is also being consumed.

There are situations where Supply Meter Points have never been registered to a Shipper. These can also create UIG but are not considered here. These are dealt with under the Unregistered Sites (020) contributor instead.

The cases considered as part of this contributor are Supply Meter Points that:

- Have no Shipper currently registered;
- Have had a Shipper registered at some point in the past; and
- Are consuming gas.

UIG IMPACT

Gas consumed at such Shipperless Sites creates positive UIG. If this is not identified and accounted for in time, this UIG remains at the Line in the Sand.

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is determined by:

- Using trend analysis to forecast the number of Supply Meter Points per main EUC band that could consume gas whilst they are Shipperless (PTS and SSrP as defined in the Settlement Context section above) in the target Gas Year, along with the sum of their AQs;
- Using trend analysis of AQ changes subsequent to registration of Shipperless Sites, scale the shipperless AQs to reflect the likely post-registration AQs more accurately;
- Using trend analysis to forecast the number of these Supply Meter Points that are found to be data errors rather than Shipperless Sites, and discounting these from the dataset;
- Using trend analysis to forecast the number of remaining Supply Meter Points that will be registered to a Shipper and back billed (thereby eliminating the associated UIG),

before the Line in the Sand occurs for the target Gas Year, and discounting these from the dataset; and

- Determining the UIG per main EUC band at the Line in the Sand for the target Gas Year by applying a national annual load profile to the sum of the AQs per main EUC band in the residual dataset.

MATRIX ALLOCATION

The forecast UIG for each main EUC band is split across the associated Matrix Positions, in proportion to the consumption for these Matrix Positions in our Consumption Forecast for the target Gas Year.

ASSUMPTIONS

- The back bill rules are applied to PTS Shipperless Sites as per Modification 0424[14] and SSrP sites as per Modification 0425V[15];
- The domestic/non-domestic status of Shipperless Sites (where the supply is not isolated) is the same as it was before they became shipperless; and
- SSrP Shipperless Sites were not shipperless prior to the new meter being installed.

CALCULATION

INPUTS

- Shipperless Sites PTS report from the CDSP;
- Shipperless Sites SSrP report from the CDSP;
- Connection Details for Shipperless Sites report from the CDSP;
- Annual Load Profiles for the West Midlands (WM) LDZ from the CDSP, aggregated to monthly level, as a proxy for the national profile;
- Our Consumption Forecast (as described in Section 4 of this Statement); and
- Shipperless AQ History report from the CDSP.

CALCULATION

The detailed calculation is described below.

Forecast the number of PTS Shipperless Sites for each main EUC band, along with the sum of their AQ, for each month in the target Gas Year

1. For each successive month's Shipperless Sites PTS report over the last three years, identify:
    a. The number of Supply Meter Points isolated before 1st April 2013 and the sum of their AQ for each main EUC band; and

[14] UNC Modification 0424: "Re-establishment of Supply Meter Points - prospective measures to address shipperless sites".
[15] UNC Modification 0425V: "Re-establishment of Supply Meter Points – Shipperless Sites".

    b. The number of Supply Meter Points removed[16] from the report (compared to the previous month's report) and the sum of their AQ for each main EUC band.
2. From step 1, forecast the number of Supply Meter Points and the sum of their AQ for each main EUC band that will meet the criteria for being on the Shipperless Sites PTS report for each month in the target Gas Year.

Determine the likely actual AQs subsequent to registration[17]

3. Using the Shipperless AQ history report, determine the post-shipperless scaling factor by dividing registered AQ by shipperless AQ. Do this for three bands:
    a. Sites with an AQ of 1;
    b. Sites with an AQ greater than 1 and less than 73,200; and
    c. Sites with an AQ greater than 73,200 (median for unregistered).
4. Apply the post-shipperless scaling factor to the Supply Meter Points determined in step 2.

Calculate the proportion of these that will not subsequently be back billed

5. Determine the Supply Meter Points that appear on the Shipperless Sites PTS report two years ago and do not appear on the latest Shipperless Sites PTS report;
6. From these, determine those that were not back billed and were not confirmed to be non-issues. This is the set that appear on a Connection Details for Shipperless Sites report (indicating that they have now been registered) with a different read to the isolation date read (indicating that consumption whilst they were shipperless was not corrected for); and
7. Determine the number that were not back billed and not confirmed to be non-issues (from step 4) as a proportion of those of those that were removed from the Shipperless Sites PTS report over the last two years (from step 5).

Forecast the UIG for each main EUC band in the target Gas Year, that is due to PTS Shipperless Sites

8. Apply the proportion of PTS Shipperless Sites determined in step 7 to the forecast of total AQ of PTS Shipperless Sites for each month in the target Gas Year (from step 4), for each main EUC band; and
9. Sum the product of these monthly total AQs and the respective month's annual load profile for the West Midlands LDZ, over the target Gas Year, for each main EUC band, to determine the UIG due to PTS Shipperless Sites for each of these EUC bands over the target Gas Year.

Forecast the number of SSrP Shipperless Sites for each main EUC band, along with the sum of their AQ, for each month in the target Gas Year

10. For each successive month's Shipperless Sites SSrP report over the last three years, identify the number of:
    a. Supply Meter Points and the sum of their AQ for each main EUC band;
    b. Supply Meter Points removed from the report (compared to the previous month) and the sum of their AQ for each main EUC band; and

[16] These are likely either to have been registered by a Shipper or by the CDSP on behalf of a Shipper.
[17] This is a new methodology step introduced this year.

c. Supply Meter Points added to the report (compared to the previous month) and the sum of their AQ for each main EUC band; and

11. From step 10, forecast the number of Supply Meter Points and the sum of their AQ for each main EUC band that will meet the criteria for being on the Shipperless Sites SSrP report for each month in the target Gas Year.

Calculate the proportion of these that will not subsequently be back billed

12. Determine the Supply Meter Points that have been removed from a Shipperless Sites SSrP report over the last two years by comparing successive months' reports;
13. From these, determine those that were not back billed and were not confirmed to be non-issues. This is the set that appear on a Connection Details for Shipperless Sites report (and so have now been registered) with a non-zero read (indicating that consumption whilst they were shipperless was not accounted for); and
14. Determine the number that were not back billed and not confirmed to be non-issues (from step 13) as a proportion of those of those that were removed from Shipperless Sites PTS reports over the last two years (from step 10).

Forecast the UIG for each main EUC band in the target Gas Year, that is due to SSrP Shipperless Sites

15. Apply the proportion of SSrP Shipperless Sites determined in step 14 to the forecast of total AQ of SSrP Shipperless Sites for each month in the target Gas Year (from step 11), for each main EUC band; and
16. Sum the product of these monthly total AQs and the respective month's annual load profile for the West Midlands LDZ, over the target Gas Year, for each main EUC band, to determine the UIG due to SSrP Shipperless Sites for each of these EUC bands over the target Gas Year.

Determine the UIG at the Line in the Sand for each Matrix Position

17. Sum the forecast PTS UIG in the target Gas Year (from step 9) and the forecast SSrP UIG in the target Gas Year (from step 16) to get the total UIG by main EUC band;
18. Split these annual UIG values for each main EUC band into the respective Matrix Positions. Use the annual ratio of consumption in these Matrix Positions in our Consumption Forecast of the target Gas Year to do this; and
19. Sum these values across Matrix Positions to get the overall UIG for this contributor for the target Gas Year.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

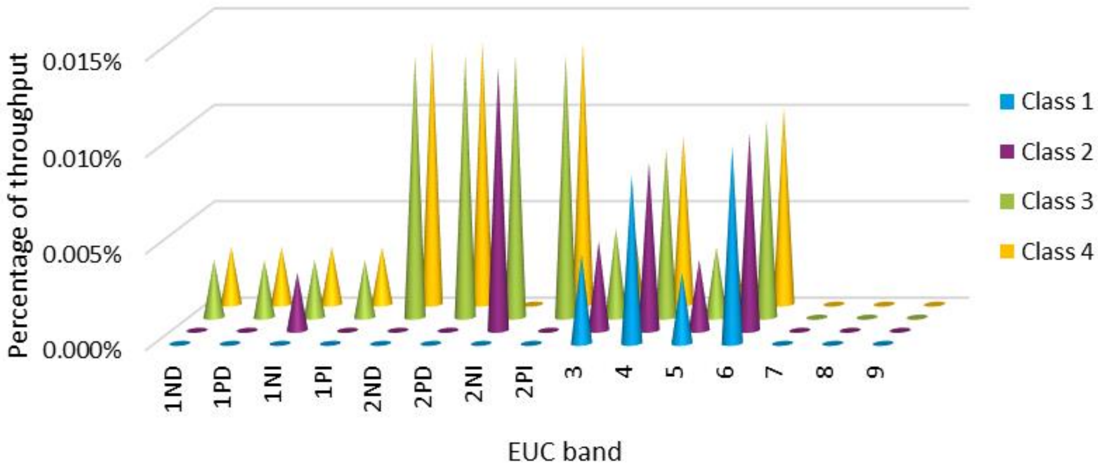
RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **17 GWh**. 7 GWh of this is due to PTS Shipperless Sites and 10 GWh due to SSrP Shipperless Sites.

This is allocated across Matrix Positions as follows:

	CLASS			
EUC BAND	1	2	3	4
1ND	-	-	2	6
1PD	-	-	0	0
1NI	-	0	0	0
1PI	-	-	0	0
2ND	-	-	0	1
2PD	-	-	0	0
2NI	-	0	1	2
2PI	-	-	0	0
3	0	0	0	1
4	0	0	1	1
5	0	0	0	0
6	0	0	0	1
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-

The graph below shows UIG as a percentage of throughput for each Matrix Position:



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

The Statement for Gas Year 2022-2023 quantified the UIG for this contributor to be 26 GWh (compared to this year's quantification of 17 GWh). The period of the dataset has moved on by a year, and the data suggests fewer of these sites are generating UIG - either because they are now connected or errors in recording these sites as shipperless have been corrected.

040 – CONSUMPTION METER ERRORS – INHERENT BIAS

DASHBOARD

UIG split by Class

UIG split by Sector

Gas Year 2023 – 2024 Updates

Data inputs updated to reflect an additional year of industry data.

Averaging methodology tweaked to create some stability in this contributor as the available testing data expands.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
040 Consumption Meter Errors	432GWh	**-15 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Meters are used to measure and record the volume of gas consumed at Supply Meter Points. There are several types of meters that are used to do this, including diaphragm, turbine, ultrasonic and rotary meters.

Shippers are allocated volumes of gas based on the AQ of the Supply Meter Points to which they are registered. This allocation is reconciled as valid meter readings are obtained. In this way, Shippers are charged for the volume of gas that has been measured. Within Settlement, it is assumed that meters measure the volume of gas accurately.

There are three potential sources of meter error:

- Meters manufactured with an inherent bias to slightly over or under-record;

- Meters becoming faulty over time, causing them to record inaccurately; and
- Meters recording inaccurately at the throughput extremes of their specified use.

Incorrect meter volumes due to extremes of use or an inherent bias give rise to UIG at the Line in the Sand.

In the case of faulty meters, the Shipper can submit a consumption adjustment before the Line in the Sand, such that the volume reconciled is correct and the Shipper is charged for the correct volume of gas. In situations where a meter fault is not detected or a consumption adjustment is not submitted, the fault also gives rise to UIG at the Line in the Sand.

DEFINITION

This contributor relates to meters that over or under-record the volume of gas consumed at Supply Meter Points.

We have previously assessed the potential for calculating UIG across the three sources noted above. Of these, only inherent bias has sufficiently robust data to enable a quantification methodology.

UIG IMPACT

Any error in the measurement of the volume of gas consumed contributes to UIG. Meters that under-record create positive UIG; meters that over-record create negative UIG. This UIG remains at the Line in the Sand, save for errors arising from meter faults where the Shipper submits a suitable consumption adjustment.

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is determined by:

- The inherent error bias for each meter type from in-service testing results;
- The forecast number of meters of each type for each EUC band 01-02 Matrix Position for the target Gas Year, using the current numbers and meter type proportions, the rate of meter exchanges and the proportions of each meter type being fitted, and the rate of new installations and the proportions of each meter type being fitted; and
- The proportion of meters of each type in each Matrix Position. For EUC bands 01-02, use the numbers determined above; for EUC bands 03-09, use the current numbers.

MATRIX ALLOCATION

The forecast UIG for each main EUC band is split across the associated Matrix Positions, in proportion to the consumption for these Matrix Positions in our Consumption Forecast for the target Gas Year.

ASSUMPTIONS

- The proportion of newly installed meter types will follow the recent trend for EUC bands 01-02;
- Meters typically operate at close to 0.2 Qmax;

- There is no error for rotary or turbine meters; and
- There are no significant regional differences in the types of meters installed throughout the country.

CALCULATION

INPUTS

- Our Consumption Forecast (as described in Section 4 of this Statement);
- Our Supply Meter Point Forecast (also described in Section 4 of this Statement);
- Meter Types report from the CDSP;
- In-Service Testing (IST) Results report from OPSS[18];
- Smart Meter Data report from BEIS; and
- Smart meters installed – derived from information contained within the Meter Types report from the CDSP.

CALCULATION

The detailed calculation is described below.

Establish the error bias for meter types, from IST results

1. Obtain the error bias at 0.2 Qmax for ultrasonic and diaphragm meter types from all the available in-service testing data from OPSS since 2016. Determine the average error bias for each of these meter types, weighted by the number of meters tested. For rotary and turbine meters, assume the bias is zero.

Determine the number of meters of each type currently in service

2. Determine the number of meters of each meter type currently in service for each Matrix Position from the Meter Type report.

Forecast the number of EUC band 01-02 meter exchanges and new installations prior to the target Gas Year

3. Determine the number of EUC band 01-02 meter exchanges that are likely to take place between the Meter Type report being obtained and the mid-point of the target Gas Year, from the BEIS smart meter installation projections; and
4. Determine the number of EUC band 01-02 new installs likely to take place, between the Meter Type report being obtained and the mid-point of the target Gas Year, by differencing the numbers in our Supply Meter Point Forecast for the target Gas Year and the meters currently in service (from step 2).

Determine the number of EUC band 01-02 meters of each type that are likely to be installed or removed prior to the target Gas Year

5. Determine the proportion of EUC band 01-02 meters of each type installed (as part of meter exchanges or new installations) over the last year, from the Meter Type report;

[18] Office for Product Safety & Standards

6. Apply these proportions to the sum of the number of meter exchanges (from step 3) and the number of new installations (from step 4), for EUC bands 01-02, to get a forecast of the number of new EUC 01-02 meters of each meter type to be put in service before the target Gas Year;
7. Determine the proportion of EUC band 01-02 meters of each type installed during or prior to 2017 from the Meter Type report; and
8. Apply these proportions to the number of meter exchanges (from step 3), for EUC bands 01-02, to get a forecast of the number of old EUC band 01-02 meters of each type to be taken out of service before the target Gas Year.

Forecast the population of each meter type for each EUC band 01-02 Matrix Position in the target Gas Year

9. Determine the number of meters of each type for each EUC band 01-02 Matrix Position as: the current number of meters of each type (from step 2), plus the new meters of each type to be put in service (from step 6), less the old meters of each type to be taken out of service (from step 8).

Forecast the error bias consumption (UIG) by meter type for each Matrix Position (using forecast meter type proportions for EUC band 01-02 and the current proportions for EUC band 03-09)

10. Determine the forecast proportion of each meter type in each EUC band 01-02 Matrix Position from the number of meters of each type in each Matrix Position (from step 9). Apply this to the consumption forecast for each Matrix Position (from our Consumption Forecast) to obtain a consumption forecast per meter type per EUC band 01-02 Matrix Position;
11. Determine the (current) proportion of each meter type in each EUC band 03-09 Matrix Position from the number of meters of each type in each Matrix Position (from step 2). Apply this to the consumption forecast for each Matrix Position (from our Consumption Forecast) to obtain a consumption forecast per meter type per EUC band 03-09 Matrix Position;
12. Determine the error bias consumption per Matrix Position as: the error bias for each meter type (from step 1), multiplied by the consumption forecast for each meter type (from steps 10 and 11). Add these across meter types for each Matrix Position to get the error bias consumption (UIG) per Matrix Position; and
13. Sum the UIG across Matrix Positions to get the overall UIG for this contributor.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

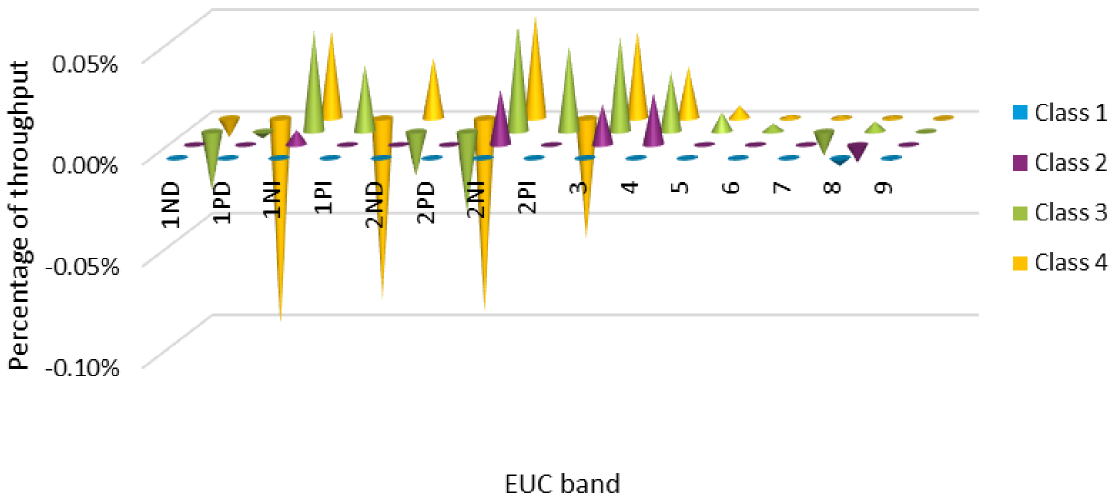
RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **-15 GWh**.

This is allocated across Matrix Positions as follows[19]:

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	-	-	-15	-20
	1PD	-	-	-0	-11
	1NI	-	0	1	3
	1PI	-	-	0	-0
	2ND	-	-	-0	2
	2PD	-	-	-0	-0
	2NI	-	0	4	6
	2PI	-	-	0	-0
	3	-	0	4	5
	4	-	0	3	3
	5	-	0	1	1
	6	-	0	0	0
	7	-	0	-0	0
	8	-0	-0	0	0
	9	-1	-	-	-

The graph below shows UIG as a percentage of throughput for each Matrix Position:



[19] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

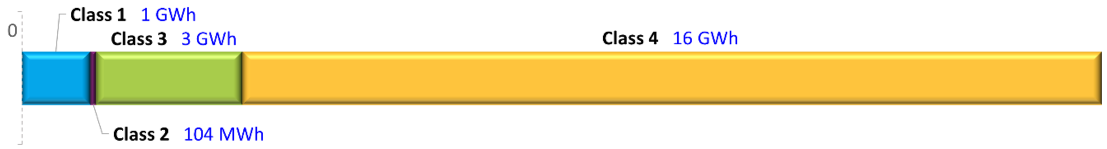
The Statement for Gas Year 2022-2023 quantified the UIG for this contributor as 432 GWh (compared to this year's quantification of -15 GWh).

