



Demand Estimation Sub Committee

2. NDM Algorithm Performance (Gas Year 2019/20)

Strand 2 – UIG Analysis

7th December 2020

Background

- Following the implementation of project Nexus on 1st June 2017 Unidentified Gas (UIG) is now the balancing figure in each LDZ for each Gas Day
- UIG is calculated using the following formula:
- $$UIG = Total\ LDZ\ Throughput - Shrinkage - DM\ Measurements - NDM\ Allocation$$
- As UIG is the balancing figure, modelling error in the estimate of NDM Allocation can be a major contributor to daily UIG levels

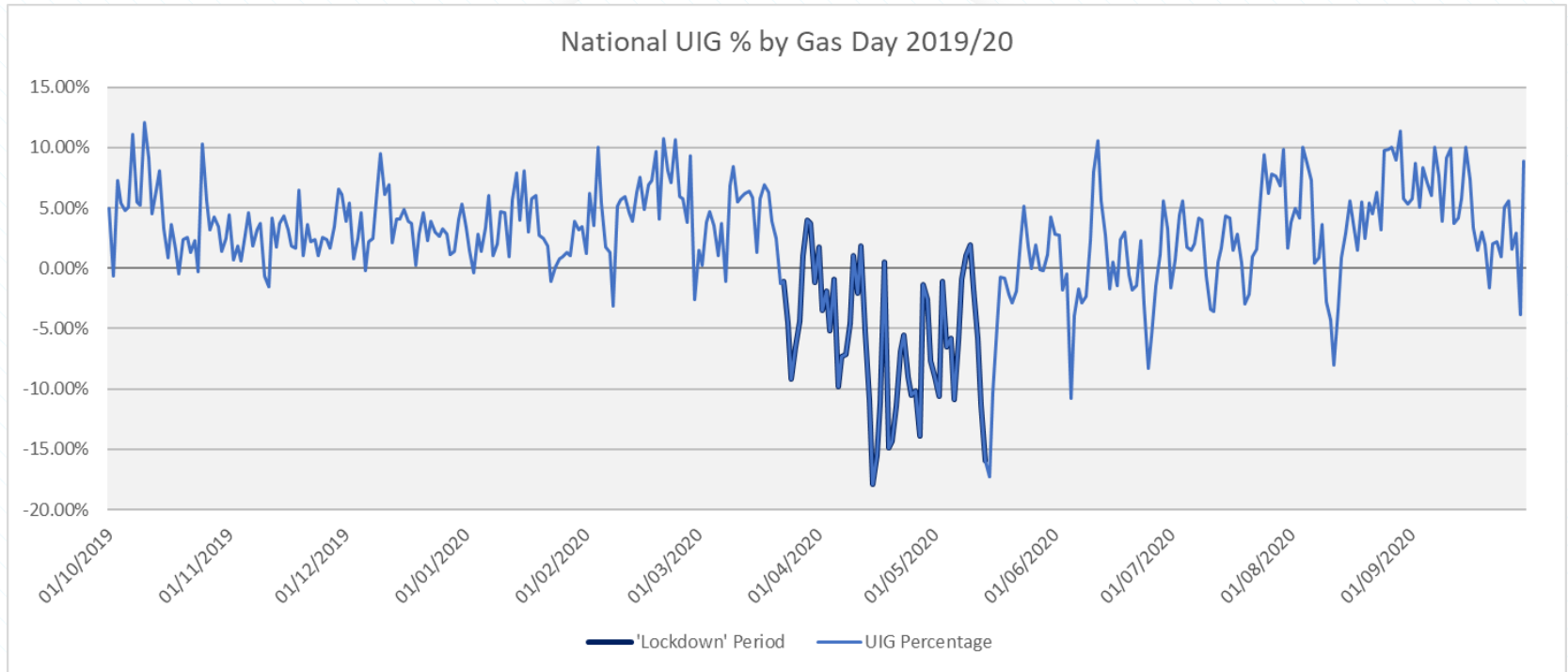
Objectives

- To analyse the observed Unidentified Gas (UIG) levels for Gas Year 2019/20
- To review the impacts of the DAF Uplift Factors on UIG for Gas Year 2019/20
- To assess the potential UIG levels using 2020 Demand Models and new CWV formula for Gas Year 2019/20
- Note: The causes of UIG on a daily basis are not considered here

Approach

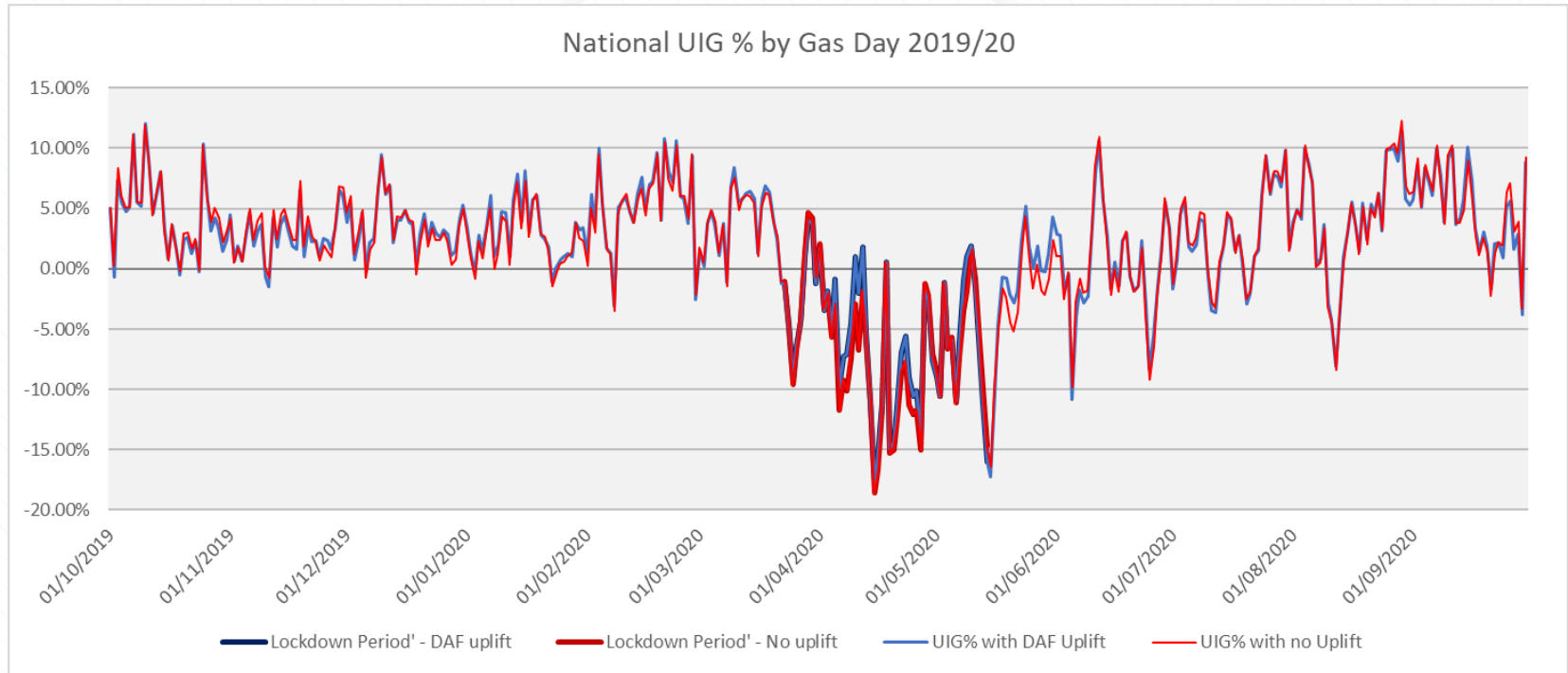
- To Analyse UIG % for gas year 19/20 by seasons:
 - Autumn: Oct '19 to Dec '19
 - Winter: Jan '20 to Mar '20
 - Spring: Apr '20 to Jun '20
 - Summer: Jul '20 to Sep '20
- To compare the UIG value for Gas Year 2019/20 with the previous Gas Year 2018/19
- To compare Gas Year 2019/20 under the following conditions:
 - Observed values (DAF Uplift factors applied)
 - Simulated values with no DAF Uplift Factors applied
- To compare observed UIG values with simulated UIG values using 2020 demand models and the new CWV formula
- Use boxplots and distribution graphs to measure how UIG varies by season and LDZ
- Note: National lockdown days referred to throughout presentation relate to the days in which the nation was under it's strictest 'Lockdown' conditions. This period is defined as Gas Days 23/03/2020 up to and including 14/05/2020. Localised lockdowns and different behavioural patterns (e.g. Home Working) will also have persisted post this defined period.

