Demand Estimation Sub Committee

4.2 Algorithm Performance Gas Year 2022/23
Strand 2 – UIG Analysis
19 December 2023

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Background

| LDZ Input (Measured)	−	DM Energy (Measured)	−	NDM Energy (Estimated)	−	Shrinkage (Estimated)	=	UIG (Balancing Figure)

- Unidentified Gas (UIG) represents the balancing figure in the daily Demand Attribution calculation and will naturally include any modelling error in the estimate of NDM Energy. UIG will also 'sweep up' any inaccuracies in the LDZ input, DM Energy, or Shrinkage values

- The UIG analysis presented in Strand 2 can therefore be used as an indicator of the performance of the NDM Algorithm by reviewing UIG volumes and trends which can provide context when reviewing Strand 3 results

- This Strand also considers the system AQ (e.g. trends during the Gas Year) as this is a key input to the NDM Algorithm

Objectives

- To analyse UIG percentages for Gas Year 2022/23 by season:

  – Autumn: Oct'22 to Dec'22
  – Winter: Jan'23 to Mar'23
  – Spring: Apr'23 to Jun'23
  – Summer: Jul'23 to Sep'23

- To compare the UIG values for Gas Year 2022/23 with the previous Gas Year 2021/22

- Use boxplots and distribution graphs to measure how UIG has varied by season and LDZ

- Consider how underlying AQ trends may have had an impact on UIG levels throughout Gas Year 2022/23

Executive Summary

- There has been a clear trend of negative UIG values across all LDZs for the majority of the Gas Year, particularly in Autumn and Winter (Oct'22 to Mar'23). This is a continuation of the UIG levels experienced in Gas Year 2021/22

- Conservation in Gas usage observed during Gas Year 2021/22 has continued into Gas Year 2022/23. When combined with the warmer weather experienced, particularly during Autumn, there has been further overallocation of demand in the NDM sector

- Domestic AQ's followed the trend of Gas Year 2021/22 and continued to fall rapidly, particularly across Winter (Jan'23 to Mar'23) this decline tapered off towards the end of the Gas Year

- UIG position post reconciliation generally continues to become positive as a greater percentage of energy is reconciled, a further indication of NDM Overallocation


GB Average UIG % - Gas Years 21/22 and 22/23
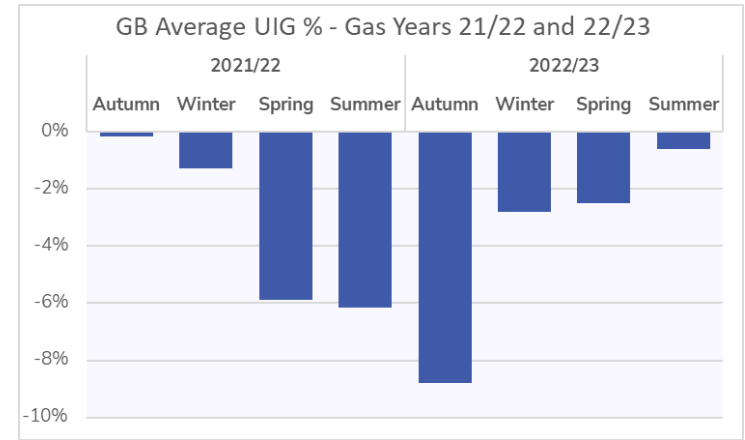
01BND Avg. AQ

Oct'21: 13,747 kWh

⬇ 6.5%

Oct'22: 12,854 kWh

⬇ 12.9%

Oct'23: 11,195 kWh

Analysis – Daily observed National UIG

National UIG % by Gas Day - Gas Year 2022/23
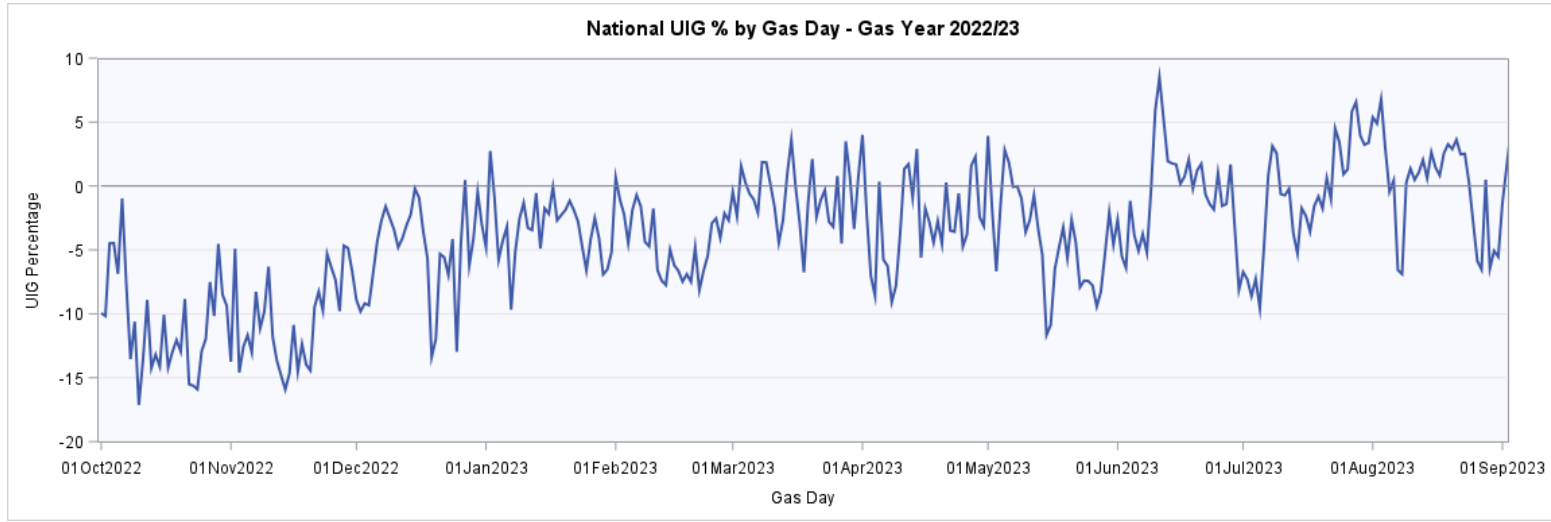
- The Daily National UIG at D+5 ranged from -17.14% to 8.49% and had an average value across the Gas Year of -3.69%