This significant change can be attributed to a combination of the continued replacement of synthetic diaphragm meters with ultrasonic, and a notable change in the error rate in the latest in-service testing results for both diaphragm and ultrasonic meter types, showing that the latest tested meters have generally been found to be over-recording rather than the historic tendency to under-record. This impact of this change has been amplified as this year's analysis took into account an extra two years' worth of testing data (which wasn't available last year) both showing this trend.

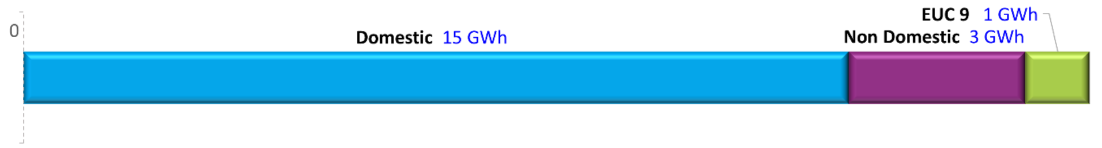
060 – IGT SHRINKAGE

DASHBOARD

UIG split by Class



UIG split by Sector



Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
060 IGT Shrinkage	18 GWh	**19 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Shrinkage is any gas that the gas network loses during transportation. There are three different areas of shrinkage: NTS shrinkage, LDZ shrinkage and IGT shrinkage.

NTS shrinkage does not affect Settlement as its inputs (and therefore the outputs) are external to the LDZ Settlement regime. LDZ shrinkage is quantified using an industry-approved methodology and engineering model, and this quantity is directly accounted for in Settlement. This means that such LDZ shrinkage does not contribute to UIG (other than by virtue of any error in its quantification[20]). LDZ shrinkage is explicitly outside of the AUGE remit and, as such, we do not consider it further here.

Independent Gas Transporters Arrangements Document (IGTAD), Section C, governs IGT Shrinkage. It is not directly accounted for in Settlement. Instead, it contributes to (and is accounted for via) UIG.

[20] We do not consider any potential error in LDZ shrinkage as a contributor to our UIG methodology as it is outside of the AUGE's remit.

DEFINITION

This contributor relates only to IGT shrinkage. This is any gas lost during transportation between entering the IGT network at the CSEP and the ECV of Supply Meter Points.

UIG IMPACT

IGT shrinkage is not directly accounted for in Settlement and therefore creates positive UIG.

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is determined by:

- Estimating the length of IGT mains in each LDZ for the target Gas Year, based on a forecast number of Supply Meter Points (from trend analysis) and the average length of main per Supply Meter Point (from the Independent Networks Association);
- Forecasting the associated leakage volume for these IGT mains by applying the leakage rate for polyethylene (PE) mains (from the National Leakage Test (NLT) programme) by the forecast lengths of IGT main; and
- Converting these leakage volumes into energy values using the LDZ Calorific Value (CV).

MATRIX ALLOCATION

The forecast IGT shrinkage UIG for each LDZ is split across the EUC bands and Classes, in proportion to the consumption for the EUC bands and Classes in our Consumption Forecast for the target Gas Year. We then sum these LDZ values to get a national value for each Matrix Position.

ASSUMPTIONS

- IGT shrinkage will not be accounted for in Settlement before the target Gas Year is over through being combined with LDZ shrinkage;
- All IGT mains are PE and there is no leakage from existing services connected to PE mains;
- All IGT shrinkage is due to leakage. That is, gas lost in the purging of new mains and services, own use gas and network theft of gas can all be ignored for the purposes of quantifying IGT shrinkage; and
- The main leaks at the same rate whether it is located at the start or end of a network.

CALCULATION

INPUTS

- Average Main Length from the Independent Networks Association (INA) (sourced in 2021);
- IGT Sites report from the CDSP;

- NLT leakage rates from the public domain. This provides the leakage rates for each type of main and service; and
- CV from National Grid's data explorer. Latest CVs for each LDZ for each Gas Day from 1st October 2020 to 30th September 2022.

CALCULATION

The detailed calculation is described below.

Identify the current number of Supply Meter Points by LDZ on IGT networks

1. Using CDSP records, determine total IGT Supply Meter Points in each LDZ.

Use historical trends to forecast the number of IGT Supply Meter Points for the target year

2. Use a snapshot of CDSP records at an appropriate number of points in history and compare to today's records to determine historic growth trends in IGT Supply Meter Points for each LDZ; and
3. Project this growth trend to the target Gas Year to forecast the total IGT Supply Meter Points for each LDZ for 1st April 2024 (as a mid-year average).

Calculate the total IGT main length per LDZ

4. Multiply the average length of main per Supply Meter Point by the forecast total number of Supply Meter Points per LDZ from step 3.

Calculate the total annual leakage volume in IGT networks per LDZ

5. Multiply the total length of IGT mains from step 4 by the annual leakage rate for PE mains, as per the national leakage survey.

For each LDZ, calculate average CV

6. Calculate the mean CV per LDZ based on the values for the two most recent complete Gas Years.

Calculate the total UIG associated with IGT shrinkage for each LDZ for the target Gas Year

7. Multiply the total annual leakage volume from step 5 by the average CV from step 6; and
8. Divide the resulting value by 3.6 to derive an energy value in kWh.

Determine the UIG at the Line in the Sand for each sub-EUC band

9. For each LDZ, split the UIG value across each sub-EUC band and Class by using the annual ratio of consumption in those sub-EUC bands and Classes for that LDZ in the IGT Supply Meter Points Consumption Forecast of the target Gas Year; and
10. Sum all UIG values to determine the national UIG value for this contributor.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, by Matrix Position.

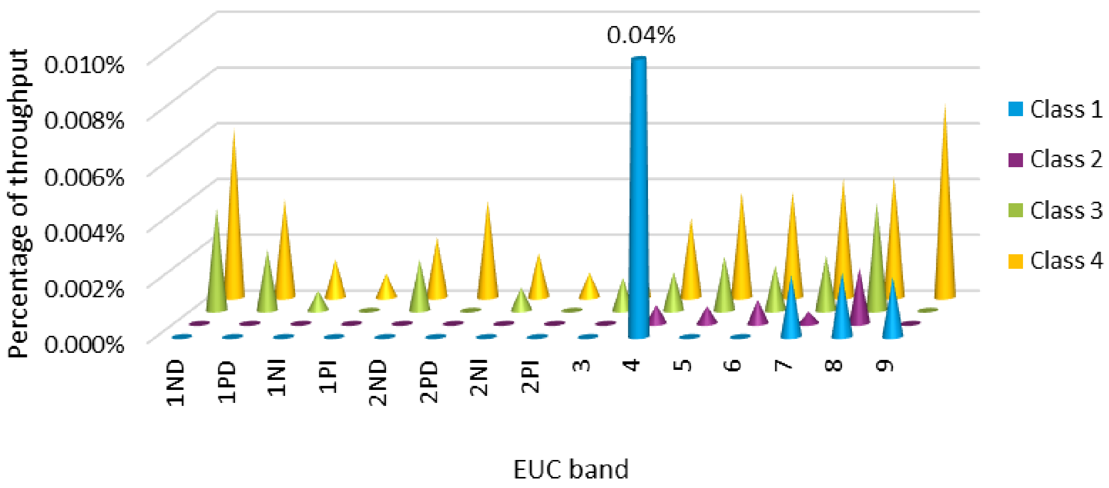
RESULTS

The UIG calculated for this contributor at the Line in the Sand for the target Gas Year is: **19 GWh**.

This is broken down by Matrix Position as follows[21]:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	2	13
	1PD	-	-	0	0
	1NI	0	-	0	0
	1PI	-	-	-	0
	2ND	-	-	0	0
	2PD	-	-	-	0
	2NI	-	-	0	0
	2PI	-	-	-	0
	3	-	-	0	0
	4	0	0	0	0
	5	-	0	0	0
	6	-	0	0	0
	7	0	0	0	0
	8	0	0	0	0
	9	1	-	-	0

The graph below shows UIG as a percentage of throughput for each Matrix Position:



[21] Note that due to rounding the sub-EUC band values in aggregate may not equal main EUC band values. Some values are negative but round to zero. Dashes are where the Matrix Position is forecast to be empty.

NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

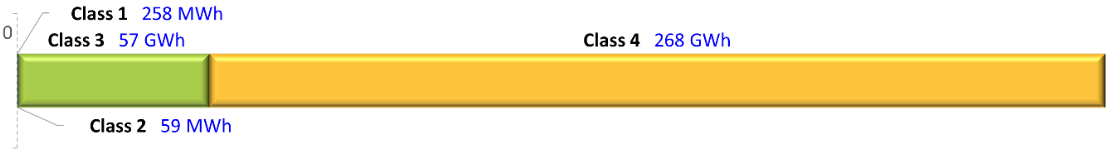
The Statement for Gas Year 2022-2023 quantified the UIG for this contributor as 18 GWh (compared to this year's quantification of 19 GWh). There is no material change for this contributor.

The contribution to total UIG from Class 1, EUC band 4 is of disproportionate size. This is because this sparsely populated Matrix Position includes a single large IGT site making up the majority of its consumption. Notwithstanding this, the overall contribution of UIG for this Matrix Position (and contributor overall) remains insignificant.

070 – AVERAGE PRESSURE ASSUMPTION

DASHBOARD

UIG split by Class



UIG split by Sector

Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
070 Average Pressure Assumption	359 GWh	**326 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

The Settlement calculations assume that meters measure gas volumes that are at a standard temperature of 15°C and a standard atmospheric pressure of 1013.25 hPa. The altitude along with localised weather and atmospheric conditions result in the actual atmospheric pressure at the location of meters being different to the standard.

There is a small number of meters that have correction equipment fitted and dynamically adjust for this according to the actual atmospheric pressure and temperature of the gas. They provide volumes that are consistent with the standard atmospheric pressure and temperature. These are typically high-capacity meters. The vast majority of meters do not do this.

In addition, there are some meters for which a location dependent Specific Correction Factor[22] is applied to the advance between two meter readings as part of the Settlement calculations. These factors are designed to adjust for variances from standard atmospheric pressure that are due to

[22] Also known as Conversion Factor.

the altitude of the meter. They do not adjust for variances that are due to the prevailing atmospheric conditions. They ensure that the volume processed in Settlement is more consistent with the standard atmospheric pressure. This occurs for Supply Meter Points that typically use over 732,000 kWh.

The remaining set of meters have a Standard Correction Factor applied to the advance between two meter readings as part of the Settlement calculations. This factor is also designed to adjust for variances from standard atmospheric pressure that are due to the altitude of the meter. However, it assumes that all meters to which it is applied are at the national average altitude of 67.5 metres. They do not adjust for variances that are due to the prevailing atmospheric conditions. They ensure that the volume processed in Settlement is more consistent with the standard atmospheric pressure, but do not adjust for the fact that most meters do not sit at the national average altitude of 67.5 metres.

The number of gas moles (the amount of gas) in a cubic metre is proportional to the gas pressure. A 1 millibar change in the gas pressure results in there being approximately 0.1% more gas in the same space. Meters measure based on the relative difference between the atmospheric pressure and the pressure of the gas. This means that a lower atmospheric pressure has the same effect as a higher gas pressure and vice versa.

Meters that do not have correction equipment fitted, over or under-record the amount of gas used when the actual pressure differs from that implicitly assumed in the Correction Factor that is applied for them in Settlement (Standard or Specific as appropriate). This over or under-recording of the amount of gas used creates UIG. There is no means for correcting for this in Settlement and so such UIG remains at the Line in the Sand.

DEFINITION

This contributor relates to meters that over or under-record the amount of gas consumed at Supply Meter Points because the actual atmospheric pressure is not implicitly assumed in the applicable Correction Factors applied in Settlement (Standard or Specific).

For the avoidance of doubt, this does not include cases where meters have correction equipment fitted as they dynamically adjust for variances with the standard atmospheric pressure and provide measurement consistent with this.

UIG IMPACT

If the atmospheric pressure at the location of the meter is less than that implicitly assumed in the applicable Correction Factor used in Settlement (Standard or Specific), the meter will over-record the amount of gas and create negative UIG.

If the atmospheric pressure at the location of the meter is more than that implicitly assumed in the applicable Correction Factor used in Settlement (Standard or Specific), the meter will under-record the amount of gas and create positive UIG.

This excludes cases where the meter has correction equipment fitted.

There is no means for correcting for this in Settlement and so such UIG remains at the Line in the Sand.

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is determined by:

- Using weather station data to derive an average weather-related pressure variance from the pressure assumptions inherent in the Settlement calculations for each LDZ;
- Using altitude data by postcode to derive an average altitude related pressure variance from the pressure assumptions inherent in the Settlement calculations for each LDZ;
- Using these pressure variances and the Pressure Volume Error Rate (the incremental volume change due to a 1 millibar variance in pressure) to calculate a Weather Pressure Error Factor for each LDZ, and an Altitude Pressure Error Factor for each LDZ;
- Identifying the AQ proportions, for each LDZ and Matrix Position, of Supply Meter Points that:
    a. Have meters with correction equipment fitted; and
    b. Do not have meters with correction equipment fitted but do have a Specific Correction Factor used in Settlement.
- Applying these AQ proportions to our Consumption Forecast for each LDZ and Matrix Position, to obtain a consumption forecast where there is neither correction equipment fitted, nor a Specific Correction Factor used in Settlement; and a consumption forecast where correction equipment is not fitted but where a Specific Correction Factor is used in Settlement;
- Applying the Weather Pressure Error Factor and the Altitude Pressure Error Factor (both explained above) to the consumption forecast for Supply Meter Points that have neither correction equipment fitted or a Specific Correction Factor used in Settlement;
- Applying only the Weather Pressure Error Factor to the consumption forecast for Supply Meter Points where correction equipment is not fitted but where a Specific Correction Factor is used in Settlement; and
- Summing these two results for each LDZ and Matrix Position to derive an estimate of the UIG. Summing these across LDZ to obtain the UIG by Matrix Position; and across Matrix Positions to get the overall UIG for this contributor.

MATRIX ALLOCATION

The UIG by Matrix Position is determined as part of the method for calculating the overall UIG for this contributor.

ASSUMPTIONS

- There are no material changes to the average atmospheric pressure in each LDZ over time (due to climate change for example);
- Weather station atmospheric pressure readings (which are corrected to Mean Sea Level) are a good proxy for the atmospheric pressure within the same LDZ (after it has also been corrected to Mean Sea Level);
- There is no correlation between altitude and the average amount of gas used at Supply Meter Points; and

- The proportion of Supply Meter Points that have correction equipment fitted will be the same in the target Gas Year as it has been in previous years.

CALCULATION

INPUTS

- Pressure Data for the Gas Years 2012-2017 from the CDSP;
- Conversion Equipment Fitted report from the CDSP;
- Postcode and Elevation Data from Open Data[23];
- Correction Factors report from the CDSP; and
- Our Consumption Forecast (as described in Section 4 of this Statement).

CALCULATION

The detailed calculation is described below.

Weather Pressure Difference: determine the difference in the average atmospheric pressure in each LDZ (corrected to Mean Sea Level) and standard atmospheric pressure (which is at Mean Sea Level)

1. Identify the weather station(s) used for each LDZ;
2. Determine the average atmospheric pressure, corrected to Mean Sea Level, for each LDZ, from the respective weather station data; and
3. Difference these values to standard atmosphere pressure for each LDZ.

Altitude Pressure Difference: determine the difference in the average atmospheric pressure in each LDZ and standard atmospheric pressure (corrected to the national average altitude of 67.5m above Mean Sea Level)

4. Determine the average altitude of Supply Meter Points in each LDZ from postcode elevation data, giving equal weightings to each postcode (on the basis that they each contain approximately the same number of Supply Meter Points). Where a postcode spans multiple LDZs, include it in the averaging for each of these LDZs; and
5. For each LDZ, calculate the pressure at the average LDZ altitude, determine the pressure difference between standard atmospheric pressure corrected to the average altitude for the LDZ (as determined above) and standard atmospheric pressure corrected to the national average altitude (67.5m above Mean Sea Level).

Identify the Pressure Gas Volume Error Rate, this being the volume change per millibar of pressure change

6. Use the Ideal Gas Law to determine the energy change for every 1 millibar change in pressure. This is 0.00098692 per millibar. Call this the Pressure Gas Volume Error Rate.

Calculate the Volume Error Factors

7. Multiply the weather-related pressure variance for each LDZ from step 3 by the Pressure Gas Volume Error Rate from step 6, to calculate the Weather Pressure Volume Error Factor; and

[23] https://www.getthedata.com/downloads/open_postcode_elevation.csv.zip

8. Multiply the altitude related pressure variance for each LDZ from step 5 by the Pressure Gas Volume Error Rate from step 6, to calculate the Altitude Pressure Volume Error Factor.

Determine the AQ proportion of the Supply Meter Points for each LDZ and Matrix Position, that require application of the error rates

9. For each LDZ and Matrix Position, determine the AQ proportion of Supply Meter Points that do not have correction equipment fitted but do have a Specific Correction Factor used in Settlement (from the Conversion Equipment Fitted report and the Correction Factor report); and
10. For each LDZ and Matrix Position, determine the AQ proportion of Supply Meter Points that do not have correction equipment fitted and do not have a Specific Correction Factor used in Settlement (from the Conversion Equipment Fitted report and the Correction Factor report).

Determine the weather-related error (UIG) and the altitude related error (UIG) for the target Gas Year for each LDZ and Matrix Position

11. For each LDZ and Matrix Position, determine the weather-related error as: the product of step 7, step 9 and the Consumption Forecast for the LDZ and Matrix Position for the target Gas Year; and
12. For each LDZ and Matrix Position, determine the altitude related error as: the product of step 8, step 10 and the Consumption Forecast for the LDZ and Matrix Position for the target Gas Year.

Determine UIG

13. Sum the result of step 11 and step 12 for each LDZ and Matrix Position to determine the UIG by LDZ Matrix Position;
14. Sum the results of step 13 across LDZs to obtain the UIG by Matrix Position; and
15. Sum the results of step 14 across Matrix Positions to obtain the overall UIG for this contributor.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

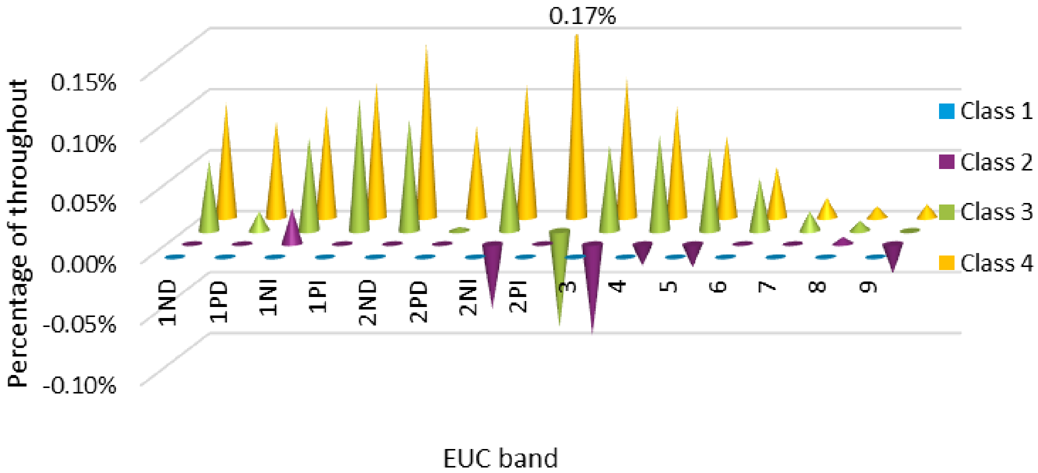
RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **326 GWh**.