Daily observed UIG – National



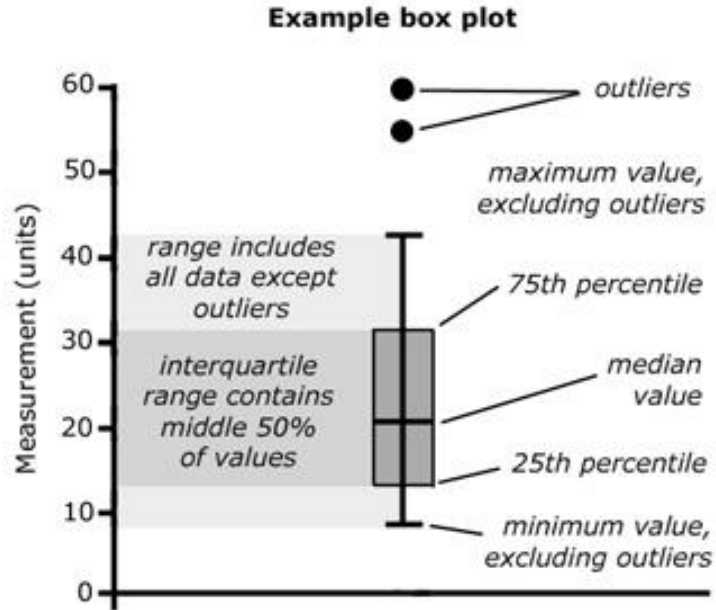
- The national average for UIG at D+5 was 1.91%
- The highlighted area represents the national 'Lockdown' period – where NDM demand was significantly reduced but models continued to allocate at normal levels, hence the large negative UIG values

Daily Observed UIG and without DAF Uplift - National



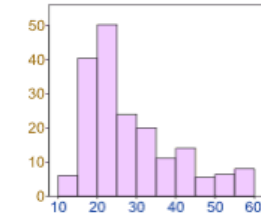
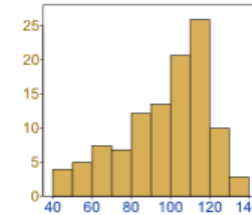
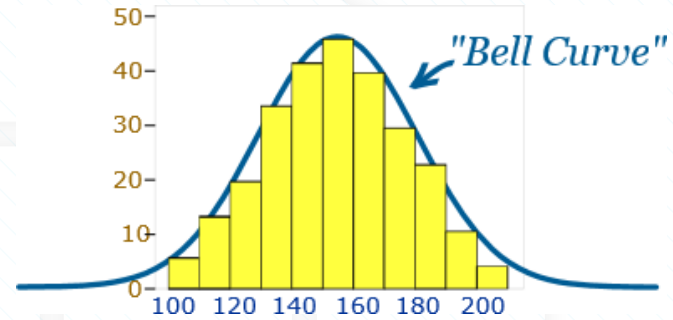
- The national average UIG at D+5 with no uplifts was 1.73%. The DAF Uplifts made very little difference to UIG volatility and overall levels in Gas Year 2019/20, supporting DESC's decision to remove them from Gas Year 2020/21 onwards

Methods used to assess UIG: Boxplot

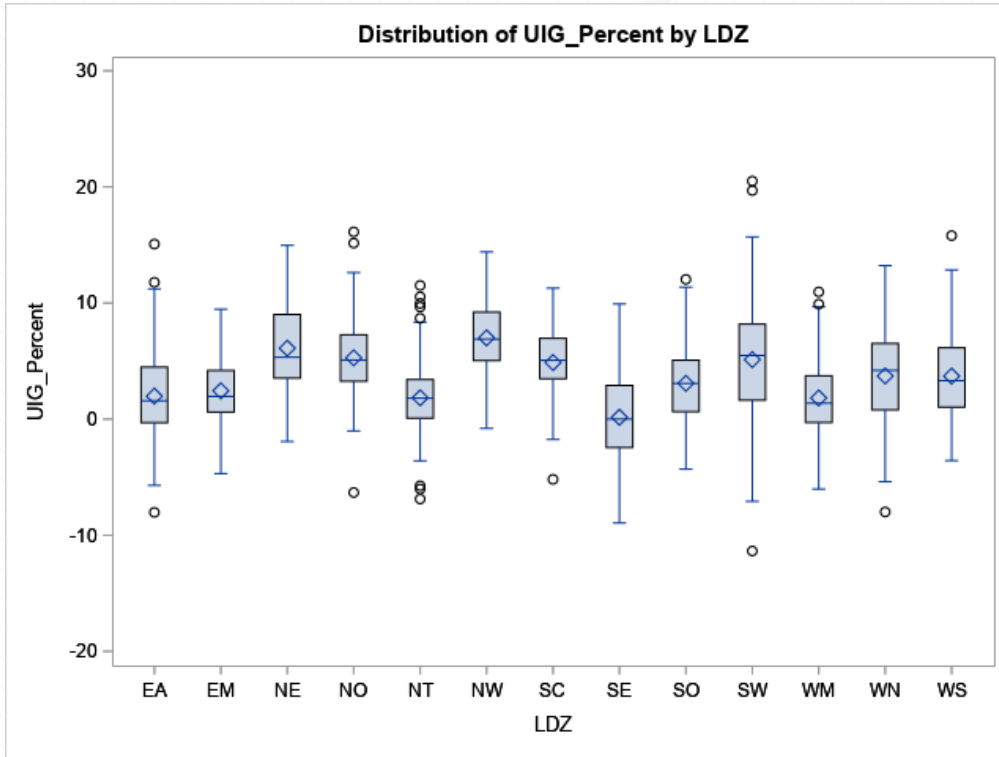


Methods used to assess UIG cont...

- 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 – a greater proportion of the measurements lie to the left of the peak value.
 - Skewed to the right – a greater proportion of the measurements lie to the right of the peak value.