- There is a clear trend of negative UIG, particularly from October 2022 to March 2023. This can be attributed to the over estimation of NDM demand, driven by the increase in gas prices and reduction in consumption, which are not necessarily reflected in AQ levels

- The second half of the Gas Year -March 2023 to September 2023 - started to see an increase in positive UIG values potentially where AQ levels have potentially 'caught up' to a better reflection of actual usage

Analysis – National UIG vs GB WCF

National UIG Percentage vs Weather Correction Factor - Gas Year 2022/23
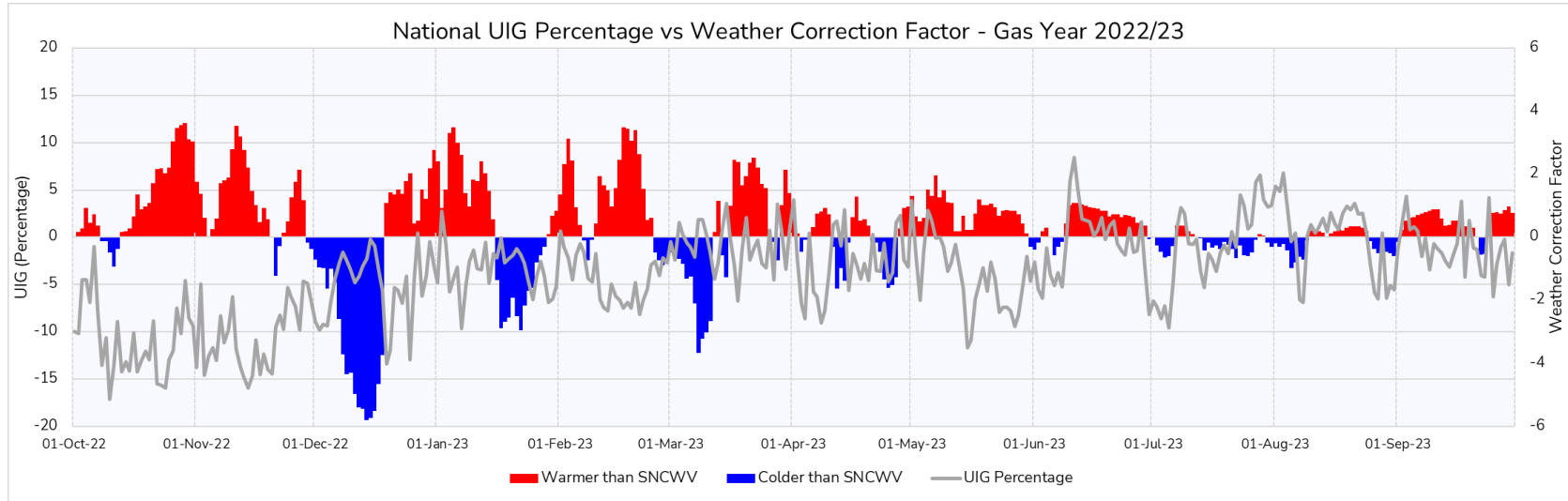
- Overall, Gas Year 2022/23 was warmer than Seasonal Normal, particularly during October and November 2022, where UIG values are at their largest (negative) values

- A period of significantly colder than normal weather during the first few weeks of December coincided with a slight improvement in UIG values

Tests – Unformatted examples
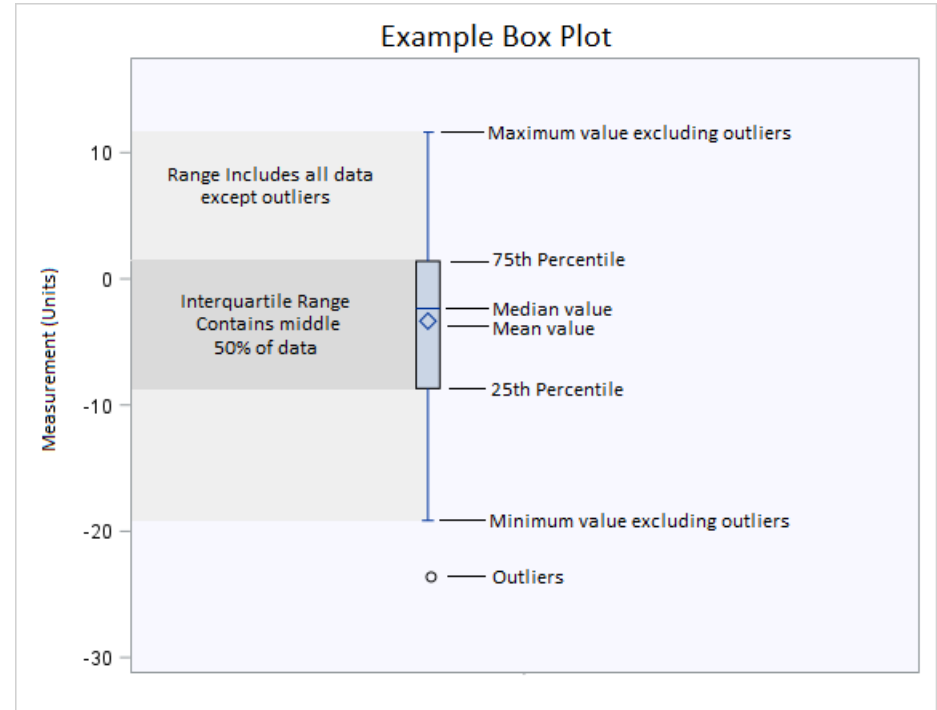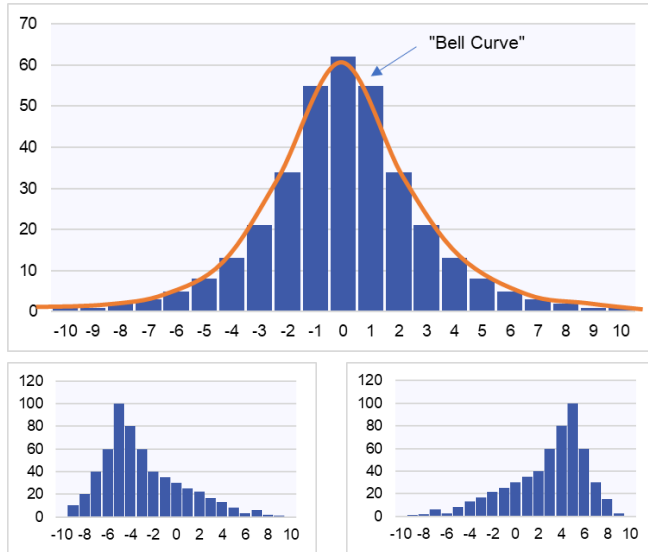
- Histograms have been used to assess the distribution (spread) of UIG
- Data can be spread in different ways
    - Symmetrical with no bias left or right (normal)
    - Skewed to the left or right, a greater proportion of measurements lie either side of the peak value, indicating a bias in the data