This is broken down by Matrix Position as follows[24]:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	31	196
	1PD	-	-	0	8
	1NI	-	0	2	7
	1PI	-	-	0	0
	2ND	-	-	0	9
	2PD	-	-	0	0
	2NI	-	-0	5	13
	2PI	-	-	-0	0
	3	-	-0	6	13
	4	-	-0	7	11
	5	-	-0	4	6
	6	-	0	2	4
	7	-	0	1	1
	8	0	0	0	1
	9	0	-0	-	0

The graph below shows UIG as a percentage of throughput for each Matrix Position[25].



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

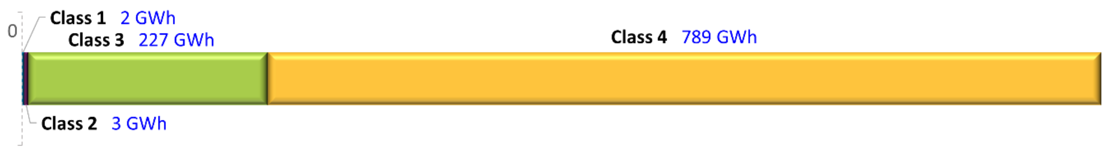
The Statement for Gas Year 2022-2023 quantified the UIG for this contributor to be 359 GWh (compared to this year's sum of 326 GWh). This slight decrease is mainly due to a reduction in our Consumption Forecast driven by the current trend of reducing AQs.

[24] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.
[25] Note this graph shows negatives for Matrix Positions with minimal throughput and these round to zero in terms of the GWh in the table above.

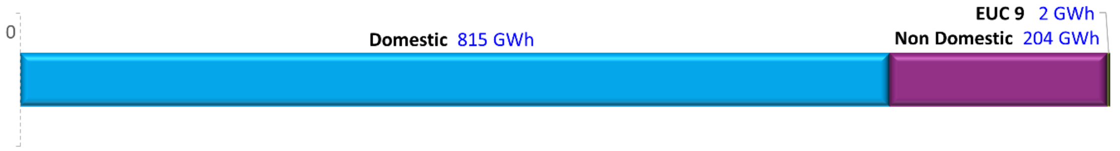
080 – AVERAGE TEMPERATURE ASSUMPTION

DASHBOARD

UIG split by Class



UIG split by Sector



Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
080 Average Temperature Assumption	1,220 GWh	**1,021 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

The Settlement calculations assume that meters measure gas volumes that are at a standard temperature of 15°C and a standard atmospheric pressure of 1013.25 hPa. Actual temperature conditions will in most cases be different to these assumptions.

There is a small number of meters that have correction equipment fitted and dynamically adjust for this according to the actual atmospheric pressure and temperature of the gas. They provide volumes that are consistent with the standard atmospheric pressure and temperature. These are typically high-capacity meters. The vast majority of meters do not have this correction equipment fitted.

In addition, there are some meters for which a location dependent Specific Correction Factor[26] is applied to the advance between two meter readings as part of the Settlement calculations. These factors are designed to adjust for variances between the average actual temperature of gas at

[26] Also known as Conversion Factor.

the meter's location and the standard temperature of 15°C. They ensure that the volume processed in Settlement is more consistent with this standard temperature. This occurs for Supply Meter Points that typically use over 732,000 kWh.

The remaining set of meters have a Standard Correction Factor applied to the advance between two meter readings as part of the Settlement calculations. This factor is also designed to adjust for variances between the average actual temperature of the gas and the standard temperature of 15°C. However, it assumes that the temperature of the gas for all meters to which it is applied is the temperature in the Thermal Regulations of 12.2°C. It ensures that the volume processed in Settlement is more consistent with the standard temperature of 15°C, but does not adjust for the fact that, for most meters, the average temperature of gas is not that in the Thermal Regulations.

The number of gas moles (the amount of gas) in a cubic metre is inversely proportional to the temperature. This means that the amount of gas is less per unit volume the higher the temperature and vice versa. Meters that do not have correction equipment fitted, over or under-record the amount of gas used when the actual gas temperature differs from that implicitly assumed in the Correction Factor that is applied for them in Settlement (Standard or Specific as appropriate). This over or under-recording of the amount of gas used creates UIG. There is no means for correcting for this in Settlement and so such UIG remains at the Line in the Sand.

DEFINITION

This contributor relates to meters that over or under-record the amount of gas consumed at Supply Meter Points because the temperature is not that implicitly assumed in the applicable Correction Factors applied in Settlement (Standard or Specific).

For the avoidance of doubt, this does not include cases where meters have correction equipment fitted as they dynamically adjust for temperature variances with the standard temperature of 15°C and provide measurement consistent with this.

UIG IMPACT

If the average temperature at the location of the meter is more than that implicitly assumed in the Correction Factor used in Settlement, the meter will over-record the amount of gas and create negative UIG.

If the average temperature at the location of the meter is less than that implicitly assumed in the Correction Factor used in Settlement, the meter will under-record the amount of gas and create positive UIG.

This excludes cases where the meter has correction equipment fitted.

There is no means for correcting for this in Settlement and so such UIG remains at the Line in the Sand.

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is determined by:

- Identifying a flow-weighted[27] average temperature for internal meter locations for each LDZ and Matrix Position from the previous temperature studies (using the same for internal and external meters if the study did not break these down);
- Identifying a flow-weighted average temperature for external meter locations for each LDZ and Matrix Position from the previous temperature studies (using the same for internal and external meters if the study did not break these down);
- Calculating an Internal Meter Error Factor and an External Meter Error Factor, arising from the variances to 12.2°C (the temperature in the Thermal Regulations), for each LDZ and Matrix Position using the Ideal Gas Law;
- Allocating each Supply Meter Point to one of the following three categories based on the meter location code: Internal, External and Unknown;
- Determining the numbers of Supply Meter Points and the total AQ, for each LDZ, Matrix Position for:
    a. Meters that have any correction equipment fitted;
    b. Internal meters that do not have any correction equipment fitted;
    c. External meters that do not have any correction equipment fitted; and
    d. Unknown meter locations that do not have any correction equipment fitted.
- Splitting the unknown meter total AQ above, across the internal meter total AQ and the external meter total AQ in proportion to the internal meter number and the external meter number above, for each LDZ and Matrix Position;
- Determining the total AQ for internal meters as a proportion of the total AQ, and the total AQ for external meters as a proportion of the total AQ, for each LDZ and Matrix Position;
- Applying the AQ proportions to our Consumption Forecast for each LDZ and Matrix Position, to obtain a consumption forecast where the meter is internal; and a consumption forecast where the meter is external;
- Applying the Internal Meter Error Factor to the internal consumption forecast for each LDZ and Matrix Position; and the External Meter Error Factor to the external consumption forecast for each LDZ and Matrix Position; and
- Summing these two results for each LDZ and Matrix Position to derive an estimate of the UIG. Summing these across each LDZ to obtain the UIG by Matrix Position; and across Matrix Positions to get the overall UIG for this contributor.

[27] A weighted average is one that takes account of varying degrees of importance. As gas demand is not static and more is used in the winter, when compared to the summer, the temperature has to be weighted as per the flow profile.

MATRIX ALLOCATION

The UIG by Matrix Position is determined as part of the method for calculating the overall UIG for this contributor.

ASSUMPTIONS

- The flow-weighted average gas temperatures from the temperature studies are the most appropriate estimate of the temperature of gas for the purposes of calculating UIG;
- The relative proportion of internal and external meters does not change materially year-on-year; and
- The proportion of Supply Meter Points that have temperature correction equipment installed does not change materially year-on-year.

CALCULATION

INPUTS

- Flow-Weighted Gas Temperature studies from BG Technology;
- Meter Location report from the CDSP;
- Conversion Equipment Fitted report from the CDSP; and
- Our Consumption Forecast (as described in Section 4 of this Statement).

CALCULATION

The detailed calculation is described below.

Identify the temperature values to be used for each Matrix Position

1. Identify the flow-weighted average temperature for internal meters and for external meters for each LDZ Matrix Position using the relevant study (as per the table in the Temperature Studies section below). Where the relevant study doesn't distinguish between internal and external meters, use the single temperature provided for both internal and external meters.

Calculate internal and external temperature error factors for each LDZ and Matrix Position

2. Calculate the internal and external temperature error factor for each LDZ and Matrix Position as follows, using the temperatures for these positions determined in step 1:

$$\text{Temperature Error Factor} = \left(\frac{288.15}{(273.15 + \text{Temperature °C}) \times 1.0098}\right) - 1$$

   Call these the Internal Meter Error Factor and External Meter Error Factor, respectively.

Determine internal and external meter numbers and total AQs for each LDZ and Matrix Position

3. Allocate each Supply Meter Point to one of three categories, based on its meter location based on the Internal/External split info below;
4. Determine the numbers of Supply Meter Points and the total AQ, for each LDZ, Matrix Position and:
   a. Meters that have any correction equipment fitted;

   b. Internal meters that do not have any correction equipment fitted;
   c. External meters that do not have any correction equipment fitted; and
   d. Unknown meter locations that do not have any correction equipment fitted.
5. Split the unknown meter total AQ above, across the internal meter total AQ and the external meter total AQ in proportion to the internal meter number and the external meter number above, for each LDZ and Matrix Position; and
6. Determine the total AQ for internal meters as a proportion of the total AQ, and the total AQ for external meters as a proportion of the total AQ, for each LDZ and Matrix Position.

Apply the internal and external error factors to the appropriate consumption values to determine the error for each LDZ and Matrix Position

7. Apply the AQ proportions to our Consumption Forecast for each LDZ and Matrix Position, to obtain a consumption forecast where the meter is internal; and a consumption forecast where the meter is external; and
8. Apply the Internal Meter Error Factor to the internal consumption forecast for each LDZ and Matrix Position; and the External Meter Error Factor to the external consumption forecast for each LDZ and Matrix Position.

Determine UIG

9. Sum the two values in step 8 to get the error (UIG) for each LDZ and Matrix Position;
10. Sum the results of step 9 across LDZs to obtain the UIG by Matrix Position; and
11. Sum the results of step 10 across Matrix Positions to obtain the overall UIG for this contributor.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

RESULTS

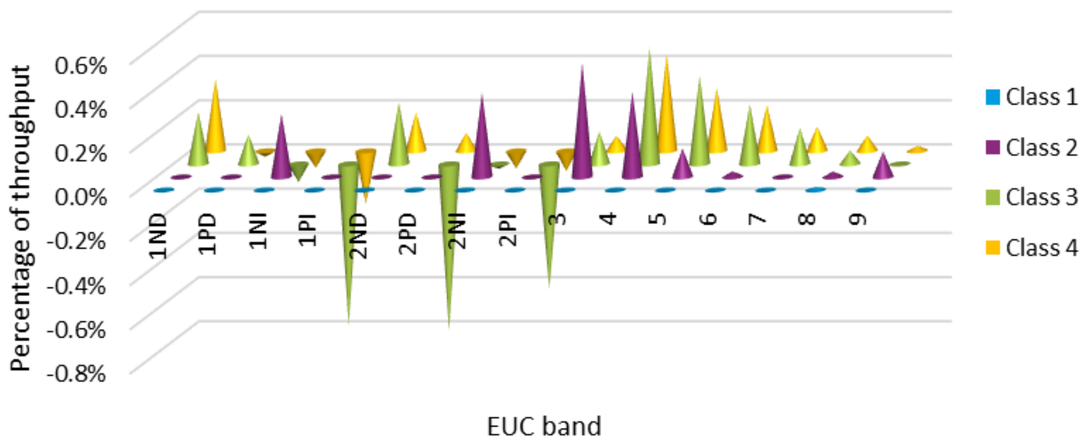
We have calculated the total estimated UIG associated with the average temperature assumption for the target Gas Year to be **1,021 GWh**.

This is broken down by Matrix Position as follows[28]:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	126	679
	1PD	-	-	1	-3
	1NI	-	0	-2	-6
	1PI	-	-	-0	-0
	2ND	-	-	1	11
	2PD	-	-	-0	0
	2NI	-	0	-2	-10
	2PI	-	-	-0	-0
	3	-	0	12	8
	4	-	1	49	52
	5	-	0	23	24
	6	-	0	11	18
	7	-	0	6	9
	8	1	1	2	7
	9	2	0	-	0

There are some Matrix Positions that create negative UIG. This is due to those positions having a higher proportion of meters that are internal, where the temperature of the gas is higher (on average) than the 12.2°C in the Thermal Regulations.

The graph below shows UIG as a percentage of throughput for each Matrix Position:



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

The Statement for Gas Year 2022-2023 quantified the UIG for this contributor to be 1,220 GWh (compared to this year's quantification of 1,021 GWh). This decrease is mainly due to a reduction in our Consumption Forecast driven by the current trend of reducing AQs.

[28] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

FURTHER BACKGROUND

TEMPERATURE STUDIES

Two studies were carried out in the early 2000s by BG Technology[29]. These calculated the temperature of the gas flowing through meters. One study was for domestic Supply Meter Points (Domestic Meters Temperature Study (DMTS)), while the other was for Industrial and Commercial Supply Meter Points (Industrial and Commercial Temperature Study (ICTS)).

The DMTS was split into two groups – one for meters located internally and the other for meters located externally. The ICTS meter locations were predominantly external.

We were not provided with the raw data from either study but did have access to the flow-weighted results of the surveys published in the Statement for Gas Year 2020-2021.

We decided to undertake our calculations broken down by EUC sub-bands to reflect the implementation of Modification 0711[30]. This meant that we did not need to estimate the proportion of domestic and I&C Supply Meter Points in EUC bands 01 and 02, as has been the case with Statements for previous Gas Years.

The vast majority of the meters within the ICTS were located externally. Therefore, we decided to use the DMTS for internal meters for the commercial sub-bands within EUC bands 01, 02 and 03, which was also the approach adopted for the Statement for Gas Year 2020-2021 and 2021-2022.

The table below shows which temperature study we used by Matrix Position.

		CLASS			
		1	2	3	4
EUC BAND	**01BND**	ICTS (DM)	ICTS (DM)	DMTS	DMTS
	01BPD	ICTS (DM)	ICTS (DM)	DMTS	DMTS
	01BNI	ICTS (DM)	ICTS (DM)	ICTS(S) E DMTS I[1]	ICTS(S) E DMTS I
	01BPI	ICTS (DM)	ICTS (DM)	ICTS(S) E DMTS I	ICTS(S) E DMTS I
	02BND	ICTS (DM)	ICTS (DM)	DMTS	DMTS
	02BPD	ICTS (DM)	ICTS (DM)	DMTS	DMTS
	02BNI	ICTS (DM)	ICTS (DM)	ICTS(S) E DMTS I	ICTS(S) E DMTS I
	02BPI	ICTS (DM)	ICTS (DM)	ICTS(S) E DMTS I	ICTS(S) E DMTS I
	03B	ICTS (DM)	ICTS (DM)	ICTS(S) E DMTS I	ICTS(S) E DMTS I
	04B	ICTS (DM)	ICTS (DM)	ICTS (L)	ICTS (L)
	05B	ICTS (DM)	ICTS (DM)	ICTS (L)	ICTS (L)
	06B	ICTS (DM)	ICTS (DM)	ICTS (L)	ICTS (L)
	07B	ICTS (DM)	ICTS (DM)	ICTS (L)	ICTS (L)
	08B	ICTS (DM)	ICTS (DM)	ICTS (L)	ICTS (L)
	09B	ICTS (DM)	ICTS (DM)	ICTS (DM)	ICTS (DM)

The tables below show the flow-weighted average temperatures for each LDZ (in °C) contained within the studies that we use in our methodology.

[29] Subsequently part of DNV GL Group.
[30] UNC Modification 0711: "Update of AUG Table to reflect new EUC bands".

DMTS	Internal	External	ICTS	Domestic (derived)	Small I&C	Large I&C	DM
EA	15.12	9.37	**EA**	9.4	9.6	10.1	11.1
EM	13.70	9.11	**EM**	10.1	10.1	10.9	12.1
NE	13.47	8.79	**NE**	9.4	9.3	9.9	11.2
NO	13.19	8.50	**NO**	9.0	8.8	9.4	10.5
NT	16.43	10.13	**NT**	12.8	13.3	13.4	14.8
NW	13.07	9.01	**NW**	9.7	9.7	10.4	11.4
SC	16.92	7.95	**SC**	8.3	8.4	8.8	9.9
SE	16.10	10.16	**SE**	10.7	11.2	11.5	13.0
SO	15.42	9.74	**SO**	9.7	9.7	10.6	11.8
SW	13.56	9.53	**SW**	10.1	10.1	11.0	12.1
WM	12.86	9.26	**WM**	8.9	8.9	10.0	10.7
WN	12.60	9.33	**WN**	9.0	9.0	9.9	10.7
WS	14.66	9.86	**WS**	10.6	10.4	11.3	12.6

INTERNAL/EXTERNAL SPLIT

There are 35 location codes contained within the CDSP's UK Link system. We split these into three categories: internal, external, and unknown. Below is our assessment of each location code.

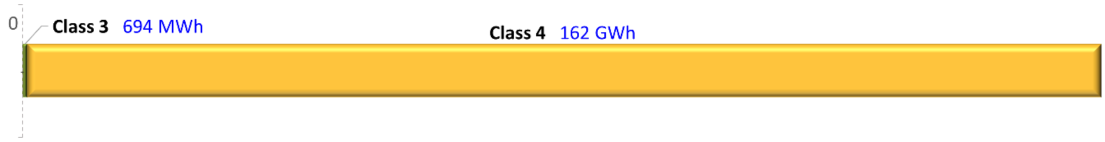
Code	Description	Assessment	Code	Description	Assessment
0	Unknown	Unknown	**18**	External WC	External
1	Cellar	Internal	**19**	Pantry	Internal
2	Under Stairs	Internal	**20**	Porch	External
3	Hall	Internal	**21**	Public Bar	Internal
4	Kitchen	Internal	**22**	Rear of Shop	Internal
5	Bathroom	Internal	**23**	Saloon Bar	Internal
6	Garage	External	**24**	Shed	External
7	Canteen	Internal	**25**	Shop Front	External
8	Cloakroom	Internal	**26**	Shop Window	Internal
9	Cupboard	Internal	**27**	Staff Room	Internal
10	Domestic Science	Internal	**28**	Store Room	Internal
11	Front Door	External	**29**	Toilet	Internal
12	Hall Cupboard	Internal	**30**	Under Counter	Internal
13	Kitchen Cupboard	Internal	**31**	Waiting Room	Internal
14	Kitchen under sink	Internal	**32**	Meter box (External)	External
15	Landing	Internal	**98**	Other	Unknown
16	Office	Internal	**99**	External	External
17	Office Cupboard	Internal			

From this assessment, we calculate the proportion of domestic Supply Meter Points with internal and external meters; and assume the Supply Meter Points in the unknown category followed the same internal/external proportions.

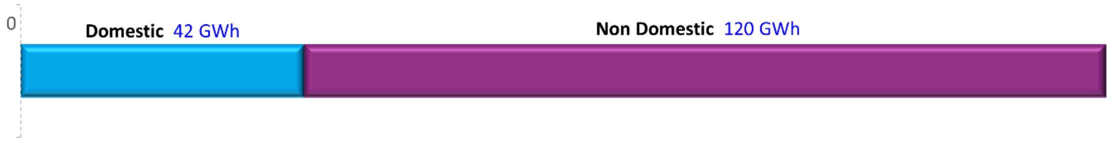
090 – NO READ AT THE LINE IN THE SAND

DASHBOARD

UIG split by Class



UIG split by Sector



Gas Year 2023 – 2024 Updates

Existing data inputs updated to reflect an additional year of industry data.