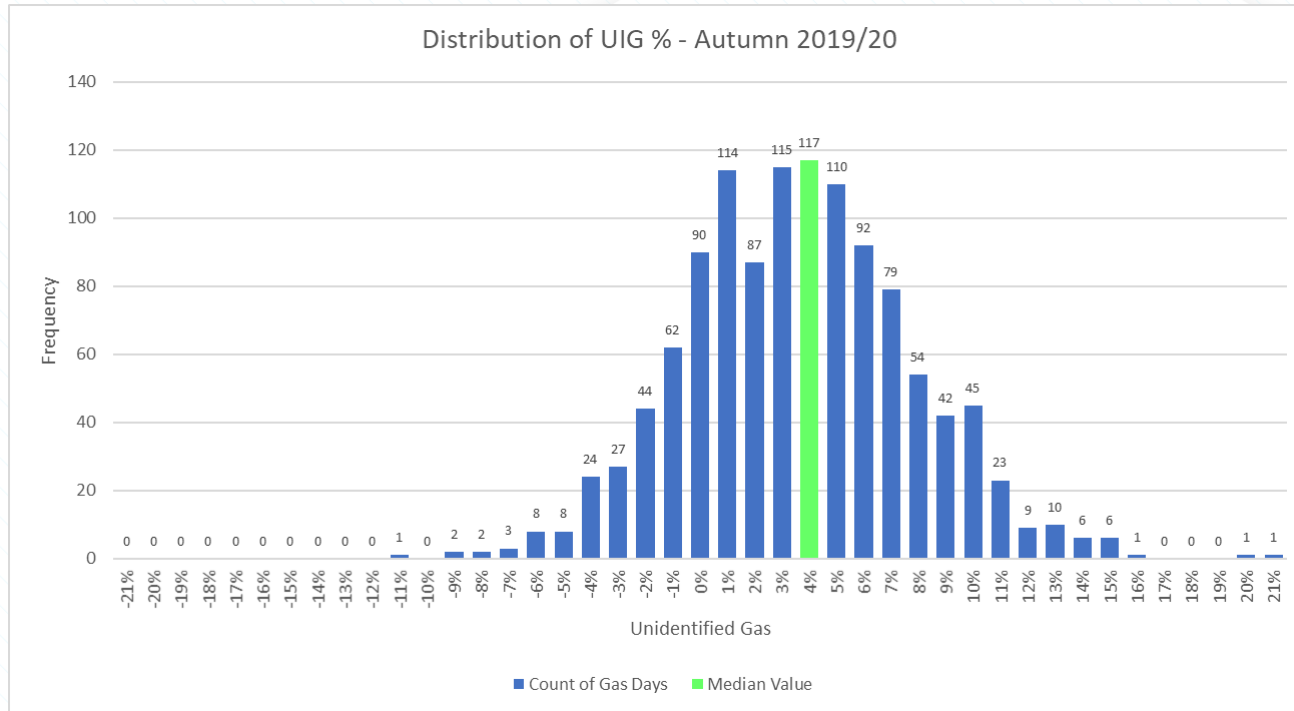
Distribution of UIG Autumn 2019/20



- Average UIG values for the period October to December range from 0.17% in LDZ SE to 6.99% in LDZ NW
- All 13 LDZs had a positive Average UIG during Autumn
- Mean and Median values across all LDZs are fairly consistent

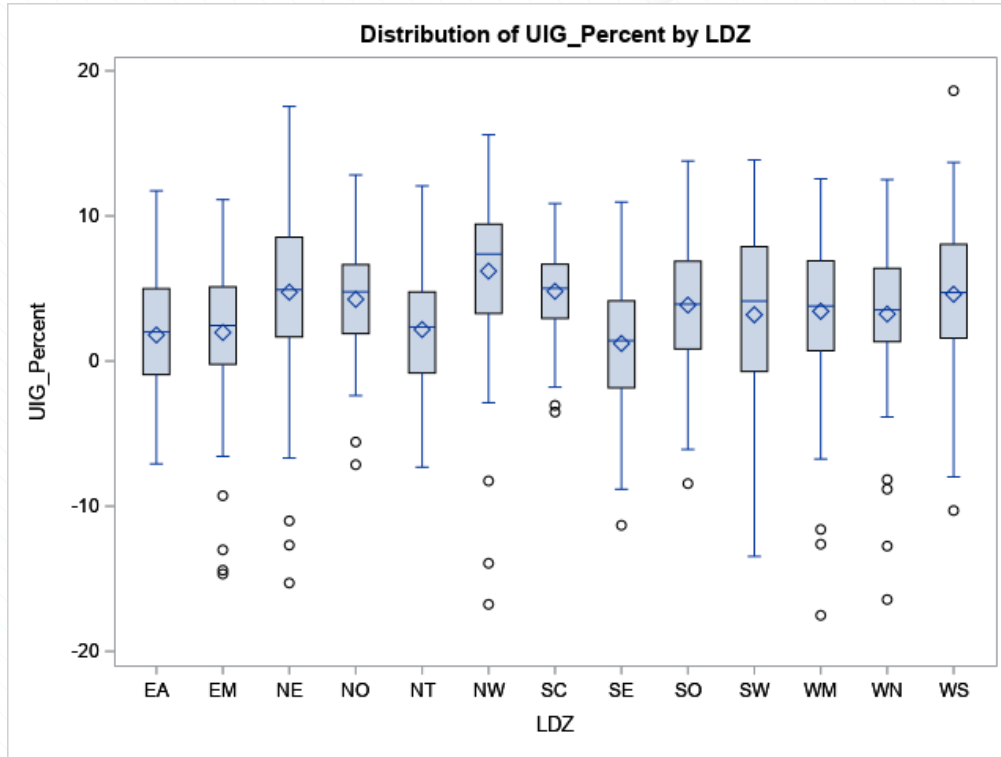
Average UIG% by LDZ - Autumn												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
1.97%	2.40%	6.11%	5.28%	1.87%	6.99%	4.87%	0.17%	2.99%	5.11%	1.85%	3.71%	3.70%

UIG Analysis Autumn 2019/20



- The average UIG value across all LDZs during Autumn was 3.62%, when rounded to 0 decimal places the median value was 4%
- 95% of UIG values are between -4% and +12%
- Data appears to show a fairly even distribution, either side of the Median value

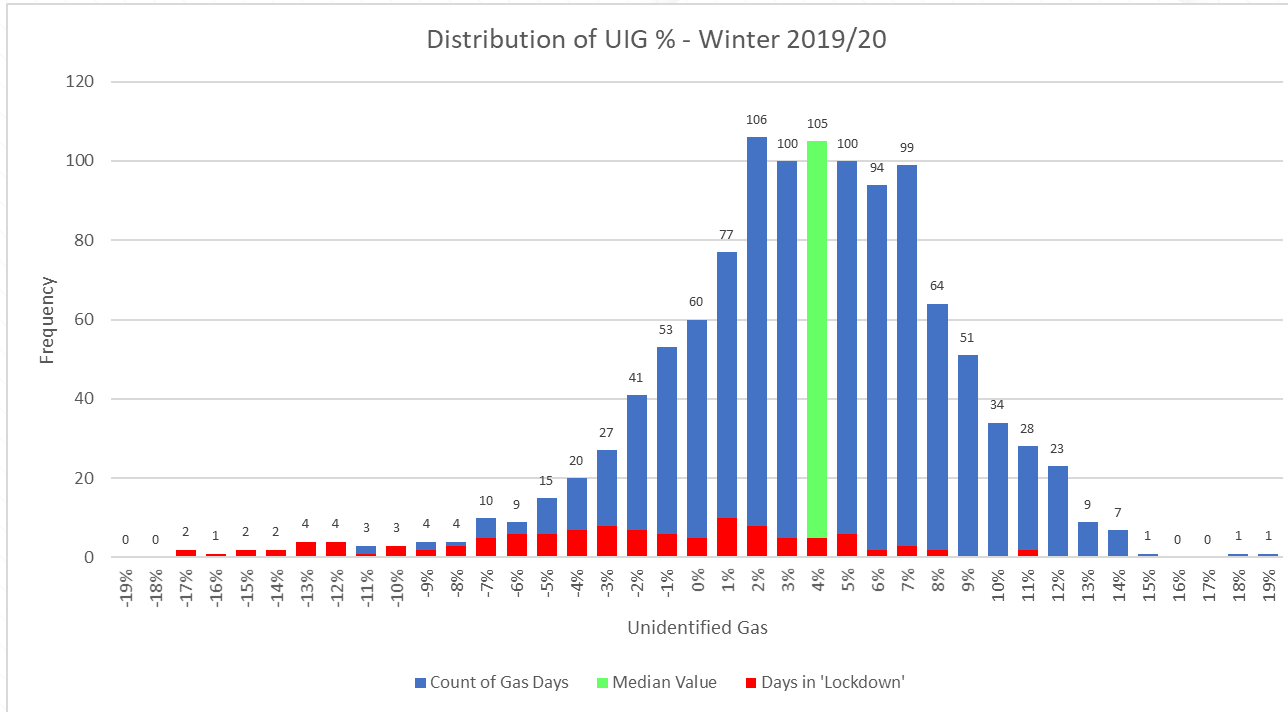
Distribution of UIG Winter 2019/20



- All 13 LDZs had a positive average UIG during Winter, ranging from 1.20% in LDZ SE to 6.20% in LDZ NW
- Some variation between the Mean and Median values can be observed in LDZs NW and SW
- There are a number of outliers in the negative UIG ranges, these are mainly comprised of the start of the 'Lockdown' period