- Box Plots have also been used to demonstrate the spread and skewness of the data, and highlight outliers

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Analysis – Autumn 2022/23

Distribution of UIG % by LDZ - Autumn 2022/23
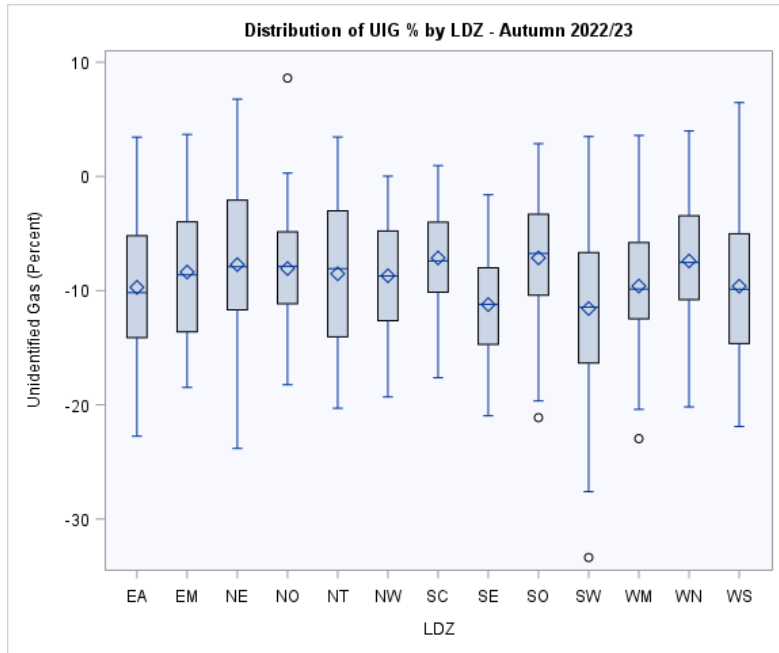
- A warm Autumn, and the effects of changing consumer behaviour led to heavily negative UIG across all LDZs in autumn.

- Average UIG values ranged from -11.57% in LDZ SW up to -7.14% in LDZ SC and SO

- The largest positive daily UIG value was 8.61% in LDZ NO for Gas Day 06/10/2022. The largest negative UIG was recorded in LDZ SW on Gas Day 10/10/2022, a value of -33.37%

- Average daily (absolute) UIG volume during Autumn was 9.76 GWh

Average UIG% by LDZ - Autumn												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
-9.71%	-8.37%	-7.73%	-8.07%	-8.52%	-8.70%	-7.14%	-11.22%	-7.14%	-11.57%	-9.60%	-7.41%	-9.61%

Analysis – Autumn 2022/23

Distribution of UIG % - Autumn 2022/23
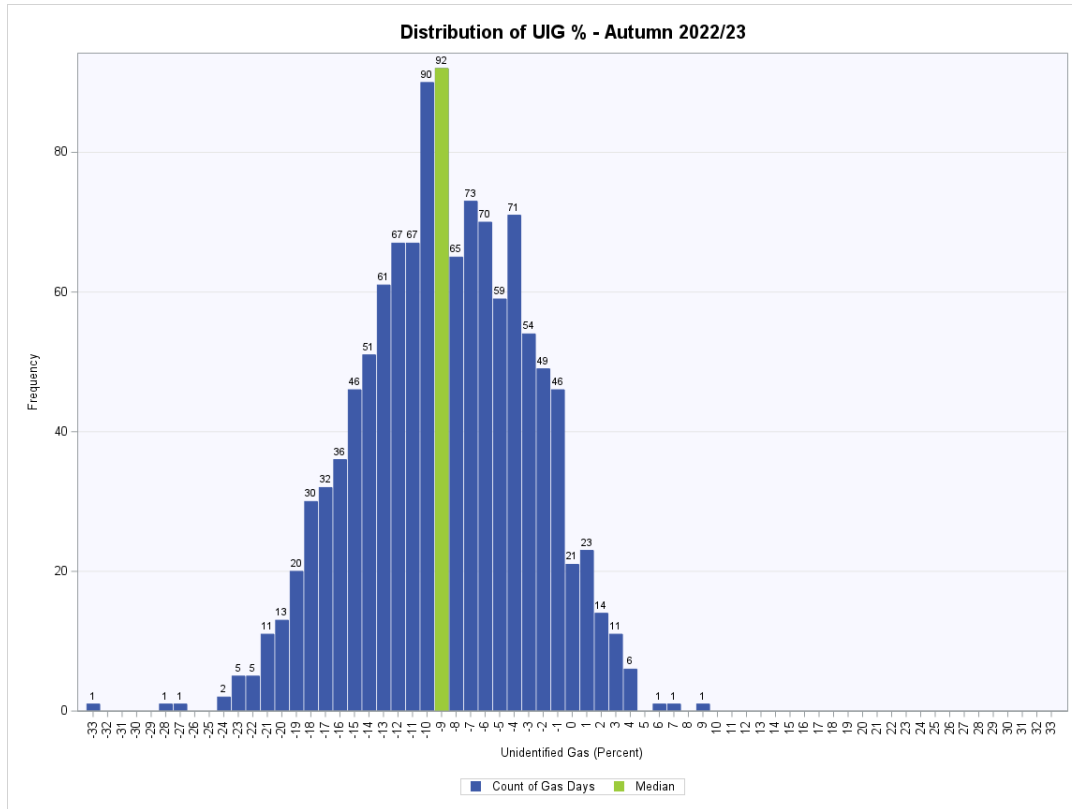
- Autumn 2022/23 continued the trend observed in Gas Year 2021/22 where consumer behaviour patterns had noticeably affected UIG levels

- The average daily UIG value across all LDZs during Autumn was -8.83%, the median value was -8.89%. 95% of daily UIG values during fell between -20.0% and 2.2%