Enhanced Allocation and Allocation Reconciled (Reconciliation percentages) data from CDSP was used.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
090 No Read at the Line in the Sand	861 GWh	**162 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Gas allocation is the process of attributing a daily amount of energy for each Supply Meter Point to the relevant Shipper. It is undertaken up to five days after the relevant Gas Day.

For NDM Supply Meter Points, allocation is estimated based on a rolling AQ. For DM Supply Meter Points, it is normally based on actual meter reads. Where these are not available, it is estimated based on a recent read or, failing that, an AQ. So, by its very nature, the process for allocation relies on estimation.

For gas consumption to be settled correctly, the allocated energy that is based on estimates must subsequently be reconciled against the actual energy used. Accordingly, when a valid actual read is accepted by the CDSP for a Supply Meter Point, the energy used since the valid previous meter read is calculated and compared to the energy that was allocated over the same period. The difference is reconciled, with an adjustment made up or down for the relevant Shipper.

For reconciliation to take place, a meter read must be obtained, validated and accepted. When a read is accepted, the previous read is typically less than 12 months older than the accepted read. In some cases though, the previous read can be much further in the past.

Within Settlement there is the concept of the Line in the Sand. This is the point in time that Settlement is closed off for a Gas Day with no further reconciliations being permitted. The Line in the Sand falls three to four years after any given Gas Day[31].

In cases where a valid read is accepted and the previous read is prior to the Line in the Sand, the proportion of energy used since the Line in the Sand is determined and reconciled, but the portion prior to the Line in the Sand is not. Instead, this unreconciled portion remains as UIG.

DEFINITION

This contributor relates to consumption at a Supply Meter Point that is not reconciled to the relevant Shipper prior to the Line in the Sand, because a timely valid meter read is not accepted into Settlement.

This includes situations where:

- The Line in the Sand has passed for the date of the previous valid read accepted into Settlement for a Supply Meter Point and there has not been a subsequent valid read accepted into Settlement; and
- The Line in the Sand has passed for the date of the previous valid read accepted into Settlement for a Supply Meter Point and, since this Line in the Sand passed, a valid subsequent read has been accepted into Settlement.

UIG IMPACT

In situations where the Line in the Sand passes for a period of time before a valid subsequent read is accepted into Settlement, UIG is created. This is the difference between the allocated energy determined from AQs over this period of time and the actual energy used.

In cases where the allocated energy determined from AQs is understated, positive UIG is created. In cases where the energy determined from AQs is overstated, negative UIG is created.

METHODOLOGY

The methodology approach for this contributor is as follows:

- Determine how much consumption is likely to remain unreconciled to valid meter reads at the Line in the Sand for the target Gas Year;
- Determine how closely the consumption derived from AQs and used in allocation is reflective of the actual consumption, and establish an error percentage; and
- Apply the resulting error percentage to the residual unreconciled consumption forecast.

[31] Close off occurs at the end of March for the 1st April – 31st March year ending three years earlier. This means that the Line in the Sand ranges from three years for each 31st March to four years for each 1st April.

CALCULATION

INPUTS

- Supply Meter Points with no Reads after April 2020 report from the CDSP;
- Allocation and Allocation Reconciled (Reconciliation percentages) report from the CDSP;
- Our Consumption Forecast (as described in Section 4 of this Statement); and
- No Read Read Rejection report from the CDSP.

ASSUMPTIONS

- There is no material change to the NDM allocation methodology before the target Gas Year;
- There is no change to read incentives for the target Gas Year;
- Read performance for the target Gas Year is equivalent to the years used in our trend analysis; and
- The energy calculated from the most recent read rejection pair reflects the likely consumption in the target Gas Year.

CALCULATION

The detailed calculation is described below.

Determining Unreconciled Consumption Forecast

Determine the Supply Meter Points without a reading approaching the Line in the Sand

1. Obtain details of Supply Meter Points without a reading since April 2020, in snapshots taken in, October 2022 and February 2023;
2. Determine the set of Supply Meter Points in the October 2022 snapshot without a reading since April 2020; and
3. Identify the set of Supply Meter Points within the data from step 2 that are not in the February 2023 snapshot. This is the set that have had a valid reading accepted in the three months between November and January.

Determine the rate at which readings are being obtained and unreconciled energy is being reconciled approaching the Line in the Sand

4. Using the set of Supply Meter Points determined in step 2 and the sub-set determined in step 3, determine the rate at which readings are being accepted (approaching the Line in the Sand) for each LDZ, class and sub-EUC band, along with the rate at which unreconciled energy is being reconciled.

Determine the percentage of unreconciled energy at the Line in the Sand

5. Obtain details of allocated energy and the amount of this that has since been reconciled to a valid meter reading as at February 2023 for each month since April 2019, for each main EUC band in Class 3 and 4;
6. Determine the percentage of allocated energy for each month that has been reconciled to a valid meter read for each LDZ and main EUC band;

7. Determine the unreconciled energy that will be reconciled over the following three months (February–April), for each LDZ and main EUC band and class 3 and 4 combined, using the rate of reconciliation (from step 4) and convert this to a percentage by dividing by the allocated energy;
8. Add the percentage that will be reconciled in the next six months (from step 7) to the percentage that has already been reconciled (from step 6), to determine a reconciliation percentage by LDZ and main EUC band (and Class 3 and 4 combined) at the Line in the Sand, for each month from April 2019 to March 2020; and
9. Convert the monthly reconciled percentages at the Line in the Sand to an annual percentage, by taking their allocation energy weighted average. Then determine the annual unreconciled percentage by subtracting this figure from 100.

Forecast the unreconciled energy at the Line in the Sand for the target Gas Year

10. For Class 3 and 4, apply the unreconciled percentages at the Line in the Sand (from step 9) to our Consumption Forecast for the target Gas Year, to determine the forecast unreconciled consumption at the Line in the Sand, for each LDZ and main EUC band; and
11. For Class 1and 2, determine the forecast unreconciled consumption for the target Gas Year as the sum of the AQs from the February 2023 snapshot of all Supply Meter Points that had not had a meter read since April 2020, considering only Supply Meter Points that had not had a read accepted since April 2019.

<u>Determining the AQ Error Percentage</u>

Determine the percentage error due to AQ trend changes

12. Obtain a snapshot of the number of Supply Meter Points and the total AQ for each LDZ and Matrix Position, for every month since February 2019 where the data doesn't exist for EUC bands 1 and 2 then just go back to October 2019;
13. From the resulting dataset, determine a percentage error for AQs used in allocation (and not subsequently reconciled to a valid meter read), by LDZ and main EUC band as:

$$100 * \frac{\text{recent average AQ} - \text{original average AQ}}{\text{original average AQ}}$$

Determine the percentage error due to read rejections

14. Obtain all the Shipper rejected reads (along with the rejection reason) for Supply Meter Points without a read since April 2020 (from step 1), as at February 2023;

For each sub-EUC band[32] (steps 15-20):

15. Calculate the new average AQ for the set of Supply Meter Points with multiple reads that were rejected due to the same reason (using reads rejected for this reason as close to a year apart as possible);
16. Determine the percentage error on the original AQs as:

[32] When the number of sites in EUC bands 3-8 and across the LDZs is low then combine EUCs/LDZs together to get an overall average for these EUC bands/LDZs.

$$100 * \frac{\text{new average AQ} - \text{original average AQ}}{\text{original average AQ}}$$

17. Determine the proportion of Supply Meter Points that had multiple reads that were rejected for the same reason, from the set that had one or more rejections (of any type);
18. Apply this proportion to the total AQs for Supply Meter Points that had no read rejections (on the basis that a proportion of these are likely to encounter this issue when a read is finally obtained and submitted for them);
19. Apply the percentage error from step 16 to all: original AQs for Supply Meter Points with multiple reads that were rejected for the same reason; and the proportion of the total AQ for Supply Meter Points without a read rejected at all, as determined in step 18 above. This gives a revised total AQ;

Determine the aggregate percentage error (for each sub-EUC band) as:

$$100 * \frac{\text{revised total AQ} - \text{orginal total AQ}}{\text{original total AQ}}$$

20. If there is more than one new AQ calculated owing to multiple read rejection reasons, then use the most recent new AQ.

Determine the overall percentage error

21. Determine the overall error percentage for each LDZ and sub-EUC band by summing the error percentages for the Read Rejections and for the AQ trend changes (from step 13).

<u>Determining the UIG</u>

Apply the overall percentage error to the forecast unreconciled consumption

22. Apply the error percentages determined in step 22 to the forecast unreconciled consumptions (from steps 10 and 11) to determine the error (UIG) in the target Gas Year.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

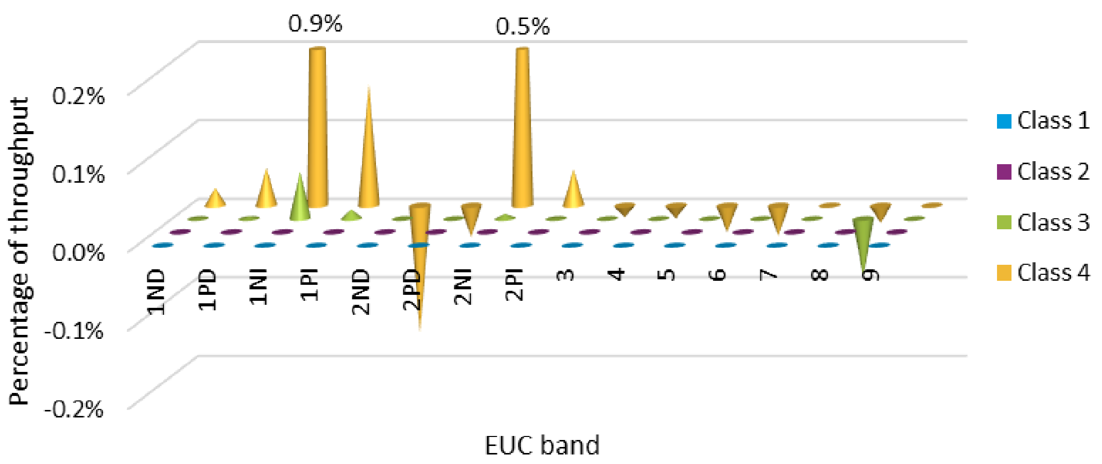
RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **162 GWh**.

This is allocated across Matrix Positions[33] as follows:

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	-	-	1	47
	1PD	-	-	0	5
	1NI	-	-	1	73
	1PI	-	-	0	0
	2ND	-	-	-0	-10
	2PD	-	-	-0	-0
	2NI	-	-	0	59
	2PI	-	-	0	0
	3	-	-	-0	-2
	4	-	-	-0	-2
	5	-	-	-0	-3
	6	-	-	-	-3
	7	-	-	-	-0
	8	-	-	-2	-2
	9	-	-	-	-

The graph below shows UIG as a percentage of throughput for each Matrix Position:



[33] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

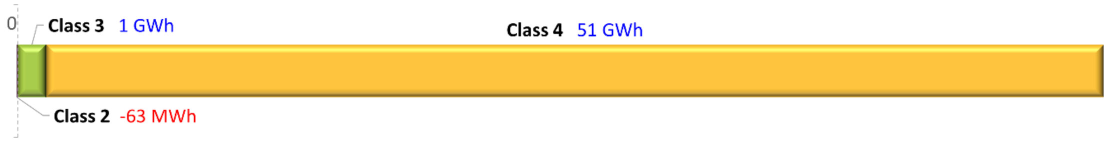
The Statement for Gas Year 2022-2023 quantified the UIG for this contributor to be 861 GWh (compared to this year's quantification of 162 GWh). This very significant decrease is partly due to average AQs reducing, as is the current trend, and the increased amount of AQ that has already been reconciled, particularly in the higher EUC bands, compared to the same time last year. This means our estimate of the amount still to be reconciled at Line in the Sand is reduced.

Additionally this year the reconciliation percentage was calculated using an enhanced dataset from the CDSP whereas last year's estimate was made based on the best data available. The availability of the enhanced dataset this year has resulted in a less approximate and subsequently lower overall estimate of gas still to be reconciled.

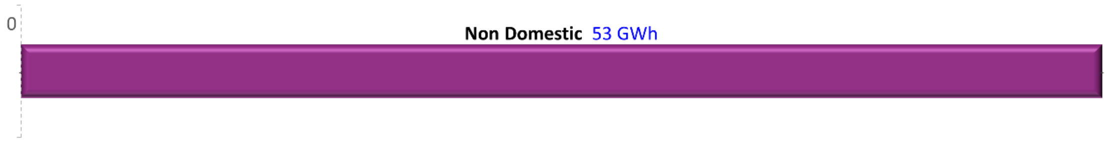
100 – INCORRECT CORRECTION FACTORS

DASHBOARD

UIG split by Class



UIG split by Sector



Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
100 Incorrect Correction Factors	53 GWh	**53 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Meters are designed to measure at a standard pressure of 1 atmosphere (1013.25 hPa) at Mean Sea Level and a standard temperature of 15°C. Any variances from this results in an inaccuracy in the measurement.

There is a small number of meters that have correction equipment fitted and dynamically adjust for this according to the actual atmospheric pressure and temperature of the gas. They provide volumes that are consistent with the standard atmospheric pressure and temperature. These are typically high-capacity meters. The vast majority of meters do not have this correction equipment fitted.

In addition, there are some meters for which a location dependent Specific Correction Factor[34] is applied to the advance between two meter readings as part of the Settlement calculations. These factors are designed to adjust for variances from standard pressure and the standard

[34] Also known as Conversion Factor.

temperature of gas, and take into consideration the meter's location, the inlet pressure and the compressibility. They ensure that the volume processed in Settlement is more consistent with the standard pressure and temperature. This occurs for Supply Meter Points that typically use over 732,000 kWh.

The remaining set of meters have a Standard Correction Factor applied to the advance between two meter readings as part of the Settlement calculations. This factor is also designed to adjust for variances from the standard pressure and standard temperature of gas, but it is not location specific and so does not achieve this as well as Specific Correction Factors.

Some Supply Meter Points are large enough to require either meters with correction equipment fitted or the application of Specific Correction Factors in Settlement. However, some of these are settled on the basis of Standard Correction Factors. In other cases, an incorrect Specific Correction Factor is applied in Settlement. In both situations, the consequential inaccuracy in the measurements results in UIG.

DEFINITION

This contributor relates to meters that over or under-record the amount of gas consumed at Supply Meter Points with AQs greater than 732,000 kWh as a result of the Correction Factor being incorrect.

For the purposes of quantifying UIG associated with this, only the following cases are considered:

- The Supply Meter Point has an AQ of more than 732,000 kWh;
- The meter does not have correction equipment fitted; and
- A Standard Correction Factor is used in Settlement; or a Specific Correction Factor is used in Settlement that is less than the lowest value possible in GB[35].

For the avoidance of doubt, this contributor does not consider errors arising from other types of incorrect Specific Correction Factors. Nor does it consider any errors that occur due to variances from the standard atmospheric pressure or temperature of the gas (assuming a correct Correction Factor is applied). These are considered as part of the Average Pressure Assumption (070) and Average Temperature Assumption (080) contributors, respectively.

UIG IMPACT

If the Correction Factor used in Settlement is lower than it should be, the measured volume will be less than the amount of gas consumed. This will create positive UIG.

Conversely, if the Correction Factor used in Settlement is higher than it should be, the measured volume will be more than the amount of gas consumed. This will create negative UIG.

[35] A Correction Factor of 0.995088 corresponds to a Mean Sea Level altitude (assuming a typical inlet pressure of 21 mbar and compressibility of 1).

METHODOLOGY

UIG FORECAST

The UIG associated with this contributor for the target Gas Year is established by:

- Determining an average Specific Correction Factor for Supply Meter Points with an AQ greater than 732,000 kWh that use a Specific Correction Factor and do not have a meter with correction equipment fitted, for each LDZ and Matrix Position;
- Determining a Correction Error Factor^{LM}[36] for each LDZ and Matrix Position as the difference between the average Specific Correction Factor and the Standard Correction Factor;
- Determining the proportion of Supply Meter Points with an AQ greater than 732,000 kWh that use a Specific Correction Factor and do not have meters with correction equipment fitted, for each LDZ and Matrix Position;
- Determining the error due to incorrect use of Standard Correction Factors, for each LDZ and Matrix Position as the product of: the proportion (determined above), the Correction Error Factor^{LM} (determined above) and our Consumption Forecast for these Matrix Positions (described in Section 4 of this Statement);
- Determining a Correction Error Factor^{SP}[37] as the difference between the lowest feasible Correction Factor (0.995088) and the actual Specific Correction Factor, for each Supply Meter Point:
    - With an AQ greater than 732,000 kWh;
    - That does not have a meter with correction equipment fitted; and
    - Has a Specific Correction Factor less than the value of 0.995088; and
- Determining the error due to unfeasibly low Specific Correction Factors, for each LDZ and Matrix Position as: the sum across Supply Meter Points, of the product of: the Correction Error Factor^{SP} (determined above) and the AQ associated with the Supply Meter Point.

MATRIX ALLOCATION

- The UIG by Matrix Position is determined as part of the method for calculating the overall UIG for this contributor.

ASSUMPTIONS

- The Specific Correction Factors are correct for all Supply Meter Points with an AQ greater than 732,000 kWh which are not unfeasibly low (i.e. are less than 0.995088);
- The proportion of Supply Meter Points with correction equipment fitted will not change before the target Gas Year;
- The proportion of Supply Meter Points using the Standard Correction Factor will not change before the target Gas Year;

[36] This represents the difference between the average Correction Factor for the Matrix Position and the Standard Correction Factor actually applied.
[37] This represents the difference between the Specific Correction Factor for the Supply Meter Point and the lowest feasible Correction Factor.

- The number of Supply Meter Points that will update their Correction Factors before the end of the target Gas Year is negligible;
- The Supply Meter Points with unfeasibly low Specific Correction Factors (less than 0.995088) will not have these factors updated before the target Gas Year; and
- The AQ of Supply Meter Points with an unfeasibly low Specific Correction Factor is a reasonable estimate of consumption for the target Gas Year.

CALCULATION

INPUTS

- Correction Factors report from the CDSP;
- Conversion Equipment Fitted report from the CDSP; and
- Our Consumption Forecast (as described in Section 4 of this Statement).

CALCULATION

The detailed calculation is described below.

Determine average Specific and Standard Correction Factors for each LDZ and Matrix Position

1. Identify all Supply Meter Points with an AQ greater than 732,000 kWh that have a Standard Correction Factor and do not have a meter with correction equipment fitted;
2. Identify all Supply Meter Points with an AQ greater than 732,000 kWh that have a Specific Correction Factor and do not have a meter with correction equipment fitted;
3. Identify all Supply Meter Points with an AQ greater than 732,000 kWh that have a meter with correction equipment fitted; and
4. Determine an average Specific Correction Factor for those Supply Meter Points in step 2, for each LDZ and Matrix Position. Where there are no Supply Meter Points upon which to base an average for a LDZ and Matrix Position, use the national average for the Matrix Position; where there are still no Supply Meter Points upon which to base an average, use the national Class average.

Calculate Altitude-Adjusted Standard Correction Factor for each LDZ

5. For each LDZ, calculate the Altitude-Adjusted Standard Correction Factor based on the average altitude within that LDZ and an assumed pressure of 21 mbar (using the Thermal Regulations).