Average UIG% by LDZ - Winter												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
1.80%	1.91%	4.74%	4.25%	2.21%	6.20%	4.81%	1.20%	3.75%	3.19%	3.52%	3.24%	4.61%

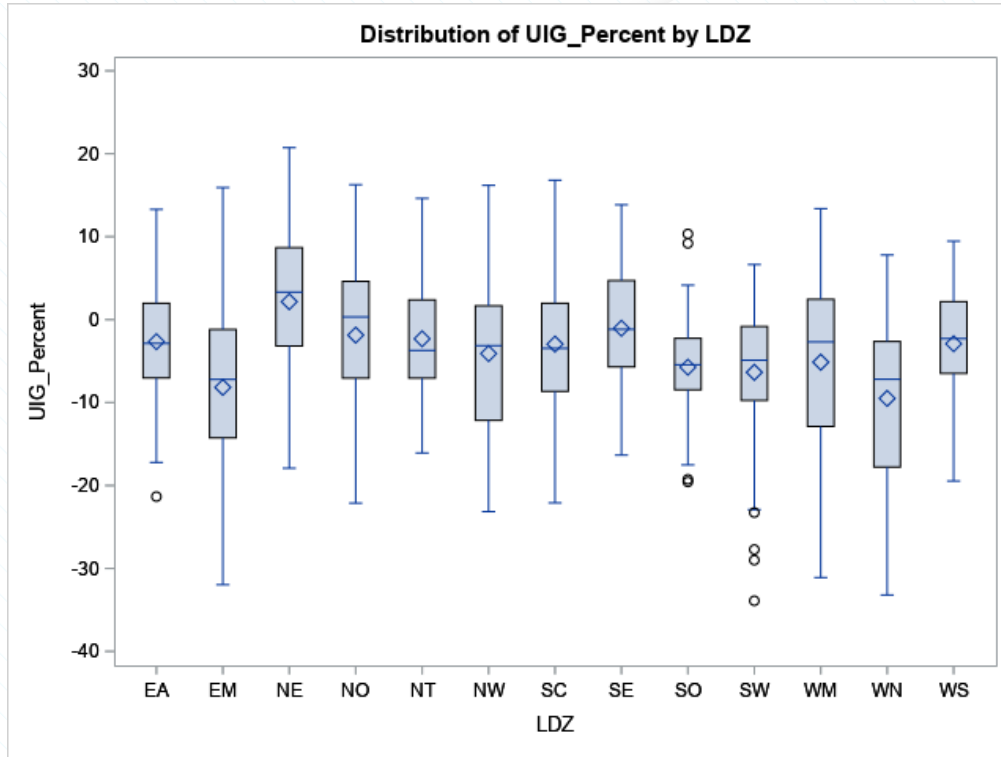
UIG Analysis Winter 2019/20



- The average UIG value across all LDZs during Winter was 3.49%
- 95% of UIG values are between -5% and +13%
- Data appears to be fairly evenly distributed either side of the median value, with a slightly longer tail towards the negative values

- The 'Lockdown' period in winter covers 23/03/2020 to 31/03/2020 and accounts for a large proportion of the highly negative UIG gas days

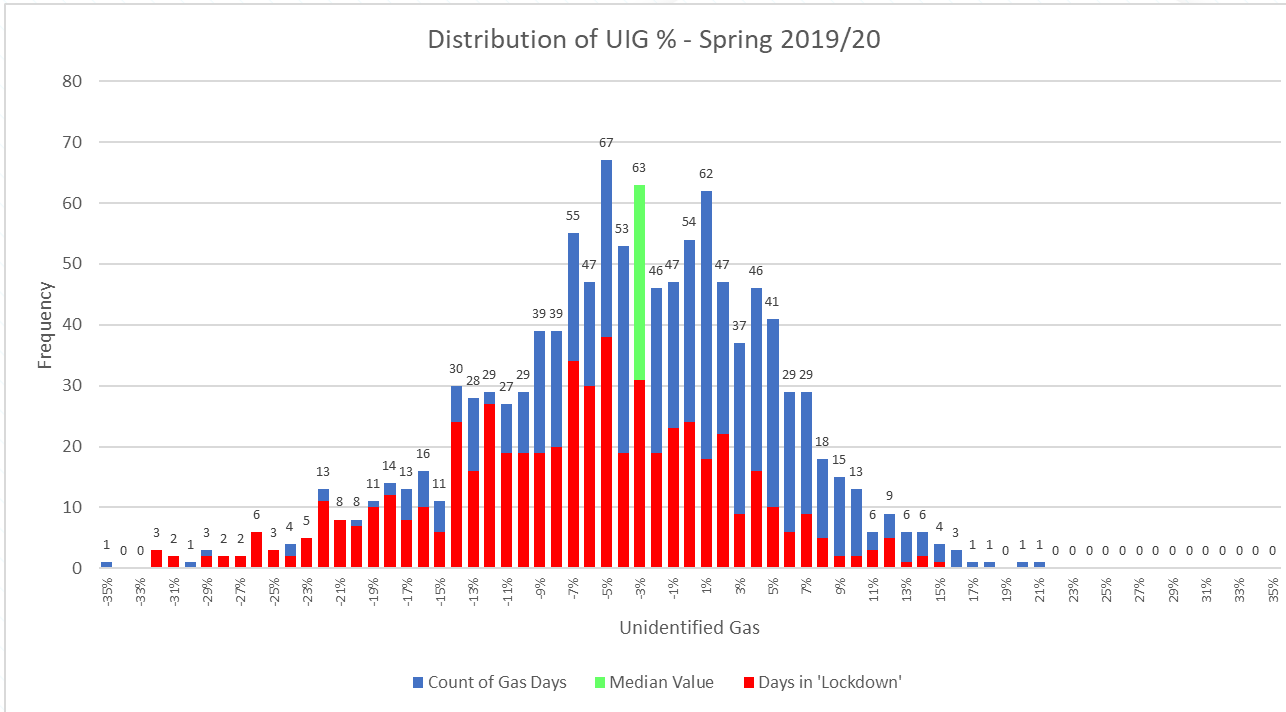
Distribution of UIG Spring 2019/20



- 12 of 13 LDZs has a negative average UIG during Spring, only LDZ NE was on average positive
- LDZ WN had the lowest average UIG during Spring, a value of -9.48%
- Larger 'whiskers' on the Box plots indicate there was a wider spread of UIG values during Spring
- Variation between the Mean and Median values can be observed in a number of LDZs, indicating skewed data

Average UIG% by LDZ - Spring												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
-2.68%	-8.12%	2.17%	-1.86%	-2.36%	-4.12%	-2.96%	-1.02%	-5.64%	-6.39%	-5.25%	-9.48%	-2.93%