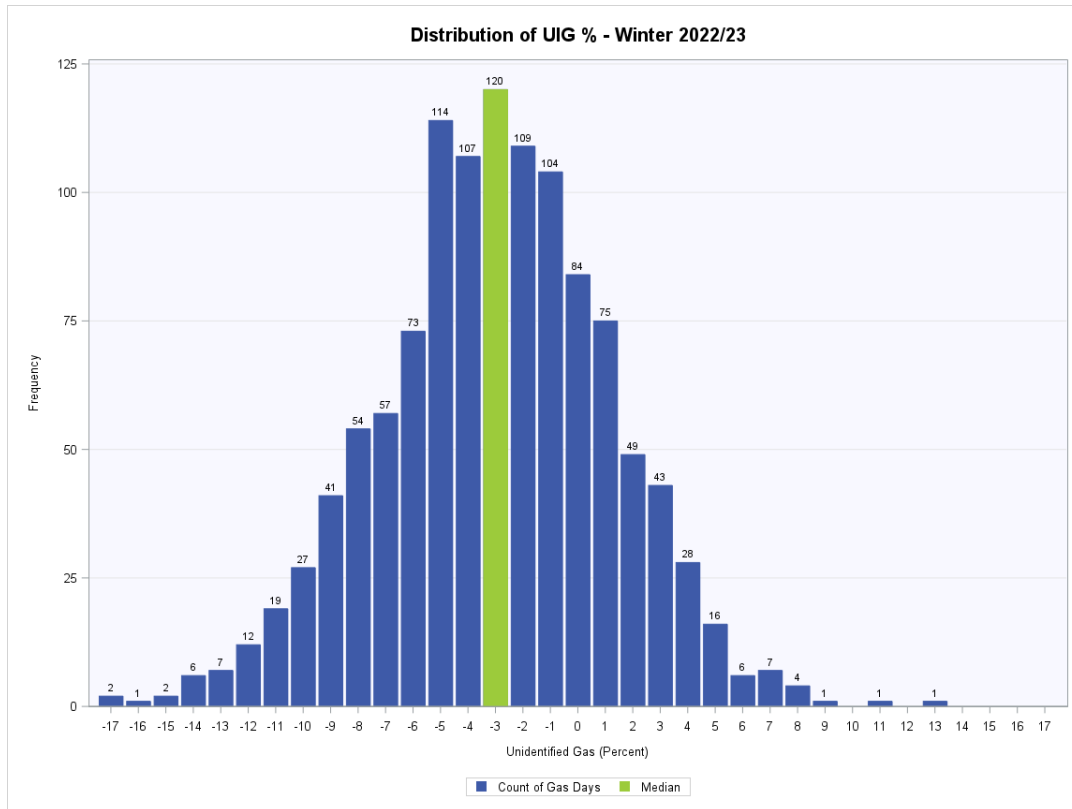- There was a very clear shift towards negative UIG during Autumn

Analysis – Winter 2022/23

Distribution of UIG % by LDZ - Winter 2022/23
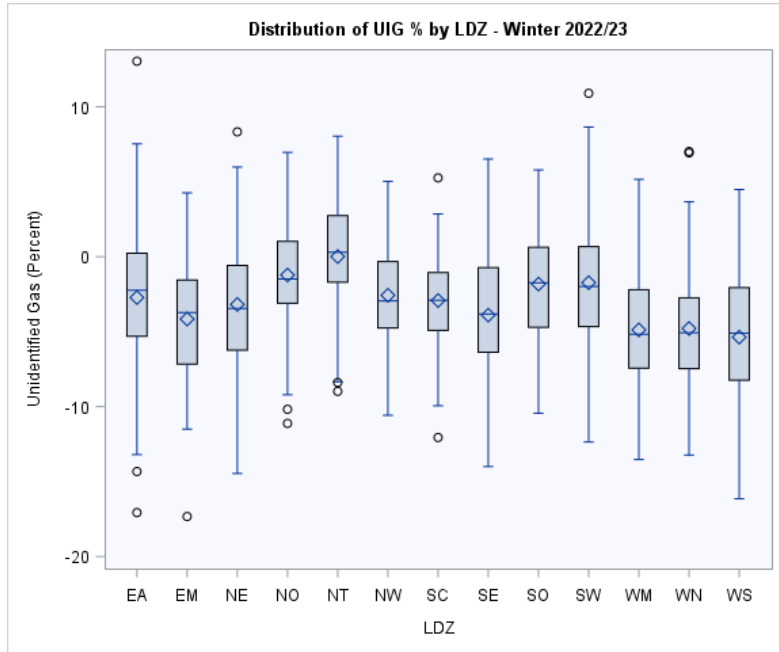
- Average UIG across Winter continued to be largely negative. At LDZ level, average UIG ranged from -5.37% in LDZ WS to 0.01% in LDZ NT

- Daily UIG values during Winter ranged from a minimum of -17.33% in LDZ EM for Gas Day 19/02/2023 to 13.04% in LDZ EA for Gas Day 09/03/2023

- Average daily (absolute) UIG volume during Winter was 5.81 GWh

Average UIG% by LDZ - Winter												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
-2.72%	-4.16%	-3.19%	-1.22%	0.01%	-2.57%	-2.92%	-3.90%	-1.83%	-1.73%	-4.88%	-4.79%	-5.37%

Analysis – Winter 2022/23

Distribution of UIG % - Winter 2022/23

- Average daily UIG during Winter was -3.02%, the median value was -2.96%

- 95% of UIG values during Winter fell between -11.2% and 5.2%

- There is a clear shift towards negative values, however UIG during Winter was fairly evenly distributed around the median with few outliers on either side