Calculate the Correction Error Factor^{LM} for each LDZ and Matrix Position

6. Determine Correction Error Factor^{LM} as the Average Specific Correction Factor (from step 4) less the Altitude-Adjusted Standard Correction Factor (from step 5), for each LDZ and Matrix Position.

Determine the error due to the incorrect use of Standard Correction Factors, for each LDZ and Matrix Position

7. Determine the AQ proportion of Supply Meter Points with an AQ greater than 732,000 kWh that use a Specific Correction Factor and do not have meters with correction equipment fitted (from steps 1, 2 and 3), for each LDZ and Matrix Position; and
8. Determine the error for each LDZ and Matrix Position as the product of: the proportion (from step 7), the Correction Error Factor^{LM} (from step 6) and our Consumption Forecast for these Matrix Positions.

Identify Supply Meter Points with an unfeasibly low Specific Correction Factor

9. Identify all Supply Meter Points with an AQ greater than 732,000 kWh that have a Specific Correction Factor below 0.995088 and do not have a meter with correction equipment fitted.

Calculate the Correction Error Factor^{SP} for each supply meter point

10. For each Supply Meter Point identified in step 9, determine Correction Error Factor^{SP} as: 0.995088 less its Specific Correction Factor.

Determine the error due to unfeasibly low Specific Correction Factors, for each LDZ and Matrix Position

11. Determine the error associated with each Supply Meter Point determined in step 9 as the product of: the Correction Error Factor^{SP} (from step 10) and the AQ for the Supply Meter Point; and
12. Sum the Supply Meter Point errors (from step 11) for each LDZ and Matrix Position.

Determine the UIG at the Line in the Sand for each Matrix Position

13. Sum the values in steps 8 and 12 to obtain error (UIG) for each LDZ and Matrix Position;
14. Sum the results of step 13 across LDZs to obtain the UIG by Matrix Position; and
15. Sum the results of step 14 across Matrix Positions to obtain the overall UIG for this contributor.

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

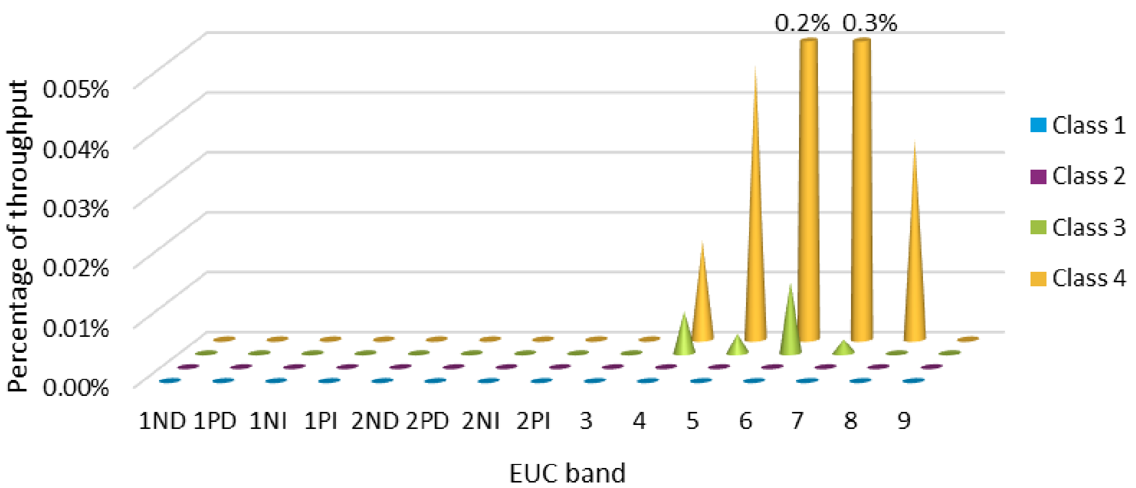
RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **53 GWh**, comprising 52.2 GWh due to incorrect (but feasible) Correction Factors and 0.4 GWh due to unfeasibly low Correction Factors.

This is allocated across Matrix Positions as follows[38]:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	-	-
	1PD	-	-	-	-
	1NI	-	-	-	-
	1PI	-	-	-	-
	2ND	-	-	-	-
	2PD	-	-	-	-
	2NI	-	-	-	-
	2PI	-	-	-	-
	3	-	-	-	-
	4	-	-0	1	2
	5	-	-	0	4
	6	-	-0	0	20
	7	-	-	0	22
	8	-	-	-	3
	9	-	-	-	-

The graph below shows UIG as a percentage of throughput for each Matrix Position:



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

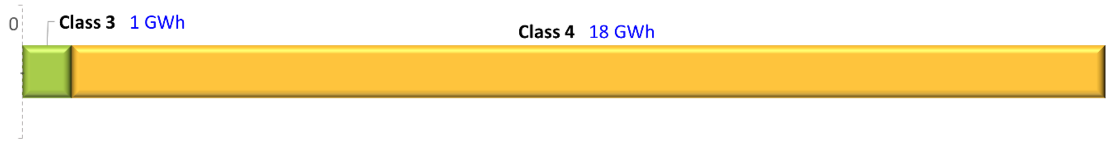
The Statement for Gas Year 2022-2023 quantified the UIG for this contributor to be 53 GWh (compared to this year's quantification of 53 GWh). There was a small increase due to the increase in average correction factors for some LDZ Matrix Positions offset by a small decrease due to the change in Consumption Forecast, resulting in the same amount of UIG as last year.

[38] Note that due to rounding the sub-EUC band values in aggregate may not equal main EUC band values. Some values are negative but round to zero. Dashes are where the Matrix Position is forecast to be empty.

160 – ISOLATED SITES

DASHBOARD

UIG split by Class



UIG split by Sector

Gas Year 2023 – 2024 Updates
Data inputs updated to reflect an additional year of industry data. This year, we have adjusted our assumptions for sites that do not have enough read data to determine whether they are advancing, by taking into account the presence of a meter where identifiable.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
160 Isolated Sites	47 GWh	**19 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Any Supply Meter Point with a status set to "isolated" in the UK Link central industry database is excluded from allocation as part of standard Settlement processes. The isolation flag indicates the presence of equipment fitted to the Supply Meter Point to prevent gas from flowing. In such cases, the site remains registered to a Shipper but they are not allocated any energy.

If the site is recorded as isolated, but for any reason gas is consumed, this consumption will not be directly allocated to a Shipper but will instead contribute to UIG.

DEFINITION

The cases considered as part of this Contributor are Supply Meter Points that:

- Have a Shipper currently registered;
- Have an isolation flag set within UK Link; and
- Are consuming gas.

This contributor does not consider cases where the Supply Meter Point has never been, or is no longer registered to, a Shipper. This is considered in the Unregistered Sites (020) and Shipperless Sites (025) contributors respectively.

Any consumption that is due to theft is considered within Theft of Gas (010).

UIG IMPACT

Gas consumed at Isolated Sites creates positive UIG. If this is not identified and accounted for, this UIG remains at the Line in the Sand.

METHODOLOGY

The overall approach is to:

- Identify the Isolated Sites and associated AQ that have an isolated date before April 2020 and do not have a theft record within the TRAS or TOG dataset;
- Identify the pre-April 2020 Isolated Sites and associated AQ that are advancing, non-advancing and those with insufficient reads using the accepted and rejected read files;
- Identify within those groups of sites which have meters attached in the CDSP data and which don't have meters attached;
- Calculate the proportion and associated AQ of pre-April 2020 Isolated Sites with insufficient reads that are likely to be advancing, in the group with meters attached and those without; and
- Calculate the UIG by adding the AQ of the pre-April 2020 Advancing Isolated Sites to the proportion of AQ of the Isolated Sites with insufficient reads that are likely to be advancing.

UPDATES CONSIDERED FOR THIS YEAR'S METHODOLOGY

Building on last year's analysis we identified some potential improvements to the methodology to better forecast UIG at Line in the Sand. Three areas were considered:

- Re-examining the assumptions around those sites with insufficient reads to determine whether consumption is occurring;
- Determining the likely future status of the currently isolated sites; and
- Determining the appropriate AQ of the currently Isolated sites to use to forecast UIG.

The first of these was implemented, with the other two noted for future consideration because there was insufficient data available to progress them.

<u>Determining a reasonable assumption of proportion of sites with advancing reads where no read evidence is available</u>

Our previous assumption was that for those isolated sites without sufficient reads data to confirm consumption (or otherwise), consumption would occur in the same proportion as for those sites where we did have good read data.

We requested additional data this year given that it is understood that there is often no physical meter present when a site has been isolated, and so for many isolated sites there is therefore no ability to record or send reads (leading to no reads being submitted to the CDSP) and these sites would not actually contribute UIG. It therefore didn't seem reasonable to apportion the same percentage of UIG to those sites where there is no meter present as ones where there is.

Examining the portfolio of isolated sites, we identified those where there is an indication of a meter still present. The below table shows the outcome:

	Advancing	Not Advancing	Insufficient Reads
Meter attached	2,099	962	7,546
Meter Not Attached	460	299	11,397

This data suggests that:

- The majority of sites in this isolated pot do not have a meter attached; and
- Generally if a site is found to be advancing, then there is a much higher chance of a meter being attached, although there are still incidences of sites found to be advancing without any record of a meter present.

It is therefore it is reasonable to apply different percentages to those two types of sites (with and without meters attached) where there is insufficient read data to tell if the site is advancing or not.

CALCULATION

INPUTS

- Isolated Sites report from CDSP;
- Isolated Meter Reads from CDSP; and
- Isolated Meter Read rejections from CDSP.

ASSUMPTIONS

- Isolated Sites with reads showing advancement have consumed since the date of isolation;
- Isolated Sites with insufficient reads with a meter attached advance in the same proportion as those that can be determined with a meter attached, and those without a meter attached advance in the same proportion as those that can be determined without a meter attached;
- The portfolio of Isolated Sites will not undergo significant characteristic change in the coming years; and
- Supply Meter Points that are no longer isolated by the Line in the Sand are in fact reconciled properly for any energy used during the period when the isolation status was set.

CALCULATION

The detailed calculation is described below.

Identify the pre–April 2020 Isolated Sites

1. For each Matrix Position identify the Supply Meter Points and calculate the total AQ for sites isolated before April 2020; and
2. Cross reference this data with the theft of gas master dataset and remove any that had theft of gas past the isolation date.

Identify reads and calculate the advancing proportions

3. Obtain all the isolated meter reads and meter read rejections for Isolated Sites in isolation pre-April 2020, as at February 2023;
4. Identify the count of Isolated Sites, associated AQ and whether they are:
    a. Advancing (25% or more of read periods since isolation showed a meter advance);
    b. Non-advancing (no read advance or fewer than 25% of read periods showing consumption); and
    c. Those with insufficient reads to determine whether they are advancing.
5. From the Isolated Sites data identified in step 4, calculate for each Matrix Position the:
    a. Sum of the AQ of Advancing Isolated Sites for sites with and separately without a meter attached;
    b. Sum of the AQ of Non-Advancing Isolated Sites for sites with and separately without a meter attached; and
    c. Sum of the AQ of Isolated Sites with insufficient reads for sites with and separately without a meter attached to identify if the site is advancing.
6. Calculate the pre-April 2020 "Isolated Sites Advancing Proportion" for each Matrix Position and each meter status by dividing the sum of the Advancing Sites AQ (step 5a) by the sum of Advancing and Non-advancing AQ (steps 5a and 5b); and
7. Calculate percentage of sites with reads which have a meter attached for each matrix position to calculate a view of the insufficient reads AQ which don't have a meter attached however it is suspected that they might do, by multiplying these proportions by the Insufficient Reads AQ where no meter is recorded in step 5c; and
8. Calculate the pre-April 2020 "Insufficient Reads Advancing AQ" for each Matrix Position by multiplying the sum of the Isolated Sites with insufficient reads AQ (steps 5c and 7) by the Isolated Sites Advancing proportion (step 6) for both sites with a meter attached and for those without a meter attached.

Determine the UIG

9. For each Matrix Position, extrapolate UIG by adding the sum of the AQ for Advancing Isolated Sites (step 5a) to the Insufficient Reads Advancing AQ (step 8).

OUTPUT

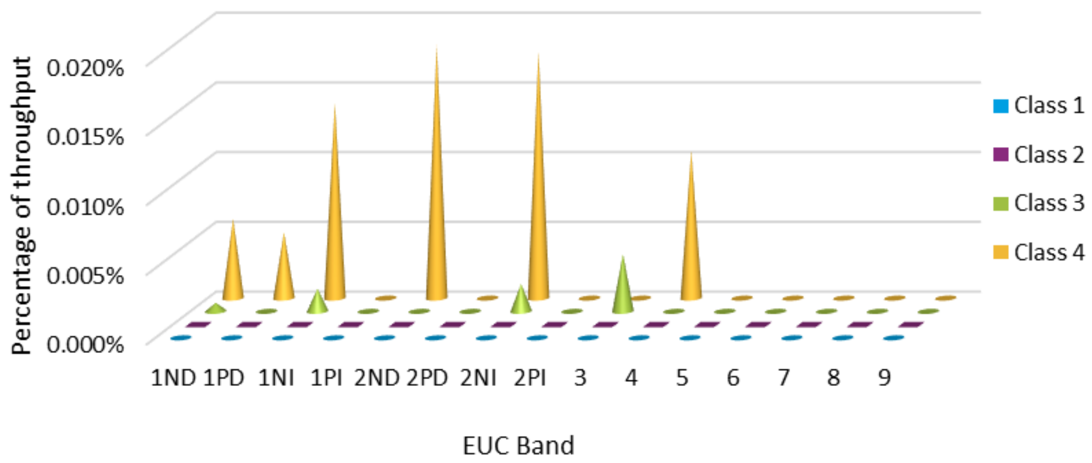
Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **19 GWh**. This is broken down by Matrix Position as follows[39]:

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	-	-	0	12
	1PD	-	-	-	0
	1NI	-	-	0	1
	1PI	-	-	-	-
	2ND	-	-	-	1
	2PD	-	-	-	-
	2NI	-	-	0	2
	2PI	-	-	-	-
	3	-	-	0	-
	4	-	-	-	1
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-

The graph below shows UIG as a percentage of throughput for each Matrix Position.



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

The Statement for Gas Year 2022-2023 quantified the UIG for this contributor to be 47 GWh (compared to this year's quantification of 19 GWh). The significant difference is due to the new methodology of taking into account whether a meter is present or not. Using the previous year's

[39] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

methodology gives a similar result to last year suggesting the new approach is the main driver behind this change and makes sense given the high proportion of sites without meters.

We note that CDSP has engaged with Shippers to reduce the number of Isolated Sites with advancing reads. The outcome of this activity is not yet evident in our analysis as the focus of this calculation is on those sites isolated before April 2020 rather than the more recent population.

FUTURE CONSIDERATIONS

As noted, we examined the potential for improvement in the following two areas, but insufficient data was available to progress this year.

<u>Forecasting the number of isolated sites by Line in the Sand</u>

By examining past movements between snapshots of data, it should be possible to model a likely future state of the current snapshot of Isolated Sites. However, unfortunately because this is only the second time Isolated Sites have been assessed, the snapshot data available to us spans only 18 months, and there is not enough read data at each snapshot to build a more robust forecast. This is something that will be considered for next year's Statement if available.

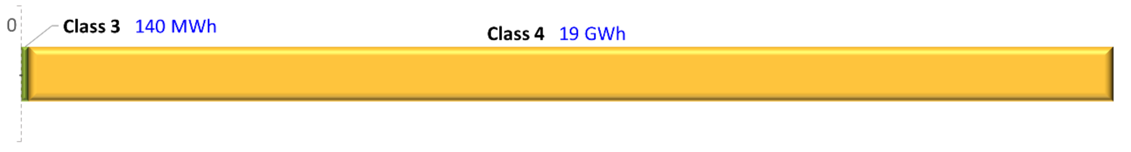
<u>Increasing the accuracy of Isolated Sites AQ</u>

We requested the appropriate data from the CDSP to enable determination of a more appropriate AQ to use in the calculations of UIG for these isolated sites which are consuming. Unfortunately it was not possible to get the data in the right format in time to facilitate this calculation. This enhancement will be reconsidered in future initial assessments.

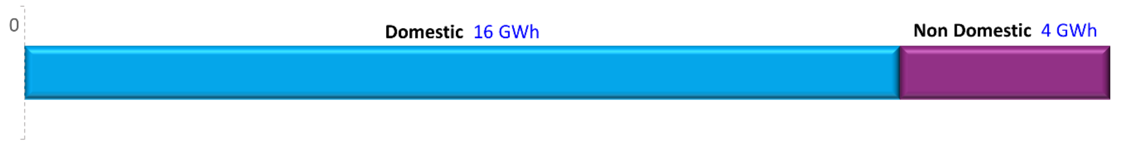
200 – DEAD SITES (NEW)

DASHBOARD

UIG split by Class



UIG split by Sector



Gas Year 2023 – 2024 Updates
This is a new contributor for the 2023-2024 Gas Year. As such, the description and methodology sections contain additional detail of the analysis undertaken to arrive at a justifiable methodology and output.

UIG	Gas Year 2022-2023	Gas Year 2023-2024
200 Dead Sites	n/a	**19 GWh**

DESCRIPTION

SETTLEMENT CONTEXT

Any Supply Meter Point with a status set to "Dead" in the UK Link central industry database is excluded from allocation as part of standard Settlement processes. The Dead status should indicate that the Supply Meter Point no longer has the ability to flow gas: generally the site has been disconnected completely from the gas mains network. In such cases, the site remains registered to a Shipper but they are not allocated any energy.

If the site is recorded as Dead, but for any reason gas is consumed, this consumption will not be directly allocated to a Shipper but will instead contribute to UIG.

DEFINITION

The cases considered as part of this Contributor are Supply Meter Points that:

- Have a Shipper currently registered;
- Have a Dead flag set within UK Link; and
- Are consuming gas.

This contributor does not consider cases where the Supply Meter Point has never been, or is no longer registered to, a Shipper. These are considered in the Unregistered Sites (020) and Shipperless Sites (025) contributors respectively.

Any consumption that is due to theft is considered within Theft of Gas (010).

UIG IMPACT

Gas consumed at Dead Sites creates positive UIG. If this is not identified and accounted for, this UIG remains at the Line in the Sand.

ANALYSIS AND RESULTING METHODOLOGY

ESTABLISHING CURRENT POPULATION OF DEAD SITES

We identified the total number of Dead Sites, by date of Dead status update. This confirmed a broad spread of Dead status dates, ranging over 13 years. The majority of affected sites being set to Dead in the last two years.

Supply Point Status Date	Count of Sites
2011	28
2012	77
2013	103
2014	838
2015	124
2016	162
2017	115
2018	257
2019	470
2020	634
2021	1,526
2022	2,220
2023	39

We then identified the Matrix Position of the Dead Sites.

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	-	-	155	3,608
	1PD	-	-	13	2,141
	1NI	-	-	20	524
	1PI	-	-	-	5
	2ND	-	-	-	24
	2PD	-	-	-	-
	2NI	-	-	10	64
	2PI	-	-	-	-
	3	-	-	4	18
	4	-	-	1	5
	5	-	-	-	-
	6	-	-	-	1
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-

IDENTIFYING UIG AMONG DEAD SITES

To determine which of these Supply Meter Points might be consuming gas, we examined their rejected reads records. The dataset was split into three categories:

- Sites with advancing meters (25% or more of read periods since Dead status showed a meter advance);
- Sites with non-advancing meters (no read advance or fewer than 25% of read periods showing consumption); and
- Sites with insufficient reads to determine whether the meter is advancing.