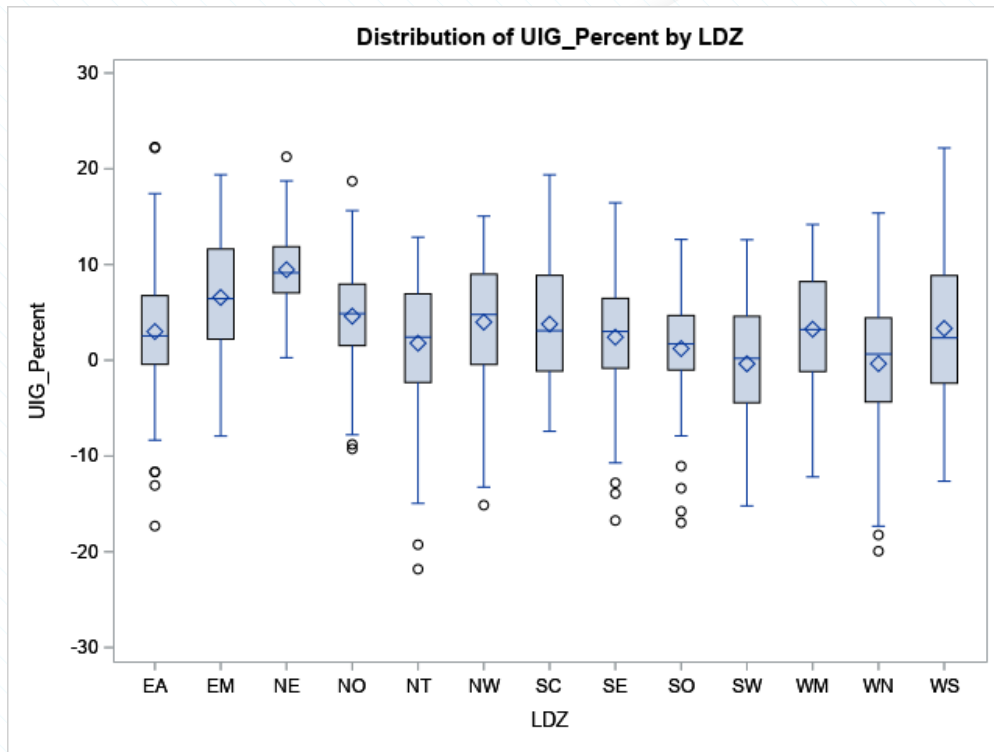
UIG Analysis Spring 2019/20



- The average UIG value across all LDZs during Spring was -3.89%
- 95% of UIG values are between -21% and +15%
- Data appears to show a flatter distribution centred around the median value of -3%

- The 'Lockdown' period in Spring covers 01/04/2020 to 14/05/2020 and accounts for a large proportion of the negative UIG gas days
- -35% UIG was recorded in LDZ SW for gas day 15/05/2020

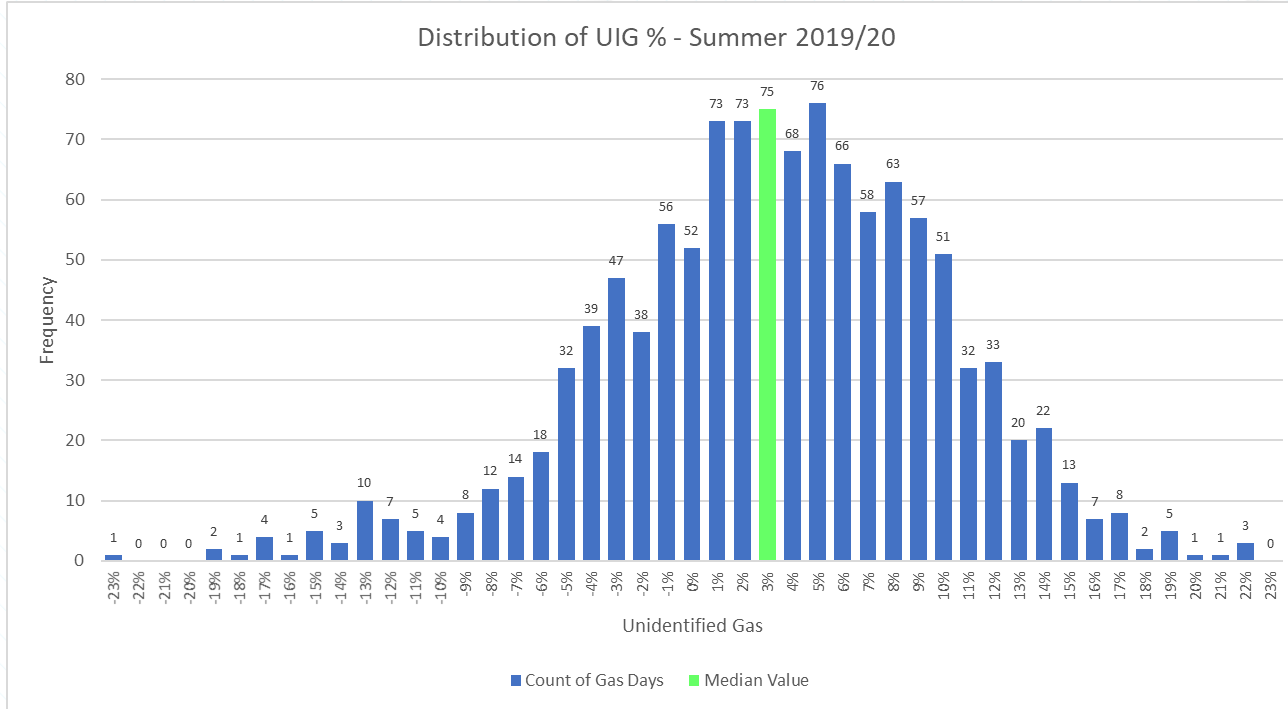
Distribution of UIG Summer 2019/20



- 11 of 13 LDZs have a positive average UIG value during Summer, SW and WN are negative
- LDZ NE had the highest average UIG during summer, a value of 9.47%
- There are a number of outliers in the negative UIG ranges

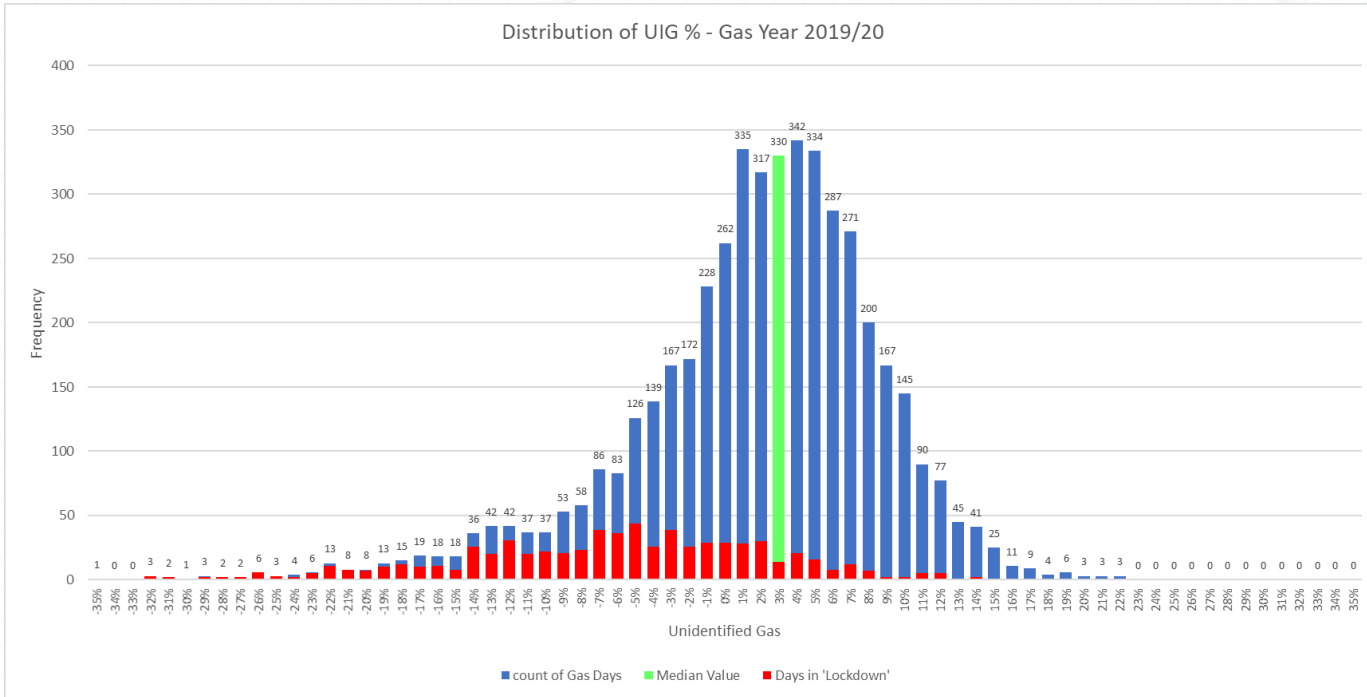
Average UIG% by LDZ - Summer												
EA	EM	NE	NO	NT	NW	SC	SE	SO	SW	WM	WN	WS
3.01%	6.55%	9.47%	4.60%	1.82%	3.99%	3.78%	2.40%	1.21%	-0.37%	3.25%	-0.33%	3.33%