Analysis – Spring 2022/23

Distribution of UIG % by LDZ - Spring 2022/23
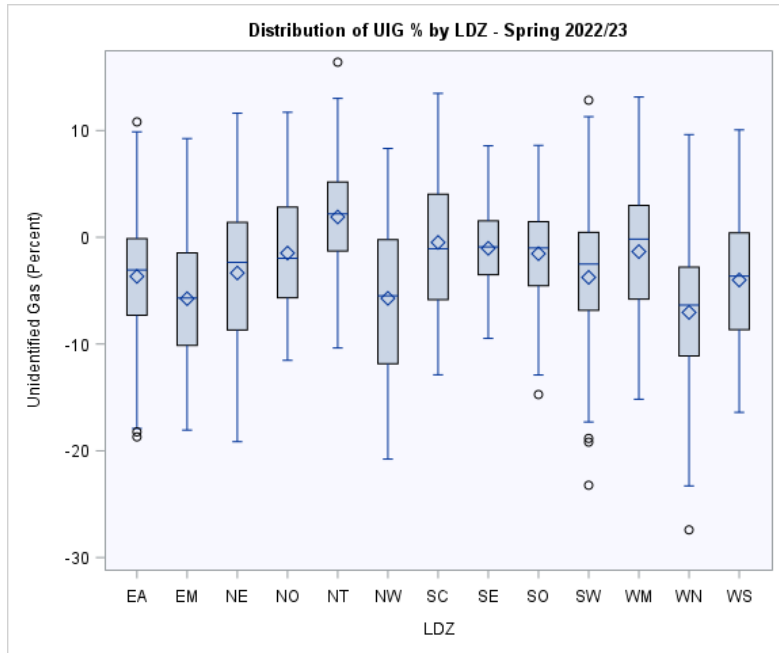
- Negative UIG was again observed during Spring. At LDZ level, average UIG ranged from -7.04% in LDZ WN to 1.90% in LDZ NT

- The largest negative UIG percentage observed during Spring was in LDZ WN for Gas Day 16/05/2023, a value of -27.41%. The largest positive UIG was in LDZ NT on 10/06/2023, a value of 16.40%

- Average daily (absolute) UIG volume during Spring was 3.69 GWh

Average UIG% by LDZ - Spring												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
-3.67%	-5.75%	-3.35%	-1.48%	1.90%	-5.72%	-0.48%	-1.03%	-1.54%	-3.76%	-1.34%	-7.04%	-4.00%

Analysis – Spring 2022/23

Distribution of UIG % - Spring 2022/23
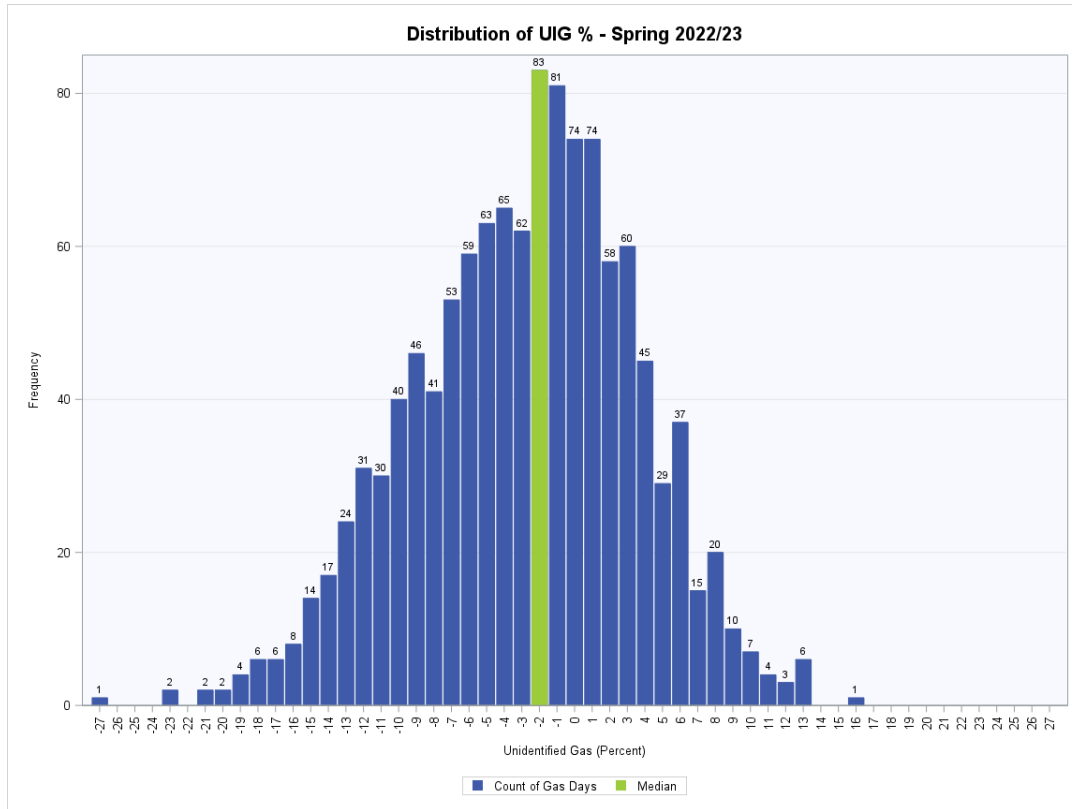
- Average daily UIG at LDZ level during Spring was -2.87%, the median value was -2.26%

- 95% of daily UIG values during Spring fell between -14.6% and 10.0%

- UIG values in Spring were fairly evenly distributed around the median with no obvious skew

Analysis – Summer 2022/23

Distribution of UIG % by LDZ - Summer 2022/23
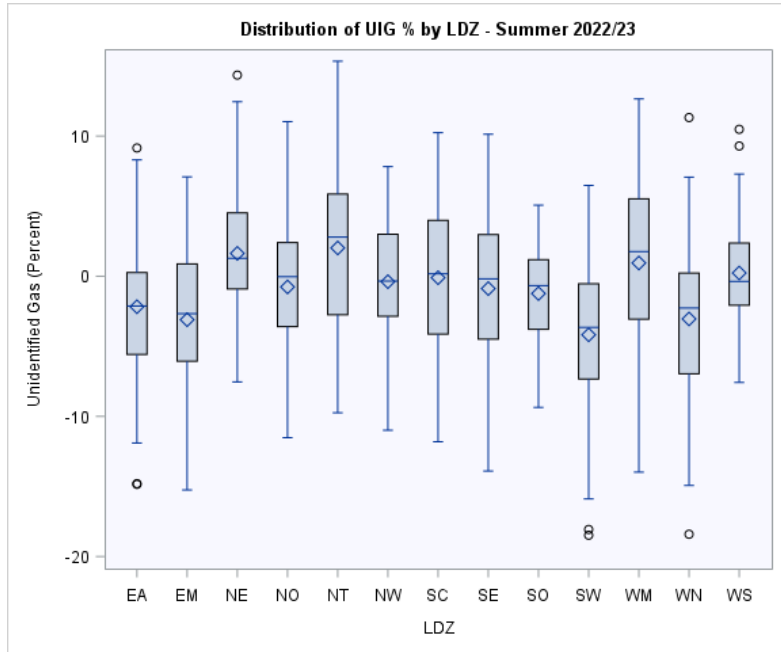
- 4 of 13 LDZs during Summer had a positive average UIG, with values ranging from -4.18% in LDZ SW to 2.02% in LDZ NT