Our investigation identified that a significant number of Dead Sites had advancing meter reads. If none of these Supply Meter Points have their current Dead status corrected before the Line in the Sand, then an estimated 24 GWh of positive UIG would be created.

However, rather than assume that this will be the case, we continued our investigation to determine the likely eventual outcome at the Line in the Sand.

DETERMINING THE LIKELY FUTURE STATUS OF CURRENT DEAD SITES

By examining past movements between snapshots of data, we could model a likely future state of the current snapshot of Dead Sites. However, because this is the first time Dead Sites have been assessed, the snapshot data available to us spans only six months.

It is therefore necessary to establish a proxy for the future state we are interested in (i.e. the Line in the Sand for Gas Year 2023-2024), as we did with Isolated Sites in its first year of assessment. To do this, we identified the Dead Sites that have a Dead status update before April 2020. These sites are likely to have already created UIG at the Line in the Sand. For our investigation, we assumed therefore that the size and nature of this historic Dead portfolio would be a reasonable proxy for that which will create positive UIG in the target Gas Year[40].

We cross-referenced the Dead Sites with our theft of gas dataset to check for recorded theft of gas after being set to Dead. We identified only one instance where this occurred, and this site was removed from the dataset.

The Supply Meter Point counts and the sum of AQs (MWh) of this portfolio are:

		CLASS						
		1 Count	1 AQ	2 Count	2 AQ	3 Count	3 AQ	4 Count
EUC BAND	**1BND**	-	-	-	-	8	75	1,198
	1BPD	-	-	-	-	7	75	948
	1BNI	-	-	-	-	-	-	104
	1BPI	-	-	-	-	-	-	2
	2BND	-	-	-	-	-	-	4
	2BPD	-	-	-	-	-	-	-
	2BNI	-	-	-	-	-	-	10
	2BPI	-	-	-	-	-	-	-
	3B	-	-	-	-	-	-	2
	4B	-	-	-	-	-	-	-
	5B	-	-	-	-	-	-	-
	6B	-	-	-	-	-	-	-
	7B	-	-	-	-	-	-	-
	8B	-	-	-	-	-	-	-
	9B	-	-	-	-	-	-	-

EXTRAPOLATION OF INITIAL RESULTS TO INCLUDE SITES WITH INSUFFICIENT READ DATA

Not all Supply Meter Points within the dataset have a rejected read. It is reasonable to assume that a proportion of the Dead Sites with insufficient reads are consuming gas. Therefore, to calculate the UIG at the Line in the Sand we added the AQ of the pre-April 2020 Advancing Dead Sites to the AQ of the proportion of Dead Sites with insufficient reads that are likely to be advancing.

[40] With each subsequent year that this methodology is applied our ability to forecast the likely Dead portfolio at the Line in the Sand will improve.

For the Supply Meter Points that were set to Dead before April 2020, the proportion of advancing, non-advancing and sites with insufficient reads within the Dead period are:

EUC Band	Advancing	Not Advancing	Insufficient Reads
1ND	71%	9%	21%
1PD	32%	42%	26%
1NI	34%	13%	54%
1PI	0%	50%	50%
2ND	50%	25%	25%
2PD	-	-	-
2NI	70%	10%	20%
2PI	-	-	-
3	50%	0%	50%
4	-	-	-
5	-	-	-
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-

The population of sites with insufficient reads account for a much smaller proportion of the pre-April 2020 portfolio, when compared with isolated sites. Unlike isolated sites, most Dead sites which have insufficient reads to use as evidence for consumption, appear to have meters attached. Therefore, the adjustment made to the Isolated methodology, to apply different percentages to those two types of sites (with and without meters attached) where there is insufficient read data to tell if the site is advancing or not, is not considered appropriate. Instead, we assume the population of meters with insufficient reads advance in the same proportion as the sites with reads.

METHODOLOGY

The overall approach is to:

- Identify the Dead Sites and associated AQ that have a status update before April 2020 and do not have a theft record within the TRAS or TOG dataset;
- Identify the pre–April 2020 Dead Sites and associated AQ that are advancing, non-advancing and those with insufficient reads using the rejected read file;
- Calculate the proportion and associated AQ of pre-April 2020 Dead Sites with insufficient reads that are likely to be advancing; and
- Calculate the UIG by adding the AQ of the pre-April 2020 Advancing Dead Sites to the proportion of AQ of the Dead Sites with insufficient reads that are likely to be advancing.

CALLCULATION

INPUTS

- Dead Sites report from CDSP;
- Dead Sites Meter Read rejections from CDSP.

ASSUMPTIONS

- Dead Sites with reads showing advancement have consumed since the date of Dead status update;
- Dead Sites with insufficient reads advance in the same proportion as those that can be determined;
- The portfolio of Dead Sites will not undergo significant characteristic change in the coming years; and
- Supply Meter Points that are no longer Dead by the Line in the Sand are in fact reconciled properly for any energy used during the period when the Dead status was set.

CALCULATION

The detailed calculation is described below.

Identify the pre-April 2020 Dead Sites

1. For each Matrix Position identify the Supply Meter Points and calculate the total AQ for sites Dead before April 2020; and
2. Cross reference this data with the theft of gas master dataset and remove any that had theft of gas past the Dead status date.

Identify reads and calculate the advancing proportions

3. Obtain all the Dead sites meter read rejections for Dead Sites with a Dead status update pre-April 2020, as at February 2023;
4. Identify the count of Dead Sites, associated AQ and whether they are:
    a. Advancing (25% or more of read periods since isolation showed a meter advance);
    b. Non-advancing (no read advance or fewer than 25% of read periods showing consumption); and
    c. Those with insufficient reads to determine whether they are advancing.
5. From the Dead Sites data identified in step 4, calculate for each Matrix Position the
    a. Sum of the AQ of Advancing Dead Sites;
    b. Sum of the AQ of Non-Advancing Dead Sites; and
    c. Sum of the AQ of Dead Sites with insufficient reads to identify if the site is advancing.
6. Calculate the pre-April 2020 "Dead Sites Advancing Proportion" for each Matrix Position by dividing the sum of the Advancing Sites AQ (step 5a) by the sum of Advancing and Non-advancing AQ (steps 5a and 5b); and
7. Calculate the pre-April 2020 "Insufficient Reads Advancing AQ" for each Matrix Position by multiplying the sum of the Dead Sites with insufficient reads AQ (step 5c) by the Dead Sites Advancing proportion (step 6).

Determine the UIG

8. For each Matrix Position, extrapolate UIG by adding the sum of the AQ for Advancing Dead Sites (step 5a) to the Insufficient Reads Advancing AQ (step 7).

OUTPUT

Forecast UIG values for the target Gas Year, at the Line in the Sand, for this contributor, by Matrix Position.

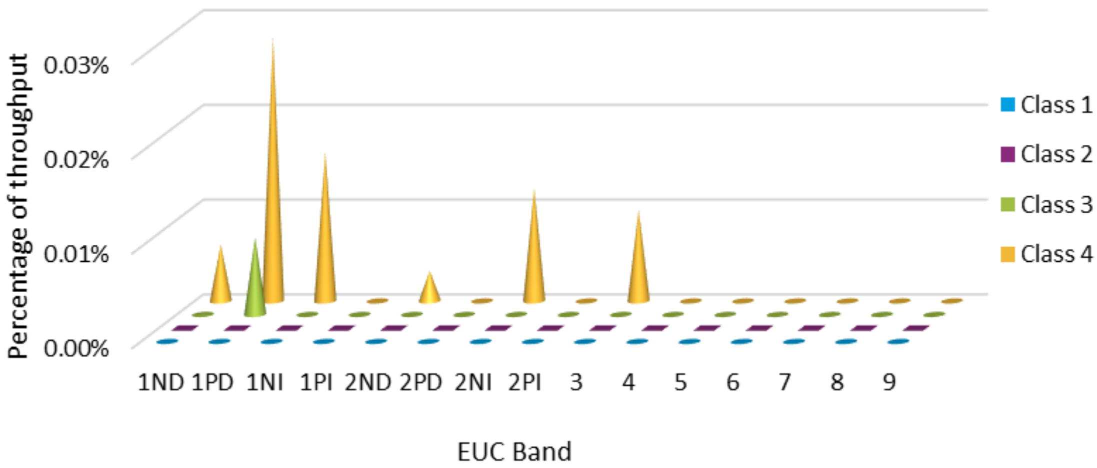
RESULTS

The forecast UIG for this contributor, at the Line in the Sand, for the target Gas year is: **19 GWh**. This is broken down by Matrix Position as follows[41]:

		CLASS			
		1	2	3	4
EUC BAND	1ND	-	-	0	12
	1PD	-	-	0	3
	1NI	-	-	-	1
	1PI	-	-	-	-
	2ND	-	-	-	0
	2PD	-	-	-	-
	2NI	-	-	-	1
	2PI	-	-	-	-
	3	-	-	-	1
	4	-	-	-	-
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-

[41] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

The graph below shows UIG as a percentage of throughput for each Matrix Position.



NOTABLE OBSERVATIONS

COMPARISON TO STATEMENT FOR GAS YEAR 2022-2023

This contributor has been quantified for the first time this year.

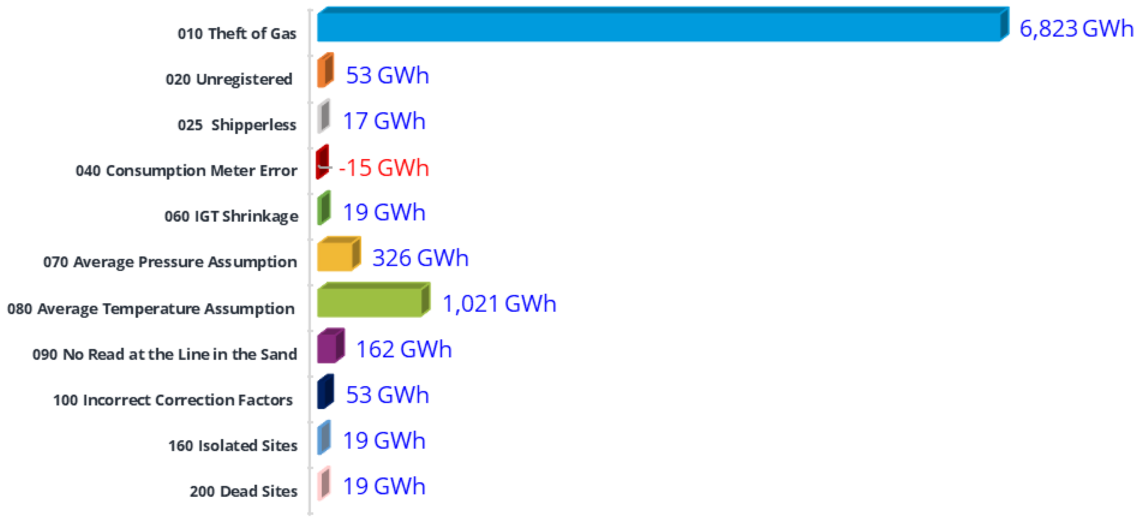
7 Results

TOTAL UIG FOR 2023-2024

We quantified total UIG to be **8,497 GWh** at the Line in the Sand for the target Gas Year. This compares to 10,652 GWh in last year's Statement for Gas Year 2022-2023.

UIG BY CONTRIBUTOR

This is broken down across 11 contributors as follows:



The table below shows the same contributors ordered by contribution to total UIG, with a comparison to last year's output[42]:

[42] Movement in UIG noted in the table (Gas Year 2022-2023 vs the target Gas Year) is based on a tolerance threshold of more than 1% and 1 GWh change.

Contributor	2022-2023 Gas Year UIG Volume	Change	2023-2024 Gas Year UIG Volume
Theft of Gas	7,602 GWh	↓	6,823 GWh
Average Temperature Assumption	1,220 GWh	↓	1,021 GWh
Average Pressure Assumption	359 GWh	↓	326 GWh
No Read at the Line in the Sand	861 GWh	↓	162 GWh
Incorrect Correction Factors	53 GWh	→	53 GWh
Unregistered Sites	35 GWh	↑	53 GWh
Isolated Sites	47 GWh	↓	19 GWh
Dead Sites	-	↑	19 GWh
IGT Shrinkage	18 GWh	→	19 GWh
Shipperless Sites	26 GWh	↓	17 GWh
Consumption Meter Error	432 GWh	↓	-15 GWh
Total	**10,652 GWh**	↓	**8,497 GWh**

UIG BY MATRIX POSITION

The 8,497 GWh of UIG we have quantified across the eleven contributors is allocated betweenMatrix Positions as shown in the table[43] below.

		CLASS			
		1	2	3	4
EUC BAND	**1ND**	-	-	559	3,455
	1PD	-	-	27	1,194
	1NI	0	0	71	945
	1PI	-	-	0	5
	2ND	-	-	3	165
	2PD	-	-	0	6
	2NI	-	0	124	681
	2PI	-	-	0	0
	3	0	0	53	112
	4	0	4	103	165
	5	0	3	54	104
	6	0	16	33	118
	7	1	35	29	126
	8	9	62	31	147
	9	52	0	0	2

COMPARISON TO OBSERVED LEVELS OF UIG

We compared our results with a forecast of UIG for the target Gas Year, based on observed levels of UIG since June 2017. This was for benchmarking purposes only. The method we used to do this is described below along with our assessment of the comparison.

[43] Note that due to rounding the individual Matrix Position values in aggregate may not equal total value. Zeros are rounded values. Dashes are where the Matrix Position is forecast to be empty.

INPUTS

The following datasets were used to forecast total UIG at the Line in the Sand in the target Gas Year:

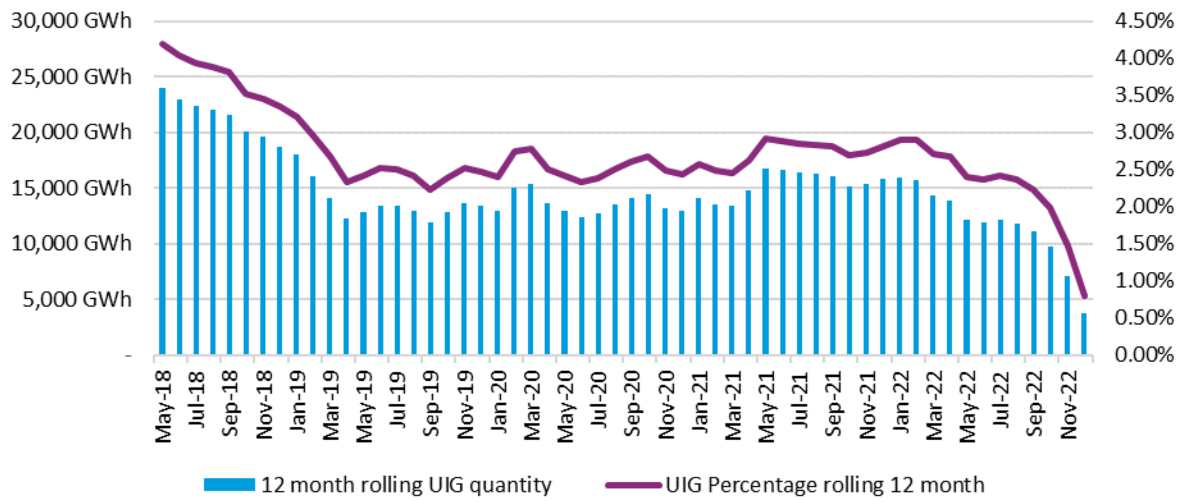
- UIG values at allocation from the Throughput report from the CDSP;
- UGR values from the Monthly Reconciliation and Offline Adjustment reports from the CDSP;
- Total throughput values from the Throughput report from the CDSP; and
- Our Consumption Forecast (as described in Section 4 of this Statement).

CALCULATION

We combined the UIG allocation values with the UGR values to calculate a best view of the current UIG position by supply month for each month since June 2017. We converted this to a percentage UIG for each month by dividing by the throughput.

We then determined a 12-month rolling average percentage of the best view of UIG.

RESULTS



The graph shown above provides the output of the analysis. Over the latest two full gas years, the average 12 month rolling UIG percentage is 2.50%.

We considered the fact that more recent months were less reconciled than earlier months and the prevalence of negative UIG at allocation stage in recent months and undertook sensitivity analysis on this by looking at earlier months that were further through their reconciliation process. This did not change the average 12-month rolling UIG percentage materially. From this we concluded that 2.50% was an appropriate value to use for benchmarking purposes.

Using this 2.50% and our Consumption Forecast, we calculated a benchmark UIG for the target Gas Year as 11,713 GWh.

COMPARISON OF RESULTS TO BENCHMARK

Our quantification of UIG, based on the current eleven contributors, is 72.5% of the benchmark UIG we forecast for the target Gas Year. This suggests that there is a proportion of UIG that is yet to have its cause identified or, despite identification, cannot be quantified due to the limited availability of reliable data - for example for Meters with a By-Pass Fitted (140), and uncertainty over Theft of Gas (010).

8 Weighting Factor Determination

WEIGHTING FACTOR CALCULATION

We calculated the Weighting Factors as a proportion of UIG relative to throughput in our Consumption Forecast for each Matrix Position within the AUG Table.

We then scaled these factors around the average of all Matrix Positions and multiplied them by 100. We did this to normalise the factors, without altering their relative values, so that the value will be comparable year-on-year. This approach means that:

- A Matrix Position with an average UIG to throughput ratio has a Weighting Factor of 100;
- A Matrix Position with a higher-than-average UIG to throughput ratio has a Weighting Factor greater than 100; and
- A Matrix Position with a lower-than-average UIG to throughput ratio has a Weighting Factor lower than 100.

Within the matrix, some positions had zero consumption in our Consumption Forecast; other positions had a consumption based on a forecast of a very small number of Supply Meter Points. For these positions, we determined the factors would not be statistically sound or are zero and that they required adjustment on a case-by-case basis. We also equalised the relevant factors in accordance with Modification 0840.

Accordingly, we made the following updates to the AUG Table:

- For each of the following Class and EUC band Matrix Position combinations (considered separately), we quantified UIG at the matrix position level and then combined the UIG and total throughput in order to calculate a single Weighting Factor for the respective combinations:
    - Class 1; all EUC bands except 1ND, 1PD, 2ND and 2PD
    - Class 2; we combined 1NI with 1PI and 2NI with 2PI;
    - We combined Class 3 1ND with 1PD, 1NI with 1PI, 2ND with 2PD, and 2PI with 2NI; and
    - We combined Class 4 1ND with 1PD, 1NI with 1PI, 2ND with 2PD, and 2PI with 2NI.
- For Class 1 and Class 2 EUC bands 1ND, 1PD, 1PI and 2ND, 2PD, 2PI Matrix Positions, we used the Weighting Factor from Class 3

We then normalised the factors once more by scaling them around the revised average of all Matrix Positions and multiplying by 100.

Note that due to observed differences between Class 3 and 4 in other Matrix Positions, we did not combine Classes 3 and 4 for 2PI and 2NI, as was the case for the 2021-2022 Gas Year. This reflects our approach to allocate UIG equitably (in this case more granularly) where there is justification or evidence to support doing this.

SMOOTHING

We judged it unreasonable for adjacent Matrix Positions, representing Supply Meter Points with similar characteristics, to have significantly different Weighting Factors. We therefore smoothed Weighting Factors across these positions.

We assessed various methods to undertake this smoothing and judged that the method that provided the most reasonable results was to set these Weighting Factors to the average of the relevant Matrix Position and the average of the surrounding Matrix Positions.