UIG Analysis Summer 2019/20



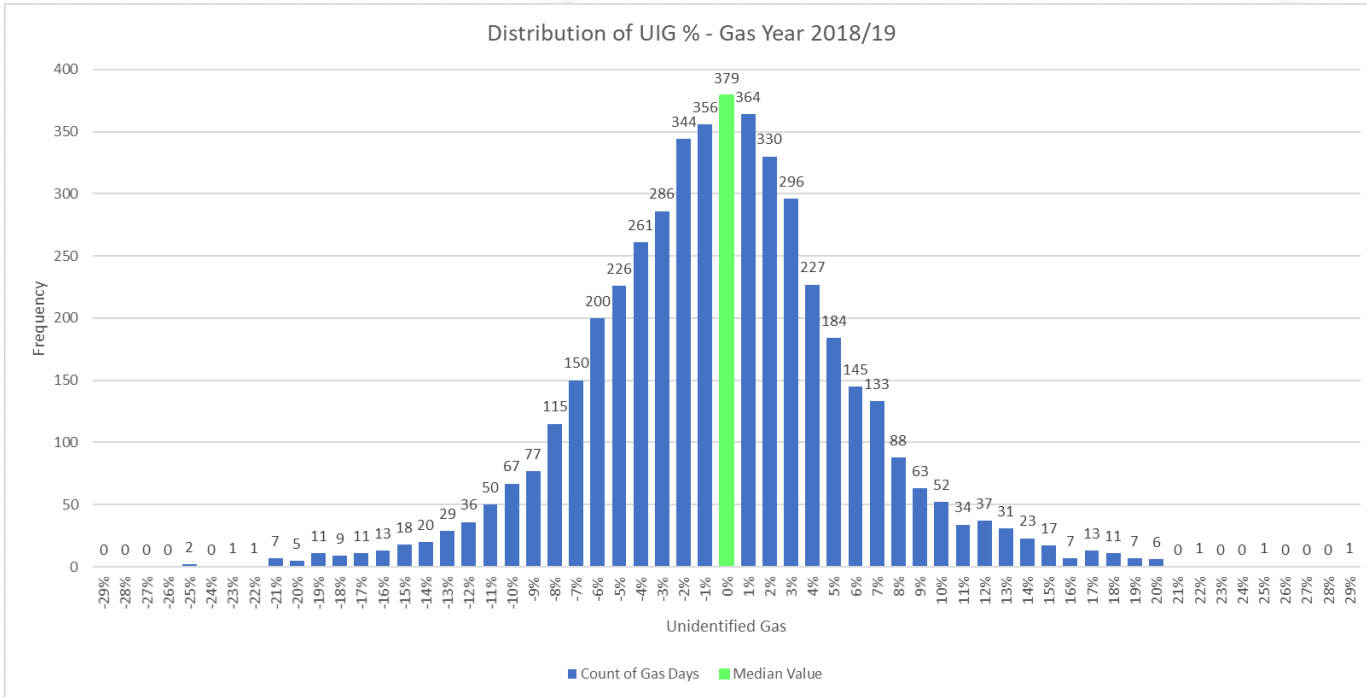
- The average UIG value across all LDZs during Summer was 3.29%
- 95% of UIG values are between -10% and +16%
- The distribution of UIG values in summer also appears to be flatter than Autumn and Winter
- Although not defined as a National Lockdown period, localised restrictions persisted throughout Summer

UIG Analysis Gas Year 2019/20



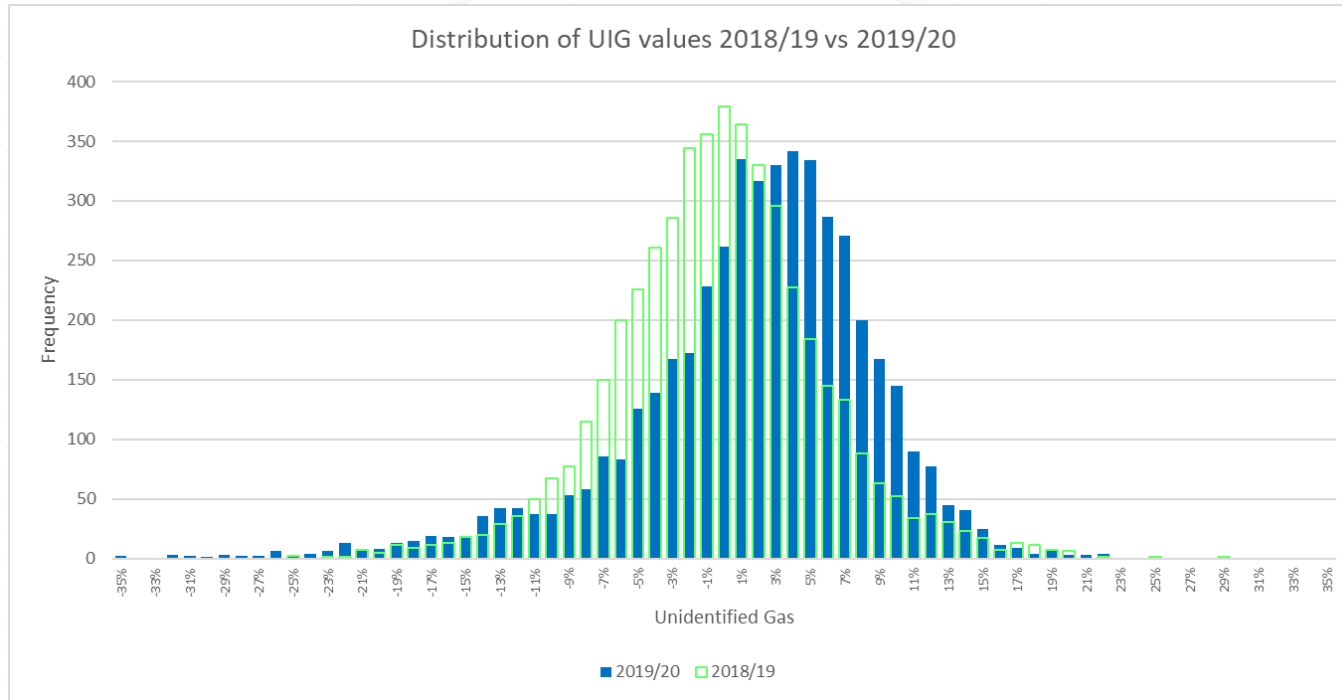
- The average UIG across all LDZs for Gas Year 2019/20 was 1.64%, the Median value was 2.53%
- The graph appears to show a slight negative skew, with the Median value being higher than the average, this is partly due to the increased number of negative UIG Gas Days during the Lockdown period

UIG Analysis Gas Year 2018/19



- The average UIG across all LDZs for gas year 2018/19 was -0.35%.
- 95% of UIG values lie between -13% and +13%
- UIG values during Gas Year 2018/19 would have been suppressed due to the application of ALP uplift factors