- UIG values across all LDZs ranged from -18.48% observed on Gas Day 25/09/2023 in LDZ SW, to 15.34%, in LDZ NT for Gas Day 28/07/2023

- Average daily (absolute) UIG volume during Summer was 1.93 GWh

Average UIG% by LDZ - Summer												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
-2.18%	-3.10%	1.63%	-0.76%	2.02%	-0.39%	-0.11%	-0.88%	-1.24%	-4.18%	0.94%	-3.05%	0.22%

Analysis – Summer 2022/23

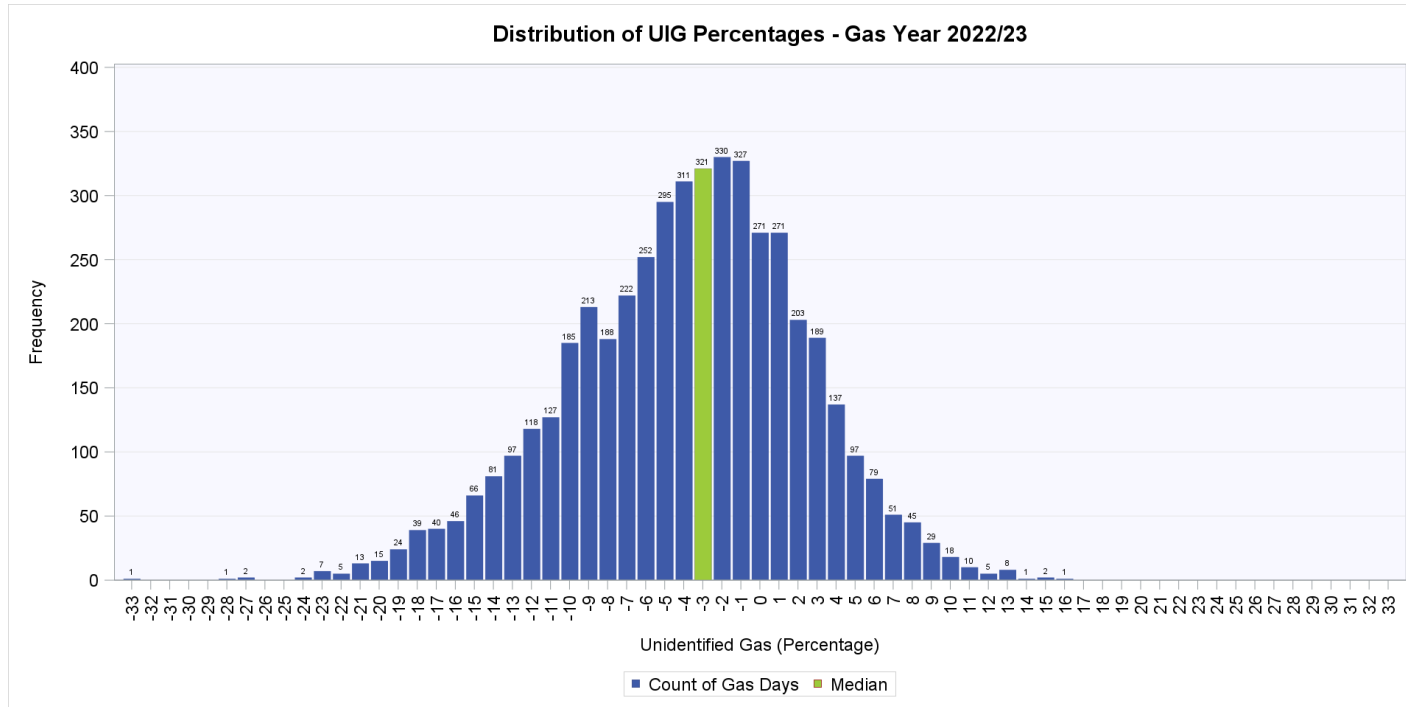Distribution of UIG % - Summer 2022/23
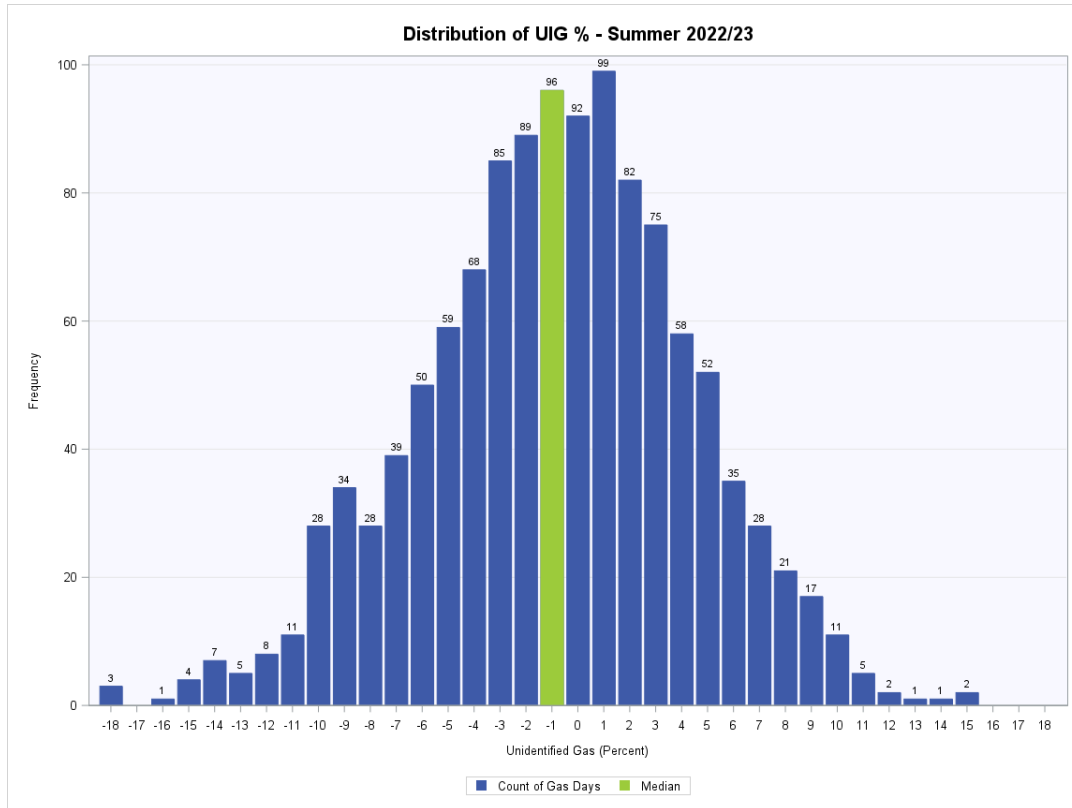
- Average daily UIG during Summer was -0.85%, the median value was -0.69%