We considered that adjacent Matrix Positions in Class 2, 3 and 4 and EUC bands 03 to 09 represent Supply Meter Points with similar characteristics and so applied the smoothing algorithm to these.

Again, we normalised the factors by scaling them around the revised average of all Matrix Positions and multiplying by 100.

9 AUG Table

The AUG Table for the 2023-2024 Gas Year is shown below:

		CLASS			
		1	2	3	4
EUC BAND	1ND	56.61	56.61	56.61	111.87
	1PD	56.61	56.61	56.61	111.87
	1NI	5.74	844.42	155.89	615.26
	1PI	5.74	844.42	155.89	615.26
	2ND	73.33	73.33	73.33	145.41
	2PD	73.33	73.33	73.33	145.41
	2NI	5.74	294.31	85.15	297.90
	2PI	5.74	294.31	85.15	297.90
	3	5.74	55.35	47.93	54.72
	4	5.74	57.43	58.67	62.88
	5	5.74	66.28	57.44	61.96
	6	5.74	67.88	55.17	63.76
	7	5.74	69.29	55.09	70.34
	8	5.74	59.76	54.86	57.90
	9	5.74	29.73	26.32	27.73

These numbers have been normalised around an average of 100 so that they are comparable year-on-year. This does not impact the relative proportions in any way. For this reason, whilst the relative numbers are comparable with Statements for previous Gas Years, the absolute numbers are not.

YEAR-ON-YEAR COMPARISON OF FACTORS

Whilst the absolute factors cannot be usefully compared, the relative values can be. We used the Weighting Factors, our calculated UIG and our Consumption Forecast to determine UIG as a percentage of throughput. The value for each Matrix Position for Gas Years 2022-2023 and 2023-2024 are provided below.

2022-2023 UIG as % of throughput

		CLASS			
	2022-2023	1	2	3	4
EUC BAND	1ND	0.0%	1.4%	1.4%	1.9%
	1PD	0.0%	0.0%	1.5%	8.8%
	1NI	0.1%	19.1%	4.0%	17.3%
	1PI	0.0%	0.0%	4.0%	17.3%
	2ND	0.0%	0.0%	1.6%	2.9%
	2PD	0.0%	0.0%	1.6%	2.9%
	2NI	0.0%	2.3%	1.4%	4.6%
	2PI	0.0%	0.0%	1.4%	4.6%
	3	0.0%	1.2%	1.1%	1.2%
	4	0.1%	1.4%	1.2%	1.3%
	5	0.1%	1.3%	1.2%	1.3%
	6	0.1%	1.3%	1.2%	1.6%
	7	0.1%	1.5%	1.3%	1.4%
	8	0.1%	1.2%	1.4%	1.1%
	9	0.1%	0.6%	0.5%	0.6%

2023-2024 UIG as % of throughput

		CLASS			
	2023-2024	1	2	3	4
EUC BAND	1ND	0.0%	0.0%	1.1%	2.1%
	1PD	0.0%	0.0%	1.1%	2.1%
	1NI	0.0%	16.2%	3.0%	11.8%
	1PI	0.0%	0.0%	3.0%	11.8%
	2ND	0.0%	0.0%	1.4%	2.8%
	2PD	0.0%	0.0%	1.4%	2.8%
	2NI	0.0%	5.6%	1.6%	5.7%
	2PI	0.0%	0.0%	1.6%	5.7%
	3	0.1%	1.1%	0.9%	1.0%
	4	0.1%	1.1%	1.1%	1.2%
	5	0.1%	1.3%	1.1%	1.2%
	6	0.1%	1.3%	1.1%	1.2%
	7	0.1%	1.3%	1.1%	1.3%
	8	0.1%	1.1%	1.1%	1.1%
	9	0.1%	0.6%	0.5%	0.5%

By comparing the percentage values above for the current Gas Year and the target Gas Year, the differences give a reasonable representation of those Matrix Positions where Weighting Factors have seen movement:

		CLASS			
		1	2	3	4
EUC BAND	1ND	0.0%	-1.4%	-0.3%	0.2%
	1PD	0.0%	0.0%	-0.4%	-6.6%
	1NI	-0.1%	-2.9%	-1.0%	-5.6%
	1PI	0.0%	0.0%	-1.0%	-5.6%
	2ND	0.0%	0.0%	-0.2%	-0.1%
	2PD	0.0%	0.0%	-0.2%	-0.1%
	2NI	0.0%	3.3%	0.2%	1.1%
	2PI	0.0%	0.0%	0.2%	1.1%
	3	0.1%	-0.2%	-0.2%	-0.2%
	4	0.0%	-0.3%	-0.1%	-0.1%
	5	0.0%	0.0%	-0.1%	-0.1%
	6	0.0%	0.0%	-0.2%	-0.4%
	7	0.0%	-0.1%	-0.3%	-0.1%
	8	0.0%	0.0%	-0.3%	0.1%
	9	0.0%	-0.1%	0.0%	-0.1%

CHANGES TO WEIGHTING FACTORS: COMMENTARY

Although the relationship between the contributors in deriving the Weighting Factors is complex, we give some commentary on the main reasons for the shifts shown in the comparison table above.

- Practically **all movements in Weighting Factors are in fact attributable to changes to Theft data**, due to the high relative proportion of all UIG coming from this contributor, the significant reduction in the consumption forecast which has not been uniform across the Matrix Positions and the implementation of Mod 0840 combining factors which have previously not been combined:
  - Matrix Positions in EUC 1PD have seen a downwards shift as a direct result of the implementation of modification 0840.
  - Matrix Positions in EUCs 1NI and 1PI have seen a downwards shift, with a commensurate upwards movement in 2NI and 2PI. This is due to movements in the theft proportions driven by our methodology's validation process for theft EUCs (particularly those before 2019 when the sub-bands were created), along with the shift in the 10-year rolling theft dataset (gaining an extra year of recent data and losing the earliest year);
- For No Read at the Line in the Sand, the refreshed data included a proportionally larger number of industrial sites with no accepted read. This had a very minor impact on pushing more relative UIG towards 2NI and 2PI, and;
- There have been material changes to UIG calculated for Consumption Meter Errors; and the LDZ Meter Error contributor has been discounted completely. However, the relative scale of these contributors means that there has been **no meaningful impact on Weighting Factors**.

10 Glossary

AQ – Annual Quantity. The estimated annual seasonal normal consumption of a Supply Meter Point based on historical consumption.

AUGE – Allocation of Unidentified Gas Expert. The party appointed by the CDSP to develop an AUGS and calculate a table of Weighting Factors, which are used to share out daily Unidentified Gas.

AUGS or Statement – Allocation of Unidentified Gas Statement. The document describing the process followed by the AUGE to determine the AUG Table of Weighting Factors.

AUG Table – The table containing the Weighting Factors for each Matrix Position.

AMR – Automated Meter Reading. Equipment attached or built into a meter to provide at least half-hourly reads and remote access to such data, which is not a Smart Meter. Used predominantly at non-domestic premises.

Back Billing – A charge made to reflect an adjustment to the energy values in a previous Settlement period.

BEIS – Department for Business, Energy and Industrial Strategy. The government department responsible for the energy industry. . (Now DESNZ: Department for Energy, Security and Net Zero).

By-pass – Mechanical device or arrangement used to provide an alternative route for gas to a Supply Meter Point, avoiding the meter, when the meter requires maintenance or replacement.

CDSP – Central Data Services Provider (Xoserve). The party appointed by the Transporters to operate central gas industry functions including Settlement and Supply Point Administration and the billing of Shippers for these services.

Class – Categories into which gas end consumers are divided based on their AQ, the frequency of reads provided and Settlement arrangements. Often referred to as “Product Class”.

CMS – Contact Management System. A secure two-way communication system used by the CDSP and industry parties for operational and invoicing contacts.

Consumption Forecast – Our estimate of gas consumption in the 2023-2024 Gas Year.

Consumption Adjustment – Process used to manually adjust recorded consumption volumes in the CDSP System where a Supply Meter Point’s reads are not reflective of actual consumption (e.g. meter error; by-pass operation)

Correction Factor – Used to convert measured gas volumes (m^3) to volumes in Standard Cubic Metres. This takes account of differences in temperature and pressure at the meter. See also Standard Correction Factor.

COVID – Covid-19. A disease (SARS-CoV-2) caused by a virus.

CV – Calorific Value. The amount in energy (MJ) in a cubic meter of gas as defined in the UNC.

DNO – Distribution Network Operator. The owner or operator of one or more LDZs.

DSC – Data Services Contract. The contract between industry parties and the CDSP.

ECV – Emergency Control Valve. An isolation valve that denotes the point where the network connects the Supply Meter Point.

Energy UK or **EUK** - The trade association for the GB energy industry with over 100 members spanning every aspect of the energy sector.

ETTOS – Energy Theft Tip-Off Service. A service allowing tip-offs regarding suspected energy theft, received from the general public, to be sent to the relevant Supplier, Transporter or IGT for investigation.

EUC Band – End User Category Band. A category of Supply Meter Points based on factors such as AQ.

Fiscal Theft – A type of theft restricted to pre-payment meters, where the meter is interfered with so that no payment is made to the Supplier, but gas is still recorded by that meter as being consumed. Fiscal theft does not contribute to UIG at Line in the Sand.

Gas Year – 1st October to 30th September.

GSR – Gas Safety (Installation and Use) Regulations 1998 (GSIUR).

IGT – Independent Gas Transporter.

IGTAD – Independent Gas Transporters Arrangements Document. The document which sets out the rights and obligations between DNOs and IGTs in relation to the connections between their respective networks and is the basis of implementation of certain provisions of the UNC in relation to CSEPs.

INA – Independent Networks Association. The trade body for Independent Gas Transporters and Independent Distribution Network Operators.

IST – In-Service Testing. A national sampling scheme for gas and electricity meters run by the OPSS, designed to ensure that only meters that operate within the prescribed limits of accuracy are used for consumer billing.

LDZ – Local Distribution Zone. A pipeline system owned or operated by a DNO, covering a defined area for which the total gas input and consumption demand can be measured each day. There are 18 of these, which between them cover the total land area of Great Britain.

Line in the Sand – Gas Settlement Cut-Off (defined more fully in the No Read at the Line in the Sand (090) contributor). It is the point in time that Settlement is closed off for a Gas Day with no further reconciliations being made. It is three to four years after the Gas Day.

Main EUC Band – EUC bands 01 to 09.

Matrix Position – A sub-EUC band and Class cell within the AUG Table.

Modification – A proposal for a change in the UNC, overseen by the Modification Panel.

Must Read – A read procured by a Transporter when the Shipper has not obtained a valid read.

National Grid NTS – The owner and operator of the NTS.

NDM – Non-Daily Metered. A Supply Point in Class 3 or 4.

NTS – National Transmission System. The network owned and operated by National Grid NTS which is connected to the LDZs owned or operated by the DNOs.

Ofgem – The regulator for Gas and Electricity energy markets in Great Britain.

OPSS – Office for Product Safety and Standards. Part of the Department for Business, Energy and Industrial Strategy.

PE – Polyethylene. A material that most modern gas pipes are made of.

Pre-Payment Meter – A meter where payment for the gas consumed is made on a pay as you go basis.

PTS – Passed to Shipper.

REC – Retail Energy Code. The industry code designed to govern the new switching arrangements, as well as amalgamating and updating the governance of existing gas and electricity retail arrangements.

Seasonal Normal – Gas demand expected under normal weather conditions for the relevant time of year.

Settlement – The combined term for the nomination, allocation and reconciliation processes.

Shipper – An industry party which has title to and causes gas to be delivered to Supply Meter Points on the network and which is liable for certain charges in relation to the Transporters' provision of this service and for related services provided by the CDSP.

Shipperless Site – A Supply Meter Point that is currently unregistered but was previously registered to a Shipper.

Shrinkage – Gas lost from the network as a result of leakage, own use gas or theft.

Smart Meter – A meter which allows the remote provision of meter reads in accordance with the Smart Metering Equipment Technical Specifications.

Specific Correction Factor – A specific correction for a Supply Meter Point with an AQ greater than 732,000 kWh calculated based on the thermal regulations, the altitude, the inlet pressure and the compressibility.

SSrP – Shipper Specific rePort.

Standard Atmosphere – A pressure of 1.01325 bar.

Standard Correction Factor – The correction factor applied to all sites with a rolling AQ of less than 732,000 kWh (1.02264).

Standard Cubic Meter – Is a cubic meter of gas at a temperature of 15C and at a pressure of one Standard Atmosphere.

Sub-EUC Band – The EUC bands including the 8 bands in EUC 01 and 02 which were implemented in October 2019 as a result of DSC Change Proposal XRN4665 (*"Creation of New End User Categories"*).

Supplier – An industry party which provides gas to end consumers and bills them for this. This is often, but not always, the same party which acts as the Shipper and provides the gas to the Supplier at the ECV. The two functions are performed under different licences issued by Ofgem.

Supply Meter Point – A metered exit point from an LDZ or IGT network that supplies gas to an end consumer.

Supply Point Register – A register of all Supply Meter Points and Supply Point premises that is maintained by the CDSP.

Target Gas Year – The Gas Year that the Weighting Factors will be applicable. For this Statement it is the Gas Year 2023-2024.

Thermal Regulations – The Gas (Calculation of Thermal Energy) Regulations 1996.

Throughput – The amount of gas that flows within a defined period.

Throughput Extremes – The minimum and maximum capacity of a meter.

TOG – Theft of Gas. A regime provided by the CDSP that utilises a contact management system (CMS) to address theft. It mandates an investigation by the Shipper or DNO to determine the amount of theft and the period over which it took place, and includes an adjustment being made in Settlement such that the stolen gas is attributed to the correct Shipper.

Transporter – National Grid NTS or a DNO.

TRAS – Theft Risk Assessment Service. A service placing a requirement on Suppliers to submit defined data items for the purposes of assessing the risk of energy theft at consumer premises to help target theft investigations.

UGR – Unidentified Gas Reconciliation. The equal and opposite value of all direct reconciliations that arise as meters are read and the amount of UIG is revised.

UIG – Unidentified Gas. Explained in more detail in the Introduction section.

UNC – Uniform Network Code. A legal and contractual framework to supply and transport gas in Great Britain.

Unregistered Site - A Supply Meter Point that has never been registered to a Shipper.

Weighting Factors – The factors contained within the AUG Table and used to share UIG between Classes and EUC bands.

Appendix 1 – Compliance with the Generic Terms of Reference

This table below details the way we have complied with the Generic Terms of Reference contained within Section 5 of the AUGE Framework document.

AUGE Framework Document Requirement	Evidence of Fulfilment
The AUG Expert will create the AUG Statement and AUG Table by developing appropriate, detailed methodologies and collecting necessary data.	We created a detailed, bottom-up holistic methodology, as described in Section 4 of this Statement, for the estimation of UIG at the Line in the Sand in the target Gas Year and collected the necessary data.
The decision as to the most appropriate methodologies and data will rest solely with the AUG Expert taking account of any issues raised during the development and compilation of the AUG Statement and AUG Table. **For the avoidance of doubt although UIG includes any LDZ Shrinkage Error, the AUG Expert acknowledges that the process for determining LDZ Shrinkage is laid out in the relevant DNO Licences. To avoid dual governance of any LDZ Shrinkage Error, the AUG Expert's role in respect of any LDZ Shrinkage Errors is therefore limited to confirming that there are controls in place to ensure that DNOs discharge their Licence obligation (that is that there is a methodology and that it is periodically reviewed for confirmation that the methodology remains relevant). The AUGE will present any comments or observations on the LDZ Shrinkage model through the annual consultation carried out by the DNOs.**	We, at our sole discretion, decided the appropriate methodologies for all contributors and other aspects of determining UIG. These are detailed further in Sections 5 and 6 of this AUG Statement. (There is also some additional historical methodology rationale in previous years' Statements.) We did not make any investigation into, nor comment in relation to, LDZ Shrinkage Error.
The AUG Expert will determine what data is required from Code Parties (and other parties as appropriate) in order to ensure it has sufficient data to support the evaluation of Unidentified Gas.	We determined the data required from Code Parties, where this was deemed necessary by us, in our sole view.
The AUG Expert will determine what data is necessary from parties in order to ensure it has appropriate data to support the evaluation of Unidentified Gas.	Please see above.

AUGE Framework Document Requirement	Evidence of Fulfilment
The AUG Expert will determine what relevant questions should be submitted to Code Parties in order to ensure appropriate methodologies and data are used in the evaluation of unidentified error.	We have asked a number of questions of Code Parties, for example, in relation to validating AMR populations, theft investigation practices, meter by-pass operations, and actual mains length from INA.
The AUG Expert will use the latest data available where appropriate.	In all cases where data has been requested from the CDSP or any other industry party, we have ensured that the data provided is the most up to date available. Updated datasets have been requested and validated where required. This year we have committed to undertaking elements of theft analysis beyond the normal analysis timetable because of the delayed delivery of TRAS data and its importance to the overall weighting factors.
Where multiple data sources exist the AUG Expert will evaluate the data to obtain the most statistically sound solution, will document the alternative options and provide an explanation for its decision.	Where we encountered multiple data sources, we evaluated that data to obtain the most statistically sound outcomes and have provided an explanation of this process within this final AUG Statement.
Where data is open to interpretation the AUG Expert will evaluate the most appropriate methodology and provide an explanation for the use of this methodology.	Where data was open to interpretation, we evaluated that data to obtain the most statistically sound methodologies and have provided an explanation of this process within this final AUG Statement.
Where the AUG Expert considers using data collected or derived through the use of sampling techniques, then the AUG Expert will consider the most appropriate sampling technique and/or the viability of the sampling technique used.	In cases where data has been collected or derived through sampling techniques, we have considered the most appropriate in each case, along with the viability of this.
The AUG Expert will present at a meeting the AUG Statement, including the AUG Table, in draft form (the "proposed AUG Statement"), to Code Parties seeking views and will review all the issues identified submitted in response.	We presented the draft AUG Statement to industry at the AUG Sub-Committee meeting on 13 January 2023 and our response to the AUG Statement consultation at the AUG Sub-Committee meeting on 17th February 2023.
The AUG Expert will provide the AUG Statement, including the AUG Table, to the Gas Transporters for publication who will then provide the AUG Statement and Table to the CDSP.	This final AUG Statement is provided for publication on 25th April 2023.

AUGE Framework Document Requirement	Evidence of Fulfilment
The AUG Expert will ensure that all data that is provided to it by parties will not be passed on to any other organisation or used for any purpose other than the creation of the methodology and the AUG Statement and Table.	All data received from any external party in relation to our role as AUGE has not been shared with any other party, nor used for any purpose other than that of the creation of the methodology and the AUG Statement and Table.
The AUG Expert shall ensure that all data provided by Code Parties will be held confidentially, and where any data, as provided or derived from that provided, is published then it shall be in a form where the source of the information cannot be reasonably ascertained.	Engage Consulting's policies in relation to protecting information ensure that all AUG data is kept secure. As AUGE we have treated all confidential data appropriately and only used this for the purpose provided.
The AUG Expert will act with all due skill, care and diligence when performing of its duties as the AUG Expert and shall be impartial when undertaking the function of the AUG Expert, ensuring that any values derived will be equitable in their treatment of Code Parties.	We have performed our duties as AUGE with a high level of skill, care and diligence and in a completely impartial manner, seeking to allocate UIG to the Matrix Positions contained in the AUG Table on as equitable a basis as possible. To ensure an impartial approach, we have also maintained a record of all our contacts with external parties in relation to the AUGE service.
The AUG Expert will compile the methodology and AUG Statement and AUG Table in accordance with this Framework.	Our Quality Assurance processes have ensured that all the work that we have undertaken in our role as AUGE has been conducted in accordance with the AUGE Framework. Our AUGE team includes a Quality Lead independent of our Service Delivery Lead and SME. We maintain Director level oversight of delivery and quality.