UIG comparison Gas Years 2018/19 and 2019/20



- Despite lockdown period where the UIG was negative during Gas Year 2019/20, the average UIG is still higher than average in 2018/19. This is because the UIG was suppressed in 18/19 by the ALP uplift factors which meant the NDM allocation was over estimated, so comparison has differences

Conclusions

- Average UIG has increased since Gas Year 2018/19, moving from a national average (at D+5) of -0.13% to 1.91%, however UIG in Gas Year 2018/19 was suppressed due to application of ALP Uplift Factors
- The shape of the distribution of UIG has not changed too much from the previous Gas Year however appears to have shifted slightly to the right (towards higher positive UIG values) and slightly negatively skewed
- Autumn: The National daily average UIG was 3.58%
LDZ SE had the smallest (absolute) average UIG at 0.17%, LDZ NW had the largest average at 6.99%
- Winter: The National daily average UIG was 3.49%
LDZ SE had the smallest (absolute) average UIG at 1.20%, LDZ NW had the largest average at 6.20%
- Spring: The National daily average UIG was -3.40%
LDZ SE had the smallest (absolute) average UIG at -1.02%, LDZ WN had the largest average at -9.48%
- Summer: The National daily average UIG was 3.89%
LDZ WN had the smallest (absolute) average UIG at -0.33%, LDZ NE had the largest average at 9.47%
- Autumn and Winter are generally evenly distributed around the Median values. The effects of the national 'lockdown' had a noticeable impact on UIG during Spring.

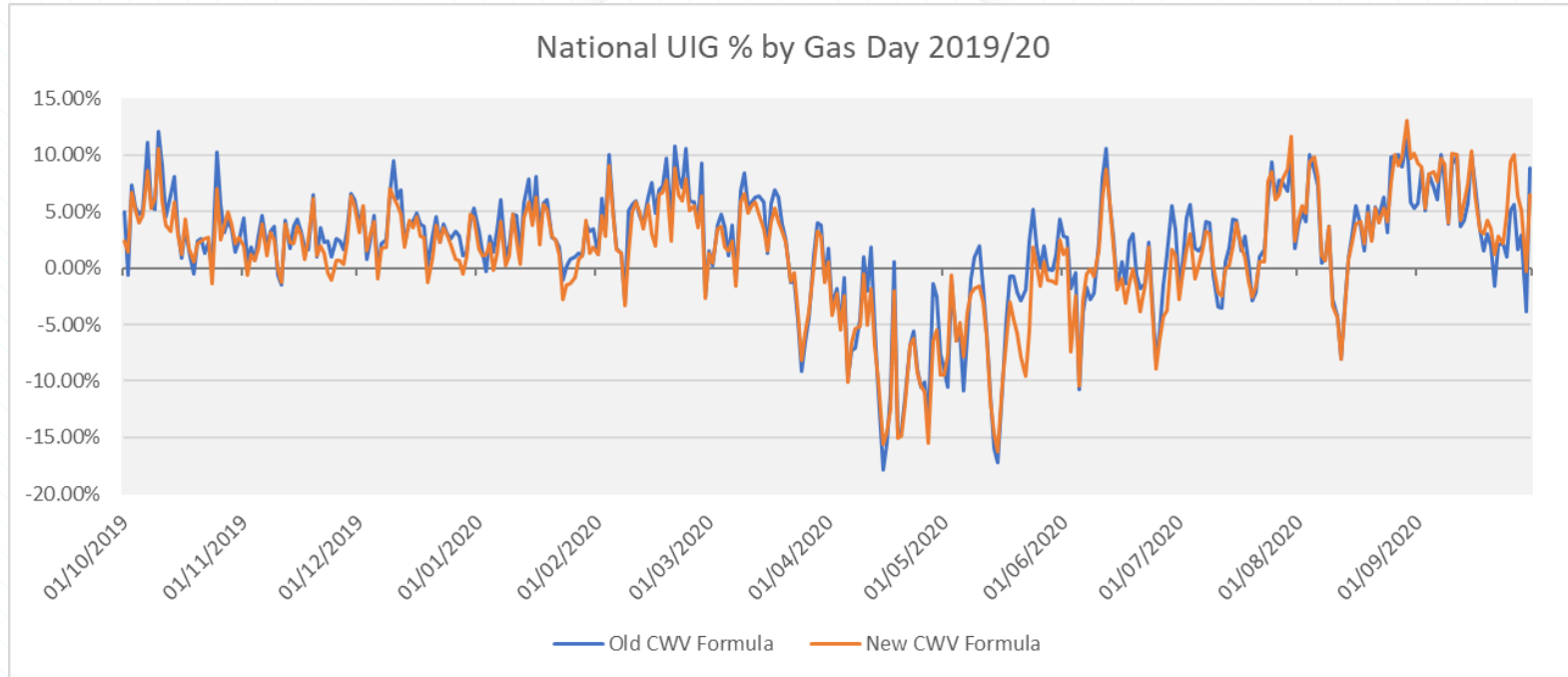


UIG Simulation using New Demand Models and New CWV Formula

Approach

- The following slides present analysis which has been performed to simulate what UIG values would have been during Gas Year 2019/20 using the 2020 EUC Demand Models and the new weather basis i.e. the new Composite Weather Variable (CWV) formula and Seasonal Normal (SNCWV)
- Note: AQ's used to produce simulated UIG values are reflective of the AQ values at the time of original allocation, and were therefore calculated using the old CWV formula (WAALPs)

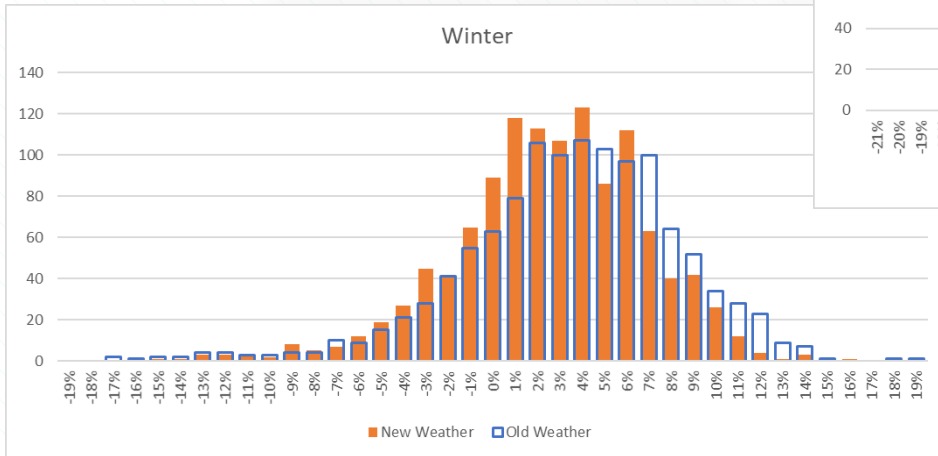
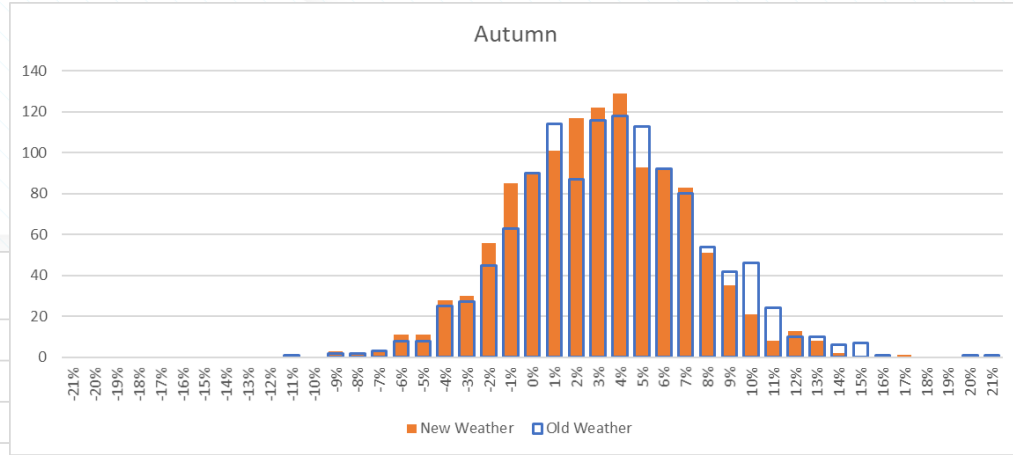
Daily Observed UIG and New CWV Formula UIG Simulation