- 95% of daily UIG values during Summer fell between -10.7% and 9.3%

- UIG values during Summer were evenly distributed around the median value with few outliers on either side
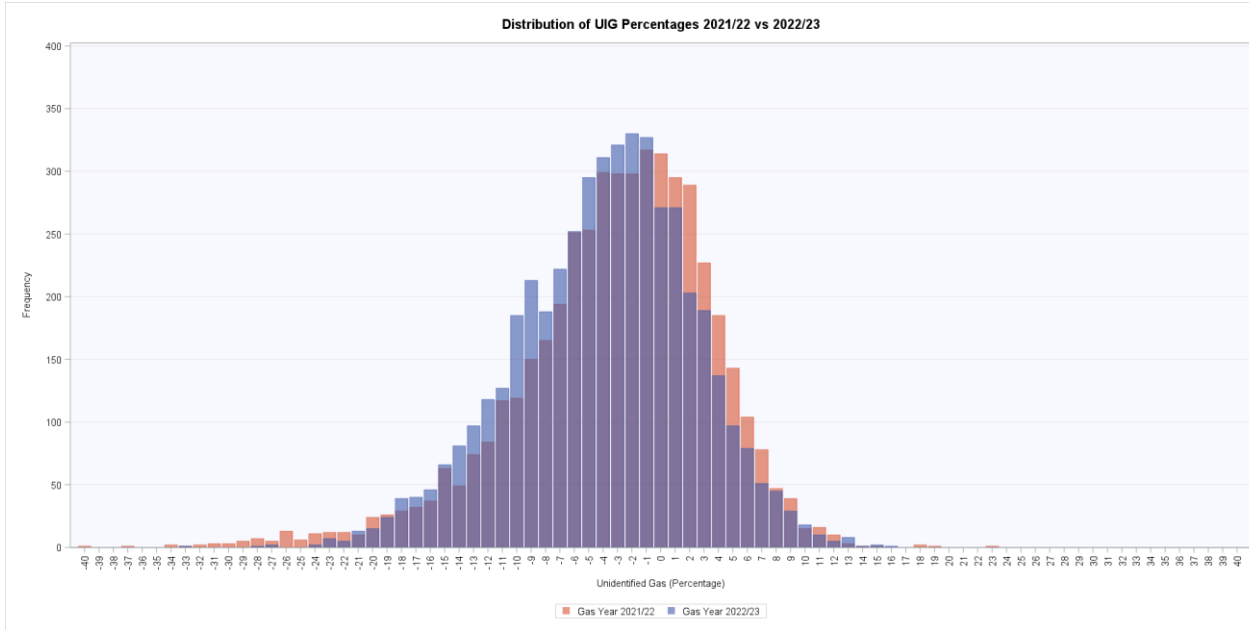
Analysis – Gas Year 2022/23

Distribution of UIG Percentages - Gas Year 2022/23

- The average daily UIG value at LDZ level for Gas Year 2022/23 was -3.90%. The Median value was -3.40%

- There is a clear shift towards Negative UIG and a slight negative skew across the Gas Year

# Analysis – Comparison of Gas Years 2021/22 and 2022/23

Distribution of UIG Percentages 2021/22 vs 2022/23

Season	Gas Year	
	2021/22	**2022/23**
Autumn	4.63	9.76
Winter	6.00	5.81
Spring	5.18	3.69
Summer	3.94	1.93
All (GWh)	**4.93**	**5.30**

A comparison of the average daily UIG volumes (absolute) for Gas Years 2021/22 and 2022/23

- When comparing Gas Years 2021/22 and 2022/23 there is a very similar distribution of UIG. Gas Year 2022/23 is shifted slightly more towards negative values; however, it has a slightly tighter distribution with fewer heavily negative outliers.

- The two gas years 'mirror' one another in that Spring and Summer in 2021/22 saw large negative UIG, whereas Autumn and Winter of 2022/23 saw large negative UIG values.