Appendix 2 – List of Data Sources

Report Name	Report Description	Source	Frequency	Use
Accepted Reads for Isolated Sites	Details of the accepted meter reads for Supply Meter Points with a live isolation status	CDSP	3x a year	Isolated Sites (160)
Accepted Reads for sites with Theft	All accepted reads for sites which have had an incidence of theft (has appeared on the TOG or TRAS file)	CDSP	2x a year	Theft of Gas – Quality of Read history (011)
Reconciliation percentages	Historical allocation energy and allocation reconciled energy by month for each EUC band	CDSP	Annual	No Read at the Line in the Sand (090)
AMR History	A report of all the Supply Meter Points with AMRs previously installed	CDSP	Annual	Theft of Gas (010)
AMR Snapshot	Details of all the Supply Meter Points with an AMR device	CDSP	2x a year	Theft of Gas (010)
Annual Load Profile	Annual Load Profiles for Gas Year 2022-2023	CDSP	Annual	Shipperless Sites (025) Unregistered Sites (020) Consumption Forecast
AQ Snapshot	The number of Supply Meter Points and associated AQ for each Matrix Position for each LDZ	CDSP	Monthly	Consumption Forecast
Average Main Length	The average length of main for IGT Supply Meter Points	INA	n/a	IGT Shrinkage (060)
By-Pass AQ Report	A report of all the historical AQ changes for Meter Points with a By-Pass currently fitted	CDSP	One off	Meters with a By-Pass Fitted (140)
Calorific Values (CV)	The daily CV used in Settlement for each LDZ	Public Domain (National Grid Website)	Annual	IGT Shrinkage (060)

Connection Details for Orphaned Sites	A report of Supply Meter Points that used to appear on the Orphaned Sites report but which have since been registered to a Shipper	CDSP	Monthly	Unregistered Sites (020)
Connection Details for Shipperless Sites	A report of the Supply Meter Points that used to appear on either the SSrP report or the PTS report, but which have since been registered to a Shipper	CDSP	Monthly	Shipperless Sites (025)
Conversion Equipment Fitted	A report of the Supply Meter Points that have volume conversion equipment fitted and their associated AQ	CDSP	Annual	Average Pressure Assumption (070) Average Temperature Assumption (080) Incorrect Correction Factors (100)
Correction Factor	Correction factors for all Supply Meter Points with an AQ greater than 732,000 kWh	CDSP	Annual	Average Pressure Assumption (070) Incorrect Correction Factors (100)
Dead Sites	A report of the Supply Meter Points that have been identified as Dead	CDSP	3x a year	Dead Sites (200)
Embedded AMR	Details of all the Supply Meter Points with an embedded AMR device	CDSP	2x a year	Theft of Gas (010)
Flow Weighted Gas Temperatures	Gas Temperature Data from DMTS and ICTS	DNV (BG Technologies)	n/a	Average Temperature Assumption (080)
IGT Sites	A snapshot of the number of Supply Meter Points Connected to IGTs	CDSP	2x a year	IGT Shrinkage (060)

In-Service Testing (IST) Results	In-service testing results of domestic sized meters	BEIS (OPSS)	Annual	Consumption Meter Errors (040)
Isolated Sites	A report of the Supply Meter Points that have been identified as Isolated	CDSP	3x a year	Isolated Sites (160)
Leakage Rates	Leakage rates from the NLT	Public Domain	n/a	IGT Shrinkage (060)
Legitimate Unregistered Sites Details	A report of Supply Meter Points that have legitimately never been registered to a Shipper	CDSP	Monthly	Unregistered Sites (020)
Less Than 12 months report	A report of Unregistered sites which have been unregistered for less than 12 months	CDSP	Monthly	Unregistered Sites (020)
Measurement Error Register	The register of the LDZ Meter Errors	Public Domain (Joint Office)	n/a	LDZ Meter Errors (050)
Meter Location	Snapshot providing the number of Supply Meter Points and Associated AQ split by meter location and by LDZ Matrix Position	CDSP	Annual Snapshot	Average Temperature Assumption (080)
Meter Type	Details of the meter types and installation year for each LDZ Matrix Position	CDSP	Annual	Theft of Gas (010) Consumption Meter Errors (040)
Monthly Reconciliation	Monthly report of direct reconciliations since June 2017	CDSP	Monthly	Comparison to Observed Levels of UIG
Offline Adjustment	Summary of offline adjustments provided by supply month and reconciliation month	CDSP	Annual	Comparison to Observed Levels of UIG
Orphaned Sites	A report of Supply Meter Points that have been unregistered for at least 12 months, have never been registered to a Shipper and where there has been an indication of meter activity	CDSP	Monthly	Unregistered Sites (020)

PAW Risk Assessment Model	The risk model provided to the Performance Assurance Committee	Public Domain (Joint Office)	n/a	LDZ Meter Errors (050)
Post Code and Elevation Data	The altitude of each postcode in Great Britain	Open Data[44]	n/a	Average Pressure Assumption (070)
Pressure Data	Historical Pressure information by Weather Station	CDSP	n/a	Average Pressure Assumption (070)
Read Frequency	Percentage of sites without a read for a set period of time	CDSP	2x a year	Theft of Gas – Quality of Read history (011)
Rejected Reads for Isolated Sites	Details of the rejected meter reads for Supply Meter Points with a live isolation status	CDSP	3x a year	Isolated Sites (160)
Rejected Reads for Dead Sites	Details of the rejected meter reads for Supply Meter Points with a status of Dead	CDSP	3x a year	Dead Sites (200)
Rejected Reads for sites with Theft	All rejected reads for sites which have had an incidence of theft (has appeared on the TOG or TRAS file)	CDSP	2x a year	Theft of Gas – Quality of Read history (011)
Rejected Reads for Sites with No Read	Details of the read rejections carried out on the Supply Meter Points with no Reads after April 2020 report	CDSP	3x a year	No Read at the Line in the Sand (090)
Seasonal Normal Factors	Seasonal normal factors that are applied in the AQ calculation forecast to take account of seasonal normal changes	CDSP	Every five years	Consumption Forecast
Shipperless AQ Report	A report of the AQ changes for Shipperless Sites that are now connected	CDSP	Annual	Shipperless Sites (025)

[44] Attribution: Contains OS data © Crown copyright and database right 2017; Contains Royal Mail data © Royal Mail copyright and database right 2017; Contains National Statistics data © Crown copyright and database right 2017.

Shipperless Sites PTS	A report of the Supply Meter Points that have been identified as Shipperless Sites on a GSR visit where the meter is the same as that previously in place	CDSP	Monthly Snapshot	Shipperless Sites (025)
Shipperless Sites SSrP	A report of the Supply Meter Points that have been identified as Shipperless Sites on a GSR visit where the meter is different to that previously in place	CDSP	Monthly Snapshot	Shipperless Sites (025)
Sites with a Meter By-pass	A report of the Supply Meter Points with a meter by-pass installed	CDSP	2x a year	Meters with a By-Pass Fitted (140)
Smart Meter Data	Smart Meter Installation data by quarter from BEIS	Public Domain (BEIS)	n/a	Consumption Forecast Consumption Meter Errors (040)
Supply Meter Points with no Reads after April 2020	Details of the Supply Meter Point ID, their AQ and the last read for Supply Meter Points with no actual read after April 2020	CDSP	Quarterly Snapshots	No Read at the Line in the Sand (090)
Telemetered Sites	Details of all the Telemetered Supply Meter Points	CDSP	n/a	Theft of Gas (010)
Theft Data	A report of the thefts from Smart and Traditional meters provided by a sub-set of EUK members	EUK	n/a	Theft of Gas (010)
TRAS Theft Information	The data outcome file from TRAS, verified and enhanced by the CDSP with meter type data	REC Co/ CDSP (via CDSP)	Annual	Theft of Gas (010)
Throughput	Daily Total throughput, DM allocation, NDM allocation and UIG by LDZ and EUC	CDSP	Monthly	Comparison to Observed Levels of UIG
TOG Theft Information	Details of theft provided to Xoserve within CMS	CDSP	2x a year	Theft of Gas (010)

Unregistered AQ Report	A report of the AQ changes for unregistered sites that are now connected	CDSP	Annual	Unregistered Sites (020)

Appendix 3 – Actual Annual Quantities and Supply Meter Points

The tables below provide the sum of the AQs and the number of Supply Meter Points broken down by Matrix Position for two points in time (February 2022 and February 2023). These have been included as reference points against which our Consumption Forecast can be compared.

Aggregate AQ (GWh) – February 2022:

		CLASS			
	Feb-22	1	2	3	4
EUC BAND	1ND	-	0	44,660	256,999
	1PD	-	-	541	17,803
	1NI	0	0	2,077	7,781
	1PI	-	-	1	34
	2ND	-	-	235	6,749
	2PD	-	-	1	181
	2NI	-	3	6,399	13,803
	2PI	-	-	1	9
	3	-	17	6,127	13,198
	4	2	155	6,602	15,121
	5	27	182	4,210	10,506
	6	318	1,222	2,912	9,980
	7	812	2,212	2,899	8,854
	8	3,835	5,116	2,432	8,587
	9	51,462	628	505	1,560
					516,758

Aggregate AQ (GWh) – February 2023:

		CLASS			
	Feb-23	1	2	3	4
EUC BAND	1ND	-	-	50,411	219,873
	1PD	-	-	630	14,663
	1NI	0	0	2,115	8,779
	1PI	-	-	1	38
	2ND	-	-	188	5,673
	2PD	-	-	3	182
	2NI	-	3	6,870	13,359
	2PI	-	-	1	6
	3	1	28	6,991	12,029
	4	2	241	7,859	12,957
	5	27	205	4,793	9,547
	6	350	1,132	3,393	9,417
	7	770	2,280	3,266	8,325
	8	4,860	4,217	1,781	10,051
	9	51,707	422	259	1,275
					480,979

Total Supply Meter Points – February 2022:

		CLASS			
	Feb-22	1	2	3	4
EUC BAND	1ND	-	1	3,564,897	18,634,359
	1PD	-	-	48,666	1,833,593
	1NI	2	7	75,331	386,189
	1PI	-	-	27	2,999
	2ND	-	-	2,134	59,982
	2PD	-	-	10	1,684
	2NI	-	15	43,073	97,969
	2PI	-	-	8	85
	3	-	34	13,706	29,282
	4	1	112	5,568	12,712
	5	5	52	1,237	3,122
	6	29	123	326	1,114
	7	38	108	138	431
	8	81	124	59	215
	9	365	9	7	21
					24,820,050

Total Supply Meter Points – February 2023:

		CLASS			
	Feb-23	1	2	3	4
EUC BAND	1ND	-	-	4,540,285	17,933,379
	1PD	-	-	62,300	1,678,177
	1NI	3	10	80,890	430,490
	1PI	-	-	37	3,222
	2ND	-	-	1,738	50,067
	2PD	-	-	25	1,619
	2NI	-	16	45,673	95,665
	2PI	-	-	5	53
	3	1	50	15,670	26,877
	4	1	189	6,580	10,922
	5	7	54	1,418	2,805
	6	33	111	382	1,040
	7	35	108	158	395
	8	103	104	44	254
	9	353	4	4	18
					24,991,374

Appendix 4 – Future Considerations

In this Appendix we have collated for reference a list of suggestions and considerations for potential UIG contributors, or refinements to methodologies for existing contributors. Some considerations arise during our own investigation and analysis. Others are proposed by industry stakeholders during consultation or stakeholder meetings.

At the start of each AUGE year, entries on this list will be reassessed, regardless of the outcome of previous assessments. Previous considerations that have been incorporated into our ongoing methodologies are removed from the list.

Contributor	Future Considerations
010 Theft of Gas	Our experience and discussion with industry parties indicates that the approach to detecting theft varies greatly between Shippers. On this basis, overlaying Shipper identities to theft datasets would validate this view and allow us to predict the likelihood of theft being detected according to the trend of market share among Shippers. This is not possible using only anonymised datasets. To progress this we would need the Shipper identifier to be provided within the theft datasets.
010 Theft of Gas	The cost of living crisis, combined with the price of gas raises questions about the level of overall gas theft proposed by the model. In addition, a recent study into energy theft has been published. We will consider this as material new information in our assessment process.
010 Theft of Gas	We will continue to work with industry to consider changes to the methodology and approach to determining Weighting Factors in Matrix Positions in EUC Band 01PD, in recognition of the historically increasing differential between these UIG for domestic credit and prepayment customers. This will include a full in-depth review of RECCo's Theft Estimation Methodology.
040 Consumption Meter Errors	We will consider the potential impact of flow rates on Consumption Meter errors. To progress this we would require Shippers to provide us with within day consumption information for high consuming Supply Meter Points. This may not be available.

Contributor	Future Considerations
050 LDZ Meter Errors	The analysis we undertook under the Consumption Meter Errors (040) contributor found an inherent bias in the accuracy of domestic diaphragm and ultrasonic meter types and concluded that this is the source of material UIG. It is possible that an inherent bias exists for LDZ meters. If it does, the UIG associated with this could be significant. For example, a hypothetical bias of a modest 0.10%, would result in circa 500 GWh of UIG per annum. However, we were unable to find any data of studies that informed this. To progress this would require in-field testing of LDZ meters and the results provided to us. Note this contributor has been discounted as insignificant to our overall UIG model; but new information on inherent bias at LDZ meters would be a reason to reconsider its inclusion.
060 IGT Shrinkage	We have considered the impact of gas lost in the purging of new mains and services; own use gas; and network theft of gas, on IGT shrinkage. Whilst the impact of the first two of these is almost certainly minimal in comparison to overall IGT shrinkage, the impact of network theft might not be. To progress this we would require IGTs to provide us with records of theft from their networks. This may not currently exist.
090 No Read at the Line in the Sand	Further enhancements to our calculation include more accurately calculating the AQ at risk. Because of the dataset available to us, our method only tracked the sites with no read for a limited amount of time. If these sites are tracked for an extended period, the accuracy of our estimation of AQ at risk will increase. This will occur as we continue to request this data as part of the annual data request process.
090 No Read at the Line in the Sand	Understanding in more detail the causes of missing meter reads would require close investigation and probably access to Shipper systems but could lead to a more accurate estimation of UIG, or a new source of data to be used in future methodologies. To progress this we would need to have access to data from Shipper systems or be provided with information about why Supply Meter points do not have a read for an extended period of time.

Contributor	Future Considerations
090 No Read at the Line in the Sand	Our investigation into must reads provided very limited results. Therefore, we would suggest a more detailed review into why must reads for monthly read sites were not being completed before the Line in the Sand. To progress we would require information on failed must reads.
100 Incorrect Correction Factors	Our Correction Factor calculations are based on applying averages and assumed deviation from those averages. We did not identify on an individual basis those Supply Meter Points with incorrect Correction Factors set. We will investigate the possibility of reviewing the exact values applied at each Supply Meter Point. Additionally, the industry could consider organising an audit of all Correction Factors. To progress this would currently require work under the innovation service as it is outside of the scope of the core AUGE activity.
UIG Calculation	Our calculation of UIG provides a single value for each contributor. A confidence rating could be added to our UIG calculation to display how certain we are with the calculated UIG value. To progress this would require further research and analysis into feasibility and options for approach.
UIG Calculation	Further validation of our outputs may give stakeholders additional confidence in their accuracy. We will consider the appropriateness and practicality of further 'top down' validation of the UIG we calculate.
070 Average Pressure Assumption	Our pressure calculation is based on a small number of weather stations and an average altitude. Accuracy could be increased by using a larger set of weather data. To progress this the additional pressure data would need to be purchased and provided to us.
080 Average Temperature Assumption	Our calculation uses temperature studies that are almost 20 years old and little information is provided on how common the dataset is used. An updated study could be commissioned to get some more up to date information. To progress this would require a temperature study which has been proposed under our innovation service.
025 Shipperless Sites	We progressed the potential inclusion of Shipperless Sites awaiting their GSR visit in our data and analysis for the 2022-2023 Gas Year. To progress this we will need up to date GSR visit outcome data that has to date been unavailable.

Contributor	Future Considerations
130 Consumption Adjustments	We will consider UIG attracted by Consumption Adjustment Errors, in line with our initial assessment procedure, for subsequent years. Assessment for the 2023-2024 Gas Year did not score this contributor highly enough to warrant investigation. This potential contributor will remain on our list for assessment for Gas Year 2024-2025.
160 Isolated Sites	Some sites in our Isolated Sites dataset may usefully be excluded with further validation. We will consider investigating additional ways to validate the Isolated Sites data to improve the accuracy of the output from this contributor. To do this we will require further site-specific data, for example vacancy status, electricity reads etc.
160 Isolated Sites	We use available AQ data to forecast the future state of the Isolated Sites dataset. There may be ways to improve the accuracy of this forecast by looking for alternative data to validate the AQ values used. We will assess whether additional data is available to improve the accuracy of AQ assumptions for Isolated Sites. This is likely to require historical read data for sites in the relevant dataset.
180 Unfound UIG Contributors	The UIG calculated using our bottom-up approach comprises only UIG from identified sources. We acknowledge that there will be additional sources that we are yet to identify or calculate. We will consider an approach to 'scaling up' our calculated UIG to a 'likely' actual level under an existing (but so far unused) contributor 180 (Unfound UIG Contributors).
Consumption Forecast	We will review all Matrix Positions for out of the ordinary historical consumption patterns given five full years' data since Project Nexus Implementation Date.

Appendix 5 – Changes Made After Consultation on the Draft Statement

Below is a record of the material updates made since consultation on the draft Weighting Factors for 2023 - 2024.

Area	Update
Changes incorporated in the proposed final AUG Statement (published 3 March 2023)	
Updated consumption forecast	New data since October 2022 gives rise to some material changes. See description in Section 4.
Refreshed datasets	We took up to date snapshots of several datasets which resulted in immaterial changes to contributors Dead Sites, Isolated Sites, and No Read at the Line in the Sand.
Weighting Factors	Weighting Factors are updated on the back of data refreshes, and comparison between these proposed Final Weighting Factors and those for Gas Year 2022 – 2023 are now set out.
Smart Rollout theft investigation	Having now analysed the most recent TRAS data, we provide a full record of the thinking behind this investigation, albeit concluding that there is no justifiable alternative to the current method for allocating undetected theft to smart meter populations.
Meter bypass	With no further meaningful inputs to our assumptions available, we record that this investigation remains inconclusive.
Changes incorporated in the final AUG Statement (published 31st March 2023)	
General presentational updates	Naming and descriptive updates only, reflecting the transition from proposed final AUG Statement and this final AUG Statement. No further changes relating to data refreshes and no updates to Weighting Factors.
Changes incorporated in the revised final AUG Statement (published 25 April 2023)	
Implementation of Modification 0840	Weighting Factors and commentary updated to reflect the new requirements for aggregating prepayment populations with their credit counterparts.

Call us on **02074 050740**

Visit our web page at **www.engage-consulting.co.uk**

Email us at **auge@engage-consulting.co.uk**

Follow us at **www.twitter.com/engageexpert**

engage

ELECTRICITY | GAS | INDUSTRY EXPERTS