- A reduction in the negative and positive peaks can be observed using the 2020 Demand Models and New CWV Formula
- The daily national average UIG at D+5 on the new weather basis was 1.31%, down from 1.91% on the old weather basis
- This equates to a reduction in UIG of c.31% which is a very positive outcome and supports DESC's changes to the CWV formula

New CWV Formula Comparison – Autumn and Winter

- Average UIG for Autumn at LDZ level using the new CWV formula and EUC Demand Models was 2.98%, down from 3.62%

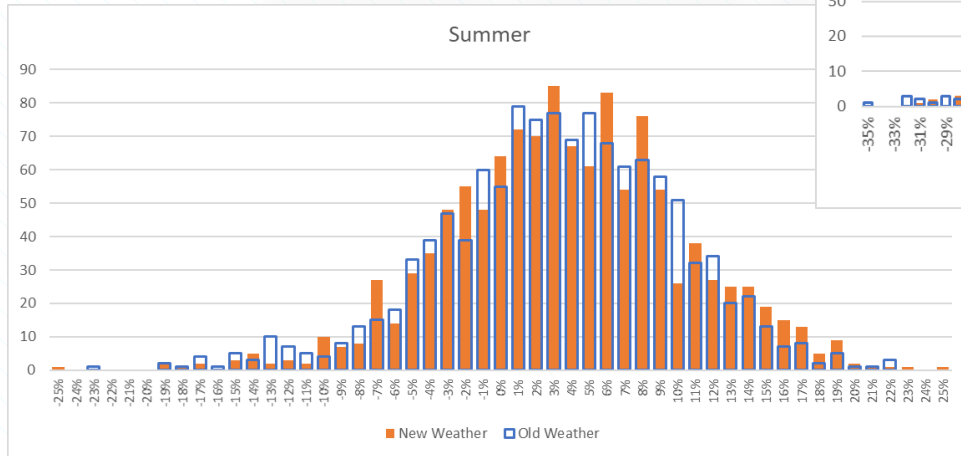
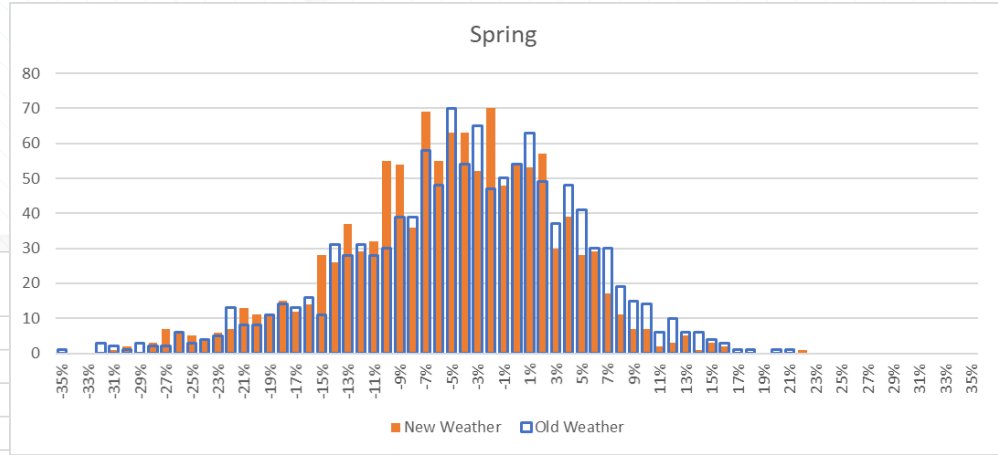


- Average UIG for Winter using the new CWV formula and EUC Demand Models was 2.55%, down from 3.49%

- The improvements in average UIG over the Autumn and Winter period where most UIG volumes are present is encouraging. There has been an 18% reduction in UIG in Autumn, and a 27% reduction in UIG during Winter

New CWV Formula Comparison – Spring and Summer

- Average UIG on the new CWV formula and EUC Demand Models during Spring was -5.18% compared to the observed value of -3.89%



- The average UIG during Summer months using the new CWV formula and EUC Demand Models was 3.70%, slightly up from the observed value of 3.29%

- Potential gains by the introduction of the new CWV formula and EUC Demand Models during Spring and Summer have potentially been subdued by the impacts COVID-19 has had on the accuracy of Allocation

Weather Version Comparison – LDZ Average UIG

LDZ Average UIG - Gas Year 2019/20			
LDZ	Old CWV Formula	New CWV Formula	% Movement
EA	1.03%	0.32%	▲ 68.99%
EM	0.70%	-0.35%	▲ 50.75%
NE	5.63%	5.01%	▲ 11.10%
NO	3.08%	3.00%	▲ 2.38%
NT	0.89%	-0.39%	▲ 56.75%
NW	3.28%	3.38%	▼ -3.12%
SC	2.63%	2.46%	▲ 6.79%
SE	0.69%	-0.58%	▲ 16.31%
SO	0.59%	-0.35%	▲ 40.58%
SW	0.40%	-1.79%	▼ -350.09%*
WM	0.85%	1.37%	▼ -61.05%
WN	-0.70%	-0.62%	▲ 11.95%
WS	2.18%	1.85%	▲ 15.27%

LDZ Average UIG (Autumn & Winter)			
LDZ	Old CWV Formula	New CWV Formula	% Movement
EA	1.89%	1.33%	▲ 29.70%
EM	2.15%	0.93%	▲ 56.87%
NE	5.43%	4.06%	▲ 25.16%
NO	4.77%	4.77%	▬ 0.00%
NT	2.04%	1.74%	▲ 14.41%
NW	6.60%	5.98%	▲ 9.29%
SC	4.84%	3.99%	▲ 17.58%
SE	0.68%	-0.29%	▲ 56.81%
SO	3.37%	2.70%	▲ 19.68%
SW	4.16%	2.34%	▲ 43.73%*
WM	2.68%	2.18%	▲ 18.70%
WN	3.47%	3.08%	▲ 11.38%
WS	4.15%	3.16%	▲ 23.80%

- The tables above show a comparison of LDZ average UIG levels in Gas Year 2019/20 as a whole (left) and only the Autumn and Winter period (right) using both the old and new CWV formula, as well as the percentage movement in the absolute level of UIG
- 10 out of 13 LDZs have seen a reduction in the absolute value of their average UIG when moving to the new CWV formula over the whole Gas Year. 3 LDZs have seen an increase (NW, SW* and WM)
- 12 of 13 of LDZs saw improvements across the Autumn/ Winter (non-COVID period) with LDZ NO remaining the same
- * Note: Bias adjustments were being applied to data in LDZ SW for Gas Year 2019/20 which are not present in the recalculated New CWV Formula history, hence differences seen in the outcome of UIG may be attributed to the change of underlying Weather data (i.e. not a fair 'like for like' comparison)

Weather Version Comparison – Conclusion

- Strand 1 showed that, on the whole, the new weather basis had resulted in a better relationship between Aggregated NDM demand and CWV, despite unsettled conditions during the national Lockdown.
- A reduction in average UIG levels in Autumn and Winter can be observed when simulated using the new CWV formula and 2020 EUC Demand Models.
- 10 out of 13 LDZs witnessed a reduction in absolute average UIG values when taken across the entire Gas Year 2019/20
- The effects of this can be seen in the resultant average National Daily UIG which has reduced from 1.91% to 1.31% when using the new CWV formula and 2020 EUC Demand Models