Analysis – AQ Trends Consumption Band 01BND

Monthly AQ Movement since October 2020 - Band 01BND
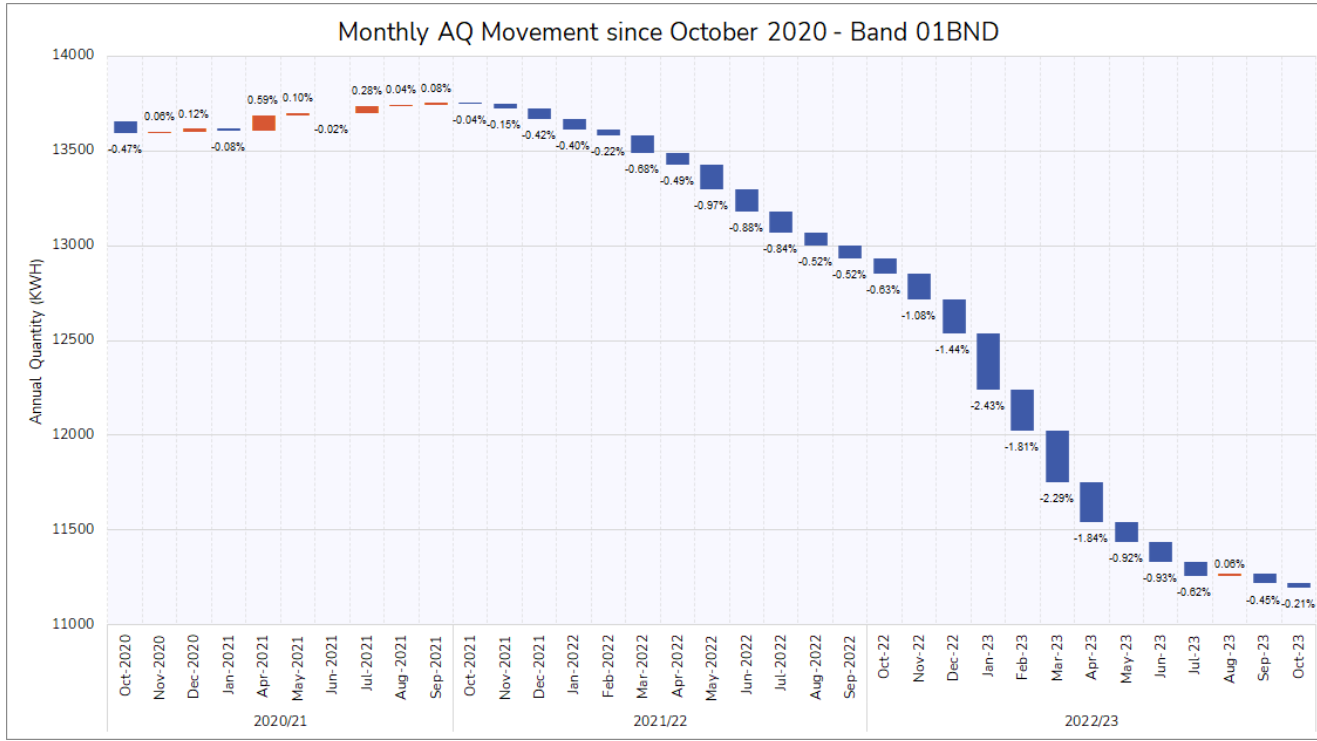
- The graph shows the month-on-month AQ movement for EUC band 01BND

- Monthly AQs have continued to decline since October 2021, except for a slight increase in August 2023

- The continued downward trend in AQs are a symptom of the change in consumer behaviour following the increase in gas prices. This decline has slowed towards the end of the Gas Year.

- The average 01BND AQ has reduced by 18.56% from October 2021 to October 2023

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Analysis – UIG Post Reconciliation
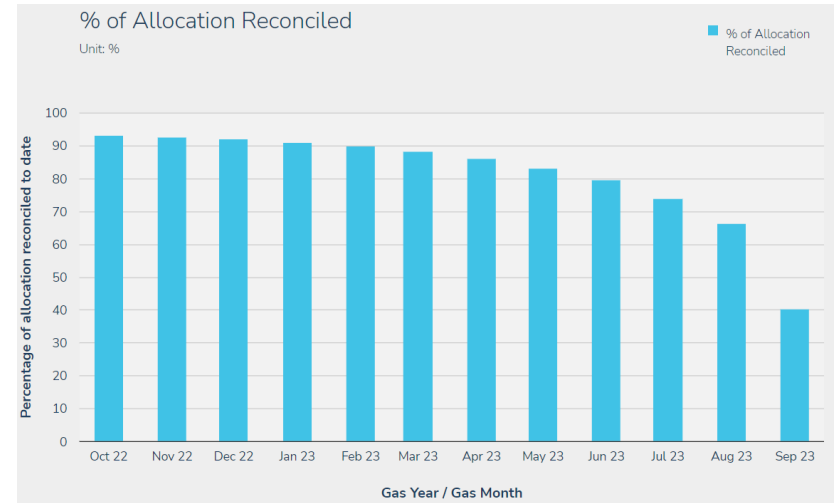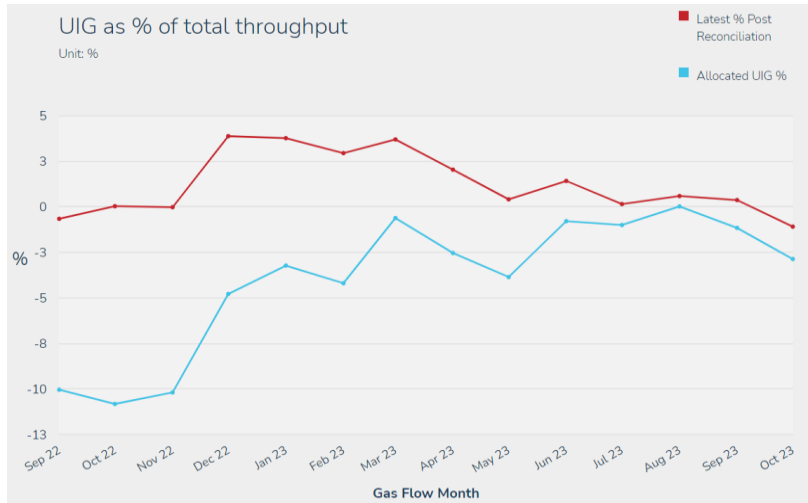
Source: UIG as % of total throughput - XOSERVE

The blue line 'Allocated UIG%' confirms the negative UIG for the year. September to November 2022 were particularly negative.

The red line, 'Latest % post reconciliation' maintained a mainly positive position for the year.

Source: Chart - % of allocation reconciled - XOSERVE

Shows proportion of original gas allocation at D+5 which has now had a meter point reconciliation.

In general, the more energy that has been reconciled the closer to the 'final' UIG position.

Conclusions

- Average daily national UIG (at D+5) during Gas Year 2022/23 was -3.69%, this was slightly below the level observed during Gas Year 2021/21 which was -3.37%.

- The following table shows the daily national average, as well as the highest and lowest average UIG value as LDZ level by season

Season	National Daily Average	Lowest absolute average UIG (LDZ)	Highest absolute average UIG (LDZ)
Autumn	-8.81%	-7.14% (SO/SC)	-11.57% (SW)
Winter	-2.82%	0.01 (NT)	4.88% (WM)
Spring	-2.50%	-0.48% (SC)	-7.04% (WN)
Summer	-0.61%	-0.11% (SC)	-4.18% (SW)

- The distribution of UIG during Gas Year 2022/23 was similar to that of Gas Year 2021/22, however with slightly less of a negative skew and fewer large negative outliers

- Autumn (Oct'22 to Dec'22) was particularly affected by the change in consumer behaviour patterns, which led to a reduction in domestic AQ levels and overallocation daily NDM energy

- Supporting document containing full examples and commentary for all 3 strands will be published as part of Section 12 of next year's NDM Algorithms Booklet.